



Department
for Environment
Food & Rural Affairs

Risk assessment on the likelihood of spread of highly pathogenic avian influenza H5N1 associated with bird fairs, shows, markets, sales and other gatherings

Qualitative Risk Assessment

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Summary

The hazard is high pathogenicity avian influenza (HPAI) virus H5N1. Here, a rapid risk assessment (RRA) is undertaken to reassess the risk of HPAI H5N1 introduction from poultry and captive birds taken to bird fairs, shows, markets, sales and other gatherings (henceforth referred to as “gatherings”). The risk of other birds subsequently becoming infected at a gathering should an infected bird be introduced into that gathering and then spreading through dispersing to different establishments has been assessed in previous versions of this RRA as medium. Critical to this RRA therefore is the probability that captive birds are infected prior to their transport to a gathering together with the probability that any infected birds are not detected (and hence removed) prior to entry to the gathering.

The main route of exposure of captive birds prior to transport is through contact with wild birds (either direct contact or indirect through environmental contamination). At the present time (December 2023) the wild bird risk is **medium** in Great Britain. This reflects the regular occurrence of albeit small numbers of wild bird positive cases each week in Great Britain over the last seven weeks (to 13 December 2023), including the first report this season of HPAI H5 in a “traditional” migratory waterbird, namely a whooper swan in Norfolk on 1 December 2023, together with concern over the increasing number of positive wild bird reports from north-west Continental Europe. The detection in one migratory swan does not necessarily indicate that the wild bird risk is going up as this swan could have been infected in Great Britain. Since even suboptimal biosecurity has some protective effect from wild birds, the risk level for poultry in Great Britain is currently assessed as low. It should be noted that the low risk level covers a broad range, and the risk to poultry with suboptimal biosecurity is up nearer the “medium end” of low, while the risk to poultry with stringent biosecurity is down nearer the “very low end” of low. This is reflected in the current levels of uncertainty for the low risk for poultry: namely low uncertainty for stringent biosecurity but high uncertainty where biosecurity is suboptimal.

In terms of the bird species considered in this RRA, those poultry and bird species that are most likely to be taken to gatherings include six bird orders, namely Psittaciformes (parrots), Columbiformes (doves and fancy pigeons excluding racing pigeons), birds of prey (Accipitriformes and Falconiformes), passerines (finches), Galliformes (poultry and game birds) and Anseriformes (ducks and geese). The baseline risk of those birds being infected prior to the gathering for this RRA is based on that of poultry with sub-optimal biosecurity. As with the previous gatherings RRA, that risk for each of the six bird orders is then refined based on specific differences in access to the environment where residual infectivity from wild birds may be present.

In conclusion, the risk of introduction and spread of HPAI H5N1 into bird fairs, shows, markets, sales and other gatherings currently (at 12 December 2023) is **low** for five of the six bird orders (namely Psittaciformes, Columbiformes, birds of prey, passerines, and

Galliformes) but **medium** for Anseriformes (ducks and geese). These risk levels and their associated uncertainties for gatherings are the same as those in our last RRA on 27 July 2023. This is because the poultry risk levels in Great Britain have not changed over the summer and autumn (although the uncertainty in the low risk for poultry with suboptimal biosecurity was reduced to medium in early September 2023 to be elevated back to high in late September 2023).

The uncertainty in the **low** probability for Galliformes introducing HPAI to gatherings is **high**. This reflects the high uncertainty in the low risk for poultry with suboptimal biosecurity. It is noted that the level of risk in Galliformes will vary with location across Great Britain. Premises located near to waterbodies with wintering wildfowl, for example, are at the medium end of the low risk band and may actually be at medium risk (in line with that for wild birds) if the biosecurity is particularly poor. The uncertainty in the **low** probability for Psittaciformes, Columbiformes, birds of prey, and passerines introducing HPAI to gatherings is **low** reflecting that for the low risk for poultry with stringent biosecurity as many are kept indoors or in aviaries.

