Updated Rapid Risk Assessment on the finding of H5N6 HPAI in wild birds in England, Scotland and Wales

May 2018
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Summary

This document is an update of a rapid risk assessment made on the 22 January 2018 in response to findings of H5N6 HPAI in wild birds in England, Wales and Northern Ireland over the winter and early spring. The same strain of virus has now been detected sporadically in wild water birds across North Europe with very few poultry or captive or wild bird cases, suggesting this remains an infection primarily of wild birds. There have been no cases in commercial or non-commercial poultry in the UK this year and the poultry sector retains its OIE disease free status. All updates made are shown in red for ease of reference.

In December 2017, the Netherlands reported a new strain of H5N6 HPAI in a duck fattening farm in Flevoland; several cases in wild birds (mute swans, *Cygnus olor*) in the same region and cases in captive birds at a single site (mallard ducks, mute swans, greylag geese and guinea fowl) were reported in the following days. In late December / early January two further cases in wild birds were reported, one in southern Germany and one in west Switzerland. H5N6 has continued to be reported in wild birds in Europe (Denmark, Sweden, Finland, Germany, Slovakia and Netherlands) this year, albeit at low frequency; the most recent case was reported in a wild bird on the 10 May in Denmark.

In January 2018, three mute swans were found dead and tested positive for H5N6 HPAI in Dorset, on the South coast of England and initial analysis confirms this virus has the same characteristics as the Netherlands strain. The current numbers for the UK, as of 8 May, are 20 separate sites with 101 wild birds testing positive; the species involved included dabbling ducks, swans and geese, raptors, gulls and occasional other waterfowl.

The sites are in or very close to the Higher Risk Areas (European Implementing Decision 2017/263), identified by the high number of migratory wild waterfowl that overwinter there.

This rapid risk assessment is to gather the evidence and assess the likely source of infection and the risk of spread of the virus to poultry or to wild birds in England, Scotland and Wales, in the context of the background risk level from migratory wild birds. Specifically to answer risk questions of the incursion of further cases in wild birds and the spread into the poultry population.

The assessment suggests that there is now a decrease in the likelihood of finding more cases in wild birds in England and Wales, while Scotland is still considered to have an even lower likelihood. The risk level for wild birds is therefore reduced to LOW in comparison to the previous national risk of incursion level (HIGH). The length of time since a positive bird has been detected, together with the departure of the wintering waterfowl and the environmental conditions (notably higher temperature) suggests that the risk of virus still being present in the environment or circulating in waterfowl/ wild birds is greatly diminished since the last report. The risk level for the direct and indirect exposure to poultry is now considered to be LOW both for housed and free range birds although it is
still recommended that poultry keepers remain vigilant to any notifiable avian disease and continue to maintain strong biosecurity.

Introduction

During the winter and spring of 2016-2017 the most significant epizootic across Europe of highly pathogenic avian influenza (HPAI) occurred, eventually affecting 26 of the 28 member states as well as non-EU countries, from Europe to Asia and Africa. The virus concerned, H5N8 HPAI was detected in multiple species of wild birds, in particular wild waterfowl, causing large die-offs. Most poultry species showed some clinical signs, with Galliforme species being the most affected, where high mortality rates were reported. For a full over-view of the situation in the EU, see the EFSA opinions (EFSA 2017a & b).

In Asia, several strains of H5 virus are circulating in wild birds and poultry and these were being monitored closely, with an expectation that the wild bird migration routes may bring such viruses to Europe within a matter of months, during the migration season. This pattern has been repeated over several years and the strains of most concern were viruses from the clade 2.3.4.4 which were reported as spreading rapidly around Asia. In February 2017 there was a single incursion in Europe of H5N6 HPAI in a backyard farm of just 60 poultry; no further cases were reported and the virus was not related to the zoonotic strains in Asia (EFSA Panel, 2017). The arrival of H5N6 HPAI in NW Europe in December 2017 was therefore anticipated. The risk level for wild bird incursion was raised to MEDIUM from LOW in October 2017 on the basis of H5N8 HPAI in Europe and the wild bird findings in Germany that month (Defra, 2017a). The finding of H5N6 HPAI in the Netherlands in December did not change that risk level, but it focussed our diagnostic capability for detecting this virus in any wild birds found dead or poultry report cases (Defra, 2017b).

