Bird flu virus detected in pigs for the first time in US

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The US Department of Agriculture reported on Wednesday detection of the H5N1 bird flu virus in a pig from a farm located in Crook County in central Oregon. This is the first case of a pig in the US infected with the current strain of the virus. Although the sequence of the virus causing this outbreak has not been shared with the public, Oregon's Department of Agriculture (ODA) informed the media that it was not associated with the strain detected among dairy cattle.

The animal was euthanized, and an autopsy of the tissue revealed the virus was present throughout the body, according to state veterinarian Ryan Scholz. In all, five pigs and 70 chickens, ducks, and geese on the farm were culled as a precaution to prevent further spread of the highly contagious virus. The property is presently under quarantine while surveillance is under way. Authorities believe exposure to infected waterfowl was the cause of the outbreak.

Poultry and pigs had been housed together. Experts speaking at a press briefing Wednesday raised concerns in particular about the appearance of the virus in pigs, as these animals are susceptible to viruses from both birds and humans. This means the viruses can intermingle with each other and lead to mutations, producing a hybrid virus through a process called reassortment of their genetic makeup. Dr. Dean Sidelinger, an Oregon epidemiologist, admitted, "We do worry about changes in this virus," but then quickly downplayed the danger, saying, "The risk to the public remains low."

However, scientists speaking with *STAT News*, who are waiting for more details on the investigation, were not as reassured. Dr. Florian Krammer, a flu virologist at Mount Sinai's Icahn School of Medicine, said, "If it doesn't spread from pigs to pigs and it just happened on that one farm, it's not a big deal." However, he cautioned, "If it starts to spread from pigs to pigs, then it's much more of a problem. If it ends up in large pig populations in the U.S., similar to cows, I think this would be a disaster."

The current outbreak of the H5N1 bird flu virus among dairy cattle was first detected in March of this year and has spread to 14 states across 404 dairy cattle herds. Colorado had been the epicenter of the outbreak this summer. But this has shifted to California where 202 cattle herds have been affected, 158 just in the last 30 days.

Human cases of H5N1 in total have reached 39 thus far. Twenty of these infections have occurred among cattle handlers, with 16 workers in California infected. Among workers handling poultry, 18 have so far been found with the virus, nine of which were in Colorado. The Centers for Disease Control and Prevention (CDC) has only tested about 300 people and has monitored over 6,100 people.

The origin of an H5N1 case in Missouri remains unknown, a troubling indication of potential human-to-human transmission of the virus. Together with the continuously rising numbers of infections among livestock and their human handlers, concerns of a novel H5N1 bird flu pandemic among human populations begin to loom larger.

The addition of pigs to the mix raises even further the specter of the development of a potential pandemic pathogen. Dr. Thomas Peacock, an expert in influenza viruses at Pirbright Institute in Britain, remarked, "Pigs are absolutely full of influenza viruses that in the past were human seasonal influenza viruses or human pandemic influenza viruses. So, they have a really, really rich genetic material in them. This is the whole idea that pigs are a mixing vessel ??in that they are a place where avian and human influenza viruses could potentially mix."

CDC's *Emerging Infectious Diseases* journal published in April 2024 raised such concerns about the emergence of the H5N1 bird flu among swine, warning, "If an avian IAV [Influenza A Virus] strain, such as H5Nx 2.3.4.4b,

successfully infected domestic swine, pig-to-pig transmission, reassortment with endemic swine IAV, or acquisition of adaptive mutations that might enable an avian-to-mammalian switch could potentially occur (1). Continued circulation in the wild bird population and peridomestic wild mammal infections elevate the risk for exposure of swine because of the current outbreak's wide distribution in states with large pig populations."

Dr. Richard Webby, flu virologist and director of the World Health Organization's Collaborating Center for Studies on the Ecology of Influenza in Animals, told STAT News that although pigs infected with H5N1 do not easily spread the virus, the fact that the current strains of H5N1 are able to more readily infect pigs than previous strains would "ratchet up the risk substantially from where we are."

Furthermore, speaking with *Scientific American*, Webby theorized that the development of a pandemic virus would require more than a reassortment of the circulating strains. "It's going to take reassortment, followed by some critical mutations in [one specific] gene." What Webby means is that such a mutation may allow the virus not just to infect the conjunctiva of the eyes, as seen among the currently infected animal workers, but adapt itself to the respiratory tract and transmit via airborne aerosols.

He added, "[The] hurdles are high that this virus has to overcome to become a human virus. But anything that gives it more opportunity to do so is obviously a concern—whether that's just more human infections from farm animals or that potential of reassorting with a human seasonal virus. All of those things would increase the risk."

Although the current infections among farm workers with the bird flu virus have not led to serious illness, recent laboratory experiments with isolates of these strains in animal models have led to alarming results.

One study that was published this week in the journal *Nature* by Dr. Yoshihiro Kawaoka and colleagues from Wisconsin, showed that the bird flu virus isolated from the eye of an infected Texas animal handler proved to spread efficiently in human respiratory cells and was lethal in mice and ferrets. They also showed the virus, without any prior adaptation, spread via aerosol to other animals, proving lethal for them as well. The researchers warned, "Based on these observations, every effort should be made to contain HPAI H5N1 [bird flu virus] outbreaks in dairy cattle to limit the possibility of further human infections."

In another recently published study by CDC investigators using ferrets as an animal model for evaluating the bird flu virus' pathogenicity, the researchers wrote:

> In this study, we employed the ferret model, a well-characterized species that permits concurrent investigation of viral pathogenicity and transmissibility in the evaluation of A/Texas/37/2024 (TX/37) A(H5N1) virus isolated from a dairy farm worker in Texas.
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> Here, we show that the virus has a remarkable ability for robust systemic infection in ferrets, leading to high levels of virus shedding and spread to naïve contacts. Ferrets inoculated with TX/37 rapidly exhibited a severe and fatal infection, characterized by viremia and extrapulmonary spread. The virus efficiently transmitted in a direct contact setting and was capable of indirect transmission via fomites. Airborne transmission was corroborated by the detection of infectious virus shed into the air by infected animals, albeit at lower levels compared to the highly transmissible human seasonal and swine-origin H1 subtype strains.
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> Our results show that despite maintaining an avian-like receptor binding specificity, TX/37 displays heightened virulence, transmissibility, and airborne shedding relative to other clade 2.3.4.4b virus isolated prior to the 2024 cattle outbreaks, underscoring the need for continued public health vigilance.

These alarming developments need to be widely discussed and shared with agricultural workers and more generally. Public health should not be relegated to scientific conferences and publications in journals, while left on the fringes of news reporting. These results require action on the parts of local and federal governments to prevent the development of the next pandemic. A wait-and-see approach is foolish and carries potentially lethal global consequences.