This RRA is based on data for December 2023. The wild waterbird migration from western Europe is almost complete with most birds now having arrived in Great Britain. While HPAI positive events in the Netherlands, Denmark and Germany are of less importance for Great Britain at this time of year compared to October/November, there is the possibility of small numbers of birds coming over to winter in Great Britain if for example the weather were to become colder in Europe. Thus the wild bird risk level in Great Britain, although currently **medium**, may increase at some stage between now and the end of February 2024 if a snap of cold weather in north-western Europe were to bring more waterbirds (assuming there is still infection in those populations in Europe) into Great Britain. This would be associated with an increase in the direct risk to poultry and hence to bird gatherings, particularly through Galliformes and Anseriformes. It should be noted that severe cold and heavy snow are forecast for north-eastern Europe in December. The uncertainty in the **medium** probability for Anseriformes spreading HPAI H5N1 through gatherings is **low** reflecting that of the assumed medium probability that captive ducks and geese are infected prior to being taken to the gathering.

Background

Here, a rapid risk assessment (RRA) is undertaken to reassess the risk of high pathogenicity avian influenza (HPAI) H5N1 introduction and spread from poultry and captive birds taken to bird fairs, shows, markets, sales and other gatherings (henceforth referred to as “gatherings”). Gatherings of birds involve the coming together and subsequent dissemination of live birds (as well as people, vehicles and equipment) and for this reason can facilitate the introduction and spread of avian notifiable disease including HPAI to different locations across Great Britain. The magnitude of this risk is influenced by the number of different groups of birds brought together and the likelihood of their being already infected at their point of origin. Movements out of an SZ or PZ around a confirmed infected premises are not permitted but other than this, traceability of poultry is lightly regulated so most moves outside a restriction zone are of uncertain origin and status.

Previous Defra risk assessments (Defra, 2016) were used as a basis for the general licence allowing bird gatherings to take place while minimising the risk of introduction of avian notifiable diseases to these events and mitigating the likelihood and impact of any subsequent spread. Here the risk assessment is updated to accommodate the risk levels for HPAI H5N1 in wild birds and poultry in December 2023.

Trends and risk levels in the current epizootic

After the unprecedented summers of 2022 and 2023 with HPAI H5 mass mortality events in seabirds and gulls respectively around the coast of Great Britain, the number of HPAI H5 reports in wild birds in Great Britain has greatly diminished (to 12 December 2023). Indeed, over the last seven weeks there have been two, four, one, zero, one, two and zero wild bird positive cases each week (with around 40 to 60 dead birds tested each week). Those species which tested positive included raptors, gulls and a shag. In terms of waterbird species reported there were two resident greylag geese in Gloucester and on the 1 December 2023 there was a whooper swan with H5Nx at Welney Wildfowl and Wetlands Trust (WWT) in south-west Norfolk. The whooper swan thus represents the first “traditional” migratory waterbird species reported this HPAI season. The risk level for HPAI H5 in wild birds in Great Britain is currently **medium**. While the detection of HPAI H5 in one whooper swan does not warrant increasing the wild bird risk, the risk level is maintained at medium and not reduced to low because HPAI H5 is clearly still present in wild birds in Great Britain, albeit at lower levels compared to earlier in the year, and this has been reflected in the detection of three outbreaks in poultry with suboptimal biosecurity since 15 November 2023. While the occurrence of one outbreak a week could be considered as “occurs regularly” which is the definition of a medium risk level (see below), it is noted that the number of outbreaks in poultry with suboptimal biosecurity is not increasing currently and the wild bird risk is still medium. Therefore, taking into account the fact that even suboptimal biosecurity has some protective effect, the risk level for poultry with suboptimal biosecurity is currently assessed as **low, albeit with high uncertainty**.

This high uncertainty is compounded by the continuing circulation of HPAI H5 in waterbirds in the Netherlands, northern Germany and Denmark in December. In October, the presence of HPAI H5 in birds in this region of Continental Europe would be a major concern for Great Britain with large numbers of migratory waterbirds flying west across the North Sea to overwinter here. However, at this time of year (mid-December) most of those waterbirds are already here and only a cold snap in Continental Europe would bring more birds into Great Britain. There is therefore some uncertainty in the future wild bird risk for Great Britain (and hence the poultry risk) between now and the end of February 2024. This uncertainty relates to the wild bird risk from migratory ducks, geese and swans flying into Great Britain from western Europe. Whether the level of HPAI in wild birds in Great Britain decreases will depend on whether HPAI begins to circulate in seabirds as they return to breed in the spring for example.

Bird orders glossary

The bird orders of captive birds considered are set out in Table 1.

Table 1 Glossary of bird orders considered here with examples.