On January 8 2018, five mute swans were found dead at a site in Dorset on the South coast of England. Three of the five tested positive for H5N6 tests and showed genetic markers for high pathogenicity. Further sequencing confirmed this virus is closely related to the European strains. More birds were found at the Dorset site and tested positive – 20 more mute swans, 1 Canada goose and 1 pochard. On the 11 January, a large wild bird die-off was reported from a large gull roost area in Warwickshire. Thirteen birds tested positive: 6 great black-backed gulls, 1 herring gull, 1 great crested grebe and 5 tufted ducks. Of the remaining birds found dead, there was a grey heron (tested negative), a greylag goose (not tested) and multiple other gulls. Many birds were either decomposed or had been predated, therefore estimates of the length of time since virus incursion are difficult to make, as indeed are estimates of the geographic bound for the virus and associated risk.

On the 19 January, at a nature reserve in Hertfordshire, another assemblage of dead wild birds was found and tested positive for H5N6. Among the 20 submissions, positive results were obtained from mallards, tufted ducks, greylag geese and a common gull.
A further 18 sites (16 in England, 1 in Wales and 1 in Northern Ireland) have been reported in 2018 (to date), where dead wild birds (waterfowl, wild pheasants and raptors) have tested positive for H5N6 HPAIV.

**Methodology**

The OIE qualitative risk assessment methodology is used to assess the likelihood of entry and spread into poultry through the movement of wild birds or through indirect contact with the affected area.

Table 1: Risk levels (and associated probabilities) are according to EFSA guidance with expanded definitions derived from Kahn et al. 1999):

<table>
<thead>
<tr>
<th>Probability</th>
<th>Definition from EFSA</th>
<th>Expanded description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible</td>
<td>Event is so rare, does not merit consideration</td>
<td>The chance of the event occurring is so small it does not merit consideration in practical terms; it is not expected to happen for many years, if at all;</td>
</tr>
<tr>
<td>Very Low</td>
<td>Event is very rare, but cannot be excluded</td>
<td>The event is not expected to occur (very rare) in the next few years but it is possible</td>
</tr>
<tr>
<td>Low</td>
<td>Event is rare, but could occur</td>
<td>The event may occur occasionally (rare) but could occur in the next few years</td>
</tr>
<tr>
<td>Medium</td>
<td>Event occurs regularly</td>
<td>The event is possible within the next year</td>
</tr>
<tr>
<td>High</td>
<td>Event occurs very often</td>
<td>The event is expected to occur within the next year</td>
</tr>
</tbody>
</table>

**Definitions**

Waterfowl: Including birds of the Anatidae family such as swans, dabbling and diving ducks and wild geese.

Water birds: Other birds living in or around water, excluding the Anatidae, including gulls, waders, shore birds, herons and coots.

**Hazard Identification**

H5N6 HPAI viruses of the clades 2.3.4.4c and d were detected first in China in 2014 and then continued to spread in poultry in China, Laos, Cambodia, South Korea, Vietnam and Japan and some viruses in clade 2.3.4.4c have zoonotic potential and caused a small number of human cases (EFSA Panel, 2017).

