Animal &
Plant Health
Agency

Scientific opinion on the incursion of High Pathogenicity Avian Influenza (HPAI) H5N1 into housed or not housed poultry flocks and captive birds

Date: 24 October 2022

Summary

This scientific opinion for the risk of incursion of HPAI H5N1 into housed and non-housed birds (domestic poultry and captive birds) in winter 2022 to 2023 in Great Britain from direct and indirect contact with wild birds has been updated, in response to an increase in the number of findings of HPAI H5N1 in poultry and wild birds and the beginning of the migratory bird season. Since the start of the 2022 to 2023 season (start date of 1 October 2022), there have been findings of HPAI H5N1 in poultry, captive birds and wild birds in the UK which are consistent with the over-summering of virus in resident wild birds.

Housing orders have been put in place three times since 2016 (in the 2016 to 2017, 2020 to 2021 and 2021 to 2022 seasons), as a preventative measure to the estimated increased risk to poultry. The European Food Safety Authority (EFSA) in 2017 used expert opinion to assess the effectiveness of various biosecurity measures in preventing outbreaks. Expert opinion was utilised as there was insufficient published evidence to assess the efficacy of housing or biosecurity on the prevention of HPAI. The opinion concluded that housing as a standalone measure (such as in the absence of other biosecurity measures such as foot dips, cleaning equipment, preventing access to wild birds and rodent control) is likely to reduce the number of outbreaks and estimated a two-fold reduction in risk but is not able to completely prevent all outbreaks. It recommended that a suite of biosecurity measures should be implemented, alongside appropriate training. Nevertheless, the paper did highlight that outdoor poultry holdings bear an increased risk of Avian Influenza incursions and the applicable biosecurity measures are more limited where birds are not confined to housing.

Here the assessment for the current HPAI risk levels is updated, based on current control measures and the infection pressure for different areas of Great Britain from wild bird abundance, The key points relating to the current situation are:

1. The outbreak in 2021 to 2022 was unprecedented with HPAI H5N1 being identified in wild birds and holdings with kept poultry in Great Britain over the summer months. As such the risk levels in the 2021 to 2022 season never dropped below **LOW** for poultry (with **high uncertainty** for premises with poor biosecurity and **low uncertainty** for premises with stringent biosecurity), or below **medium** for wild birds.
2. In the 2021 to 2022 season (1 October 2021 to 30 September 2022) there were 152 infected premises.
3. Since the start of the 2022 to 2023 season (1 October 2022 to 24 October), there have been 70 confirmed Infected Premises (IPs) of poultry, with 64 of these in England and 2 in each of Scotland and Wales (correct at the time of writing).
4. HPAI H5 wild bird detections continued across Great Britain throughout the summer and into the new season, with 146 detections to 24 October 2022. The majority of these have been found in England (124), followed by Wales (19) and Scotland (3). While the majority (134) have been confirmed as H5N1, there are 12 cases for

which the HPAI H5 genotype has been identified, but characterisation of neuraminidase (NA) subtype is in progress due to low viral loads in samples.

5. Infection in resident species including waterfowl and gulls (such as mute swans, mallards, and herring gulls) has been reported, as well as infection in a small number of migratory species (pink footed goose and barnacle goose).
6. HPAI H5 (majority H5N1) has been reported across northern Europe and Russia throughout the summer in poultry and wild birds, with an increase in reports observed over the last few weeks. As such, migratory birds may bring further incursions of HPAI H5 with them and will also add to the susceptible population size in Great Britain over the coming months.
7. Following the high number of HPAI detections in wild birds and IPs in October 2022, the risk level was increased to **VERY HIGH** for wild birds on 21 October 2022 and the risk levels to poultry were increased to **HIGH** (with low uncertainty) where biosecurity is sub-optimal and increased to **MEDIUM** (with high uncertainty) where biosecurity is stringent (practicing the highest standards of biosecurity) on 14 October 2022.
8. Avian Influenza Prevention Zones (AIPZs) were declared in England, Scotland, Wales, and Northern Ireland on 17 October 2022. The AIPZ requires keepers and personnel working with poultry to take additional biosecurity measures. The AIPZ in England is additional to the AIPZ which was declared in Norfolk, Suffolk and parts of Essex on 27 September 2022, following an increase in the number of HPAI IPs with domestic poultry in the region and additional housing measures came into force for Norfolk, Suffolk, and parts of Essex on 12 October 2022. This means that all bird keepers in these areas (whether they have pet birds, commercial flocks or just a few birds in a backyard flock) are required by law to take a range of biosecurity precautions, including housing their birds (except in very specific circumstances).
9. There are a number of risk pathways for the introduction of HPAI to domestic birds. Transmission between infected wild birds and kept birds can occur as a result of direct transmission (beak to beak contact) or indirect transmission (wild birds contaminate objects and the environment which kept birds then come into contact with)
10. Spread of HPAI between premises when disease control measures and keeper awareness are high has been rare in the UK. Two proven events of secondary spread of HPAI prior to this winter season have occurred, in 2007 and 2017, where spread between two units of the same business occurred through shared workers. Nevertheless, in 2021 2022, and so far in the 2022 to 2023 season, there has been an unprecedented number of outbreaks in commercial farms in some areas and the source of infection (lateral spread, separate incursions from wild birds or from a heavily contaminated environment) is still under investigation.

Introduction

In an unprecedented season, HPAI has persisted in Great Britain throughout the summer months of 2022, with virus maintained in wild birds (including colony breeding seabird populations and gulls). In early autumn 2022, detections shifted to resident waterbirds (Canada geese, mallards, mute swans and gulls) prior to the arrival of the autumn migratory waterbirds. Currently (October 2022) the wild bird risk and infection pressure on poultry in GB has rapidly increased in recent weeks and the national risk levels for HPAI H5 in wild birds has been raised to **very high**, the risk to poultry with sub-optimal biosecurity has been raised to **HIGH** with **low uncertainty** and **MEDIUM** with **high uncertainty** for poultry with stringent biosecurity, following an increase in the number of Infected Premises (IPs).

