



Department
for Environment
Food & Rural Affairs

Risk assessment on the likelihood of spread of highly pathogenic avian influenza (H5Nx) associated with bird fairs, shows, markets, sales and other gatherings

Qualitative Risk Assessment

November 2021



© Crown copyright 2021

You may re-use this information (excluding logos) free of charge in any format or medium, under the terms of the Open Government Licence v.3. To view this licence visit www.nationalarchives.gov.uk/doc/open-government-licence/version/3/ or email PSI@nationalarchives.gsi.gov.uk

This publication is available at www.gov.uk/government/publications

Any enquiries regarding this publication should be sent to us at

helen.roberts@defra.gov.uk

www.gov.uk/defra

Contents

| | |
|--|----|
| Summary | 4 |
| Background..... | 5 |
| Hazard identification | 7 |
| Risk Question | 11 |
| Scope | 11 |
| Terminology related to the assessed level of risk..... | 11 |
| Entry assessment..... | 11 |
| Captive birds..... | 12 |
| Game birds | 12 |
| Birds of prey | 13 |
| Exposure assessment..... | 15 |
| Consequence assessment..... | 17 |
| Mitigation measures | 19 |
| Conclusions..... | 19 |
| Assumptions and Uncertainties | 19 |

Summary

The licence for holding bird gatherings during periods of freedom from notifiable avian disease i.e. between epizootics, is supported by a risk assessment which considers the general background risk of avian influenza based on an unidentified, albeit very low level of circulation in wild birds on a year-round basis. As the avian influenza season starts, the risk level increases and the licences and risk assessments are reviewed.

In previous years, as a result of the outcome of a rapid risk assessment, undertaken to assess the risk from poultry and captive bird gatherings in response to outbreaks and cases of highly pathogenic avian influenza (HPAI) H5 subtypes (H5N8, H5N1 and H5N6, all of which were detected in poultry, captive and wild birds in the UK) the licence for gatherings has been suspended for certain species of bird. In this new avian influenza season, during October 2021 there have been several cases of HPAI H5N1 detected in England, Scotland and Wales in endemic or recently captive wild birds and one outbreak in a wildlife rescue centre, presumed introduced through rescued wild mute swans. This unprecedented, early, widespread reporting is not entirely unexpected given the AI situation on the Continent, but does suggest that virus is circulating in GB.

Due to the developing season of HPAI H5N1 in the UK, the risk levels for wild birds, poultry and captive birds were increased on October 29th to HIGH for further wild bird cases, MEDIUM for introduction into poultry farms and captive bird establishments with less stringent biosecurity and LOW for poultry farms and captive bird establishment with stringent biosecurity. An Avian Influenza Prevention Zone (AIPZ) may be put in place which would expect personnel working with poultry and hobbyists to take additional biosecurity measures. A housing order was used in the 2020-21 epizootic, and would be an option to further reduce the risk of HPAI cases in domestic birds should the risk continue to increase.

The risk of spread of HPAI as a result of birds mixing at a gathering, becoming infected and then dispersing to the same or different establishments was assessed as MEDIUM and was based on the overall risk for a bird to be infected at the establishment of origin before entering the gathering and that multiple birds from multiple sites come together in shared airspace. Since the qualitative risks are combined using a matrix that takes the lowest risk in the risk pathway, it follows that the risk of HPAI H5Nx infection in those birds being taken to gatherings must be LOW (or lower) in order for the predicted output risk of spread of HPAI H5Nx from bird gatherings also to be LOW. That is, the risk in captive bird species (excluding racing pigeons which are subject to a different assessment) and poultry that could be taken to gatherings should be LOW across GB irrespective of biosecurity standard. It is therefore necessary to ensure that only those captive birds and poultry that may attend gatherings are in this LOW risk category for the purpose of maintaining a low risk of spread from gatherings (those that are practicing adequate levels of biosecurity).

The focus of this RRA is on those poultry and captive birds that are most likely to be taken to gatherings. In terms of species, these include six bird orders, namely psittacines (parrots), columbiformes (doves, excluding racing pigeons), birds of prey, passerines (finches), galliformes (poultry and game birds) and anseriformes (ducks and geese). Of particular interest are those captive birds and poultry of hobbyists and backyard owners who, unlike the large commercial poultry premises, are likely to have less stringent biosecurity procedures in place and therefore are at a higher risk of becoming infected from direct or indirect exposure to wild birds and their faeces. Where Anseriformes (or Charadriiformes) are present, these may present a greater risk of transmission to other species, as these families act as reservoirs, producing large quantities of virus and often have few or milder clinical signs. Where Galliformes species are present, the clinical signs are expected to be overt and would raise suspicion by the owner or show staff. For the other species, in the absence of clinical signs, there is no evidence to suggest they are highly infectious to other birds.