According to a Promed report on 13 December 2017, “The OIE/FAO/EU International Reference Laboratory at APHA-Weybridge, UK, working with the Animal and Plant
Quarantine Agency of the Republic of Korea, characterized a novel emerging highly pathogenic avian influenza A(HPAI) (H5N6) virus isolated from both wild birds and domestic poultry in the Republic of Korea. Phylogenetic analyses of a representative of these viruses showed that it was different from previously circulating Korean H5N6 viruses in the 2016-2017 winter season and which had caused a very limited number of human cases. All genes of the novel HPAI virus except the neuraminidase were of the "European H5N8 HPAI lineage" that emerged last winter (16/17) and continues to be detected in some European countries. The neuraminidase N6 is most similar to the H5N6 reassortant virus isolated from chickens in Greece in early 2017, which had acquired a neuraminidase gene from the Eurasian low pathogenic avian influenza A virus lineage circulating in wild birds. These analyses demonstrate continued circulation of this H5 lineage in multiple geographic regions and likely wild-bird mediated spread." See also Lee et al, 2017.

The current season (winter 2017/2018) has seen several outbreaks in poultry and cases in wild birds of H5N8 HPAI in Italy, Bulgaria and Germany (see Figure 1), but none in the northerly part of the EU; further outbreaks of H5N8 HPAI cannot be ruled out since the virus continues to circulate elsewhere including the Middle East and South Africa.

In December 2017, the Netherlands reported a single outbreak of avian influenza in fattening ducks in Flevoland region (OIE, 2017). Four week old ducks showed increased clinical signs and increased mortality. The birds tested positive at the National Reference Laboratory and the virus was confirmed as H5N6 HPAI; disease control measures were put in place, including a housing requirement for all commercial poultry. According to the Dutch laboratory, the sequence shows this was a reassortant between a low pathogenic HxN6 strain and the circulating Eurasian H5N8 HPAI strain (Wageningen, 2017). Further cases in wild mute swans were reported during December and January (OIE, 2017). At the end of December, Switzerland reported a case of H5N6 HPAI in a wild mute swan and on the 8 January, Germany reported a case of H5N6 HPAI in a wild duck (species not known; OIE, 2017). The H5N6 HPAI currently in Europe therefore appears to be an emerging strain.

Between the 8 January and the 8 May 2018, the EU has continued to report H5N6 HPAI in wild birds, however the numbers have not been as high as last year when H5N8 HPAI was circulating widely and the species of wild birds involved have been different. These wild bird cases are located on the migration route for wild waterfowl along the East Atlantic flyway in terms of geographic distribution and timings, such that the first cases appeared as the waterfowl arrived for the overwintering season and cases have reduced in frequency since the birds started to leave. The latest cases found in the UK are all in raptors around the same site in Suffolk and must indicate a local source of virus. This may be a local resident population of wild waterfowl. Buzzards will eat carrion when their preferred prey of small rodents is not available so they (and other raptors) make good sentinels for highly pathogenic avian influenza. The last buzzard found dead and testing positive was in mid-April.
During the winter and spring of 2016-2017 there were multiple outbreaks of H5N8 HPAI in poultry and captive birds and cases in wild birds across Europe. When compared to this year and the H5N6 HPAI outbreaks on the Continent (see Figure 2 below) it is clear that the level of infection pressure is far lower this year than at the same time last year. This meant the risk level for the UK was considerably higher earlier in the season in 2016/2017. There are of course caveats to these data – the new strain of H5N6 HPAI may not be causing such high levels of mortality in wild waterfowl as was seen with H5N8 HPAI in 2016/2017; the waterfowl may exhibit some resistance to infection if they had previously been exposed to H5N8 HPAI virus; the findings in mute swans above other species could be increased susceptibility, exposure or simply they are easier to find when they die. Nevertheless, there can also be similarities drawn with the 2014/2015 winter when the first cases of H5N8 HPAI were detected in the EU, and which caused only a very limited number of outbreaks (only 9 commercial premises) and cases in Germany, Italy, Netherlands and the UK (Adlhoch et al. 2014). The finding in gulls was interesting; the Warwickshire site represented the first large wild bird die-off involving this strain of virus and the first finding in gulls. However, testing of gulls is not frequently done in Europe, mainly because of the large number which may be found dead from other causes. During the 2016/2017 epizootic there were multiple findings of H5N8 HPAI in gulls (EFSA, 2017a), including Herring gulls (41 findings in 7 countries), Black-headed gulls (22 findings...
in 8 countries) and Great Black-backed gulls (16 findings in 4 countries) out of nearly two thousand reported findings in all member states.

