Policy Backgrounder: Bird Flu Outbreak

H5N1 Spreads to Cattle

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H5N1 bird flu, which the Centers for Disease Control (CDC) describes as "widespread" around the world, including in the US, has been devastating wild and domestic bird populations since 2022. For the first time during this spike in infections, bird flu has transmitted to cattle, with the virus infecting 36 dairy herds in nine states. A Texas dairy worker who caught bird flu in late March from an infected cow marks the second ever reported case of the virus in humans in the US and demonstrates the virus's ability to transmit between mammalian species.

- As of May 8, H5N1 infections have been reported in poultry in 48 states and in 36 dairy herds in nine states. While the US Department of Agriculture (USDA) first reported the virus on March 25, a recent analysis of genomic data by USDA's Animal Disease Center revealed that the highly pathogenic H5N1 virus was likely circulating in dairy cows for four months before it was identified.
- According to the CDC, the risk of general transmission of the virus to the public remains low; however, the agency anticipates additional sporadic human infections because of the potential for influenza viruses to evolve rapidly and the wide global prevalence of H5N1 viruses.
- Federal health officials have already begun efforts to develop a vaccine to protect people in the case that the H5N1 virus mutates significantly enough to permit easy human-to-human transmission. As of now, the US stockpile includes two vaccines made from older, similar strains of the virus, but experts are concerned about the whether those vaccines would remain effective against the strain currently circulating in the US.

Bird Flu Transmits to Cattle

During bird flu outbreaks, farmers report the incident to the USDA, and USDA officials visit the farm to cull the entire flock. For chicken farmers, that means "hundreds of thousands of them that were laying multiple eggs are now not," said Andrew Stevens, an agricultural economist at the University of Wisconsin. As of May 7, nearly 91 million poultry have been affected, one of several factors that have led to an increase in the price of eggs in 2024. A dozen large grade A eggs currently cost an average of $2.99, up from $2.52 in January. However, the outbreak is not the only factor contributing to this increase; egg consumption has also risen because more families are eating eggs as a principal protein source.

On March 25, USDA reported a multi-state outbreak of Highly Pathogenic Avian Influenza (HPAI) A(H5N1) virus in dairy cows, marking the first known time that a bird flu virus has transmitted to cattle. Unpasteurized, clinical samples of milk from sick cattle collected from two dairy farms in Kansas and one in Texas tested positive for bird flu. Deceased wild birds were found on the properties, making it probable that wild migratory birds are the source of infection. As of May 2, H5N1 has infected 36 dairy herds across nine states as well as a Texas farmworker, marking the second reported case of bird flu virus in humans reported in the US (CDC believes the other case, from 2022, resulted from poultry exposure).

A USDA study published as a preprint ahead of peer review found evidence that infected cattle passed the virus to domestic poultry flocks "through multiple transmission routes." The widespread nature of the outbreak suggests efficient transmission among cattle. Other USDA scientists recorded that the virus sequenced from the infected Texas dairy worker had key differences from cow genomes; it is unclear whether this resulted from missing samples from the cows with which the worker had contact or from the mutation of the virus as it moved from host to host.

Researchers also found that the outbreak infected a raccoon as well as cats who lived among the cows on dairy farms. A separate study published last week suggests that the infected cats died from drinking raw milk containing high levels of the virus. It is not uncommon for dairies to dump discarded milk into manure pits or lagoons, which "could definitely serve as a source of infection to other susceptible species," according to Dr. Diego Diel, a virologist at Cornell.

Late Detection and Unreported Cases

A recent analysis of genomic data by USDA's Animal Disease Center revealed that the highly pathogenic H5N1 virus was likely circulating in dairy cows for four months before it came to the attention of scientists and government regulators. Tests of milk from retail stores have shown remnants of the virus in approximately one in five samples using quantitative polymerase chain reaction (qPCR), according to an April 25 analysis by the FDA. The high prevalence of the virus suggests that infection in cows from the virus has become more widespread than originally assumed. However, a positive qPCR result does not necessarily represent actual infectious virus that may be a concern to consumers. On May 1, the FDA assured consumers that the commercial milk supply is safe; however, it strongly advises against the consumption of raw dairy products.

Experts note that early detection is essential in preventing viral events that can lead to human pandemics. According to Dr. Michael Worobey, head of the Department of Ecology and Evolutionary Biology at the University of Arizona, metagenomic sequencing should have been used once the cows were noticeably sick. Rather than testing for specific viruses and bacteria, the technique would read all the genetic material in a sample that uses computers to identify relevant findings. "If that had been done, that would have revealed H5N1 in January and even beyond that," said Worobey. "We have to get out of the mindset of waiting for that tip of the iceberg of sick animals or sick humans to be noticed." Instead, Worobey said, animals need to be routinely tested with "modern techniques" for identifying emerging pathogens.

