Bird flu vaccines are put to the test

Until recently, vaccination against bird flu was not permitted in Europe, but with new EU rules and favourable research results, vaccinating poultry is now becoming a serious option. Wageningen Bioveterinary Research is studying how effectively bird flu vaccines protect chickens.

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The animal ambulances in the Netherlands can barely keep up with the reports they are getting of sick birds and carcasses that need removing. This spring, a particularly large number of black-headed gulls are being found dead; last year, the bird flu virus decimated entire breeding colonies of great terns. Both black-headed gulls and terns live in colonies and build their nests close together, which enables the virus to spread at lightning speed. Infection spells the end for many wild birds, as neurological damage eventually leads to death.

The avian flu virus is conquering the world. For a long time, South America was spared, but even there, the highly pathogenic H5N1 virus has killed thousands of birds and even sea lions in the past six months. The virus can spread quite easily between different bird species as well as to other animal groups. In Europe, otters, foxes and seals have already died of the virus. For this reason, gloves and protective clothing are worn for handling and disposing of dead birds.

OUTDOOR BAN

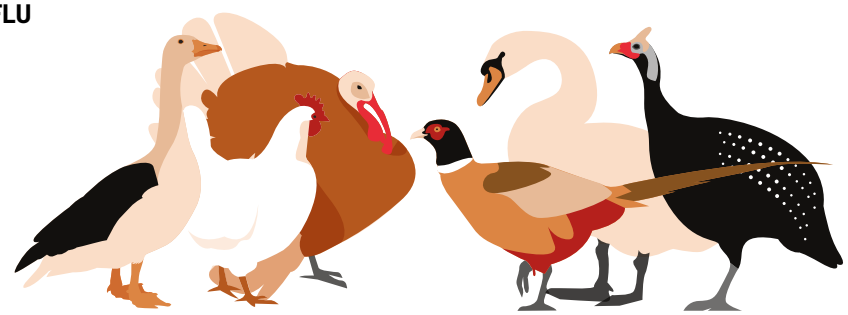
Many bird species found in the Netherlands such as geese, ducks and terns hibernate or breed elsewhere and can pick up an infection there or during migration. That means the virus can reach the country during the autumn migration and then infect poultry. For this reason, it is compulsory to keep poultry indoors and to shield birds in locations such as zoos. An outbreak of bird flu among poultry automatically means a cull by the Dutch Food and Consumer Product Safety Authority (NVWA). Between October 2022 and April 2023, hundreds of thousands of chickens, turkeys and ducks were culled on more than 20 farms. In 2022, the losses due to culling came to about 44 million euros.

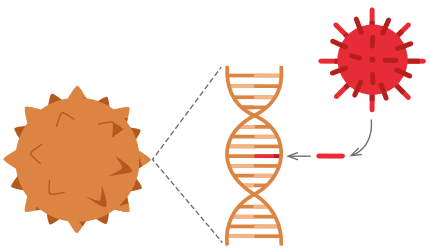
In view of the impossibility of preventing all infections by keeping poultry indoors, and continued presence of the virus among wild birds, there has been a growing interest in recent years in the option of vaccinating poultry against bird flu. With a new generation of vaccines, it is now possible to distinguish between vaccinated birds and those infected with bird flu using a laboratory test. This procedure (known as 'DIVA' – Differentiating Infected from Vaccinated Animals) is a key prerequisite for controls in international trade. So the new vaccines remove a major objection to vaccination.

Veterinarian and veterinary microbiologist Evelien Germeraad of Wageningen Bioveterinary Research in Lelystad recently >

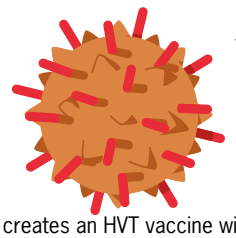
HVT-H5 VACCINES AGAINST BIRD FLU

The two vaccines that came out as effective in the Wageningen study are what are termed HVT-H5 vaccines. HVT stands for *Herpes Virus of Turkeys*. This virus can replicate in other poultry without causing disease symptoms.