Therefore, the baseline risk of this RRA is based on that of poultry with less than stringent biosecurity which is currently (as from 29 October 2021) MEDIUM. The risks for the six bird orders considered here (namely psittacines, columbiformes, birds of prey, passerines, galliformes and anseriformes) are then refined based on specific differences in access to their home environment where residual infectivity from wild birds may be present and prior to entering the gathering. The risk assessment also takes into account the probability that infected birds for each of the six orders are not detected prior to transport to the gathering.

Currently (from 29 October 2021) the risk associated with gatherings is predicted to be **low** for those where there are only psittacines, Columbiformes, passerines or birds of prey, but **medium** for any shows where Galliformes and/or Anseriformes are present.

This new assessment concludes that, bearing in mind the **high level of risk for GB for an incursion** of HPAI H5Nx and the **low to medium risk** depending on the quality of biosecurity for subsequent spill-over into resident domestic poultry, wild or captive birds, and the **medium risk of spread** should disease be introduced in a gathering, there are options around the licensing of gatherings which include to ban for the period of a prevention zone, to allow but only for certain species of birds or to allow but with improved requirements for biosecurity or on a regional basis.

Background

Prior to 2005, bird gatherings were not regulated in the UK, in contrast to those of other livestock. However, as a consequence of repeated introduction of avian influenza into several Member States of the European Union at that time, the EU introduced a general ban of all bird gatherings, unless permitted under licence by the individual Member Statesⁱ. These requirements are implemented in England under Regulation 6 of the Avian Influenza (Preventive Measures) (England) Regulations 2006ⁱⁱ. Separate legislation applies in Walesⁱⁱⁱ and Scotland^{iv} imposing the same requirements.

Initially, licences were issued for each gathering based on a standard assessment of whether a gathering was high, medium or low risk. However, this quickly proved unworkable with a massive administrative burden on Animal Health and Defra due to an estimated 10,000 bird gatherings a year across Great Britain.

In December 2005, it was decided to move to a single general licence which allowed all gatherings to take place (apart from gatherings for international pigeon races) providing that organisers adhered to the conditions in the licence. However, these types of gatherings are a concern as there is not always complete information on where the birds are coming from and there is no longer a requirement for a veterinary inspector or animal health officer to be present at the event.

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. This is the reasonable worst case scenario for avian influenza, as defined in the National Risk Assessment. [“An outbreak lasting at least 12 months from day zero to disease freedom declared by the OIE. 80 to 90 infected premises geographically spread across the UK. All infected premises are assumed to cover the manufacture of chicken and chicken products. Multiple outbreaks across the EU restrict multilateral trade across the region.”] During the last season in Europe, multiple outbreaks (105 in backyard holdings) associated with a dealer were reported in Germany in March which is an example of how quickly a problem can spread (European Commission Paff Meeting, April 2021. reg-com_ahw_20210423_pres_hpai_deu.pdf (europa.eu))

Gatherings of birds involve the coming together and subsequent dissemination of live birds (as well as people, vehicles and equipment) by definition and for this reason can facilitate the introduction and spread of avian notifiable disease. The magnitude of this risk is influenced by the number of different groups of birds brought together and the likelihood of them becoming infected at their point of origin. Movements out of an SZ or PZ around a confirmed case 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.

Birds with undisclosed infection may be potentially infectious to other birds at gatherings due to the possibility of virus shedding. This may be a risk to poultry and other captive birds kept elsewhere if the virus is introduced to a bird gathering and subsequently brought to premises where the participating birds are returned to as birds may be returned to different premises after the event (for example onward sale / change of ownership). Also, if infection is introduced to a gathering, it can be passed on to other susceptible birds to a variable degree depending on a number of factors such as the nature / size / layout of the event and the biosecurity measures applied. Infection can also be spread through bird gatherings by contamination of animals and things such as cages, feed, litter, vehicles, personal clothing, footwear, etc. This route is directly influenced by the extent of biosecurity applied.

Hazard identification

The hazard identified is the avian influenza A virus, HPAI H5Nx, which is most commonly H5N1, H5N2, H5N3, H5N4, H5N5, H5N6 and H5N8.

Since the start of the new season in 2021 (September) wild birds, captive birds and poultry in Europe have tested positive for HPAI H5N1 and H5N8. In UK between mid to end of October, there have been detections of HPAI H5N1 in wild birds and a wild bird rescue centre in England, Scotland and Wales. All these viruses are genetically closely¹ related through their haemagglutinin gene, which is the key viral gene influencing pathogenesis, host range, transmission, and host immunity. Continued alteration to circulating viruses following co-infection and genetic reassortment in wild birds is not unexpected in this haemagglutinin gene. Although to date, the viruses characterised have been of high sequence identity across isolates of the same H5 subtype. Further genetic variation at genome level may however still occur.