In addition to maintenance of HPAI H5N1 in Great Britain over the summer months, reports have continued across Northern Europe during this time. The migratory birds which have historically brought HPAI to Great Britain have begun to make their journeys, with some having already arrived (though numbers are expected to peak in through December to January) which may act as a new source of infection, and/or a larger susceptible population.

Housing orders have been utilised in several countries. During the current season to date (24 October 2022), a housing order in high-risk areas has been implemented in France following the recent increase in reports, and housing has remained in place in some parts of the Netherlands for ten months. In the epizootics of 2021 to 2022 and 2016 to2017, many EU Member States (MS) put in place a housing order. The orders may cover just certain sectors of commercial poultry and certain high-risk areas.

The effectiveness of a housing order is difficult to assess. In 2021 to 2022 and 2016 to 2017 it is possible there would have been a higher number of outbreaks without an order in place. However, it is difficult to estimate how many flocks would have been exposed to the virus if the housing order had not been in place and therefore how many were prevented as a result of housing.

EFSA carried out a comprehensive review of the outbreaks of HPAI H5N8 in 2016 to 2017 to assess the risk of introduction into poultry from migratory and residential wild birds (EFSA, 2017). The opinion concluded that once virus is introduced to a wild bird population, a critical population size is required before virus amplification and further wild bird-associated geographical spread of the virus can take place. Therefore, there is an increased likelihood of incursion into poultry farms most closely located to large gatherings of wild birds (including but not exclusively waterfowl) of target species during the migration season. Once the migratory birds leave (from March onwards usually) the risk of incursion usually reduces but in cases where non-migratory birds are still testing positive, there will be a continual, albeit lower, risk. As has been observed over the summer months of 2022.

Through expert opinion, the impacts of various sanitary control measures were estimated and the relative risk reduction for entry of the virus was estimated to be **three-fold** by preventing access to water bodies, that housing gives a further **two-fold** reduction, and by applying routine biosecurity there is a further **fourfold** reduction in risk while high biosecurity leads to a **44-fold** reduction in risk.

A further supporting document to EFSA opinions on the risk of introduction of HPAI into poultry farms in general (EFSA, 2017a) was a systematic review of previous outbreaks to identify risk factors and concluded that the main risk factor for introduction is contact with wild birds or fomites contaminated with wild bird faeces. Other important risk factors were poultry species (waterfowl and turkeys are higher risk); production system, where outdoor systems are higher risk than indoor; and presence of biosecurity flaws.

This scientific opinion is aimed assess whether the implementation of housing is likely to reduce the number of outbreaks in Great Britain in the 2022 to 2023 season to aid policy decisions.

Risk assessment

Hazard identification

The hazard identified is the high pathogenicity avian influenza (HPAI) virus H5N1 subtype, as this is the only subtype isolated from the UK during the current season with just a single confirmed report of HPAI H5N8 in a mute swan found in Wiltshire in November 2021.

Risk question:

“What is the risk of incursion of HPAI H5N1 into housed and non-housed birds (domestic poultry and captive birds) in England, Scotland, and Wales in Winter 2022 to 2023 from direct and indirect contact with wild birds?”

Terminology related to the assessed level of risk

For the purpose of the risk assessment, the following terminology will apply (WOAH, 2021):

• **Negligible**: event is so rare that it does not merit consideration

• **Very low**: event is very rare but cannot be excluded

• **Low**: event is rare but does occur

• **Medium**: event occurs regularly

• **High**: event occurs very often

• **Very High**: event occurs almost certainly

Assumptions and uncertainties

- The wild bird counts for this year are not known and we are using an annual assessment based on previous years, alongside expert opinion of APHA ornithologists. This is likely to be similar year on year and the key point is that many birds have now arrived and will continue to do so until the expected peak in December through to January.
- HPAI H5N1 has been circulating over the summer months at levels high enough that it has been detected in resident waterbirds and other resident wild birds including red kites, gulls, buzzards, and sparrowhawks. This year is therefore epidemiologically distinct from previous years, and so the progression of the outbreak may not be similar to previous years. In previous years the virus may have been circulating but at levels below the sensitivity of our detection systems.
- Other wild bird species (although this assessment considers the most abundant) may also be important for the transmission of this virus.
- The patterns of movement of gulls are more complex than waterfowl. They aggregate at night-roosts (usually large waterbodies such as reservoirs) but forage and loaf across the wider landscape, often in wet pasture or tilled fields, exploiting opportunities on farms, but also at anthropogenic sites where food may abundant (inc. sewage facilities, landfill sites, food production facilities, commercial and tourist sites etc). Therefore, these should not be ignored as potential sites of concern for proximity to poultry farms. The presence of gulls has been noted on some IPs.
- The evidence for the economic benefits and dis-benefits of housing birds is not part of this assessment.
- A broad analysis of the last year of outbreaks across the European region has not been carried out but would provide useful intelligence on the effect of biosecurity measures.

Entry assessment

Probability that HPAI H5 is present in Great Britain currently

The 2021 to 2022 season began on 26 October 2021 when HPAI H5N1 was confirmed in a wild bird rescue centre in Worcester. It was expected that the season would cease after the winter as per the pattern in previous years, however detections in wild birds and IPs continued throughout the year. For administrative purposes the season officially ended at the end of September 2022 and the 2022 to2023 season began on 1 October 2022. It is important to note that the 2022 to 2023 season started at a point where cases had recently been confirmed in Great Britain which had not been free from HPAI for several months prior to the start of the season. Figure 1 shows that cases persisted through 2021 to 2022 unlike the season before. Since 1 October 2022 and as of 24 October 2022, there have been 70 confirmed Infected Premises in GB, with 66 in England, two in Wales and two in Scotland (Figure 2).