Order	Examples
Psittaciformes	Parrots
Columbiformes	Pigeons and doves
Birds of Prey (Accipitriformes and Falconiformes)	Hawks and falcons
Passeriformes	Perching birds (Finches and canaries)
Galliformes	Turkeys, pheasants, chickens, guineafowl.
Anseriformes	Ducks and geese

Hazard identification

The hazard identified is highly pathogenic avian influenza virus, (HPAI) H5N1.

Risk Question

- 1) *What is the risk of the introduction of highly pathogenic avian influenza H5N1 onto bird fairs, shows, markets, sales and other gatherings?*
- 2) *What, if any, management options are available to reduce the likelihood and the impact of introduction and subsequent spread of avian notifiable disease through the abovementioned gatherings?*

Scope

This qualitative risk assessment covers the risk of introduction and subsequent spread of avian notifiable disease to and from bird gatherings organised in Great Britain that were legally moved to the event from within the UK.

This risk assessment does not assess the risk related to illegal movements, negligence to report clinical disease, false certification, breaches in biosecurity etc. Any risks potentially presented by (or to) wild birds are also not assessed here.

Terminology related to the assessed level of risk

For the purpose of the risk assessment, the following terminology will apply (OIE, 2004):

- **Negligible:** So rare that it does not merit to be considered
- **Very low:** Very rare but cannot be excluded
- **Low:** Rare but does occur
- **Medium:** Occurs regularly
- **High:** Occurs very often
- **Very high:** Event occurs almost certainly

It should be noted, however, that the risk terminologies here do not represent how often an event will occur, but more indicate the probability of the event occurring.

Entry assessment

The Defra (2016) assessments concluded that the overall risk of the introduction of avian notifiable diseases including HPAI to a bird gathering is related to the ongoing disease situation in Great Britain, both in domestic poultry and in wild birds.

As adopted in previous RRAs for gatherings, the risk of those birds which may attend gatherings being infected with HPAIV H5N1 is based on the official risk of poultry with suboptimal biosecurity in Great Britain being infected through background environmental contamination from infected wild birds (see Table 2). **This risk is currently low (with**

high uncertainty). While there have been no outbreaks recently in poultry with stringent biosecurity there has been three outbreaks in poultry with suboptimal biosecurity almost every week since 15 November (to 6 December 2023) which could be interpreted as “occurs regularly” and hence a medium risk level (although there were no poultry outbreaks in the following week). This together with the current medium risk for wild birds is reflected in the high uncertainty in the low risk for poultry with suboptimal biosecurity. The risk to poultry with stringent biosecurity is also low but the uncertainty in this risk level is low. It should be noted that the low risk level covers a broad range, and the risk to poultry with suboptimal biosecurity is up nearer the “medium end” of low, while the risk to poultry with stringent biosecurity is down nearer the “very low end” of low.

Since there is no housing order currently in place in Great Britain, it is likely that most birds which may attend gatherings will have some access to the outside, often without basic biosecurity measures now. There is also no Avian Influenza Prevention Zone (AIPZ) in place which in the past years brought a mandatory biosecurity measures. For example, hobbyist fancy poultry may be allowed to roam, and pigeons, birds of prey, and even parrots may have some outside access. Those birds kept in aviaries may be at lower risk in that they cannot access ranges to which wild birds have access. However, depending on the level of biosecurity, there may be potential for direct contact with wild birds through the cage netting or indeed from wild birds perching on the aviary roofs, or indirect contact via contamination of their feed and water.

It is assumed that keepers of any birds participating at a gathering are doing so in full compliance with the legal requirements for movements of live birds, and that birds are not coming from areas under disease control restrictions.

Probability of captive bird being infected prior to being taken to gathering.

Due to the lower level of biosecurity, those birds being taken to gatherings and shows will be of more uncertain infection status than commercial poultry with stringent biosecurity. Also monitoring and data for commercial production mean that commercial birds can be tracked more easily than for those birds at gatherings and shows. Birds from non-commercial settings carry greater uncertainty. The baseline risk of infection assumed for those birds that could be taken to gatherings is based on the current (12 December 2023) risk to poultry with sub-optimal biosecurity, that is low, albeit with high uncertainty. The risks for the six bird orders considered here (Table 1) are refined in Table 2 based on specific differences in access to the environment where residual infectivity from wild birds may be present. It has already been noted above that the “low” risk band covers a wide range of risk, in fact wider than the “medium” risk level and so for bird orders such as parrots and passerines which tend to be kept in aviaries and therefore with less likelihood of contact with wild birds, the exposure level will be lower within the low band than for Galliformes and ducks and geese.

