Study: Indirect transmission can trigger influenza outbreaks in birds

June 2 2009

New data on the persistence of avian influenza viruses in the environment has allowed a team of University of Georgia researchers to create the first model that takes into account both direct and indirect transmission of the viruses among birds. The model, which is detailed in the early online edition of the journal *Proceedings of the National Academy of Sciences,* has the potential to shed new light on how outbreaks begin in wild bird populations.

"The environmental transmission of avian influenza among birds is quite rare, but our model shows that it can play an important role in outbreaks," said lead author Pejman Rohani, professor in the UGA Odum School of Ecology. "There are situations where ignoring the possibility of environmental transmission would cause you to significantly underestimate the probability, magnitude and duration of an outbreak."

Rohani explained that current models of avian influenza only take into account the direct transmission of the virus that occurs when infected waterfowl and shorebirds shed the virus in their feces and those nearby drink contaminated water. But research in the UGA College of Veterinary Medicine has revealed that some avian influenza viruses can persist in water for up to 150 days. So even when no infected birds are present, Rohani said, virus present in the water can trigger an outbreak. Models that only take into account direct transmission, he pointed out, would incorrectly conclude that there's no risk of an outbreak when no infected birds are present.

The viruses the researchers studied are known as low-pathogenicity viruses and do not infect humans. Low-path viruses only cause mild symptoms in birds but have the potential to swap genes and give rise to high pathogenicity viruses that can cause massive die-offs in poultry and—in rare cases—can infect humans. The H5N1 avian influenza virus, for example, has a 60 percent mortality rate in humans and is responsible for 262 deaths worldwide since 2003, according to the World Health Organization.

"We need to understand low-path viruses because they are a storehouse of genetic variation that can give rise to new and potentially dangerous strains," said study co-author John Drake, assistant professor of ecology.

In addition to the environmental persistence of the virus, the team's model takes into account variables such as lake size and the rate at which infected birds recover to describe likely and worse case outbreak scenarios. The model also reveals that environmental transmission extends the duration of an outbreak by infecting birds that haven't come into contact with other birds yet have consumed contaminated water.

The data on the environmental persistence of avian influenza viruses comes from the lab of David Stallknecht, associate professor in the department of population health in the UGA College of Veterinary Medicine. In a study recently published in the journal Veterinary Microbiology, Stallknecht and lead author Justin Brown determined the persistence of 12 low-path avian influenza viruses under natural ranges of pH, salinity and temperature.

The researchers found that the duration of persistence varied widely among viruses, but that the viruses generally are most stable at a slightly basic pH, temperatures of less than 63 degrees Fahrenheit (17 degrees Celsius) and in fresh to slightly brackish water.

"The role of the environment in the transmission of avian influenza has been almost completely undefined, and that's what makes this research so exciting," said Brown, a post-doctoral researcher. "Migration and other factors relating to the biology of the avian host are still very important factors that drive the epidemiology of avian influenza, but now we can look at various environments and ask if they're better or worse for the transmission of avian influenza."

Source: University of Georgia (news : web)

Citation: Study: Indirect transmission can trigger influenza outbreaks in birds (2009, June 2) retrieved 18 April 2024 from
https://phys.org/news/2009-06-indirect-transmission-trigger-influenza-outbreaks.html