Mega-Farms Are Driving the Threat of Bird Flu

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A handful of dairy farms sprawl across the valley floor, ringed by the spikey, copper-colored San Jacinto mountains. This is the very edge of California's dairy country—and so far, the cows here are safe.

But everyone worries that the potentially lethal bird flu is on the way. "I hope not," says Clemente Jimenez, as he fixes a hose at Pastime Lakes, a 1,500-head dairy farm. "It's a lot of trouble."

Further north and west, in the San Joaquin Valley—the heart of the state's dairy industry—the H5N1 virus, commonly known as bird flu, has rippled through the massive herds that provide most of the country's milk. Farmworkers have piled carcasses into black and white heaps. This week the state reported 19 new confirmed cases in cows and more than 240,000 in chickens. Another 50,000 cases were confirmed at a chicken breeding facility in Oklahoma.

Most worrying, though, is the spillover from livestock to humans. So far, 58 people in the United States have tested positive for bird flu. Fifty-six of them worked either on dairy or poultry farms where millions of birds had to be culled.

The Centers for Disease Control and Prevention confirmed that four of the cases in humans had no known connection to livestock, raising fears that the virus eventually could jump from one human to another, though that hasn't happened yet. On December 5, a study published in Science by researchers at The Scripps Research Institute said it would take only a single mutation in the H5N1 virus for it to attach itself to human receptor cells.

Large livestock facilities in states across the country, and especially in California, have become the epicenters of these cases, and some researchers say that's no surprise: Putting thousands, even hundreds of thousands, of animals together in confined, cramped barns or corrals creates a petri dish for viruses to spread, especially between genetically similar and often stressed animals.

More drought and higher temperatures, fueled by climate change, supercharge those conditions.

"Animal production acts like a connectivity for the virus," said Paula Ribeiro Prist, a conservation scientist with the EcoHealth Alliance, a not-for-profit group that focuses on research into pandemics. "If you have a lot of cattle being produced in more places, you have a higher chance of the virus spreading. When you have heat stress, they're more vulnerable."

So far, this bird flu outbreak has affected more than 112 million chickens, turkeys, and other poultry across the US since it was first detected at a turkey-producing facility in Indiana in February 2022. In March of this year, officials confirmed a case of the virus in a Texas dairy cow—the first evidence that the virus had jumped from one livestock species to another. Since then, 720 cows have been affected, most of them in California, where there have been nearly 500 recorded cases.

In the United States, a trend of consolidation in agriculture, particularly dairies, has seen more animals housed together on ever-larger farms as the number of small farms has rapidly shrunk. In 1987, half of the country's dairy cows were in herds of 80 or more, and half in herds of 80 or fewer. Twenty years later, half the country's cows were raised in herds of 1,300 or more. Today, 5,000-head dairies are common, especially in the arid West.

California had just over 21,000 dairy farms in 1950, producing 5.6 billion pounds of milk. Today, it has 1,100 producing around 41 billion pounds. Total US milk production has soared from about 116 billion pounds in 1950 to about 226 billion today.

"The pace of consolidation in dairy far exceeds the pace of consolidation seen in most of US agriculture," a recent report by the US Department of Agriculture (USDA) said.

Initially, researchers thought the virus was spreading through cows' respiration, but recent research suggests it's being transmitted through milking equipment and milk itself.

“It’s been the same strain in dairy cows … We don’t necessarily have multiple events of spillover,” said Meghan Davis, an associate professor of environmental health and engineering at Johns Hopkins Bloomberg School of Public Health. “Now it’s transmission from one cow to the next, often through milking equipment.”

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It’s still unclear what caused that initial jump from wild birds, which are the natural reservoirs of the virus, to commercial poultry flocks and then to cows, but some research suggests that changing migration patterns caused by warmer weather are creating conditions conducive to the spreading of viruses. Some wild birds are migrating earlier than usual, hatching juvenile birds in new or different habitats.

“This is leading to a higher number of young that are naive to the virus,” Prist explained. “This makes the young birds more infectious—they have a higher chance of transmitting the virus because they don’t have antibodies protecting them.

“They’re going to different areas and they’re staying longer,” Prist added, “so they have higher contact with other animals, to the other native populations, that they have never had contact [with] before.”

That, researchers believe, could have initiated the spillover from wild birds to poultry, where it has become especially virulent. In wild birds, the virus tends to be a low pathogenic strain that occurs naturally, causing only minor symptoms in some birds.

“But when we introduce the virus to poultry operations where birds live in unsanitary and highly confined conditions, the virus is … able to spread through them like wildfire,” said Ben Rankin, a legal expert with the Center for Biological Diversity, an advocacy group. “There are so many more opportunities for the virus to mutate, to adapt to new kinds of hosts and eventually, the virus spills back into the wild and this creates this cycle, or this loop, of intensification and increasing pathogenicity.”

Rankin pointed to an analysis that looked at 39 different viral outbreaks in birds from 1959 to 2015, where a low pathogenic avian influenza became a highly pathogenic one. Out of those, 37 were associated with commercial poultry operations. “So it’s a very clear relationship between the increasing pathogenicity of this virus and its relationship with industrial animal raising,” Rankin said.

Some researchers worry that large farms with multiple species are providing the optimal conditions for more species-to-species transfer. In North Carolina, the second-largest hog-producing state after Iowa, some farmers have started raising both chicken and hogs under

contracts that require huge numbers of animals.

“So you’ve got co-location at a pretty substantial scale of herd size, on a single property,” said Chris Heaney, an associate professor of environmental health, engineering, epidemiology, and international health at the Bloomberg School of Public Health. “Another concern is seeing it jump into swine. That host, in particular, is uniquely well suited for those influenza viruses to reassort and acquire properties that are very beneficial for taking up residence in humans.”

In late October, the USDA reported the first case of bird flu in a pig that lived on a small poultry and hog farm in Oregon.

Farmworker advocates say the number of cases in humans is likely underreported, largely because the immigrant and non-English speaking workforce on farms could be reluctant to seek help or may not be informed about taking precautions.

“What we’re dealing with is the lack of information from the top to the workers,” said Ana Schultz, a director with Project Protect Food Systems Workers.

In northern Colorado, home to dozens of large dairies, Schultz started to ask dairy workers in May if they were getting protective gear and whether anyone was falling ill. Many workers told her they were feeling fluish, but didn’t go to the doctor for fear of losing a day of work or getting fired.

“I feel like there’s a lot more avian flu incidents, but no one knows about it because they don’t go to the doctor and they don’t get tested,” Schultz said. “In all the months that we’ve been doing outreach and taking protective gear and flyers, we haven’t had one single person tell us they’ve been to the doctor.”