Psittaciformes and Passerines

Psittaciformes and passerines are kept in aviaries. Given the ongoing high wild bird infection pressure, the risk to birds even with stringent biosecurity being exposed to HPAIV H5 cannot be reduced to very low because even with being kept in indoors or in aviaries, some exposure could occur given residual contamination in the environment. Therefore, the risk of captive birds being infected prior to going to the gathering is not assessed as very low even for those bird orders namely Psittaciformes and passerines which tend to be kept indoors or in aviaries and therefore with less likelihood of wild bird contact. Thus, for Psittaciformes and passerines the risk of infection prior to being taken to the gathering is still considered low in line with the official risk for poultry with stringent biosecurity. The uncertainty is low in line with that for poultry with stringent biosecurity.

Columbiformes

For the purpose of this document, racing pigeons are not included as they are considered a very different husbandry system and are the subject of an independent risk assessment. Nevertheless, related Columbiformes may taken to bird gatherings for other species or breeds. There have been relatively few reports of cases in wild Columbiformes on WOA. Since 1 October 2022 there have been one turtle dove, 2 collared dove, and five wood pigeons in Europe on WOA. In Great Britain since 1 October 2022 there have been 11 rock doves, 5 wood pigeons and 2 unidentified doves. Overall considering the abundance of Columbiformes both in Great Britain and Europe, there have been relatively few HPAI H5N1 cases in pigeons and doves reported. Although Columbiformes may be kept outside, direct contact with waterbirds is likely to be low. The probability of Columbiformes being infected prior to being taken to the gathering is therefore assumed to be low with low uncertainty.

Birds of prey

There are many reports of wild raptors being infected both in Great Britain and globally with HPAI H5N1, perhaps because they are exposed to very high viral doses through eating infected carcasses including the lungs and GI tract. Most captive birds of prey will be fed on commercial feed (such as day-old chicks, small rodents) but some are fed shot game, including wild duck. HPAI virus was detected in 4.8% of shot wild duck at sites in eastern England in autumn 2019 to spring 2020 (Wade et al. 2023). After several deaths of captive raptors infected with H5N8 in England in 2021 through being fed frozen shot wild duck, falconers are now aware of the risk of HPAI transmission to their birds through this route. In particular they now appreciate that freezing does not inactivate the HPAI virus. Current advice is to continue to fly birds for exercise and to keep them clean but feed them on commercial feed only. The overall risk of captive birds of prey having disease prior to being taken to a gathering is considered low (low uncertainty) as reflected by the few reports of outbreaks in Great Britain this year.

Galliformes

The risk to Galliformes is the same as that for poultry with suboptimal biosecurity, namely low with high uncertainty. This is supported by the low number of outbreaks in poultry in Great Britain in the summer and autumn of 2023. The probability of Galliformes being infected prior to being taken to the gathering is therefore assumed to be low albeit with high uncertainty.

Anseriformes

The risk level for captive Anseriformes (ducks and geese) however is increased to medium with low uncertainty (Table 2). This is because captive ducks and geese kept outside or in un-netted ponds are more likely to have contact with wild waterbirds. It should be noted that there have been relatively few cases of HPAI H5 in waterbirds in Great Britain recently with two greylag geese (resident birds) in Gloucester and a whooper swan (migratory bird) at Welney WWT in early December. It is anticipated there may be more in the coming weeks particularly as severe cold and heavy snow are forecast by the Meteorological Office in north-eastern Europe in the second half of December.

Table 2 Probability of HPAI H5N1 infection in each group of captive birds

Order	Examples	Probability of being infected currently (12 December 2023) prior to going to gathering	Uncertainty
Psittaciformes	Parrots	^a Low – kept in aviaries. Given some are kept indoors there is argument for reducing this risk to very low.	^a Low
Columbiformes	Pigeons and doves	^a Low – generally kept outside. Although susceptibility to H5N8 is low compared to other species (Kwon et al, 2017) infection does occur.	Low – based on few cases in wild birds given high abundance and exposure in the environment

