Avian Influenza Control Strategy

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Summary

Outbreaks of Avian Influenza have increased significantly worldwide during the last 10 years. Not only have they had implications for the poultry industry, but also for human health. Different approaches can be followed in order to control Avian Influenza. Throughout this paper different control measures and their monitoring are discussed. The use of vaccination is included as one of the main control tools in the face of possible outbreaks.

Introduction

Between 1959 and 2003 twenty-one outbreaks of highly pathogenic avian influenza have occurred worldwide. The first ten outbreaks occurred in 32 years, the last eleven in twelve years. This is already a clear indication that Avian Influenza, which was in the past a rare disease, is now more or less becoming more of a common disease. This also means that we may have to change our eradication strategy for this disease. In the past stamping out was considered the method of choice. This works very well, but to be successful it needs substantial financial backing. Furthermore, it is difficult to ethically defend the culling of so many healthy birds. In the Netherlands in 2003 six million birds were infected, but an additional 24 million healthy birds were killed and destroyed to get the epidemic under control.

The current epizootic of highly pathogenic avian influenza (HPAI), subtype H5N1, sweeping through a number of Asian countries has resulted in international concern. The ever-increasing number of cases reported of humans being infected by this avian influenza strain, has raised concerns that this could trigger the start of a human influenza pandemic, thus calling for prompt control measures.

Vaccination of Poultry as part of the Control Measures

In a joint statement issued by the FAO, OIE and WHO there has been a call for a targeted strategy including poultry vaccination to help curb AI in Asia. Vaccination against AI has proven to be a successful additional control measure implemented alongside controlled culling (Italy (H7N1 & H7N3), Mexico (H5N2), Pakistan (H7N3) and Hong Kong (H5N2)). The expected advantages of incorporating vaccination as part of the policy to control the spread of AI are twofold. Firstly, vaccination reduces susceptibility to infection, such that a higher dose of virus is necessary for establishing an infection in vaccinated birds. Secondly, there is a significant reduction in the amount of virus shed by infected birds, thus there is less virus to contaminate the environment. This leads to a reduction in the risk of it spreading to other avian species and a corresponding reduction in the occupational risk faced by poultry workers. Currently, inactivated AI vaccines are the most widely used. These could be made using a homologous virus (like the one causing the problems) or a heterologous virus type (prepared from a virus with the same H type as the field strain but with a different N type). If a heterologous inactivated vaccine is used then the H type ensures protection, while antibodies against the neuramidase of the field virus can be used as a marker. Selecting an inactivated heterologous vaccine enables the application of a 'DIVA' (Differentiating Infected from Vaccinated Animals) strategy to demonstrate that the field virus is no longer circulating in a vaccinated poultry population, a prerequisite for the lifting of trade bans.

However, we hasten to caution that vaccination is not intended to replace stamping out policies. The primary goal remains eradication of AI, and vaccination, by increasing the infection threshold and decreasing virus shedding, represents a valuable aid to the eradication of infection if combined with appropriate control measures.

To successfully eradicate AI, vaccination could be implemented together with strict surveillance and biosecurity measures. This is best achieved if well-defined manageable zones are identified. A zone should as far as possible be self-contained limiting the need to transfer poultry or poultry related products (including feed and manure) across the zone's borders.

Stamping out is the preferred control option for an outbreak of HPAI and should be used on all flocks exhibiting clinical disease. The

decision to create a vaccination zone should be driven by the following key priorities.

a. Vaccination to create a buffer zone between infected and non-infected areas.
b. Vaccination of flocks in areas free of AI, but at a high risk of infection (e.g. functional connection with infected areas)
c. Vaccination of flocks in the initial restocking of affected areas that were depopulated and disinfected.

All poultry, including backyard chickens, within a vaccination zone must be vaccinated with an approved AI vaccine. In commercial flocks 30 to 60 birds must be left unvaccinated to act as sentinels. The measures applied in the vaccination zone should, where feasible include:

a. The identification of all holdings having poultry within the zone.
b. Clinical and serological examination of flocks prior to vaccination to verify AI free status.
c. For at least a three-week period following primary vaccination (time required to establish immunity), strict control of the movements of persons handling poultry and eggs as well as vehicles transporting eggs or poultry feed.
d. The transport of poultry and poultry manure should be prohibited during this three-week period.
e. For detailed guidelines on the movement of poultry in a vaccination zone refer to Table 2 from the article "The Use of Vaccination as an Option for the Control of Avian Influenza" (Capua and Marangon, 2003 – Refer to OIE website).
f. Regular serological monitoring of the sentinels (as explained later on) should be conducted. In case of HPAI infection the sentinels will most likely die within 2-3 days of infection. Thus it is important that pathology/virus testing be done on all dead sentinels.

Monitoring Efficacy of Vaccination

Assessment of vaccination should be done by HI test one month after the second vaccination.

Test 10 - 20 serum samples per flock.

Require an HI titre greater than 1:16 in more than 70% of tested samples (Guidelines set by Agriculture, Fisheries and Conservation Department, Hong Kong).

Monitoring for Virus Circulation in Vaccinated Flocks

Thirty to sixty clearly identified sentinels (chickens left unvaccinated) must be placed in each house.

Ten to twenty serum samples collected from sentinels should be tested every 30 – 45 days (ELISA or HI).

If the sentinels seroconvert the flock is considered AI positive. However, in case of HPAI infection the sentinels will most likely die within 2-3 days of infection. Thus it is important that pathology/virus testing is done on all dead sentinels.

Alternatively, if suitable testing/laboratory facilities are available and a heterologous AI vaccine has been used serological testing can be performed in accordance with the 'DIVA' strategy.

Final Comment:

Confirmation of an AI infection in a vaccinated flock (mortality or seroconversion of sentinels) should be dealt with as per standard stamping out procedures.

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