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Potential spread of highly pathogenic avian influenza H5N1 by wildfowl: dispersal ranges and rates determined from large-scale satellite telemetry

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Abstract:

Our study combine experimental exposure data and telemetry based data to quantify the dispersal potential of pathogens associated with wild bird migration, with direct relevance to the management of the risk of spread of avian-borne diseases. In recent years, wildfowl have been suspected to contribute to the rapid geographic spread of highly pathogenic avian influenza (HPAI) H5N1 virus. We here evaluated the dispersive potential of HPAI H5N1 viruses by wildfowl through analysis of the movement range and movement rate of birds monitored by satellite telemetry, in relation with the asymptomatic infection duration measured in experimental studies. We analysed the first large-scale data set of wildfowl movements, including 228 birds from 19 species monitored by satellite telemetry in 2006-2009 over the main regions of Asia, Europe and Africa reporting occurrence of HPAI H5N1 viruses.

Our results indicate that individual migratory wildfowl have the potential to disperse HPAI H5N1 over extensive distances (up to 2900 km kilometres). However, the likelihood of such virus dispersal over long distances by individual wildfowl is low: we estimated that for an individual migratory bird there are, on average, only 5 to 15 days per year when infection could result in the dispersal of HPAI H5N1 virus over 500 km. Staging at stopover sites during migration is longer than the period of infection and viral shedding, preventing bird from dispersing a virus over several consecutive but interrupted long-distance movements. Intercontinental virus dispersion would be more likely through relay transmission between a series of successively infected migratory birds.