Order	Examples	Probability of being infected currently (12 December 2023) prior to going to gathering	Uncertainty
Birds of Prey	Hawks and falcons	^a Low – kept in aviaries and no longer fed infected frozen shot wild duck meat as owners now well aware that freezing does not inactivate the virus. May be flown, and risk would be higher is allowed to catch wild birds, particularly ducks.	^a Low
Passerines	Finches and canaries	^a Low - kept in aviaries or indoors	^a Low
Galliformes	Turkeys, pheasants, chickens, guineafowl.	^b Low - based on current risk to poultry with poor biosecurity.	^b High – likely to be outdoors with greater opportunity of exposure to wild birds
Anseriformes	Ducks and geese	^c Medium – likely to be outdoors with access to ponds	^c Low
^a Based on current risk to poultry with stringent biosecurity ^b Based on current risk to poultry with poor biosecurity. ^c Assumed that ducks and geese have greater contact with wild birds particularly gulls			

Probability of HPAIV H5 not being detected prior to gathering

The level of awareness of avian notifiable diseases in Great Britain is thought to be generally high and suspicions of clinical disease in poultry and other captive birds would be reported reasonably quickly, generally within a few days. Movement restrictions for disease control purposes would be uniformly implemented based on domestic and retained EU Community legislation. The length of the virus incubation period as well as the possibility of virus shedding during this time is an important factor to be considered while assessing these risks. However, no official incubation period for avian influenzas is established for bird species other than poultry and the actual length of the incubation period is affected by numerous factors including the disease, the virus load, the actual virus strain, the species, immune status etc.

Psittaciformes

Cases of HPAI H5N1 infection in wild parrots have been reported on WOAHA mainly in South America. These include blue-and-yellow macaw, budgerigar, burrowing parrot, Mealy parrot, red-and-green macaw (2), scarlet macaw, slender-billed parakeet (3), white-winged parakeet, and yellow-headed Amazon parrot. There was also an unidentified parrot at zoos in Russia and the United States and a military macaw at a zoo in Poland. The likelihood of HPAI infection being undetected for Psittaciformes is unknown, but given the multiple detections in wild parrots in South America and the cases in zoos is assumed to be low with medium uncertainty.

Columbiformes

A study in which 18 pigeons were inoculated intranasally HPAI H5N8 (clade 2.3.4.4 subgroup B) from South Africa reported viral shedding in medium and high-dose pigeons for up to eight days. Infected pigeons successfully transmitted virus to contact pigeons. There were no clinical signs observed in any of the birds involved and seroconversion was observed in two of the high-dose group chickens (Abolnik et al, 2018). Another study of domestic pigeons, inoculated oculo-nasally with HPAI H5N8 (Clade 2.3.4.4 sub-group icA3) of Korean origin, showed no clinical signs or mortality even though, relatively high levels of shedding were observed half of the pigeons. The study concluded that, though they have lower susceptibility than some other species, pigeons can be infected with HPAI H5N8 when exposed to high doses and could excrete the virus in sufficiently high doses to infect other species of birds (Kwon et al, 2017). Pigeons could also be fomite transmitters of the virus. Pigeons do not show clinical signs when infected with H5N8 (Abolnik et al, 2018, Kwon et al, 2017) and it is assumed here that there is a high probability (medium uncertainty) of not detecting Columbiformes infected with HPAI H5N1.

Birds of prey

The probability of disease not being detected prior to the gathering is low for birds of prey. This is because birds of prey seem particularly susceptible to morbidity and mortality from HPAI H5 with many affected in the wild in both Great Britain and globally. It is known that

birds of prey show overt clinical signs if infected with the H5N8 HPAI virus. The infected birds of prey would show clinical signs within 2-3 days of feeding, and are likely to be detected prior to taking to a gathering, hence the low risk. However, this may not be the case of all birds of prey, for example white-tailed eagle and the uncertainty is medium.

Passerines

Passerines, including canaries and finches, are known to be susceptible to LPAI H5 and that they can shed large amounts of viral RNA through the respiratory route (Marché et al 2018). While they do not show clinical signs or mortality with LPAI, if infected with HPAI H5 then mortality would be expected and there have been reports of mortality of wild passerines both globally and in Great Britain from the current HPAI H5N1 strains. This indicates that if infected with H5 HPAI mortality is likely to be expected. Since 01 October 2022, HPAI H5N1 cases include chaffinch, tree sparrow, goldfinch, house sparrow (2) and several corvids in Europe with cases in zebra finch in the Americas. To 12 December 2023 (since 01 October 2022) in Great Britain there has been four cases in passerines, namely a reed warbler and three carrion crows. The probability of infected passerines not being detected is therefore assumed to be low albeit with high uncertainty.