Figure 2: Reports of H5N8 HPAI in captive birds, wild birds and poultry from October 2016 to 9 January 2018. Reports of H5N6 HPAI are superimposed to demonstrate the difference in the infection pressure.

Figure 2 demonstrates quite clearly that 2017/2018 has been quite different to 2016/2017 with substantially fewer wild bird cases and only a handful of poultry or captive bird cases. During this time, not all countries required mandatory housing of commercial poultry. Therefore this low number of incursions into poultry cannot be solely attributed to the housing of birds. However it is likely that many poultry keepers in Europe have been closely implementing improvements in biosecurity. Nevertheless, we cannot rule out undetected disease in either wild bird or poultry nor that this particular strain may be less likely to transmit from wild birds to poultry.

Risk Assessment

Risk question

What is the likelihood of further findings of H5N6 in wild birds (migratory or resident) across England, Scotland and Wales occurring at new sites in addition to those already detected since January 2018, during the summer (low migration period for waterfowl)?
What is the likelihood of the finding of H5N6 in a poultryholding in England, Scotland and Wales as a result of exposure to infected wild birds during the summer (low migration period for waterfowl)?

The risk assessment will consider the likely source of infection at the sites under the entry assessment and then the spread to poultry as the exposure assessment.

This document will not consider the public health aspects of the virus. Consequence assessment will only cover the impact of an outbreak in poultry premises.

Entry Assessment

1. Migratory wild birds arriving into the UK will continue to be a source of infection in GB - low likelihood; low uncertainty

2. Resident wild birds will continue to act as a source of infection in GB – low likelihood; medium uncertainty

3. The source of infection for wild birds is spread through indirect contact (contaminated environment, fomites, products of animal origin etc) - low likelihood; medium uncertainty

Evidence:

Migratory birds into GB

The wild waterfowl which overwinter in GB departed several weeks ago (April onwards) for summer breeding sites in the north. Despite the late spring, expert opinion (WWT and BTO) is that once migratory birds start their migration flights, they may land for short periods to feed but will not turn back. Bad weather can “down” the birds but there is an energy trade-off between staying too long in a place with a poor food source and carrying on with the migration.

Birds heading to Iceland have a fairly protracted departure, but most by now would have left although it is possible some may have remained in Scotland until early May, but these birds will not travel south again.

By early April many of the migratory Whooper swans (which head back to Iceland) and all the Bewick’s swans (heading to Russia) had left their main wintering sites in England (WWT Welney, Norfolk observation data).

Of the geese populations in Scotland that migrate, Greylags and Pinkfoot geese (heading for Iceland), Barnacle geese and Greenland white fronted geese (both heading for Greenland) will have left by the end of April. The migratory ducks would have left even
earlier in the season, and most by the end of March. There will still be a substantial population of non-migratory geese remaining in the country over the summer.

The testing data support the evidence that this year the virus was primarily detected in resident birds which use wetland areas all year round (see Figure 3). There is good monitoring coverage across England, Scotland and Wales. The points on the map reflect the sites but not the numbers of birds as there were multiple tests done at many of the sites over the course of the winter and spring months. There were no positive detections in Scotland and only a single one in Wales and a single one in Northern Ireland. The last waterfowl species to test positive were in Lincolnshire (Greylag goose) and Surrey (Mute swan), both tested positive in March. The only birds to test positive since then have been raptors.
Annual and winter resident wild birds:

The threshold for reporting wild birds found dead for testing was reduced this year (March 2018) so that singleton birds are to be reported and tested. However the reports of dead wild birds were similar to last year for the same time period and are now decreasing and this is now considered a low sensitivity surveillance system at this time of year (summer). There is limited information about this new strain of virus and its pathogenicity in wild birds.

