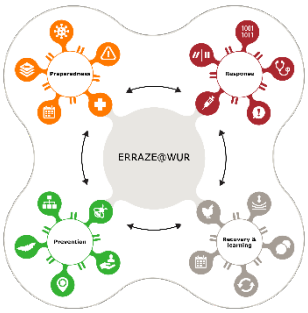
Paradigm Shifts for Global One Health

Greater resilience requires transformation and integration

Book of Abstracts

International symposium
23-25 April 2024
Wageningen, The Netherlands



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Designing surveillance systems for early detection of highly pathogenic avian influenza in wild birds to reduce the risk of incursion into poultry farms

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Aim: HPAI viruses have been circulating all year round among migratory and resident wild birds in the Netherlands, which has resulted in infections in commercial poultry becoming widespread. Dutch farmers culled about 6.9 million poultry birds between January 2021 and May 2023 following HPAI outbreaks. Prevention and control costs are sharply increasing in recent years; estimated at 55 million euros in 2022. Wild birds are the main sources of HPAI infections in Dutch poultry farms. Early warning of HPAI should, therefore, focus on surveillances of HPAI viruses in wild birds. An effective surveillance system is critical for the early warning system long-term sustainability. This study aims at evaluating the effectiveness of alternative output-based surveillance systems in wild birds as early warning for HPAI infections in poultry farms.
Methods: The effectiveness of surveillance systems can be improved by conducting targeted surveillance at high-risk areas during high-risk seasons. We evaluated the effectiveness of alternative systems by estimating the early detection surveillance sensitivity (EDSS). EDSS is a function of four parameters: proportional relative risk (PRR), population coverage (sample size), temporal coverage (target timeframe for the system to effectively detect infections (sampling frequency)) and detection sensitivity of the test/analytical method (derived from a scenario tree model). We stratified Netherlands into low-, moderate- and high-risk areas based on relative risk of incursions into poultry farms (PRR).
Results: Poultry farms located in high- and moderate- risk areas are 6.60- and 2.98-times more likely to be infected with HPAI than those farms located in low-risk areas, respectively. The corresponding PRRs are 0.095, 0.282 and 0.623 for low-, moderate- and high-risk areas, respectively. Our tentative results show that the spatial HPAI risks for wild birds and poultry farms are similar (a crude risk map for wild birds (which is under refinement) resembles to the poultry risk map).
Which species, where and when to sample? Samples should be collected from identified "High risk" wild bird species among dabbling ducks, geese and swan species, which are associated with high risk of HPAI incursions into poultry farms. Following the PRR estimates, the distributions of samples are 10%, 28% and 62% for low-, moderate- and high-risk areas, respectively. Based on temporal risks, 73% of samples should be collected during winter (September-February) and the remaining 27% during breeding season.
Conclusions: The effectiveness of surveillance systems can be improved by collecting samples from high-risk wild bird species while accounting for the spatial and temporal risks for poultry farms.

Keywords: Avian influenza, Early warning, HPAI, Poultry, Surveillance, Wild bird