

Avian influenza in wild birds – a need for new control strategies

Katharina D.C. Stärk¹, Sabine Reiser², Norbert Greber³, Thomas Giger⁴, Gertraud Regula¹, Hansueli Ochs¹, Irene Keller^{1,5}, Hans Wyss¹

¹Federal Veterinary Office, Bern, Switzerland, ²LRA Bodenseekreis D5, Friedrichshafen, Germany, ³Veterinary Office, Bregenz, Austria, ⁴Veterinary Office, St. Gallen, Switzerland, ⁵Vogelwarte, Sempach, Switzerland

Introduction

From February until April 2006, cases of highly pathogenic avian influenza (HPAI) virus Asian lineage H5N1 occurred in wild birds around Lake Constance. This lake is situated between Germany, Austria and Switzerland. It is a waterbird sanctuary of international significance with over 400 recorded species. The waterbird population is particularly high during the months of October to February when large numbers of waterbirds use the lake as their wintering site. During these months, the population of waterbirds increases from <20,000 to >200,000. The most common species at Lake Constance are shown in Table 1.

Table 1: Number of wintering birds and breeding population sizes for ten common waterbird species at Lake Constance (Heine et al., 1999)

		Wintering ¹	Breeding ²
Tufted Duck	<i>Aythya fuligula</i>	84077	243
Common Pochard	<i>Aythya ferina</i>	52311	56
Common Coot	<i>Fulica atra</i>	48690	1782
Mallard	<i>Anas platyrhynchos</i>	14844	2289
Gadwall	<i>Anas strepera</i>	5654	94
Common Teal	<i>Anas crecca</i>	4163	14
Red-crested Pochard	<i>Netta rufina</i>	3635	367
Great Crested Grebe	<i>Podiceps cristatus</i>	3503	1361
Common Goldeneye	<i>Bucephala clangula</i>	2077	0
Mute Swan	<i>Cygnus olor</i>	1540	288

¹ Mean of November counts 1982-1996

² Survey of breeding birds 1990

The first case of HPAI was detected on February 15, 2006, in a Common Pochard (*Aythya ferina*) on German territory. As a consequence of this outbreak, issues related to disease control measures against HPAI in wild birds were intensively discussed within an international working group. These discussions highlighted a number of issues related to current risk management approaches.

Methods and Results

During the outbreak, measures applied in the European Union and Switzerland were primarily based on strategies derived from HPAI cases in domestic poultry, i.e. the implementation of protection and surveillance zones, accompanied by movement restrictions of animals and animal products, increased biosecurity and surveillance (Council Directive 2005/94/EC, Commission Decisions 2005/734/EC, 2006/115/EC).

Surveillance was increased in both domestic and wild bird populations using active and passive surveillance approaches. Over 2,200 wild birds were tested by April 2006 out of which 57 were positive. No cases in domestic birds occurred. For some wild bird species, for example Common Pochard (*Aythya ferina*), approximately 1% of the birds present during the time was tested. In general, the proportion of virus-positive samples was low, but distinct differences were detected between bird species. The highest proportion of positive samples was found in ducks, specifically Common Pochards (*Aythya ferina*) and Tufted Ducks (*Aythya fuligula*). The majority of carcasses were collected along the river Rhine after it exits Lake Constance. Due to a power plant, the flow speed of the river is considerably reduced at one

location and many carcasses were washed up to the shore or caught in the rake of the plant. This site did not correspond to where the highest numbers and concentrations of waterbirds were found but was approximately 20 km downstream.

Protection and surveillance zones were implemented around the detection sites of positive birds. However, the time from carcass collection until confirmation of HPAI H5N1 took a minimum of 6 days and often considerably longer. This raised the discussion on appropriate timing of zoning and the subsequent effectiveness of measures applied within a zone, e.g. disinfection of detection sites. The detection sites were sometimes difficult to identify, for example, when carcasses were found floating on the lake. This led to difficulties in determining the adequate location of zones. Due to the continuing detection of positive birds, zones were introduced eventually almost around the entire lake. To facilitate management, the Veterinary Services then decided to introduce a surveillance band of 10 km around the entire lake.

Due to the trans-boundary nature of the outbreak, there was a considerable need for coordination between Veterinary Services of the three countries. An international working group was therefore introduced. Major issues for coordination were the extent of zones and their exact boundaries and the time of lifting of zones. Additionally, differences in risk management measures were difficult to communicate, for example containment of cats indoors in Germany but not in Switzerland.