Figure 1: Bar chart showing the number of infected premises in the 2020/21 and 2021/22 seasons.

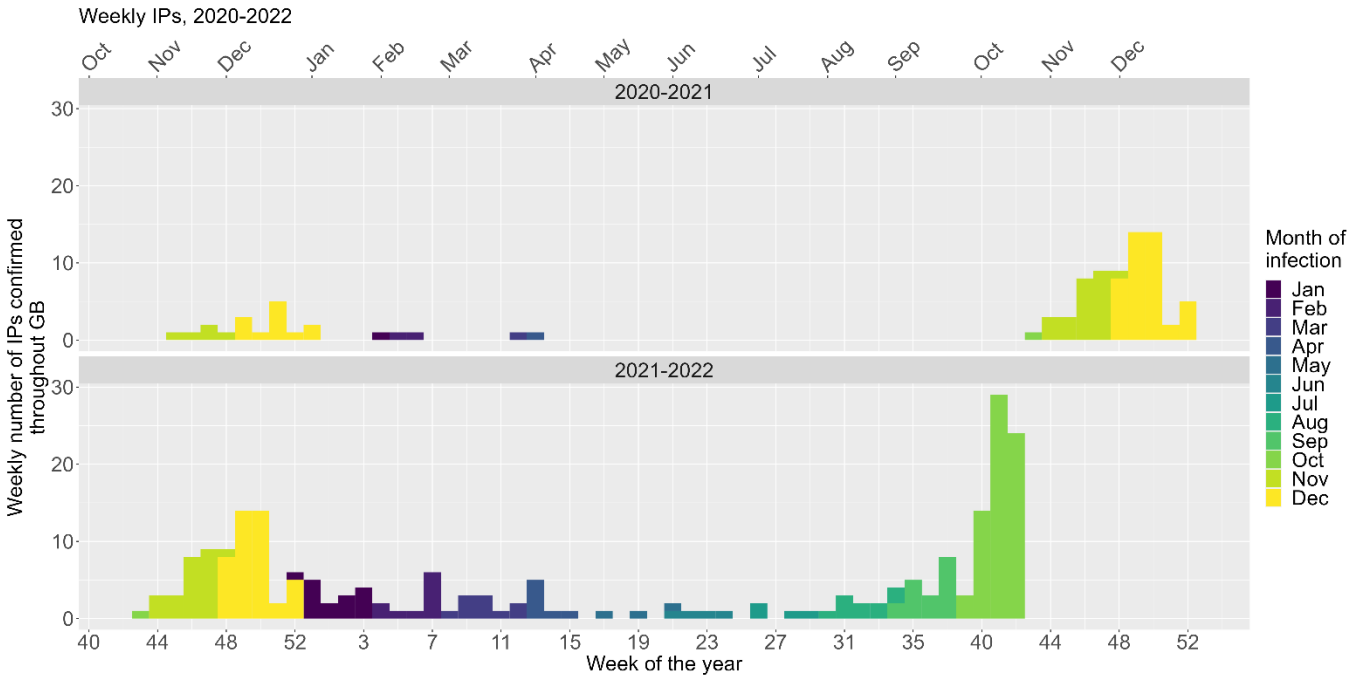
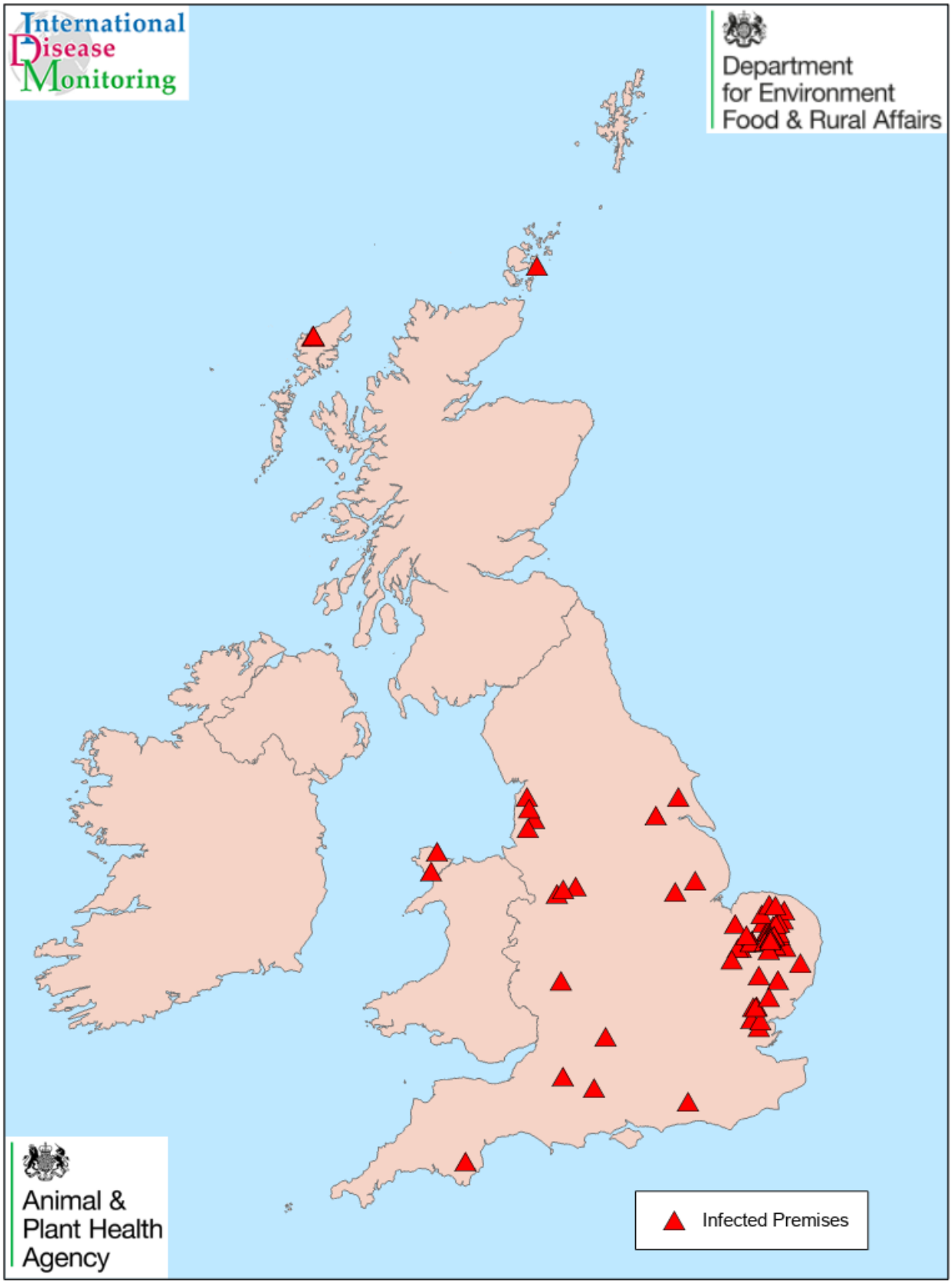


