

Avian influenza: a short review of the disease in wild birds, and of European wild bird surveillance during winter 2005/06

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Abstract

The highly pathogenic avian influenza (HPAI) H5N1 virus expanded its range beyond Asia in summer 2005 and was detected subsequently at many sites in Russia, the Middle East, Europe and Africa. Between February and May 2006, the virus was detected in 13 EU Member States, mainly in dead wild birds. Following the initial incursion of the virus into Russia, the European Commission instigated a surveillance programme to look for HPAI H5N1 in wild birds. Each Member State tested environmental faecal samples and wild birds that were live-caught, shot or found dead. While HPAI H5N1 was not detected in any of the over 23,000 samples taken from live birds during the winter of 2005/06, it was detected in more than 300 samples taken from birds found dead. In the UK, surveillance of dead birds detected one positive case of HPAI H5N1 in a Whooper Swan *Cygnus cygnus* found in Fife, Scotland. Surveillance of live birds did not detect HPAI H5N1 in any of the 3,324 samples collected from wild waterbirds by the Wildfowl & Wetlands Trust between October 2005 and March 2006.

Key words: avian influenza, incursion, surveillance, wild birds.

Highly pathogenic avian influenza (HPAI) H5N1 was first recognised in poultry in Hong Kong in 1996. Efforts made to eradicate the disease appeared initially to control the infection. However, it re-emerged in Asia in autumn 2003 and spread rapidly in domestic poultry in a number of countries. The outbreak tapered off in spring 2004 but re-emerged in the summer and is ongoing. Since summer 2005, H5N1 has expanded its geographic range beyond Asia (Table 1). In particular:

1) In late July 2005, outbreaks of H5N1 in poultry were recognised in Russia, Kazakhstan and Mongolia.

2) In October 2005, H5N1 was discovered to have spread to Turkey and Europe, and the spread west across Europe in wild birds continued in spring 2006.

3) In February 2006, H5N1 was confirmed in a commercial poultry flock in northern Nigeria, marking the first reports of the disease in Africa. Several other African nations have since been affected.

Europe	Africa		Central Asia		East Asia	
	D	W	D	W	D	W
Croatia		×	×		×	×
Romania	×		×	×	×	×
Russia (European Russia)	×	×	×	×	×	×
Sweden	×	×	×	×	×	×
Greece	×	×	×	×	×	×
Italy	×	×	×	×	×	×
Bulgaria	×	×	×	×	×	×
Austria	×	×	×	×	×	×
Germany	×	×	×	×	×	×
Slovenia	×	×	×	×	×	×
Ukraine	×	×	×	×	×	×
France	×	×	×	×	×	×
Hungary	×	×	×	×	×	×
Slovakia	×	×	×	×	×	×
Bosnia-Herzegovina	×	×	×	×	×	×
Serbia	×	×	×	×	×	×
Poland	×	×	×	×	×	×
Albania	×	×	×	×	×	×
Czech Republic	×	×	×	×	×	×
Switzerland	×	×	×	×	×	×
Denmark	×	×	×	×	×	×
Spain	×	×	×	×	×	×
United Kingdom	×	×	×	×	×	×

Table 1. Countries that have reported outbreaks of HPAI H5N1 in domestic (D) and wild (W) birds to the World Organisation for Animal Health (OIE) as at October 2006.

With respect to wild birds, H5N1 has been detected in dead wild birds in southeast and central Asia, Europe, the Ivory Coast and Egypt, in small numbers of live wild birds in affected areas, and in wild birds in the pet trade. It seems likely that free-living populations of wild birds have become infected through contact with infected domestic birds, although genetic studies indicate that the strain found in wild birds in Europe is closely related to the strain found during the first major 'overspill' to wild birds at Lake Qinghai in China in spring 2005 (Brown *et al.* 2006; Chen *et al.* 2006).

Although much of the spread of H5N1 is related to poultry movements, the outbreaks in autumn 2005 around the Black Sea and eastern Mediterranean were consistent with spread by wild birds migrating from central Asia; and the outbreaks in Europe in spring 2006 were consistent with spread by wild birds moving in response to cold weather.

The circulation of a highly pathogenic strain of avian influenza in wild birds would seem to be unprecedented, and the range of species affected has been great. Although the majority of cases have been found in wild Anseriformes, cases of avian influenza in wild birds have also been described from the following orders: Charadriiformes, Columbiformes, Falconiformes, Galliformes, Gruiformes, Passeriformes, Pelecaniformes, Podicipiformes and Strigiformes (source: World Organisation for Animal Health (OIE) reports). Interestingly, carnivorous mammals (e.g. felids and mustelids) have also been infected, almost certainly as a result of feeding on infected birds.

Methods

Wild bird surveillance in Europe in winter 2005/06

Given the importance of this disease in terms of its threat to the poultry industry and implications for human health, the spread of the disease into Russia in summer 2005 prompted European Member States to instigate surveillance of wild birds. In general, the aims were to provide an early warning of the potential introduction of infection and to aid understanding of the role of wild birds in the epidemiology of the disease. Ideally, a coordinated, strategic, pan-European approach to surveillance would have been developed. However, individual Member States designed and implemented their own surveillance programmes.