The Texas dairy worker who contracted bird flu from contact with cows in late March developed a severe case of pinkeye but none of the symptoms typically associated with influenza viruses, such as fever or upper respiratory discomfort. Swabs of the worker's eye and nose revealed the H5N1 infection, marking the first known instance of bird flu spreading from cows to humans. He was given the antiviral Tamiflu and told to isolate as he recovered. The CDC reported last week that over 100 people have been asked to monitor themselves for symptoms for 10 days after coming into contact with an infected animal.

So far, no one else has tested positive for the virus, but experts suspect that cases are going undetected because dairy farmers worry that they would lose their cattle if they report a positive test. Even though most infected cows do not die from the virus, it is "because cows infected with H5N1 generally don't die of the flu, they are 'effective mixing vessels' in which viruses can swap genetic material with other viruses [.]If you have a virus that's hopscotching back and forth between cows, humans and birds, that virus is going to have selective pressures to grow efficiently in all those species," according to Angela Rasmussen, a virologist at the University of Saskatchewan. "The biggest concern that we hear our dairy farmers say is, 'I don't want to test because they are going to depopulate my herd,'" said Dr. Keith Poulsen director of the Wisconsin Veterinary Diagnostic Laboratory. Further, dairy workers who are sick may opt out of testing out of fear of missing work. "The people tested volunteered to be tested," said Lara Anton, senior press officer with the Texas Department of State Health Services. "It's likely there were

other people with symptoms who did not want to be tested so we cannot say with absolute certainty that no one else contracted H5N1 [.]".

H5N1 Has "Pandemic Potential"

Details of the Texas dairy worker's case were published last Friday in the *New England Journal of Medicine*; the report's authors noted that H5N1 viruses "pose pandemic potential and have caused severe respiratory disease in infected humans worldwide." The authors also noted that "rapid implementation of preventative measures is recommended to reduce human exposure to any infected animals and environments contaminated by them." The report noted that while it is likely the dairy worker became infected by rubbing his eyes with a glove that had been contaminated, it could not be ruled out whether he became infected through respiratory droplets. The CDC recommends that workers in contact with dairy cattle wear personal protective equipment (PPE) consisting of a respirator, water-resistant coveralls and boots, head cover, and safety goggles.

Since 1997, a total of 909 sporadic human A(H5N1) cases have been reported across 23 countries with a cumulative fatality rate of over 50%. Since 2022, nearly all human cases reported globally were associated with exposures to poultry. Now, the case of the Texas dairy worker shows the virus's ability to transmit between mammals. According to the CDC, the current risk to the public from H5N1 remains low because of the virus's perceived inability to bind to receptors that predominate in the human upper respiratory tract. CDC also reported, however, that "because of the potential for influenza viruses to rapidly evolve and the wide global prevalence of HPAI A(H5N1) viruses in wild birds and poultry outbreaks and following the identification and spread among dairy cattle in the United States, additional sporadic human infections are anticipated [.]"

Federal health officials are already working to develop a vaccine to protect people in case that the H5N1 virus mutates significantly enough to permit easy human-to-human transmission. "We've got some preparedness pieces in place that will get us a head start should we need a large-scale vaccination campaign in a pandemic situation," said Dawn O'Connell, Assistant Secretary for Preparedness and Response at the Department of Health and Human Services. The US vaccine stockpile includes two vaccines made from older, similar strains of the virus that testing indicates could potentially offer some protection for people in the event of an outbreak of the current strain.

However, some experts are unconvinced that these vaccines would be effective, as the virus would have likely changed if it becomes a real threat to people, according to Michael Osterholm, Director of the Center for Infectious Disease Research and Policy at the University of Minnesota. Others worry about the government's ability to respond quickly enough. Most flu vaccines are produced using technology that relies on growing virus in eggs, which may take months to manufacture enough to cover the population. "We still seem to be stuck in reactive mode. We shouldn't be waiting for evidence that the virus is devastating us. We should be trying to act now to prevent the virus from devastating us," said Jennifer Nuzzo, Director of Brown University's Pandemic Center.

Conclusion

The multi-state outbreak of bird flu among dairy cows demonstrates the ability of the H5N1 virus to spread quickly and undetected among mammals. According to CDC, the current risk to the public from H5N1 remains low, but government officials are on high alert for mutations that would give the virus the ability to spread more easily between human hosts. This reinforces a principal lesson of the COVID-19 pandemic: the importance of preparedness to mitigate the dire public health and economic effects of future pandemics.

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