Figure 2: Outbreaks of HPAI H5N1 in domestic poultry and captive birds (as of 24/10/2022), in GB in October 2022.



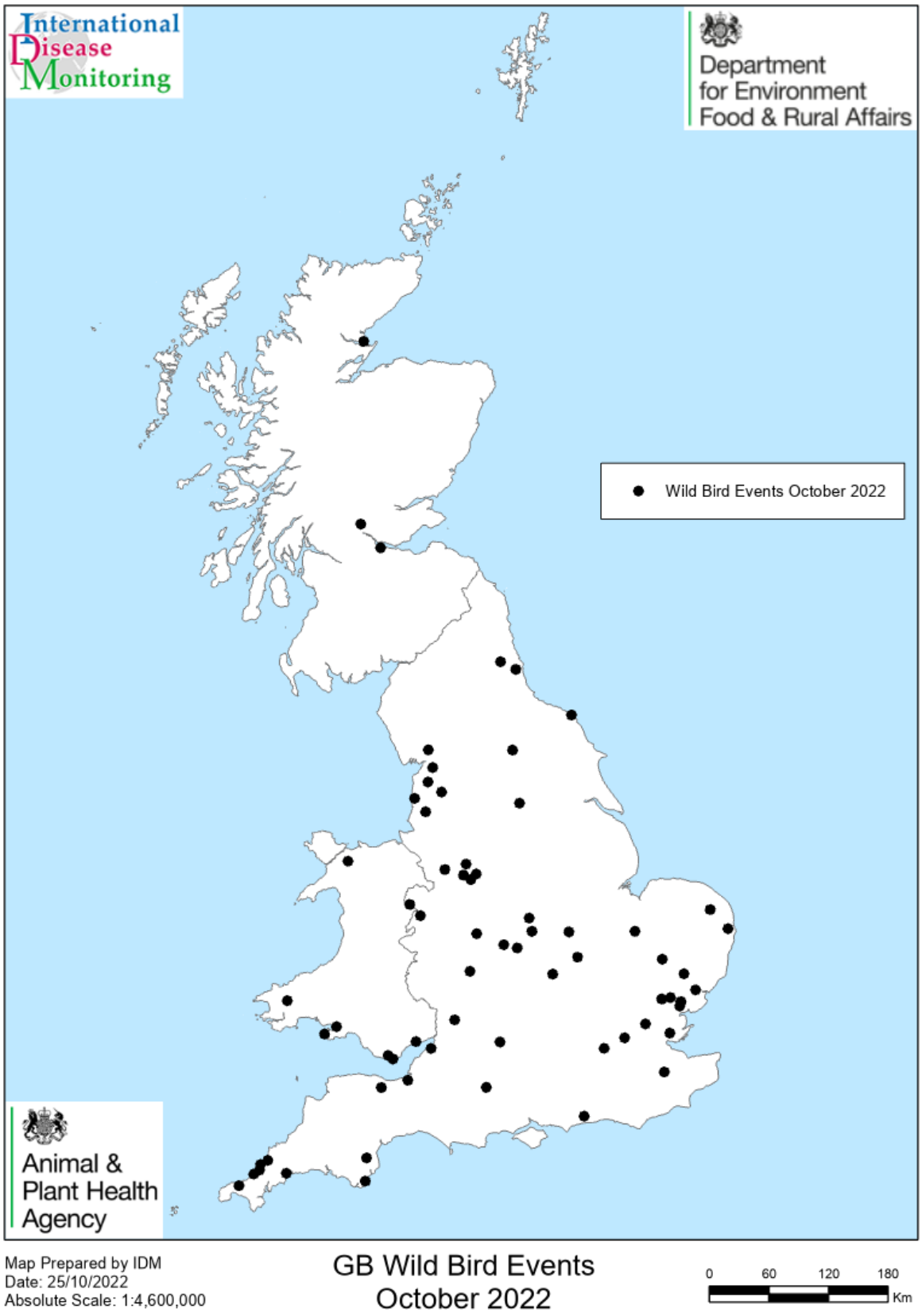
The wild waterfowl population in GB is relatively well understood. Several non-governmental organisations (NGOs) conduct regular surveys for the wild waterfowl at known wintering sites across GB. In particular, the British Trust for Ornithology (BTO), The Joint Nature Conservation Councils (JNCC), the Royal Society for the Protection of Birds (RSPB) and the Wildfowl and Wetlands Trust (WWT) carry out counts of wild birds. There are 53 sites counted with at least 20,000 birds wintering year after year across Great Britain, though this represents only a portion of wintering sites used by waterfowl in Great Britain.