Last year's epizootic was unusual for the long season and the wide range of migratory and non-migratory wild waterfowl in Europe that were identified as infected, with over 2,500 cases (and around 160 in the UK) in wild birds between mid-October 2020 and early April 2021 (IZSve 2021). Since September 2021, there have been more than 15 outbreaks of HPAI H5N1 in poultry in Czechia, Estonia, France, Denmark, Germany, Netherlands, Italy and Poland and multiple wild bird cases in North West Europe. Therefore the avian influenza viruses are likely to be circulating widely in wild birds across Europe.

What is unknown at present, is whether there are species of wild waterfowl which do not show clinical signs of infection, and whether the virus can circulate in non-migratory, wild birds such as passerines. There is limited information regarding H5Nx infection in pigeons, although in the past there has been observable morbidity and / or mortality in the small number of cases reported.

Expert opinion is that the virus will retain infectivity in the environment at low temperatures, at least to 21 days at 4°C and 8.4 days at 20°C. Data on viral persistence indicate that the HPAI H5N8 virus has extended survival properties when compared to the 2016 H5N8 virus that had survival properties of 14 days at 4°C and 6 days at 20°C. Ultimately, this suggests that the 2020/21 isolate lasts 50% longer at 4°C and 40% longer at 20°C than the H5N8 characterised in 2016/17.

¹ The National (& OIE) Reference Lab at Weybridge has confirmed the H5N1 viruses isolated from GB cases are closely related to those previously circulating in 2020/2021. Whilst there are notable differences to contemporary H5Nx viruses, the UK H5N1 virus demonstrates no strong correlates for specific increased affinity for humans.

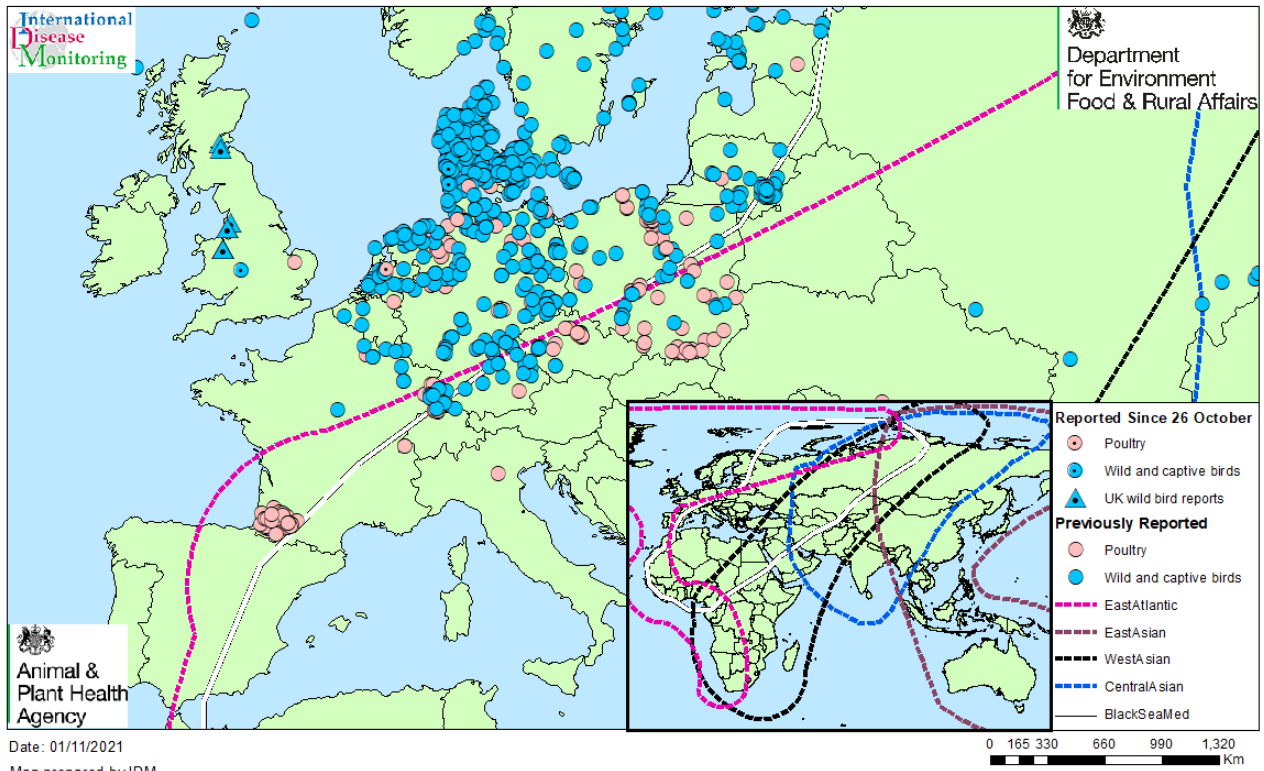
The pattern of geographical distribution follows that seen for the previous two epizootics (2016/17 and 2020/21) of HPAI H5Nx in Europe. In those years, spread occurred along the route of migratory wild waterfowl causing wild bird die-offs in North and Central Europe. This new season is following a similar pattern; of transmission in wild birds, and spill-over into domestic poultry. It can be expected that the season will continue to challenge the poultry sector in Europe over the coming months, especially if the virus continues to circulate in non-migratory waterfowl or other species in Europe.