Therefore, we consider that the likelihood of resident wild waterfowl being infected with H5N6 is **LOW (with low uncertainty)**. This is based on the number of birds which were found and tested positive during the season, the expected incubation date for an avian influenza virus (a few days) and the improving environmental temperatures and sunlight reducing levels of environmental contamination.

There is a year round system for reporting dead and sick or injured wild birds to Defra and warden patrols take place at areas of high migratory wild waterfowl congregations. Waterfowl species tend to be the first wild birds to test positive for avian influenza in the autumn/winter. Although the presence of undetected infection in apparently healthy wild waterfowl resident in the area cannot be ruled out, the balance of probability for the source of infection when the disease was first introduced in January 2018 lies with the migratory wild waterfowl in the area given the birds' contact structure and the virus's epidemiology. Four months on, it would be very unlikely that the virus would still circulate in those areas as most birds would either already have had contact or would have left for summer breeding sites.

**Conclusion for entry assessment**

As the source of infection in the initial findings in winter was highly likely to be migratory wild birds followed by spread to resident wild birds mainly in the South and Central regions of England, the likelihood of finding another wild bird site in England, Scotland and Wales from now on is considered to be LOW. This does not entirely rule out other sporadic findings, but this accounts for our usual background level of risk over the summer months.

This conclusion has been reached because migratory species have left GB for their breeding sites; that resident birds will be entering the breeding season which means they are less mobile and have fewer social contacts and; the improving environmental temperatures and sunshine will reduce the persistence of the virus in the environment.
Exposure Assessment

1. Other wild water birds or wild birds becoming infected or contaminated at a site and carrying infection to poultry on poultry farms over a wider area – **low likelihood; medium uncertainty** (dependent upon on farm biosecurity)

2. Spread through indirect contact (fomites, products of animal origin etc) carried by gulls or other bridging species to poultry premises with good biosecurity in place – **low likelihood; medium uncertainty**

3. Spread through indirect contact (fomites, clothes, shoes) carried by persons to poultry premises – **low likelihood; low uncertainty**

Evidence

There is evidence that H5N6 virus was present in multiple sites in January 2018 over separated geographic locations across Southern and Central England and one in South Wales in species which are not only migratory but also resident (indicative of local transmission) and in species which will be relatively sedentary (mallards) but also some which are highly mobile (gulls). However, there has been continual surveillance and no cases have been found in sentinel birds at wild waterfowl sites since the beginning of March (in Lincolnshire and Surrey).

The last cases to be detected were all on one site in Suffolk in Common buzzards which may have been feeding off the same carrion. The five birds were picked up and tested a few weeks apart, but no other species were found so presumably the source of infection was not a new infection each time.

In mainland Europe, there have been only 8 cases of H5N6 HPAI in captive birds or poultry. These were in the Netherlands, Germany and Sweden; three were commercial poultry in the Netherlands (one of which was in a premises which was infected with H5N8 HPAI in 2016/2017 season). In comparison to last year (2016/2017), this level is remarkably low, when over 600 outbreaks were reported in the same time period across multiple member states. The map of the cases across Europe (Figure 1) is strongly suggestive that the virus was circulating in the wild waterfowl on migration flyway north-east through the Baltic. This flyway crosses one of the most densely populated poultry areas, in NW Europe, which makes the low number of cases in poultry even more surprising. Although some reduced reporting may have occurred if poultry are not showing clinical signs, there was a high level of awareness in the UK poultry industry so suspect clinical signs would have been reported; there have only been thirteen report cases this year. There is only limited evidence of the pathogenicity of this new strain of virus in poultry.
Conclusion for Exposure Assessment

We consider the likelihood of detecting an incursion in poultry is now reduced to LOW. Avian Influenza is still present in Europe and there is no guarantee, despite the warmer weather that there are not pockets of environmental contamination still present which could be introduced to poultry.