Recent expert ornithological opinion is that there have been no major differences in the populations of migratory wild birds, the location of the large assemblages or the timing of arrivals of migratory populations compared to previous years. In terms of migration, the wild waterfowl will have been arriving to GB from Northern Europe since August and September and generally peak in December to January. While some species, such as swans, will be site loyal from one year to the next, others will be less so, and there will be mixing between species in the large aggregation sites. Outward migration will start again in March to May.

In addition to potential infection pressure from migratory birds, and the increase in susceptible bird population in Great Britain, there have been continued detections of HPAI H5 in wild birds throughout the year.

There is a system for wild bird surveillance in the Great Britain, whereby found dead birds from target species are reported either by wardens at reserves and wetland sites, or by the public and then submitted for testing at the National Reference Laboratory (NRL). It is important to note that this system of passive surveillance does not provide complete knowledge of the population. Not all infected birds will die, and the detection of dead birds will vary depending on the species of bird that die (smaller birds are less likely to be noticed than large birds), the location (detection is less likely in remoted areas) and the level of awareness of the people who find the dead birds (trained wardens are more likely to report than members of the general public). Once positive birds have been reported at a site, more findings may not be tested until two weeks have passed. Since 1 October 22 and as of 24 October 2022 there have been 146 HPAI H5 detections in wild birds (figure 3). While the majority (134) have been confirmed as H5N1, there are 12 cases for which the HPAI H5 genotype has been identified, but characterisation of neuraminidase (NA) subtype is in progress due to low viral loads in samples.

Figure 3: Map showing HPAI H5 cases in wild birds (as of 24/10/2022), in GB in October 2022



Across Northern Europe and Russia since September 2022, HPAI H5N1 infection has been detected in multiple species of wild bird and poultry (Avian influenza in Europe: updates | EURL avian influenza Newcastle disease (izsvenezie.com)).The latest number

of outbreaks in poultry[1] and cases in non-poultry (including wild birds) in Europe are shown below (table 1):

Wild birds affected in Europe included many ducks, geese and swans, gulls, several species of bird of prey, and a small number of corvids (magpie, jackdaw, and rook) and passerines including sparrows. Corvids, gulls, and sparrows could serve as bridging species, and therefore we presume these species could also become infected in the UK, as several gull species and corvids were found HPAI H5 positive over the 22021/22 season, presenting a potential route to poultry.

Table 1: Outbreaks and cases of HPAI H5 in Northern Europe and Russia September-October 2022

Country	HPAI Reports in poultry in September 2022	HPAI Reports in poultry in October 2022	HPAI Reports in non-poultry (including wild birds) in September 2022	HPAI Reports in non-poultry (including wild birds) in October 2022	Total
Belgium	3	3	25	26	57
Bulgaria		1			1
Denmark			4		4
Faroe Islands				7	7
Finland			2		2
France	11	18	74	41	144
Germany	10	6	19	12	47
Iceland				8	8
Ireland			31	2	33

[1] According to the 2021 WOAH definition of poultry: Terrestrial Code Online Access - WOAH - World Organisation for Animal Health

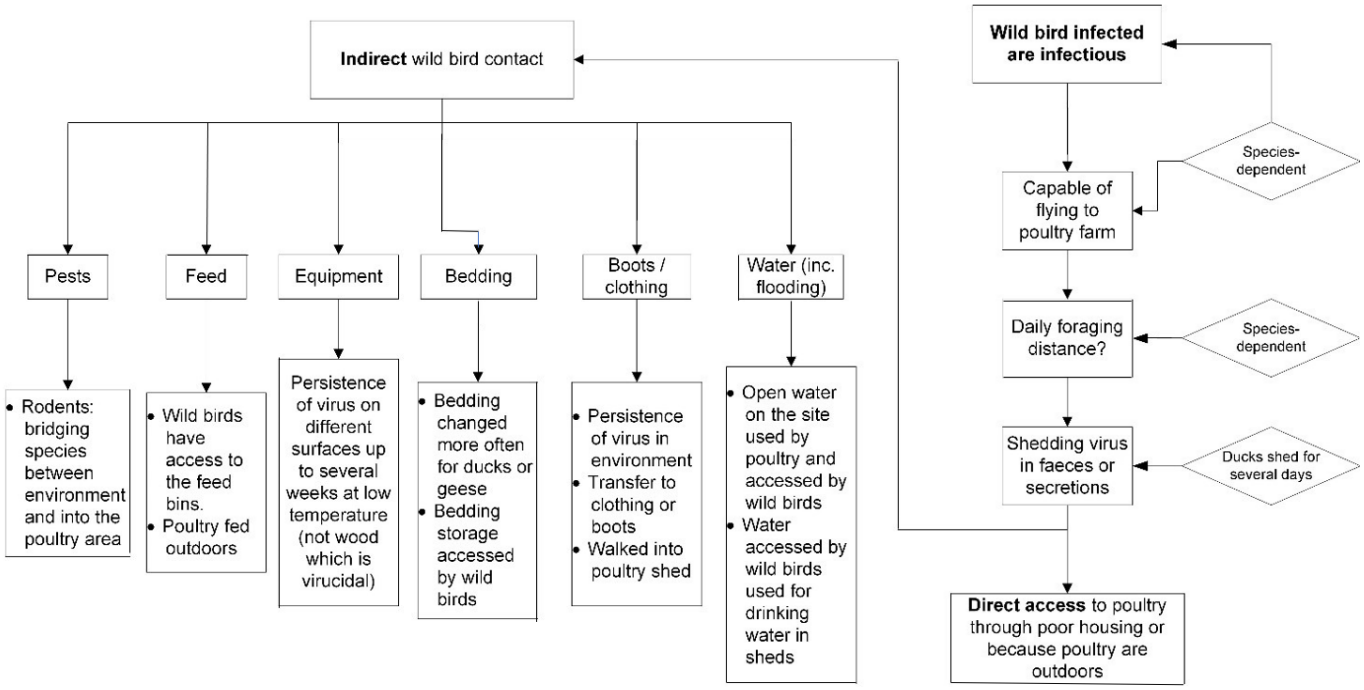
Country	HPAI Reports in poultry in September 2022	HPAI Reports in poultry in October 2022	HPAI Reports in non-poultry (including wild birds) in September 2022	HPAI Reports in non-poultry (including wild birds) in October 2022	Total
Italy	1	1		8	10
Netherlands	8	12	7	3	30
Norway		1	2	1	4
Poland	1				1
Portugal	3		5		8
Russia	1		1	1	3
Slovenia				1	1
Spain	3		20	32	55
Total	**41**	**42**	**190**	**142**	**415**

