



International Alliance for
Biological Standardization



World Organisation
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Vaccination and Surveillance for High Pathogenicity Avian Influenza in poultry: Current Situation and Perspectives

October 22-23, 2024
WOAH, Paris

Concepts of surveillance for early warning and demonstration of disease freedom in vaccinated populations

BACKGROUND – The theoretical and statistical basis for surveillance differs significantly according to the purpose. Approaches to demonstrating freedom from disease are well established. A number of considerations need to be taken into account for vaccinated populations, which influence the relative value of different surveillance approaches. For early warning and early detection, the intent of the surveillance is well understood, but work to formalize the theoretical basis is much more recent, and implementing effective and affordable early detection surveillance is a more challenging task.

CHALLENGES – This paper presents the theoretical concepts behind these two purposes as a foundation for planning and assessing surveillance for avian influenza in vaccinated populations.

When demonstrating freedom from disease, working with vaccinated populations creates two main challenges. Firstly, depending on the test used, there is an increased risk of poor test specificity, particular for serological tests that are unable to distinguish vaccine-acquired from naturally acquired antibodies. The second challenge relates to the design prevalence. In a naïve population of, for example, poultry in an intensive production barn, it is expected that once introduced, the disease would rapidly spread to achieve a relatively high prevalence. This allows a high design prevalence value to be used, making sample sizes smaller and surveillance less expensive. In a vaccinated population, the disease may be present without rapid spread, making it much more difficult to detect.

For highly sensitive early detection, high population and temporal coverage is required, with a highly sensitive test. This combination can often only be achieved with surveillance based on daily observations of flocks by producers and rapid reporting and follow-up of suspicions. Vaccination makes clinical observations of the flock less sensitive, resulting in poorer early detection performance.





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RELEVANT GUIDANCE – When designing surveillance to demonstrate freedom, poor specificity can be addressed using multiple independent tests in series, the use of DIVA tests, or the use of a cut-point approach to the analysis of surveillance data, which recognizes that positive results from an uninfected population are inevitable. It is proposed, however, that the surveillance community seek to establish an appropriate agreed design prevalence (P^*) value for use in surveillance in vaccinated flocks, to allow standardization of analysis and comparison of results.

For early detection, surveillance planners need to recognize the challenges of achieving high sensitivity for detecting the first bird or flock. If clinical surveillance becomes less effective, laboratory-based surveillance may be necessary, but will require large sample sizes to be used frequently. Practicality and price may be more important considerations than extremely high sensitivity. Modelling of disease dynamics provides a tool for more precise understanding of surveillance performance in vaccinated flocks under different conditions.

CONCLUSIONS – Surveillance for avian influenza in vaccinated populations poses challenges. Tools and approaches are available to meet these challenges but often with significant cost implications.