The UK's surveillance programme in winter 2005/06

Within the UK, three main methods were used to monitor wild birds for pathogenic avian influenza, and particularly the H5N1 strain of the virus:

- 1) Screening of live-caught wildfowl – organised by the Wildfowl & Wetlands Trust (WWT).
- 2) Screening of shot wildfowl as part of usual wildfowling activities – organised by the British Association for Shooting and Conservation (BASC).
- 3) Screening of individual birds found dead.

Results

Continental Europe

Across continental Europe, over 300 cases of HPAI H5N1 infection in dead wild birds were reported to the OIE between February and May 2006. The pattern of wild bird deaths was unpredictable and sporadic. It would seem that extreme cold weather conditions in early 2006 in eastern and central Europe were responsible for pushing birds further south and west and also causing mortality. The highest number of reported cases of HPAI H5N1 (> 130) was found in dead birds in Germany, centred around the island of Rügen in the Baltic Sea. Cold weather had resulted in high concentrations of birds in relatively small areas of unfrozen open water. It is possible that these severe environmental conditions together with high population densities created favourable conditions for local spread of the virus.

For a wild bird to be efficient at spreading a virus, it would need to become infected and shed the virus over a period of time and over distance. Thus apparently-healthy birds constitute the greatest risk in terms of disease spread. During winter 2005/06, over 23,000 live birds were screened by European Member States (including the UK) and were found to be negative for H5N1, indicating that even if wild birds are able to survive with their infection the prevalence of infection is very low. However, there have been occasional reports of live birds being found with HPAI H5N1. For example, in March 2006, the virus was found in a number of live-caught Black-headed Gulls *Larus ridibundus* in Croatia.

United Kingdom

Live birds

Live wildfowl were caught at four WWT centres (two in England, one in Scotland and one in Northern Ireland) using various methods including cage trapping, traditional duck decoys, swan pipes and cannon netting. Of some 3,324 birds of 17 species caught between mid-October 2005 and the end of March 2006 (Table 2), no HPAI H5N1 was found. Two low pathogenic strains were identified (H1 and H2) but could not be fully characterised. The H1 strain was found in a sample taken from a Mallard caught in northwest England, and the H2 strain was found in a sample taken from a Shelduck caught in southwest England.

Shot birds

Over 300 shot wildfowl were screened during winter 2005/06. No HPAI H5N1 was found, and only three low pathogenic avian influenza viruses were found (H1N1, H6N2 and an uncharacterised H5).

Birds found dead

Surveillance of dead birds over the winter yielded one positive case of HPAI H5N1: a Whooper Swan *Cygnus cygnus* found in Cellardyke, Fife, Scotland. The bird was reported dead on 29 March 2006 and appeared to have died out at sea and been washed into the harbour. Despite extensive surveillance of dead birds across the UK following this finding, no further cases were discovered.

Table 2. Numbers of samples collected from live-caught wild waterbirds by the Wildfowl & Wetlands Trust between mid-October 2005 and the end of March 2006.

Species	Scotland	N Ireland	NW England	SW England	UK total
Wigeon <i>Anas penelope</i>	17	12		114	143
Gadwall <i>Anas strepera</i>				24	24
Teal <i>Anas crecca</i>	1	202	6	291	500
Mallard <i>Anas platyrhynchos</i>	97	72	155	480	804
Pintail <i>Anas acuta</i>	1	2	86	303	392
Pochard <i>Aythya ferina</i>			62	114	176
Tufted Duck <i>Aythya fuligula</i>				20	20
Bewick's Swan <i>Cygnus c. bewickii</i>				88	88
Whooper Swan <i>Cygnus cygnus</i>	435		198		633
Canada Goose <i>Branta canadensis</i>	32			25	57
Greylag Goose <i>Anser anser</i>	5			76	81
Shelduck <i>Tadorna tadorna</i>			216	120	336
Others	46	1	11	12	70
Total	634	289	734	1,667	3,324

Discussion

Understanding of the epidemiology of HPAI H5N1 in wild birds is still in its infancy, thus it is difficult to design, let alone implement, ideal surveillance strategies. Despite this, it is clear that the prevalence of the virus in wild populations is low, and sample sizes need to reflect this. For example, of the bird populations screened for avian influenza in Europe in winter 2005/06, the only population for which > 1% was sampled was the Icelandic Whooper Swan population (D. Stroud, pers. comm.). The UK's surveillance programme will continue in winter 2006/07, with methods and coverage similar to those used in winter 2005/06. However, live-bird surveillance will also be conducted at two additional sites, one in Wales and the other in southeast England. For a more targeted

approach, dead-bird surveillance will cover particular counties and specific wetland sites.

Although HPAI H5N1 poses a threat to the conservation of wild birds, human health and national economies, it also presents an opportunity to create integrated wildlife health surveillance programmes across nations. There is no shortage of calls for such collaboration and communication between authorities, institutions and countries (e.g. EFSA 2006; UNEP/CMS International Scientific Task Force on Avian Influenza 2006), however wildlife health surveillance is notoriously complex and will require both funding and long-term international commitment.

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