



Vaccination Strategies for Avian Influenza

An outbreak of avian influenza can lead to rapid infection of many thousands of poultry birds and the spread of the virus between neighbouring farms in a short period of time, especially between intensive flocks where a high viral load and virus shedding may be likely to develop. Good biosecurity procedures and swift, humane eradication strategies are key to the successful management of any outbreak. One strategy that has been used successfully to reduce numbers of birds culled when managing avian influenza outbreaks is vaccination.

How Vaccination Works

Avian influenza vaccine is given to birds who do not already have the virus. Birds are injected individually with an inactivated 'heterologous' form of the virus, which is developed from one or more subtypes of avian influenza (for example a low pathogenicity H3, as opposed to the high potency H5 as found in the current avian influenza outbreak). The bird will then develop antibodies to that subtype of the virus. A diagnostic test is then used regularly as part of the avian influenza monitoring strategy, to test the type of antibodies in the blood of sample birds. In the example above, those who have H3 antibodies would show up as vaccinated birds. If birds were found with H5 antibodies this would show that an avian influenza outbreak had begun, requiring emergency eradication. This is known as a 'DIVA' strategy (Differentiating Infected from Vaccinated Animals).

The key aspect of vaccination is that it can improve resistance to infection by the more potent strain of the virus and, if birds get the disease, experts suggest it will stave off the worst effects (see editor's notes below). Vaccinated birds are reported to shed less of the virus in faeces and respiratory secretions; thus vaccination could reduce the amount of virus available to be transmitted to other farms, for example via people moving between them, or animals being transported before symptoms appear. By reducing the number of these secondary outbreaks, the virus is more likely to be contained to one region.

Use of Vaccination in Protection and Management of Avian Influenza Outbreaks

Vaccination can be a useful part of avian influenza management strategies when used in conjunction with regular monitoring. Without monitoring, birds may become infected and shed virus but not become so ill or die so quickly. This is important as both illness and bird death are often the first signs seen in an unmonitored outbreak.

Vaccination does not lead to immediate immunity, which may take up to three weeks to fully develop. Birds need to be injected by hand and the process may need to be repeated. Vaccination may not work quickly enough to counter a large outbreak of a high pathogenicity version of the virus – it is not a substitute to a swift and efficient outbreak management strategy. However, once the outbreak is contained, it can be used to reduce further spread of the virus into unaffected populations. For example, the Soil Association, the UK's leading standards-setting body for organic production, suggests using a ring barrier vaccination strategy: vaccinating all birds at farms that lie within a circular area around an outbreak, outside the eradication zone, to prevent both further culls and potential spread of the virus.

The DIVA strategy has successfully been used in outbreaks of avian influenza in Italy since 2000. Prior to trialling the DIVA vaccination strategy, over 13 million birds had been killed (often referred to as 'stamped out') in Italy during an outbreak of H7N1 in 1999-2000. 15 million birds were vaccinated in Italy between 2000-2002. During this time only one vaccinated farm became infected, and there was no spread of the virus to adjacent farms. A further 45 million birds were vaccinated in an outbreak of the H7N3 form of the virus in 2002-3. No vaccinated birds were found to be infected.

The USA currently considers vaccination to be one option within its avian influenza management strategy and India is considering its use. China is using avian influenza vaccines widely. The use of vaccination is not universally accepted however and reports suggest that Japan will not use vaccination in a H5N1 outbreak; Hong Kong may cull all poultry if there is an outbreak of this strain; the UK is not proposing to use vaccination at this time. The European Union clearly states that it permits vaccination as a supplement to other control measures (Directive 92/40/EEC) and has allowed derogations that lift trade restrictions on meat from vaccinated (uninfected) flocks from regions where virus circulations are not occurring. The European commission proposes that "provision should therefore be established for both emergency and protection vaccination" (Proposal for a Directive on Community Controls on Avian Influenza, paragraph 17, page 11).

Summary

Vaccination of poultry within a DIVA avian influenza management strategy can potentially benefit both human and animal health by reducing the infectivity of high pathogenicity strains and the opportunity for spread of the virus. It may be particularly beneficial for breeding and laying flocks where birds live longer and the financial cost and time for repopulation is much greater. CIWF believes that where possible, maximum use should be made of both protective and emergency vaccination in order to minimise the requirement for culling.

Editor's Notes

European Food Safety Authority (EFSA) information on vaccination and related Directives:

http://www.europa.eu.int/comm/food/animal/diseases/controlmeasures/avian/vaccination_en.htm

EU Proposal for a Directive on Community Controls on Avian Influenza:
http://www.europa.eu.int/comm/food/animal/diseases/controlmeasures/avian/index_en.htm

EFSA Animal Health and Welfare Panel Scientific Opinion on Animal Welfare Aspects of Avian Influenza:
http://www.efsa.eu.int/science/ahaw/ahaw_opinions/1145_en.html

The Soil Association factsheet on avian influenza, including vaccination
http://www.soilassociation.org/web/sa/saweb.nsf/Living/information_on_avian_flu.html