Galliformes

Galliformes show high mortality in the poultry outbreaks. Similarly, pheasants are susceptible to H5 HPAI infection and rapidly show clinical signs although those birds infected recently would still be in the incubation period. Thus the probability of infected pheasants not being detected prior to taking to a gathering would be low. However, partridges may not show clinical signs and could thus be missed. Furthermore, although Galliformes show high mortality it is considered that detection and/or reporting may be low in backyard poultry. Therefore, for the purpose of this risk assessment it is assumed the probability of disease not being detected/reported in Galliformes on backyard premises which could be taken to gatherings is medium with medium uncertainty.

Anseriformes

While there have been many dead Anseriformes-positive wild bird cases reported both in the Great Britain and globally, many wild ducks and geese have survived. Furthermore, some ducks may not show clinical signs suggesting that the probability of infected ducks and geese not being detected prior to the gathering event is high. The uncertainty is medium.

Exposure assessment

This section deals with the risk that an infected bird entering a gathering will spread disease to other birds at that gathering. If infection were to be introduced to a bird gathering, the likelihood of its spread depends on a number of factors such as the pathogenicity and transmissibility of the virus, the amount of virus being shed by the infected bird, the nature

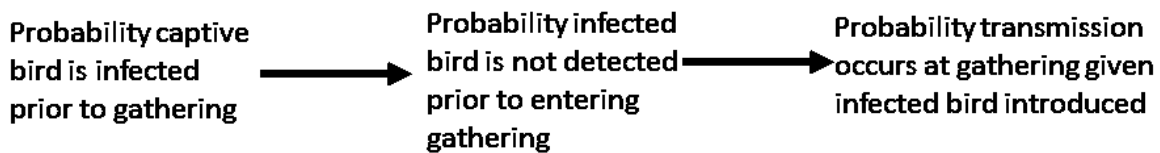
and layout of the gathering such as the housing and proximity of the participating birds, whether the birds are mixing, access to common water sources and whether they are in direct contact with visitors.

Spread of disease within the gathering

Spread through a gathering is based on the aggregated risk from multiple contacts between the infected bird introduced to the gathering and the other birds from different origins and hence going to different destinations after mixing at the gathering. From an epidemiological point of view, the probability of one or more birds actually being exposed to infection at the gathering is defined as “ $1-(1-p)^n$ ”, where p is the probability that an infected bird introduced to the gathering infects another bird given a contact, and n is the number of such contacts. There are no data on p and n at gatherings. However, even if p with low then just ten contacts with the infected bird at the gathering would be sufficient to give an aggregated probability of medium that at least one exposed bird at the gathering would be infected. If p were medium, then just one contact would be sufficient to give a medium aggregated probability that at least one bird would be exposed. Therefore, the risk of disease spread, if introduced to a gathering would be at least medium.

Qualitative risk assessment

For the purpose of this RRA a simplified risk pathway is used as set out below.



The three qualitative risks in the pathway for each bird order are combined using the matrix of Gale et al. (2009) to give the overall risk of spread of HPAIV H5 from bird gatherings in Great Britain currently.

The risk assessment for the current situation (13 December 2023) is set out in Table 3.

Table 3 Qualitative risk assessment for spread of HPAI H5N1 at bird gathering according to bird group. Uncertainty in parentheses.

	Psittaciformes	Columbiformes	Birds of Prey	Passerines	Galliformes	Anseriformes
Risk of infection prior to gathering (12 December 2023) see Table 2	Low (Low)	Low (Low)	Low (Low)	Low (Low)	Low (High)	Medium (Low)
Probability of not being detected prior to gathering	Low (Medium)	High (Medium)	Low (Medium)	Low (High)	Medium (Medium)	High (Medium)
Risk of spread of disease at gathering	Medium	Medium	Medium	Medium	Medium	Medium
^a Overall risk	^b Low (low)	Low (low)	^b Low (low)	^b Low (Low)	Low (High)	Medium (Low)
<p>^aOverall risk of spread of HPAIV H5 at bird gathering calculated as lowest probability in the column according to matrix of Gale et al. (2010).</p> <p>^bMathematically “low” x “low” equals “very low” according to Gale et al. (2014). However, given the medium/high uncertainty, the overall risk is left at “low”.</p>						

Consequence assessment

Spread of disease from the gathering

If undisclosed avian notifiable disease were to be introduced to a bird gathering by live birds, there is a possibility that unless disease is confirmed during the event, it would remain undisclosed until after the gathering – and therefore there is a potential for further spread. The likelihood of this depends on the length of the event as with longer events the possibility that birds show signs of disease becomes greater, although it may also increase the number of potential contacts between birds at the gathering.