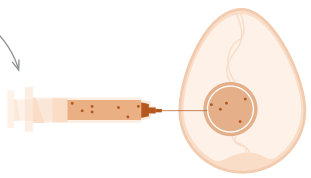




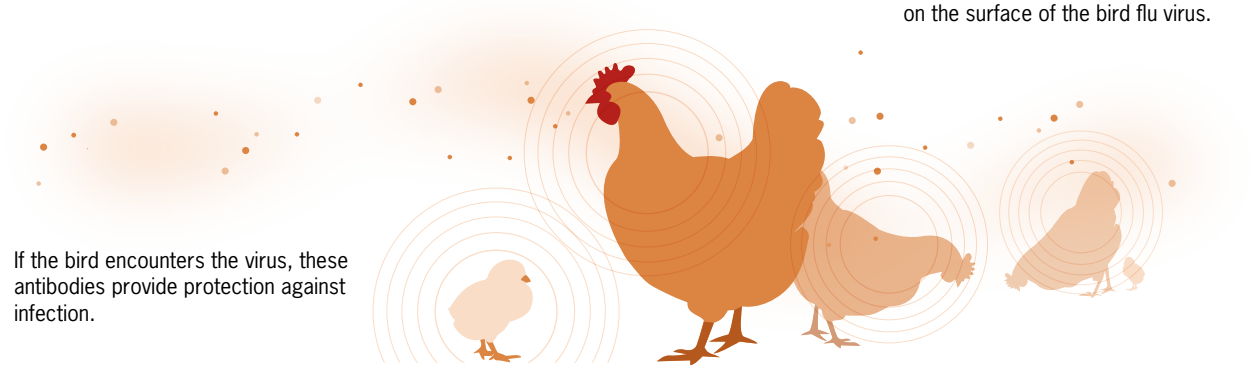
Genes from other virus species such as the avian flu can be added to the genetic material of the virus.



This creates an HVT vaccine with the H5 protein of H5N1 avian flu on its surface.



After vaccination a fertilized egg with an HVT-H5 vaccine, the chicken makes antibodies against a protein on the surface of the bird flu virus.



If the bird encounters the virus, these antibodies provide protection against infection.

A strong point of HVT vaccines is that a laboratory test can determine whether a vaccinated bird is infected with avian flu. A vaccinated chicken only has antibodies against the H5 protein; a chicken that has been infected with avian flu has a broader antibody profile. This differentiation is known as DIVA: Differentiating Infected from Vaccinated Animals. It is a safeguard for disease detection and control in the international poultry trade.

system, so that it recognizes the virus again later. We're going to do further research on that.'

Will a new vaccine be needed if a new virus variant emerges?

'These bird flu vaccines were developed by pharmaceutical companies with the aim of providing broad protection. If an H5N1 virus mutates in a few places around the world, it shouldn't make much difference. But if, say, an H7 virus emerges a year from now, as happened in 2003, the current H5 vaccines won't offer as much protection against it. But it's been H5 viruses that we've been dealing with since 2014, and that's also the variant we have found most often in wild birds in recent years.'

Do we have enough knowledge now to make a decision about bird flu vaccination in the Netherlands?

'Our study was small-scale and was conducted under laboratory conditions. In the follow-up study, chickens will be vaccinated on a pilot farm, just as is usually done with other vaccines. We want to examine some of those vaccinated chickens in the laboratory in Lelystad at different moments to analyse how well they are protected. That way you can see whether the vaccine is just as effective under everyday conditions. That project will take quite a long time because we also want to study the long-term protection offered by the vaccine.

'We will pass our results on to the Ministry of Agriculture, Nature and Food Quality, which will develop policy in consultation with the poultry industry. Will bird flu vaccination soon become compulsory? Will it be the farmer's choice, or a regional decision? These are questions that policymakers have yet to answer.' ■

www.wur.eu/birdflu