ISWAVLD 2023

International Symposium of the World Association of Veterinary Laboratory Diagnosticians

29 JUNE-1 JULY 2023 Congress Centre Lyon

Towards the veterinary diagnostics of the future

Main topic : Animal Health

Poultry vector vaccines: innovative serological assays for vaccination monitoring and DIVA testing for H5 and H9 avian Influenza A

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Influenza viruses belong to the family Orthomyxoviridae and infect a variety of human and animal hosts. There are four types of influenza viruses: A, B, C and D; which are defined by the nature of their internal nucleocapsid antigen. Type A is the most conserved genus and can be further divided into subtypes based on their Hemagglutinin (H) and Neuraminidase (N) antigens. Eighteen H antigens (H1 to H18) and eleven N antigens (N1 to N11) have been isolated. Most avian influenza viruses are low pathogenic, such as H9, and are generally involved in co?infection with other avian viruses, which can lead to important losses in poultry flocks. Some subtypes containing H5 and H7 are associated with highly pathogenic forms of the disease, with high rate of mortality. Particularly, a current H5 HPAI (Highly Pathogenic Avian Influenza) lineage has been circulating around the world since 2004 and has been responsible for dramatic poultry losses, wild bird mortalities and human cases. All viruses belonging to this current H5 lineage share a common known ancestor (Goose/Guangdong/1/96 strain). Vaccination is an essential tool for poultry disease control. For many years, conventional vaccines were used.

Today, innovation in poultry vaccinology include immune-complex vaccines and vector vaccines. Vector vaccines are made from a vector microorganism of which the genome has been genetically modified to encode an immunogenic protein of the disease of interest. One or more genes may be inserted to ensure stronger protection or to widen the spectrum of protection to more diseases. Benefits that could be associated with this technology include bio-security, efficiency, ability to breakthrough passive immunity, and long-lasting immunity.
In addition, vector vaccines may be used to as part of DIVA (Differentiation between Infected and Vaccinated Animals) strategies. In the last 5 years, successive waves of Influenza in Europe pushed the health authorities to review their vaccination strategy concerning this virus, and nowadays, more particularly concerning the H5 vaccination. Given the need for rapid and reliable serological tools for monitoring of vaccination, IDvet has developed new tools to monitor vaccination with vector vaccines for Avian Influenza (AI) and implement DIVA strategy.
The ID Screen® Influenza H5 and H9, based respectively on H5 and H9 hemagglutinin recombinant proteins, are indirect ELISAs used for the monitoring of recombinant vaccines based on H5 or H9.
Vaccination monitoring with indirect quantitative ELISAs has the advantage to be highly correlated with HI test and could be used to monitor both conventional and recombinant vaccines.
As vaccinated animals will only develop antibodies against the Hx protein, IDvet has also developed a DIVA strategy in which vaccinated animals may be monitored using the previous kit, and naturally infected animals may be detected using the ID Screen® Influenza A Nucleoprotein Indirect, based on NP protein.
Preliminary results obtained with the H5 indirect ELISA for vaccinated samples will be presented.