Gatherings of birds involve the coming together and subsequent dissemination of live birds (as well as people, vehicles and equipment), by definition, and for this reason can facilitate the introduction and spread of avian notifiable disease. The magnitude of this risk is influenced by the number of different groups of birds brought together, the species and the likelihood of them becoming infected at their point of origin. Movements out of an SZ or PZ around a confirmed case are not permitted without licence. Traceability of birds is one of the control measures which improves the ability to control disease. For poultry and other captive birds at gatherings, this can be very difficult to enforce.

Birds with undisclosed infection may be potentially infectious to other birds at gatherings due to the possibility of virus shedding. This may be a greater risk to poultry and other captive birds kept elsewhere if the virus is introduced to a bird gathering with an infected bird (and therefore shedding virus for several days) and the birds are together for a significant period of time (the time required for transmission is not known so it is not possible to state a “safe” length of exposure time). If infection is introduced to a gathering, it can be passed on to other susceptible birds to a variable degree; depending on a number of factors, such as the nature / size / layout of the event, the biosecurity measures applied and the length of the event. Infection can also be spread through bird gatherings by contamination of animals, and things such as cages, feed, litter, vehicles, personal clothing, and footwear. This route is directly influenced by the extent of biosecurity applied.

The UK has now reported the first cases this season of HPAI H5N1 both in captive birds and poultry and at multiple sites with infected wild birds across Western England, Southern Scotland and North Wales (see Figure 1). The wild bird infection pressure is thought to be rapidly increasing in the UK. The migratory wild waterfowl population is still continuing to arrive, with the winter peak expected in December to January, with the majority of migratory water bird species departing the UK by the end of March; the frequency of wild bird HPAI cases is now expected to significantly increase in the UK. Bridging species (sedentary birds) may play a role in fomite spread, and environmental contamination is likely to be substantial around wild migratory waterfowl areas. Therefore, the risk of HPAI H5 incursion in wild birds is currently **HIGH**.

Given a increasing wild bird infection pressure, and increasing levels of environmental contamination, the risk of HPAI exposure to poultry and captive birds across the whole of GB is currently **LOW** with medium uncertainty (where stringent biosecurity measures are applied) **and MEDIUM** with medium uncertainty (where biosecurity is sub-optimal).



Highly pathogenic avian influenza in Poultry, Captive and Wild birds
 May - October 2021
 Overlay: migratory bird flyways

Figure 1 – Europe HPAI H5Nx outbreaks and wild bird cases (2020/2021 season, from May to 31/10/2021)

