

New research reveals genetic reason that some chickens are resistant to bird flu

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A cock and a hen roosting together. Image: Wikimedia Commons.

The genes of some chickens make them almost completely resistant to a serious strain of bird flu, new research has revealed.

The findings, which are published in the journal *Scientific Reports*, show that genetics play a key part in whether the birds are susceptible or resistant to the potentially deadly [virus](#). Until now, scientists around the world have paid little attention to the role the genetics of birds play in the transmission of [flu](#), focusing instead on how the virus itself evolves and infects.

Led by Dr Colin Butter from the School of Life Sciences at the University of Lincoln, UK, this new research, which was carried out at The Pirbright Institute, could prove valuable in developing our understanding of the mechanisms of influenza transmission within and between birds. Dr Butter is one of the UK's leading authorities on avian flu with expertise in animal science, virology and immunology.

Influenza virus is the cause of influenza, or 'flu' –

the contagious respiratory viral disease common in many birds and mammals. The viruses circulating in wild birds and domesticated poultry are of particular interest to scientists because they may mutate into forms that are capable of infecting humans, and represent an emerging threat to human health as potential sources of the next [flu pandemic](#).

This danger has led the World Health Organisation to highlight effective control measures, as well as an in-depth assessment of factors surrounding the infection of host animals, as part of their research priorities. Dr Butter's study takes an important step towards meeting these needs.

Dr Butter, Reader in Bioveterinary Science at the University of Lincoln, said: "It is important for us to understand how different genetic lines of bird react to influenza viruses, so that we can begin to understand the spread of the disease. Until now we knew relatively little about how a bird's genetics can affect its reaction to flu virus but this new research, which for the first time shows that some poultry lines are genetically resistant to avian flu, represents a significant step forwards.

"Our results are valuable in emphasising the important role a 'host' plays in the spread of avian flu, and also in highlighting a number of factors relating to the chain of infection and control mechanisms which are affected by the route of infection."

The research team, based at The Pirbright Institute (an international research centre working to improve the health of farm animals worldwide), also included specialists from the University of Oxford and The Francis Crick Institute in London and was funded by the Biotechnology and Biological Sciences Research Council (BBSRC). The researchers examined two different lines of chickens to determine whether genetics played a part in the susceptibility or resistance to infection.

They found that birds that carried the virus but were genetically resistant to the disease only shed the virus through their respiratory tract and for a limited period of time, whereas birds which were susceptible to the disease also shed virus in faeces and over a longer time. The researchers discovered that this was the only relevant means of spreading the virus and that resistant birds were therefore completely unable to initiate or sustain a chain of infection. Further results in the study suggest that this could be due to a genetic restriction within the animal which stops the virus spreading when inside the body.

Professor Venugopal Nair, the Head of the Avian Viral Diseases programme at The Pirbright Institute, said: "The findings of this study emphasise the importance of examining the intricate nature of the virus-host interactions and the potential role of the host genetic factors influencing the transmission dynamics and outcomes of important diseases such as [avian flu](#)."

These findings now lead the way for further investigation and work is being planned to discover and examine the precise biological mechanisms behind genetic resistance. This could have major implications for poultry breeding, as well as human flu treatments, in the future.

Dr Butter added: "The prospect of breeding [birds](#) with natural immunity to [influenza virus](#) would certainly widen the scope of existing [control measures](#) and perhaps limit the risk to the human population of the emergence of pandemic viruses. Furthermore, as human genetic determinants for catching flu are comparatively unknown, research such as ours which is developing a better understanding of the genes and mechanisms involved could also lead to improved therapeutic options in humans."

More information: Raul Ruiz-Hernandez et al. Host genetics determine susceptibility to avian influenza infection and transmission dynamics, *Scientific Reports* (2016). [DOI: 10.1038/srep26787](https://doi.org/10.1038/srep26787)

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