There is still considerable uncertainty about whether the majority of infection pressure will be present in migratory species as opposed to resident species (some species of which could act as bridging species) over the coming months. At present, most positive detections are in the resident bird population. However, as the winter progresses, migratory species may not only present a greater infected population but also expand their range for forage and come into contact with resident species. This is of greater significance if a new strain is circulating. The current virus strain is likely to continue to circulate in wild birds in Great Britain over the coming months, although the prevalence of infection may begin to fall towards spring in line with previous epizootics.

It is therefore considered that the likelihood of there being infected wild bird species present in Great Britain is **VERY HIGH**, and it is expected that more HPAI H5 cases in wild birds will be detected in the next month (November 2022).

Exposure assessment

Figure 1 Exposure pathways for poultry to HPAI H5N1 via contact with wild birds



There are multiple pathways for the exposure of poultry to influenza viruses causing notifiable avian diseases via direct or indirect contact with infected wild birds

These include contact with:

- infected poultry such as live birds, hatching eggs and day-old chicks of poultry
- live infected wild birds, particularly waterfowl
- poultry products and by-products of infected poultry,
- contaminated feed, water, bedding, equipment, vermin, or clothing and footwear of people in contact with infected birds or contaminated environment.
- contaminated environment, for example contaminated ranges or flood water.

For this risk assessment, the pathways associated with trade in live poultry or poultry products (including domestic moves: first and third points above) will not be considered.

Data generated at APHA Weybridge indicates that this H5N1 virus will retain infectivity in the environment at low temperatures, for up to 55 days at 4°C (Ian Brown, APHA, Pers. Comm.). This means the environment could remain contaminated for several weeks in certain conditions.

It is concluded from sequence data that the UK H5N1 virus demonstrates no strong correlations for specific increased affinity for humans.

The EFSA opinion from 2017 used a combination of systematic review of all poultry outbreaks in the EU and expert knowledge elicitation from members of the poultry sectors. Experts were asked to consider four levels of biosecurity: preventing access to waterbodies; housing; carrying out “routine” daily biosecurity (boot washing, limiting visitors, rodent control, clean feed, and water) and high biosecurity as used in compartments (all the above, plus shower in and out, no visitors, reverse air pressure, dedicated staff, and equipment etc). The opinion estimated that the relative risk for entry is reduced **three-fold** by preventing access to water bodies, that housing gives a further **two-fold** reduction, and applying routine biosecurity gives a further **four-fold** reduction. The relative risk for entry is estimated to lead to a **44-fold** decrease by applying high biosecurity measures as observed in compartment premises (Defra compartments, British Poultry Council). However, it is recognised that this level of biosecurity is not implemented to the same standard across all poultry premises and that a range of biosecurity plans are in place across Great Britain, with varying levels of efficacy, which will be impacted by the surrounding infection pressure.

In the scientific opinion presented here, we class the level of biosecurity maintained by premises in poultry compartments as stringent, where every effort is made to prevent wild bird access, where foot baths and clean equipment is used, where bedding is stored undercover, rodent control is applied and other measures. It covers those premises with the highest standards of biosecurity, which include air and door locks, shower in – shower out facilities, pristine areas in the poultry sheds all of which are applied to the “Compartment” breeding and rearing facilities.

Direct contact with live infected wild birds

The likelihood of contact between poultry and infected wild birds will be dependent on their abundance in the locale and how attractive the site is to birds; an on-farm pond, uncovered bedding or poorly managed feed bins are three well-known factors which make the direct contact of free-range poultry with wild birds more likely. Therefore, well-constructed and maintained facilities, aimed at reducing contact between poultry and outdoor areas will reduce the direct contact with wild birds, and indirect contact via contamination of outdoor ranges, ponds, feed, waterers, feeders, and roosting areas with wild bird secretions. It will not prevent all indirect pathways through which disease may enter a poultry premises, and additional biosecurity measures will be required to mitigate those risks.

Contact with contaminated feed, water, bedding, equipment, vermin or clothing / footwear of people in contact with infected birds or contaminated environment including flood water

Contamination of feed, bedding, and water by infected wild birds during an outbreak is possible on a poultry farm unless access by wild birds is prevented. For poultry which require frequent bedding changes, moving potentially contaminated bedding into the poultry house is a possible route of transmission. For poultry fed outdoors, feed may be

accessed by wild birds (or wildlife acting as mechanical vectors). Contaminated water sources may also introduce virus to the poultry (for example from a local pond or reservoir). When wild bird food is scarce, if poultry are fed outdoors, it is quite likely wild birds will be attracted to the site. The roofs of poultry sheds may also be suitable loafing sites for gulls or corvids which may act as bridging species.