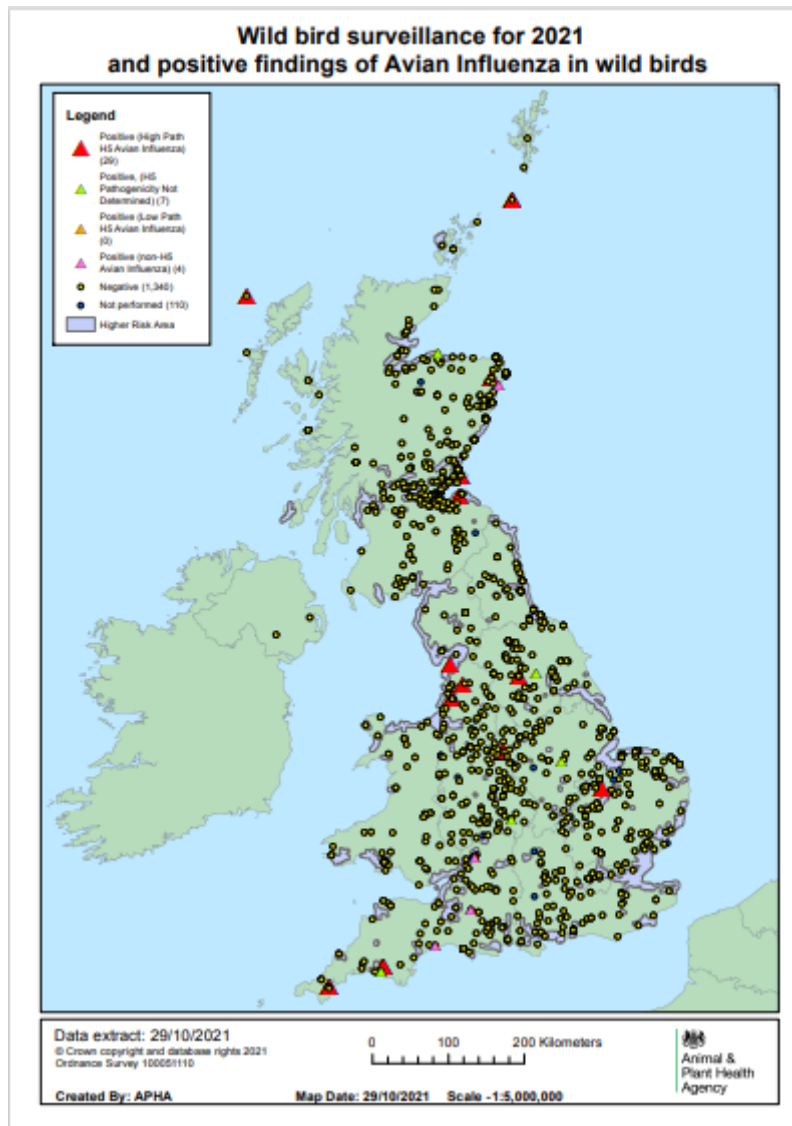


Figure 2: UK Wild bird surveillance for 2021

Bird families glossary

Order of birds and some examples:

- Columbiformes: Pigeons and doves
- Birds of Prey: Hawks and falcons
- Passerines: Finches and canaries
- Galliformes: Turkeys, pheasants, chickens, guineafowl.
- Anseriformes: Ducks and geese

Risk Question

- 1) *What is the risk of the introduction of avian notifiable disease into 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 above mentioned 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 often
- **Very high:** Event occurs almost certainly

Entry assessment

Previous Defra risk assessments (Defra, 2010 et seq.) 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. These assessments concluded that the overall risk of the introduction of avian notifiable diseases to a bird gathering is related to the actual disease situation domestically and in Europe, both in domestic poultry and in wild birds.

HPAI H5N1 is already in the UK and therefore the risk of entry is not assessed. The risk from wild birds in the EU is relevant at this stage of the season but this is encapsulated in the overall risk level to poultry and captive birds. The risk of those birds which may attend gatherings being infected with HPAI H5Nx should be based on the official risk of GB poultry with poor biosecurity being infected through background environmental contamination from infected wild birds. This is currently MEDIUM. The risks for the six bird orders considered here (namely psittacines, columbiformes, birds of prey, passerines, galliformes and anseriformes) are then refined based on specific differences in access to the environment where residual infectivity from wild birds may be present.

An avian influenza prevention zone has only now been put in place across England, Scotland and Wales but without a housing requirement, therefore it is likely that all birds which may attend gatherings will have some access to the outside. For example hobbyist fancy poultry may be allowed to roam in the “backyard”, pigeons, birds of prey, and even parrots may have some outside access. Captive 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.

Captive birds

Captive birds, such as those held in collections, zoos or approved bodies are already semi-housed and should be kept separate from wild birds. For some, it will be difficult to prevent access to their water environment (penguins, pelicans, flamingos, ducks, geese etc) and it is unlikely that it will be possible to house indoors, so every effort should be made to prevent wild waterfowl access in these situations.

Game birds

Game birds have been released for the shooting season and will not be gathered up until January/February. Some may be transported for sale at auctions at this time of year in readiness for the breeding season in the spring.

Most species of game bird are susceptible to HPAI H5Nx infection and rapidly show clinical signs (although this is variable and depends on the species of gamebird). Indeed, there have already been several large die-offs of pheasants in Finland associated with HPAI H5N1 infection and one in GB (AIV 2021/08). Even though the birds have been released, as this is the middle of the shooting season, they are still managed by the game keepers who will feed the birds and ensure they stay in the area and do not disperse. It is likely that as they become moribund such birds are more easily predated by foxes etc before they could be re-caught or may die away from feeders, avoiding detection.

Birds of prey

It is known that birds of prey show overt clinical signs if infected with the current circulating HPAI H5Nx viruses. There are many examples of wild raptors being infected both the UK and in the EU during the last two seasons (2019/20 and 2020/21). 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. It is most likely that two housed captive peregrine falcons became infected in England in 2021, after being fed shot infected wild duck meat, which had been stored in a freezer. Freezing reduces the rate of the viral decay, therefore, there may be a store of infected frozen wild duck meat in the UK being kept for the purpose of feeding to birds of prey. At this stage in the season, captive birds of prey catching and consuming infected wild birds is likely because of the high risk in wild birds. Current advice is to fly birds for exercise and to keep them clean but feed them on commercial feed only. Captive birds of prey which do become infected in the UK through being fed frozen infected shot wild duck meat would show clinical signs within 2-3 days of feeding and are likely to be detected prior to taking to a gathering; hence the risk of not detecting prior to taking to a gathering is low.

