Combination and comparison of two spread models of highly pathogenic avian influenza (HPAI) in a region of Spain

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Since 2003 HPAI has had devastating consequences for poultry affecting ~400 million domestic birds and causing ~$20 billion economic losses. Early detection of HPAI cases helps the application of control measures mitigating the impact of the disease. Models are an efficient way to obtain early detection enabling the simulation of epidemics. Until 2006 Spain was free of HPAI, however in the last 5 years 2 cases of HPAI were notified. Because Spanish industrial poultry sector ranked 3[erd] in Europe, the spread of HPAI would have devastating consequences on the country. Consequently a better knowledge of the dynamic of the spread of HPAI in Spain is needed. A comparison of two spatial spread models is the solution proposed to investigate the variation of HPAI risk in each zone, and the adequacy of using either in control plans. Model I was a deterministic spatial model based on risk factors compiled by multicriteria decision. Model II was a stochastic spatial simulation model carried out using InterSpread Plus. Comparing results of both models in each farm showed a significant correlation (Spearman coef. $\rho=0.825$, $P=0.0$). Results were classified into quartiles of risk (Very High, High, Medium and Low) and compared. Bivariate analysis shows a significant association ($P=0.0$), which was more significante in quartiles 'Very high' and 'Low'. The consistency of results suggests appropriate assumptions in the introduction of parameters in each model. Similar risk farm classification in Very high and Low risk quartiles show that decisions to prioriced or discard control areas, according to risk estimated, would have been similar using either model. These areas identified could be selectively targeted as part of a surveillance program aimed at early detection, which could contribute to improved the control of HPAI.This work was financially supported by FAU2008-0O1-CO2-01.