These pathways can be prevented by sourcing such products from safe sources (such as, where contamination from wild birds was not possible) and keeping such items in containers which no wild birds can access. The site can be made less attractive to wild birds by removing or covering any ponds on site, preventing accumulation of standing water, using drinking water from bore holes or mains water and making sure feeding areas are protected. Contact with contaminated equipment, footwear and clothing can be prevented by making sure all personnel in contact with the birds use dedicated clothes and boots and that cleansing, and disinfection are applied appropriately. This will be particularly important where birds are housed, as personnel contact with the birds may be more frequent, as feed, bedding and water must be brought into the houses and birds must be checked for welfare issues and/or eggs collected from inside the houses. Visitors to the farm should be limited, and adequate records of all movements on and off the poultry premises should be kept. Other important biosecurity practices to ensure wild birds are separated from flocks, include feeding birds indoors or under cover, discouraging wild birds from landing, removing wild bird contamination, netting ponds, and draining watercourses, removing feeders and water stations from the range, ensuring good building maintenance and regular inspections for signs of wild bird/rodent access. It is not always possible to prevent flooding at a site, and ingress of flood water has been implicated as a source of virus in past outbreaks, but housing should be wherever possible, built to prevent ingress.

Above all, the EFSA opinion recommended that all personnel are trained in and practice good biosecurity, regardless of whether birds are housed or not, as housing cannot reduce transmission through fomite pathways as a standalone measure.

Domestic poultry

The poultry sector in Great Britain is complex and seasonally variable. There is a requirement for all poultry keepers in England, Scotland, and Wales with more than 50 birds to be registered with the British Poultry Register. Therefore, any data available will not include all the backyard or smallholder community. In terms of the proportion of the sector which is raised outdoors, for the egg sector, there are circa 25-26 million free-range hens, and 1.5 million organic hens accounting for approximately 63.7% of UK production (Egg info). For broilers, the proportion is a lot lower, at 3-5% (BCP). For ducks it is estimated that around 30% are outdoor and for geese, the majority are raised outdoors.

Captive birds (non-poultry)

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 etc) but it is unlikely it will be possible to house indoors, so every effort should be made to prevent wild bird access. There were outbreaks in captive birds in Europe (in zoos) in 2016 to 2017 and 2020 to 2021 and a derogation exists domestic legislation in Great Britain which means birds may not have to be destroyed, unless they are in contact with the infected collection.

Ratites

Ratites, such as ostriches, cannot be housed on a long-term basis for welfare reasons as they are already considered wild, but the susceptibility of such birds to this virus is not well understood. Ratites are often considered refractory to HPAI infection however there have been cases in Germany and USA of emus showing clinical signs in a zoo and therefore these birds should also be considered susceptible.

Game birds

Game birds are released for the shooting season and therefore are considered wild and outside the scope of a prevention order around housing. Any remaining birds will be gathered up in late January.

Captive birds used as decoys would be at risk of increased contact with wild birds. If they remain at one place for the duration of the fowling season, then they will not come into contact with domestic poultry. However, if the birds are moved around to other sites or spend any time at a premises where domestic poultry are kept, this is an increased risk for the poultry. It is illegal to release by hand captive birds for the purpose of being shot immediately after their liberation, under Part 1, Section 8 of the Wildlife and Countryside Act, 1981. Therefore, if gamebirds are released and then test positive when they have been shot, they are unlikely to have been infected at the premises of origin and more likely from contact with wild birds.

Summary

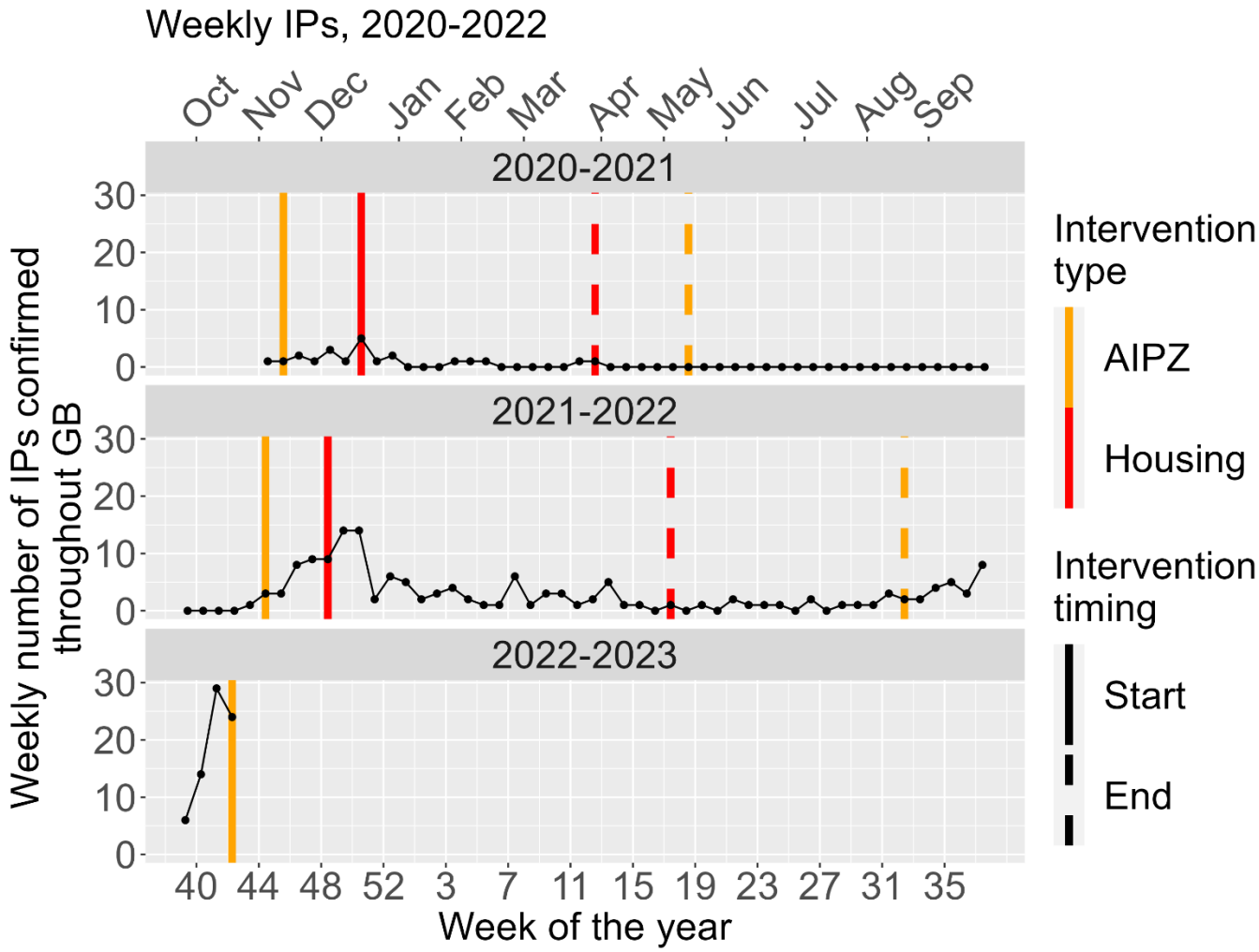
The probability of HPAI H5 still being present in wild birds in GB this month is **VERY HIGH**. With the increasing number of weekly detections at an early stage in the season (figure 4), arrival of overwintering migrant waterfowl and changing environmental conditions, it is important to emphasise that we are in a dynamic phase of the outbreak where an increase in detections is expected.

