

'Leaky vaccines' play important part in farm chicken disease management

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Vaccines that do not prevent onward transmission or infection are more effective than previously thought in controlling the severity of a viral disease in chickens.

So-called leaky vaccines were found to not only reduce the likelihood of chickens developing the painful symptoms of Marek's [disease](#), but this benefit also extended to unvaccinated chickens in the same flock, researchers said.

Chickens infected with Marek's disease virus can develop tumours in various parts of the body, eye cancer, and wing and leg paralysis, eventually leading to death.

Marek's disease has implications for [animal welfare](#) and the food production industry. It can lead to a reduction in egg laying and meat being deemed unfit for human consumption.

Virus transmission

The virus is spread through inhalation of what is known as '[chicken](#) dust' - a mixture of bird feed, bedding material, bird droppings, feathers and dead skin. It is estimated to cause the poultry industry \$1 billion a year.

Leaky vaccines are the most commonly used method of controlling Marek's disease. However, little was known about how these vaccines impact on overall populations, especially in unvaccinated chickens.

Researchers at the University of Edinburgh's Roslin Institute, in collaboration with researchers from the U.S. Department of Agriculture's Avian Disease and Oncology laboratory (ADOL), conducted a study to test the impact of vaccination on Marek's disease transmission.

One group of chickens received a leaky [vaccine](#), which contained a related live virus originating from turkeys, which causes an immune response, but not symptoms.

A second, control, group received a sham vaccine, which contained no biological material, but replicated the act of vaccination. Both groups of birds were then infected with the disease-causing Marek's disease virus.

Impact of vaccination

Groups of these infected birds—either all vaccinated or all sham-vaccinated—were then each placed with different sets of unvaccinated chickens for 48 hours, at 13 days and then again at 20 days after exposure to Marek's disease. Researchers then observed how the Marek's disease virus was transmitted.

It was found that there was little difference in transmission of the Marek's disease virus to unvaccinated chickens within the two groups, with more than 97 percent of birds becoming infected.

However, the unvaccinated chickens that had contact with those who had received the leaky vaccine were less likely develop full-blown Marek's disease and there were fewer deaths. This was found to be because vaccinated birds transmitted fewer copies of Marek's disease virus.

"In our study, we found that leaky vaccines can provide benefit in terms of reducing the presence and severity of symptoms, and mortality, caused by Marek's disease even for unvaccinated chickens. We need further research to understand how this effect changes as the [virus](#) mutates and in other strains of chickens," says Dr. Richard Bailey, research fellow at the Roslin Institute.

The findings of this research were published in the journal *PLOS Biology*.

"Our findings suggest that even leaky vaccines can play a key role in reducing disease transmission. However, this is only one component in

tackling disease in farmed animals, others include improved animal husbandry and breeding for disease resistance," says Professor Andrea Doeschl-Wilson, personal chair in animal disease genetics and modelling at the Roslin Institute.

More information: Richard I. Bailey et al. Pathogen transmission from vaccinated hosts can cause dose-dependent reduction in virulence, *PLOS Biology* (2020). [DOI: 10.1371/journal.pbio.3000619](https://doi.org/10.1371/journal.pbio.3000619)

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