The extent of onward geographical spread depends on the extent of contact and spread between birds at the gathering itself and also where the birds are transported to following the event. The most effective way of preventing such spread would be to detect suspicion of disease at the time of the gathering, while the birds are still together. However, if the source of infection is a (group of) birds with subclinical infection, this increases the risk of onward spread. The size of the gathering, levels of biosecurity and length of the gathering would directly affect the number of potential contacts between infected and susceptible birds.

The consequence of avian influenza being detected in birds either at or having attended a gathering during the risk period is a serious matter for not only industry but also for the competent authorities. This could lead to a multi-focal outbreak in birds which have moved to different parts of the country and which are difficult to trace.

Any outbreak of notifiable avian disease has a significant impact on the UK poultry industry, through the trade and economic impacts on the producer. This is the same for any notifiable avian influenza virus. Average costs to government may be between £2 million and £4 million per outbreak, depending on the number of birds involved and complexity of the investigation.

If disease is detected at a gathering before it concludes and before the birds are dispersed, Government would face a complex challenge relating to disease control at the gathering, including dealing with a large number of owners who may be resistant to the need to cull their birds.

Whilst spread from a gathering may not lead to widespread disease into the commercial sector and may be restricted to small producers, the case in 2007 in the UK involving a market showed that there is a potential scenario for this occurrence. While for the majority of shows and gatherings involve birds classified as not destined for the food chain (as breeders or producers) it is important to note that even one outbreak in backyard premises would still lead to implementing disease control measures, as specified in the current regulations.

The risk assessment presented here addresses the risk of transmission at gatherings and does not consider how many other establishments could be infected, which would depend on the size of the gathering and individual bird keepers who attend them. In the 2020 to 2021 epizootic of HPAIV H5 in Europe, there was evidence that many captive bird/poultry outbreaks could be traced to a single dealer in southern Germany emphasizing the potential consequence that gatherings could have.

A reasonable worst-case outcome for multiple outbreaks to occur would be for an infected but apparently healthy bird to be taken to a gathering where it infects some, but not all, of the other birds present, but disease is not detected. The birds at the gathering are then taken to widely distributed premises. One or more of the infected birds is then detected through passive surveillance leading to at least one outbreak being confirmed with consequent disease control zones, impacts on industry and a costly tracing exercise.

There has been one comparable case in recent years but this involved LPAI so the consequences were limited and again, for certain species of birds this is less likely.

Mitigation measures

Measures to mitigate the risk of disease entering a gathering and the potential impact include disease vigilance and prompt reporting of any suspicion, high levels of biosecurity and accurate record keeping to assist in any possible tracing exercise following the event. A table is provided below of possible measures. The risk of further (cross) contamination and onward spread occurring at and beyond the gathering could be mitigated by maintaining high levels of biosecurity, including reducing the number of potential contacts between infected and susceptible birds and informing livestock keepers about the need for vigilance for clinical signs of avian notifiable disease. A quarantine/standstill period on holdings after return of birds from gatherings could also be considered, although may be impractical, particularly for backyard premises.

Conclusions

Currently (12 December 2023) the risk from gatherings is predicted to be **low** for all captive bird groups including Psittaciformes, Columbiformes, passerines, birds of prey, and Galliformes with the exception of Anseriformes (ducks and geese) for which the risk is **medium**. This is because ducks and geese have greater contact with wild waterbirds. Due to the high uncertainty in the low risk level for the presence of infection in poultry prior to attending the gathering (based on the current risk level for poultry with suboptimal biosecurity), the uncertainty in this low risk level for Galliformes attending gatherings is also high, and the risk from some Galliformes, depending on their biosecurity, may be nearer the medium end of the low risk level. The uncertainty in the low risk levels for Psittaciformes, Columbiformes, passerines, and birds of prey is low as many are kept indoors or aviaries. The uncertainty in the medium risk level for Anseriformes is low.