Effective and well-maintained housing reduces the probability of poultry exposure to wild birds and their excretions, but does not completely prevent indirect contact, particularly where HPAI virus can still be carried into poultry houses on clothing, footwear, feed, and bedding.

Plotting IP’s over previous seasons following the introduction of a housing order shows a decrease in IPs after housing is introduced, (figure 4) though this it is difficult to say with

any degree of certainty what proportion of this (if any) is due to housing birds alone rather than other factors such as waterfowl migration patterns and the implementation of mandatory, complimentary biosecurity measures as part of the housing order.

Figure 4: Plot showing IPs by week per season (2020 to 2023 so far), with implementation, and lifting, of AIPZ and housing shown.



Given the increasing infection pressure from wild migratory birds, favourable environmental conditions for virus survivability, and the rapid increase in the number of infected poultry premises and backyard flocks over the last month, we consider the likelihood of at least one outbreak being detected in the next month in Great Britain to be to **HIGH** (occurs often) **with low uncertainty** where biosecurity is suboptimal and there are biosecurity breaches, and **MEDIUM** (occurs regularly) **with high uncertainty** where stringent biosecurity is applied. The high uncertainty reflects that there may be differences based on geographical location, and the variation on how well biosecurity measures are applied. This takes into consideration the Avian Influenza Protection Zone (AIPZ) and assumes that bird keepers are taking the additional biosecurity measures required.

Given these risk levels, the high infection pressure in wild birds in Great Britain, and the abnormally high number of IPs confirmed at the start of the 2022 to 2023 season, the risk of incursion of HPAI H5N1 into non-housed birds (domestic poultry and captive birds) in

England, Scotland, and Wales in Winter 2022 to 2023 from direct and indirect contact with wild birds is considered to be extremely likely and occur often. As estimated in the EFSA opinion (EFSA 2017), a two-fold reduction in the number of IPs is anticipated where birds are housed, though this is not recommended as a standalone measure and should be used in conjunction with other biosecurity measures mentioned earlier in this report alongside appropriate training.

As the most likely contact of poultry with wild birds will be in those areas where there are high concentrations of wild birds. Therefore, where there are no large aggregations of wild birds, the risk is lower for this particular pathway, but there are still other pathways which could lead to the introduction of any notifiable avian disease.

This assessment has identified that the risk of infection in housed birds is likely to be lower than the risk of infection in birds which are not housed, however decisions around implementation of a housing order will also need to consider the area to which the order is applied and the species to which the order applies as it may not be feasible or advisable to house some species

Conclusions

The incursion into poultry premises depends on the level of biosecurity present. There are multiple pathways which can bring infection into poultry and these are not necessarily prevented when housing is used as a control measure in the absence of any other biosecurity. Events in poultry continue to be reported, with a greater number being reported in the first 25 days of the season than observed in the whole of the 2020 to 2021 epizootic.

Expert opinion suggests that housing leads to a two-fold reduction in risk, which is significant in terms of the number of outbreaks potentially prevented given the number of premises with poultry in GB and the large number of outbreaks so far reported. The effect of housing may be underestimated because it also includes removing access to ponds which may have an additional three-fold effect. The behavioural impact of announcing a housing order may also send a message to poultry keepers that the risk has increased significantly, so the daily routine biosecurity measures are more effective.

Housing birds which are not used to housing can cause welfare issues. Making sure their environment is enriched (for example with toys), that they have plenty of room to move, access to feed and water, clean bedding and the ability to display natural behaviours are all welfare priorities. For ducks their bedding must be changed regularly as they will mess it quickly and they need access to water so they can clean their feathers. If the birds become stressed, they may be more prone to infections or other behaviours which impact on welfare. Certain species cannot be housed for welfare reasons or because they are already considered wild: geese, ratites and gamebirds.

It should be noted that there are studies and expert opinion assessments which confirm that housing is only part of the biosecurity continuum (EFSA, 2017). Housing, in addition to

directly reducing contact with wild birds, also enables the application of more stringent biosecurity measures. For example, a foot bath and change of clothes is likely to be more effective at mitigating indirect transmission when birds are housed, compared to when poultry are let out and wild birds can also access the range, water, feed and roosting areas. If stringent biosecurity is applied, the risk to poultry is substantially reduced and housing of poultry will further reduce that risk.

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