Whilst there may be more birds of prey becoming infected in the UK through consuming wild infected birds, for captive birds of prey, the overall risk of these birds having undetected disease is **low** based on the length of the show and the whether the birds were fed recently.

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). However, they do not show clinical signs or mortality with LPAI. Nevertheless, if infected with HPAI H5 then mortality would be expected and there have been reports of mortality of wild passerines, namely house sparrows in Poland and France in February 2021 from the current HPAI H5 strains. The morbidity of HPAI infected passerines is not known. The probability of infected passerines not being detected is therefore assumed to be **low**.

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, it is possible that related Columbiformes may be present at a bird gathering for other species or breeds.

A recent study, in which 18 racing pigeons were inoculated intranasally HPAI H5N8 (clade 2.3.4.4 subgroup B) of South African origin, viral shedding was reported 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 pigeons. The quantity of virus

excreted was below the threshold for an infectious dose for a chicken and in contact chickens did not become infected or seroconvert (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 although con-housed chickens did not become infected or seroconvert (Kwon et al, 2017). Pigeons could also be fomite transmitters of the virus.

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

The baseline risk of infection assumed for captive birds that could be taken to gatherings is based on the current risk to poultry with poor biosecurity. This is currently MEDIUM. The risks for the six bird orders considered here (namely psittacines, Columbiformes, birds of prey, passerines, Galliformes and Anseriformes) are refined in the table below based on specific differences in access to the environment where residual infectivity from wild birds may be present.

| Order | Examples | Probability of being infected currently (from 22 March 2021) prior to going to gathering |
|---------------|---|---|
| Psittacines | Parrots | Low – kept in aviaries or indoors |
| Columbiformes | Pigeons and doves | Low – although kept outside, susceptibility to H5Nx is low compared to other species (Kwon et al, 2017). |
| Birds of Prey | Hawks and falcons | Medium – although kept in aviaries, may be fed infected frozen shot wild duck meat from autumn/winter 2020/21 |
| Passerines | Finches and canaries | Low - kept in aviaries or indoors |
| Galliformes | Turkeys, pheasants, chickens, guineafowl. | Medium* (>60% layers are outdoor; <5% broilers) |
| Anseriformes | Ducks and geese | Medium* – likely to be outdoors with access to ponds |

*Based on current risk to poultry with poor biosecurity.

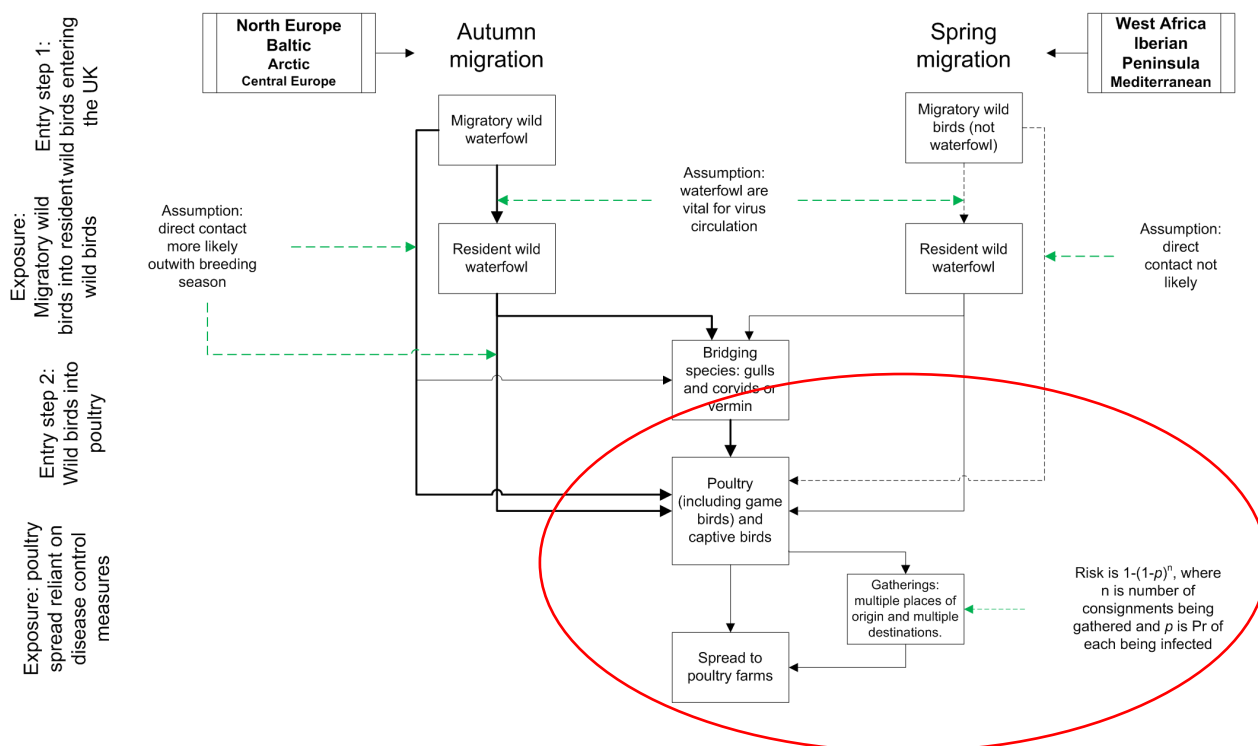
Probability of HPAIV H5 not being detected prior to gathering