Nevertheless, the lack of poultry cases observed across Europe in commercial sector and captive birds suggests that this virus is not easily transferred into poultry farms either because of the improvements to biosecurity which have been made in the last year or because there is a considerably lower force from infection in wild waterfowl.

Consequence Assessment

Further wild bird findings both locally and nationally are still possible in late spring. Where there is good biosecurity present on poultry farms, i.e. reduced level of direct and indirect contact between poultry and wild birds, there should be substantially reduced likelihood of incursion.

A finding in a wild bird has no trade impact; there are no requirements for control zones or any implications for trade in live poultry, poultry products including meat and table eggs or other captive birds.

Any outbreak of avian influenza is a serious issue and the Government has good control plans in place should an outbreak occur in poultry, which will limit the spread and allow the UK to regain our disease free status as soon as possible. The trade impact would be regionalised as much as possible, in accordance with the EU regulations and third country agreements but there can still be a substantial impact from reporting a single outbreak, regardless of the size of the poultry premises.

Conclusion

<table>
<thead>
<tr>
<th>Risk Assessment Stage</th>
<th>Qualitative Score</th>
<th>Quality of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry Assessment (1) – incursion from a migratory wild bird</td>
<td>Low</td>
<td>Very good</td>
</tr>
<tr>
<td>Entry Assessment (2) – incursion from a resident</td>
<td>Low</td>
<td>Expert evidence and reasonably sensitive surveillance during the high risk months in the winter. Several weeks since the last report of a</td>
</tr>
<tr>
<td>Wild bird</td>
<td>Wild bird (one which was unlikely to be infected from consuming carrion)</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Exposure Assessment</td>
<td>Low (but dependent on biosecurity and preventing access to wild birds)</td>
<td>Expert evidence for effective biosecurity measures; very few cases reported with the new strain of virus this year across Europe</td>
</tr>
<tr>
<td>Consequence Assessment</td>
<td>Medium</td>
<td>Good</td>
</tr>
<tr>
<td>Overall Assessment</td>
<td>Low</td>
<td>Overall good evidence but medium uncertainty</td>
</tr>
</tbody>
</table>

**Uncertainty**

An uncertainty rating is assigned to the analysis based on the following matrix. It uses a combination of the type, amount and quality of the evidence against the level of agreement between different sources.

Qualitative categories for expressing uncertainty given the available evidence; based on definitions within the literature (EFSA, 2006; ECDC, 2011, Spiegelhalter & Riesch, 2011)

<table>
<thead>
<tr>
<th>Uncertainty category and definition</th>
<th>Type of information/evidence to support uncertainty category</th>
</tr>
</thead>
</table>
| **Low**                             | - Solid and complete data available (e.g. long term monitoring results)  
- Peer reviewed published studies where design and analysis reduce bias (e.g. systematic reviews, randomised control trials, outbreak reports using analytical epidemiology)  
- Complementary evidence provided in multiple references  
- Expert group risk assessments, specialised expert knowledge, consensus opinion of experts  
- Established surveillance systems by recognised authoritative institutions  
- Authors report similar conclusions |
| **Medium**                          | - Some but no complete data available  
- Non peer-reviewed published studies/reports  
- Observational studies/surveillance reports/outbreak reports  
- Individual (expert) opinion  
- Evidence provided in a small number of references  
- Authors report conclusions that vary from one another |
| **High**                            | - Scarce or no data available  
- No published scientific studies available  
- Evidence is provided in grey literature (unpublished reports, observations, personal communication)  
- Individual (non-expert) opinion  
- Authors report conclusions that vary considerably between them |
Acknowledgements

Thanks to the Defra Ornithological Expert Panel and other risk assessors from the GB / NI network. This document represents the summary of the risk assessment from these experts.

References


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OIE (2017) WAHID – Weekly Disease information
http://www.oie.int/wahis_2/public/wahid.php/Diseaseinformation/WI
