Serological surveillance for avian influenza infections in poultry: is the gold standard really 'golden'?

Comin, A.[1], Toft, N.[2], Stegeman, A.[3], Klinkenberg, D.[3] and Marangon, S.[1], [1]Istituto Zooprofilattico Sperimentale delle Venezie, Italy, [2]University of Copenhagen, Department of Large Animal Sciences, Denmark, [3]Utrecht University, Department of Farm Animal Health, Netherlands; acomin@izsvenezie.it

Avian influenza (AI) control in areas at high risk of exposure should be centred on risk-based surveillance programs to promptly identify the infection in poultry populations. Diagnostic tests are fundamental to surveillance. Serological tests coupled with clinical inspection of poultry holdings are among the methods currently applied for low pathogenicity AI (LPAI) surveillance. Serological diagnosis of LPAI can be performed using different methods, yet the hemagglutination inhibition (HI) test is considered as the ''gold standard'' for AI antibody subtyping. Although alternative diagnostic assays have been developed, in most cases their accuracy has been evaluated in comparison to HI test results, whose performance for poultry has not been properly evaluated. In this study, we estimated the sensitivity (Se) and specificity (Sp) of the HI test and six other diagnostic assays for the detection of AI antibodies in the absence of a gold standard. We applied a Bayesian version of Latent Class Analysis to compare the results of multiple tests from different study settings reported in the literature. The results showed that the HI test has nearly perfect accuracy (i.e. 98.8% Se and 99.5% Sp). It performed well in both chickens and turkeys yet was less accurate in experimentally infected poultry, compared to naturally infected. Blocking ELISA and the indirect immunofluorescence assay also performed very well. In conclusion, given its very high Se and Sp, the HI test may be effectively considered as a gold standard. However, in the framework of LPAI surveillance, where large numbers of samples have to be processed, the blocking ELISA could be a valid alternative to the HI test, in that it is almost as accurate as the HI test yet quicker and easier to automate.