It is assumed that the likelihood of disease not being detected prior to the gathering is **high** for Anseriformes and Columbiformes, **medium** for Psittacines but **low** for Passeriformes and birds of prey. This is because birds of prey seem particularly susceptible to morbidity and mortality from the current HPAI H5 with many affected in the wild in both the UK and EU perhaps because they are exposed to very high viral doses through eating infected carcasses including the lungs and GI tract. 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. Similarly Galliformes show high mortality in the poultry outbreaks. 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**. While there have been many dead Anseriforme-positives reported both in the UK and Europe, many wild ducks and geese have survived suggesting that the probability of infected ducks and geese not being detected prior to the gathering event is at least medium. The likelihood of disease being undetected for Psittacines is unknown and assumed to be **medium**. Pigeons do not show clinical signs when infected with H5N8 (Abolnik et al, 2018, Kwon et al, 2017) and there is a **high** probability of not detecting infected Columbiformes.

Exposure assessment

This section deals with the risk that infected birds will spread disease at a bird gathering. The following figure illustrates the different risk pathways for entry and exposure and highlights the exposure associated with spread through a gathering, notably the concept of $1-(1-p)^n$ which is the expression of the aggregated risk of multiple consignments from different origins mixing in a gathering with the same airspace and resulting in multiple infected birds.



This updated assessment of the risk pathways for bird gatherings highlights the following main routes of disease spread where these events may play a role.

Introduction of disease to the gathering

Avian notifiable disease can be introduced to bird gatherings in a number of ways: by infected live birds and their products; contamination such as cages, feed, litter, water, clothing, footwear, vehicles etc; contact with infected wild birds. This likelihood would increase if a disease outbreak were reported from the country or region of origin of introduced birds or in the region of the gathering. Good biosecurity is necessary to mitigate this risk as far as practicable – this includes advice that only healthy birds are introduced (i.e. disease vigilance) and that clean cages, vehicles and other equipment used to transport birds should be used and that contact with wild birds should be minimised. Because birds can be infected but not show signs of disease during a variable incubation period or certain species can be susceptible to infection but not show signs of disease, there is a risk that apparently healthy birds may be infected. Therefore, for a large gathering, the probability of disease being introduced can increase, according to the number of locations from which birds are gathered, where there are mixed species (in particular mixing Anseriformes poultry with Galliformes poultry) on the establishment of origin and the biosecurity level at the establishment of origin.

Spread of disease within the 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 and the source of the infection (infectious live birds may be more effective in spreading disease than a contaminated piece of equipment), 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 etc. Therefore, the risk of disease spread, if already introduced to a gathering would be **medium**. The possibility to implement risk mitigating measures would largely depend on the nature of the gathering and would include advice to make an informed choice of the place/venue/event layout, to practice good biosecurity during the event, to minimise potential contact between birds and to maintain vigilance for any clinical signs of avian notifiable disease.

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.

However, if the causative agents of the disease were to be introduced by mechanical spread (i.e. contamination), the likelihood that birds would become infected at the event would depend on the level of biosecurity practiced 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. Therefore it is important to note that with certain avian influenza viruses, with high pathogenicity, there will be a higher likelihood of disease being reported.

Qualitative risk assessment

Current situation

Current situation 29 October 2021: Qualitative risk assessment for spread of HPAI H5Nx at bird gathering according to bird family.

| | Psittacines | Columbiformes | Birds of Prey | Passerines | Galliformes | Anseriformes |
|--|-------------|---------------|---------------|------------|----------------------------|--------------|
| Likelihood of infection prior to gathering | Low | Low | Medium | Low | Medium | Medium |
| Likelihood of not detecting disease | Medium | High | Low | Medium | Low to Medium [†] | High |
| Risk of spread of disease at gathering | Medium | Medium | Medium | Medium | Medium | Medium |
| Overall risk* | Low | Low | Low | Low | Medium | Medium |

[†]Depends on the breed – some Galliformes game birds may show less overt clinical signs. This results in high uncertainty in these values until more data are available.

