

How researchers are helping predict the outbreak of bird flu on US dairy farms

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Less than a year ago, the Centers for Disease Control and Prevention funded a disease prediction center at Northeastern University called EPISTORM: The Center for Advanced Epidemic Analytics and

Predictive Modeling Technology.

Considered a "National Weather Service for epidemic threats," the center was designed to help detect and prepare the United States for the next outbreak of infectious disease, especially in rural areas.

Now, EPISTORM researchers find themselves on the front lines of the [bird flu](#) outbreak.

Also known as H5N1, bird flu has been detected in 169 livestock herds on [dairy farms](#) in 13 states since March 25, according to the U.S. Department of Agriculture.

The spread to cows is of particular concern to scientists, who say any extension to [mammal species](#) creates more opportunities for the respiratory virus to evolve into a strain more dangerous to people.

To help mitigate the outbreak, EPISTORM researchers have produced risk maps highlighting potential hot spots on farms based on the cows' travel across state lines, says Alessandro Vespignani, director of Northeastern's Network Science Institute, Sternberg Family Distinguished Professor and head of EPISTORM.

"We correctly identified" the potential for outbreaks in Colorado, Minnesota, Iowa, Wyoming and Oklahoma, Vespignani says.

The USDA has required testing of dairy cows moved between states since late April, a few weeks after the CDC reported a human infection linked to dairy cattle in Texas—which is believed to be the first cow-to-human transmission of H5N1.

The federal health agency says that as of July 3, four people have been infected with bird flu after contact with sick dairy cows, while published

reports say seven poultry farm workers in Colorado have contracted H5N1 just this month.

The CDC says from 1997 through late April 2024, 909 people across the globe were reported to have H5N1, 52% of whom died. Since 2022, seven people have succumbed after contracting bird flu.

Severity profile: Unknown

"The current viruses lack some of the changes observed in prior bird flu viruses," Vespignani says. "We have to be very careful crying wolf too much because we don't want to continually say we are on the verge of a new pandemic.

"We need to be honest and say we don't know. We don't know what the severity profile of the disease will be," he says.

Vespignani also called for continued testing in farm workers and their families to monitor the potential asymptomatic spread of H5N1.

"The more human cases we have, the higher the risk that the virus will pick up the mutation that will make it more adapted to humans and human-to-human transmission," Vespignani says.

The infections reported this month in Colorado are the largest bird flu outbreak to date.

Bird flu, also known as highly pathogenic avian influenza, has affected more than 100 million poultry birds in the U.S. since January 2022. The first human case of H5N1 in the U.S. was reported three months later in a person in Colorado who had been culling infected birds, the CDC says.

"Even if this doesn't trigger a human pandemic, it is in the interest of

everybody to understand what is going on in farms," where the virus is causing economic harm through the culling of flocks, Vespignani says.

"That's why the epidemic experts community is monitoring (the virus) very carefully," he says.

Human cases of H5N1 in the U.S. have been mild so far, with pink eye or conjunctivitis being a major complaint associated with the [respiratory virus](#). No hospitalizations have been reported.

More testing is needed

"We aren't doing enough testing," says Sam Scarpino, director of AI + Life Sciences at the Institute for Experiential AI at Northeastern and a member of the EPISTORM innovation center, which is supporting public stakeholders in detecting and preparing the U.S. for the next outbreak of disease.

"We just have no idea" how many people have been potentially infected by the virus in the past months, Scarpino says.

Public health officials most likely missed some bird flu cases in humans, Scarpino says, adding that he guesses the number could range from 50 to 100.

"We know we haven't missed thousands because we would see them in the emergency department," he says.

Active surveillance of wastewater by the CDC and private companies such as WW Scan does not indicate spikes in any type of influenza, including bird flu, Scarpino says.

Mammals can be infected with H5N1 if they are exposed to

environments contaminated with the virus or if they eat infected birds. Most cows recover with supportive treatment, but avian flu is associated with high mortality in birds, according to the American Veterinary Medical Association.

Follow the evolution of the virus

Scarpino and Vespignani said they'd like to see increased blood testing and group or pool testing of [farm workers](#), their families and co-workers.

"We need to know the landscape of transmission," Vespignani says. "We need to follow the evolution of the virus. It's in the interest of everybody to understand what's going on, what is the level of spreading on the farms."

"We know that so far it has been mostly in [dairy cattle](#). It will be important to understand if there is spillover in meat cattle," he says.

"The way we prevent larger outbreaks is by monitoring, carefully isolating people as soon as they get the infection from animals, limiting the number of human cases as much as we can," Vespignani says. He says he's not worried about the food chain as long as people drink pasteurized instead of raw milk.

Farm workers, especially those working around sick animals, can help avoid contracting H5N1 by wearing personal protective equipment, Vespignani says.

[Published reports](#) say workers at the egg farm in Colorado where the latest outbreak among humans occurred might not have been wearing heavy and cumbersome PPE due to temperatures in the 100° range.

"If a farm worker dies, it's going to be a preventable death and tragically unnecessary," Scarpino says.

Tests for the public?

The CDC says federal officials are meeting with commercial labs about the possibility of making commercial H5N1 testing available.

"Ten of those licenses are currently in place, and several more are in progress," the [CDC says](#).

"Testing is the way we get information in public health," Vespignani says. "It is crucial that we have situational awareness."

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