Discussion

The goal of risk management interventions is risk mitigation. In the case of Lake Constance, the risk was defined as the probability of transmission of HPAI H5N1 from wild birds to poultry and the consequences of this transmission. Risk management measures need to be effective and therefore take into consideration the epidemiology and biology of the agent (science-based). Additionally, due to limited resources available to Veterinary Services, risk management interventions need to be efficient. There is therefore a need to target efforts and to set priorities. Additionally, the appropriate level of protection needs to be defined in order to determine which interventions are proportionate taking into account benefit-risk considerations. The key questions to be addressed by Veterinary Services can be summarized as follows:

- 1) Which risk management measures are effective?
- 2) Where should efforts be targeted?
- 3) For how long should measures remain in place?

Most of these questions can be systematically addressed using risk assessment methods. Risk assessment is an element of risk analysis and provides a framework to identify risk pathways and their relative significance. Risk assessments have been conducted with respect to HPAI H5N1 in wild birds (EFSA, 2006). Although there remain considerable data gaps and uncertainties in the current assessments, risk assessments can be used as a basis for decision making and they can be updated as more knowledge becomes available.

Risk mitigation measures derived from the management of HPAI outbreaks in poultry are problematic as the location, extent and duration of virus exposure cannot be determined on the basis of carcasses of wild birds that are found and later confirmed to harbor the virus. The detection site of a carcass is likely to be substantially distant from where the bird was located when still alive as it may have been moved by water currents or predators after death. Also, the time of detection is likely to be substantially different from the time of death of the bird. Thirdly, some measures that are usually used within disease control zones such as movement

control in poultry are not priority interventions as long as transmission to poultry has not occurred.

The epidemiology of the outbreak of HPAI in wild birds at Lake Constance demonstrated that alternative risk management strategies are needed. They should be based on the current knowledge of HPAI in wild birds as synthesized by risk assessment, and they require continuous updating as new information becomes available. As an alternative to zoning, the implementation of a monitoring area is proposed. The extent of this area could be established on a case-by-case basis including the entire affected area of a waterway or lake. It should be adapted using local epidemiological, ornithological and limnological information. Within the monitoring area, risk-based surveillance of wild and domestic birds should be applied. Priority should be given to wild bird species that are more likely to carry the virus. Among poultry holdings, existing knowledge on risk factors can be applied to identify holdings of increased risk either due to a higher probability of exposure or due to the extent of consequences of an infection. Examples of such risk factors are: poultry density, poultry species kept on the holding (e.g. clinical signs of HPAI in ducks may be very mild), size of the holding, type of the holding (e.g. parent flock) or husbandry system used including biosecurity and biocontainment level (e.g. free-range production). In such holdings of higher risk, increased monitoring may be required. Additionally, measures to prevent virus spread from wild to domestic bird populations should be implemented. General biosafety measures for poultry holdings as well as indoor housing for holdings that are at higher risk are recommended. In accordance with OIE standards, there should be no trade restrictions as long as no transmission to domestic poultry occurs. The advantage of the monitoring area is that it is tailored to the epidemiology of HPAI in wild birds, it encourages monitoring and therefore knowledge gain regarding wild birds. The monitoring area can also be applied preventively, for example during times of peak bird migration, to protect poultry holdings situated in the proximity of important waterbird habitats.

Risk management measures should be proportionate to the appropriate level of protection. The risk analysis framework allows to make benefit-risk considerations transparent. Veterinary Services will be willing to implement more stringent risk management measures with respect to poultry holdings if the consequences of transmission are substantial, for example, due to extensive international trade. In a country where limited consequences are expected, the acceptable level of risk is likely to be different. Transparency regarding such considerations will support risk communication as differences in acceptable levels of risk and different levels of risk management between regions or countries can be explained.

The occurrence of cases of HPAI H5N1 in wild birds at Lake Constance in 2006 demonstrated that HPAI in wild birds is a trans-boundary problem. Therefore, international coordination and standardization of control measures and risk communication will support compliance and therefore successful prevention of transmission of the virus to poultry. As the probability of exposure of poultry to HPAI from wild birds may persist over an extended time period, sustainable risk management measures are required.

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