*Risk of spread of HPAI H5Nx at bird gathering calculated as lowest probability in the column according to matrix of Gale et al. (2010).

Consequence assessment

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 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 multiple outbreaks in backyard premises would still lead to implementing disease control measures, as per the EU regulations.

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 type of event is less likely to happen. The National Risk Assessment (NRA) has a reasonable worst case scenario for avian influenza which is defined as:

- Scenario: An outbreak lasting at least 12 months from day zero to diseased freedom declared by the OIE. 80 to 90 infected premises geographically spread across the UK. All infected premises are assumed to cover the manufacture of chicken and chicken products. Multiple outbreaks across the EU restrict multilateral trade across the region
- The total costs were estimated at **£90m-£360m**. This includes:
 - Staff (in-house or contracted) cost (Gvmt)
 - Compensation (Gvmt)
 - Wider impacts on UK society
 - Impact on export markets
 - Uncompensated losses
- This gives a rough cost per IP (Gvmt + industry + rest of society) of roughly £1m-£4m.

Although this scenario is based on multiple incursions into chicken premises, an outbreak associated with a large gathering could lead to a similar number of outbreaks, but with the added complication of this occurring over a shorter time period which puts considerable

stress on resources, and that the types of owners may have more emotional attachment to individual pedigree or show birds.

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.

Conclusions

Currently (from 29 October 2021) the risk associated with gatherings is predicted to be **low** for those where there are only psittacines, Columbiformes, passerines or birds of prey, but **medium** for any shows where Galliformes and/or Anseriformes are present.

Therefore in response to the risk questions:

- 1) What is the risk of the introduction of avian notifiable disease into bird fairs, shows, markets, sales and other gatherings? *The risk currently (from 29 October) is low to medium depending on the species but with high uncertainty given the lack of data for the clinical signs of this HPA H5N1 virus in some bird species of interest.*
- 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.*
- 3) See table below but the key additional measures would be: a) vet in attendance; b) keeping records when birds change ownership; c) when birds change ownership, isolating for 7 days at destination.

Assumptions and Uncertainties

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, e.g. that birds are not coming from areas under disease control restrictions.

The level of awareness of avian notifiable diseases in the UK and EU 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 Community legislation. Member States are kept informed through the regular meetings of the Standing Committee on Plants, Animals, Food and Feed (PAFF) and by communications issued by the European Commission. In the event of a confirmed disease outbreak in a Member State, cross-border tracings are notified to the relevant Chief Veterinary Officers which trigger follow-up disease investigations and possible measures in the country(ies) affected.

The diseases relevant to this risk assessment are notifiable by law. Systematic active surveillance has been carried out across the European Union for notifiable avian influenza in domestic poultry and wild birds for a number of years. However, the true prevalence of notifiable avian disease cannot be established as it is not possible to test all categories of birds with the required precision and subclinical forms of disease may occur. Generally, we consider that avian influenza viruses are circulating in the wild bird population and there is a continual low risk of introduction into the domestic poultry population.

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.

According to the World Animal Health Organisation (OIE), the maximum incubation period in poultry for notifiable avian influenza has recently been re-assessed by the OIE to 14 days². Therefore, this risk assessment considers that susceptible birds may shed the virus during this period and act as potential sources of infection to other susceptible birds before showing clinical signs of the disease. The monitoring period during which tracing activity should be undertaken, has been assessed by EFSA as 21 days ([Scientific Opinion on the assessment of the control measures of the category A diseases of Animal Health Law: Highly Pathogenic Avian Influenza | EFSA \(europa.eu\)](#))

² [Terrestrial Code Online Access - OIE - World Organisation for Animal Health](#)

ⁱ Commission Decision of 19 October 2005 laying down biosecurity measures to reduce the risk of transmission of highly pathogenic avian influenza caused by Influenza virus A subtype H5N1 from birds living in the wild to poultry and other captive birds and providing for an early detection system in areas at particular risk ([2005/734/EC](#)) as amended by [2005/745/EC](#), [2005/855/EC](#), [2006/574/EC](#), and [2009/818/EC](#)).

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

ⁱⁱ [The Avian Influenza \(Preventive Measures\) England Regulations 2006](#)

ⁱⁱⁱ [The Avian Influenza \(Preventive Measures\) \(Wales\) Regulations 2006](#)

^{iv} [The Avian Influenza \(Preventive Measures\) \(Scotland\) Order 2007](#) and [The Avian Influenza \(Preventive Measures in Zoos\) \(Scotland\) Regulations 2005 \(as amended\)](#).

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.