It should be noted that the “low” risk band covers a wide range of risk and so for bird orders such as Psittaciformes, birds of prey and passerines which tend to be kept in aviaries and therefore with less likelihood of contact with wild birds, the risk level will be lower within the low band than for Galliformes. Also the low probabilities that infected birds of prey and passerines are not detected prior to the gathering would reduce their risks further.

Therefore in response to the risk questions:

- 1) What is the risk of the introduction of HPAI H5N1 into bird fairs, shows, markets, sales and other gatherings? **The risk currently (at 12 December 2023) is low for all species with the exception of Anseriformes (ducks and geese) for which the risk is medium.**
- 2) What, if any, management options are available to reduce the likelihood and the impact of introduction and subsequent spread of avian notifiable disease through the above mentioned gatherings? **Options are to ban, allow only certain species or allow everything with stricter controls and this is in order of increasing risk. A regionalisation option could also be considered.**

Uncertainties

The uncertainty in the medium probability for Anseriformes spreading HPAI through gatherings is low reflecting that of the medium probability that ducks and geese are infected prior to being taken to the gathering. The uncertainty in the low probability for Galliformes spreading HPAI through gatherings is high.

It is noted that the level of risk in Galliformes will vary with location across Great Britain. Premises located near to waterbodies such as estuaries and lakes with wintering wildfowl, for example, are at the medium end of the low risk band and may actually be at medium risk (in line with that for wild birds) if the biosecurity is particularly poor.

The wild waterbird autumn migration from western Europe is almost complete with most birds now having arrived in Great Britain for the winter. While HPAI positive events in the Netherlands, Denmark and Germany are of less importance for Great Britain at this time of year compared to October/November, there is the possibility of small numbers of birds coming over to winter in Great Britain if for example the weather were to become colder in Europe. Thus the wild bird risk level in Great Britain, although currently **medium**, may increase at some stage between now and the end of February 2024 if a snap of cold weather in north-western Europe were to bring more waterbirds into Great Britain. This would be associated with an increase in the direct risk to poultry and hence to bird gatherings, particularly through Galliformes and Anseriformes. It should be noted that severe cold and heavy snow are forecast for north-eastern Europe in December 2023.

References

- Abolnik, C., Stutchbury, S. and Hartman, M. J. (2018) Experimental infection of racing pigeons (*Columba livia domestica*) with highly pathogenic Clade 2.3.4.4 sub-group B H5N8 avian influenza virus. *Veterinary Microbiology* 227:127-132.
- Defra (2016) [Risk assessment on the likelihood of spread of avian notifiable disease associated with bird fairs, shows, markets, sales and other gatherings \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/534227/risk-assessment-on-the-likelihood-of-spread-of-avian-notifiable-disease-associated-with-bird-fairs-shows-markets-sales-and-other-gatherings.pdf).
- Gale, P., Brouwer, A., Ramnial, V., Kelly, L., Kosmider, R., Fooks, A.R. and Snary, E.L. (2009) Assessing the impact of climate change on vector-borne viruses in the EU through the elicitation of expert opinion. *Epidemiology and Infection* 138, 214-225.
- Gale, P., Goddard, A., Breed, A.C., Irvine, R.M., Kelly, L. and Snary, E.L. (2014) Entry of highly pathogenic avian influenza virus into Europe through migratory wild birds: a qualitative release assessment at the species level. *Journal of Applied Microbiology*, 116, 1405-1417.
- Kwon, J.-H., Noh, Y.K., Lee, D.-H., Yuk, S.-S., Erdene-Ochir, T.-O., Noh, J.-Y., Hong, W.-T., Jeong, J.-H., Jeong, S., Gwon, G.-B., Song, C.-S., Nahm, S.-S. (2017). Experimental infection with highly pathogenic H5N8 avian influenza viruses in the Mandarin duck (*Aix galericulata*) and domestic pigeon (*Columba livia domestica*). *Veterinary Microbiology* 203: 95-102.
- Wade, D., Ashton-Butt, A., Scott, G., Reaid, S.M., Coward, V., Hansen, R.D.E., Banyard, A.C. and Ward, A.I. (2023) [High pathogenicity avian influenza: targeted active surveillance of wild birds to enable early detection of emerging disease threats - PubMed \(nih.gov\)](https://pubmed.ncbi.nlm.nih.gov/36812341/).