Department
for Environment
Food & Rural Affairs

Risk assessment on the likelihood of spread of H5N8 Highly Pathogenic Avian Influenza associated with racing pigeons

Qualitative Risk Assessment

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Summary

Following multiple outbreaks of H5N8 highly pathogenic avian influenza (HPAI) in domestic poultry and wild birds in the EU and elsewhere in the world, the question was raised as to what risk domestic and international pigeon racing poses with regard to possible introduction and spread of the HPAI virus to, from and between populations of wild birds and captive birds.

On the basis of available information from published literature and official sources, this veterinary risk assessment concludes the following:

a) Domestic pigeon racing or training releases in GB

We consider there is a **medium risk** that racing pigeons would be exposed to HPAI infection if they are kept within or released from an area under official disease control restrictions for that disease. This would depend on the level of environmental contamination or the time since the disease control restrictions were put in place as the longer since the last outbreak, and the closer to spring, the lower the environmental contamination would be expected, so this risk should be kept under review.

In the current epizootic, where there is a GB wide Prevention Zone in place, there would be a **low risk** that racing pigeons would be exposed to HPAI infection outside areas under official additional disease control restrictions for AI (ie where an outbreak or an infected wild bird area has been identified). Racing pigeons generally won't have frequent contact with wild birds.

There is a **low risk** that pigeons would become infected and infectious following exposure to H5N8 HPAI. The gathering and basketing of pigeons for training or racing could be a route for spreading infection between lofts, should birds become infectious.

b) UK racing pigeons flying back from races starting in other EU countries

The risk that racing pigeons would be exposed to HPAI infection while overflying areas of other Member States under disease control restrictions imposed under EU rules is considered to be **medium** depending on the level of environmental contamination and whether the birds land to eat, rest or drink.

There is a **low risk** that pigeons would become infected and infectious following exposure to H5N8 HPAI. There is a higher risk of being exposed than of becoming "infected and infectious" because pigeons are considered to be less susceptible to infection with avian influenza viruses which are adapted to wild waterfowl.

c) Risk of pigeons transmitting avian influenza to other poultry or captive birds

There is a **very low risk** that racing pigeons become infected when resting, feeding or drinking, while flying over areas where avian influenza has been detected and then carry

infection back to poultry farms or other captive birds, because such racing birds are trained to return to their own loft and rarely stray onto poultry farms. If racing pigeons are co-located with poultry, there is no greater risk to the poultry as the risk from contact with wild birds is already low to medium. There is a higher likelihood that pigeons could be exposed to avian influenza viruses including HPAI while transiting such areas, however currently available evidence suggests that pigeons appear to be less susceptible to infection than many other species of birds and are ineffective propagators and disseminators of virus (EFSA, 2008; Abolnik, 2014).

Movements of captive birds including pigeons from areas free from restrictions are subject to Community rules. Potential risks of illegal movements of racing pigeons from restricted areas should be addressed by adequate enforcement of national and EU legislation during disease outbreaks.

There is a level of uncertainty about HPAI infection in pigeons. However, we are not aware of more than a very few isolations of HPAI viruses from feral pigeons in areas affected by disease outbreaks. **Whilst HPAI is notifiable in all captive birds including racing pigeons in the EU, we are not aware of any reports of the disease being confirmed in racing pigeons in the European Union during the current epizootic**. However there have been seven outbreaks (out of 550, where the poultry species involved is known) in farmed pigeons, which may be a different breed to racing pigeons and may have different level of contact with contacts with other poultry. Of these seven outbreaks, two had high morbidity and four had high case fatality rates. The conclusions of this risk assessment reflect current knowledge but will remain subject to review should further scientific information on the HPAI infection in pigeons become available, or should disease be confirmed in racing pigeons.

The implementation of the Higher Risk Areas in parts of England is not aimed at pigeon keeping or pigeon racing. Racing pigeons may still be flown outdoors for exercise.

Background

This risk assessment was undertaken to consider any risks of possible introduction or further spread of highly pathogenic avian influenza (HPAI) by pigeons kept for racing during the current epizootic of H5N8 HPAI virus in Europe. There have been a limited number of Columbiformes testing positive for H5N8 HPAI: 7 outbreaks in farmed pigeons, and one wild bird in France as part of wild bird surveillance. The role of wild birds in onward transmission is considered a very low risk, according to historical information gathered over the last ten years or so that globally, pigeons are rarely found infected during either epizootics or in endemic areas where H5 viruses circulate.

As a consequence of repeated introduction of avian influenza into several Member States of the European Union after 2005, the EU introduced a general ban of all bird gatherings,

unless permitted under licence by the individual Member States[i]. These requirements are implemented in England under Regulation 6 of the Avian Influenza (Preventive Measures) (England) Regulations 2006[ii]. Separate legislation applies in Wales[iii] and Scotland[iv] imposing the same requirements.

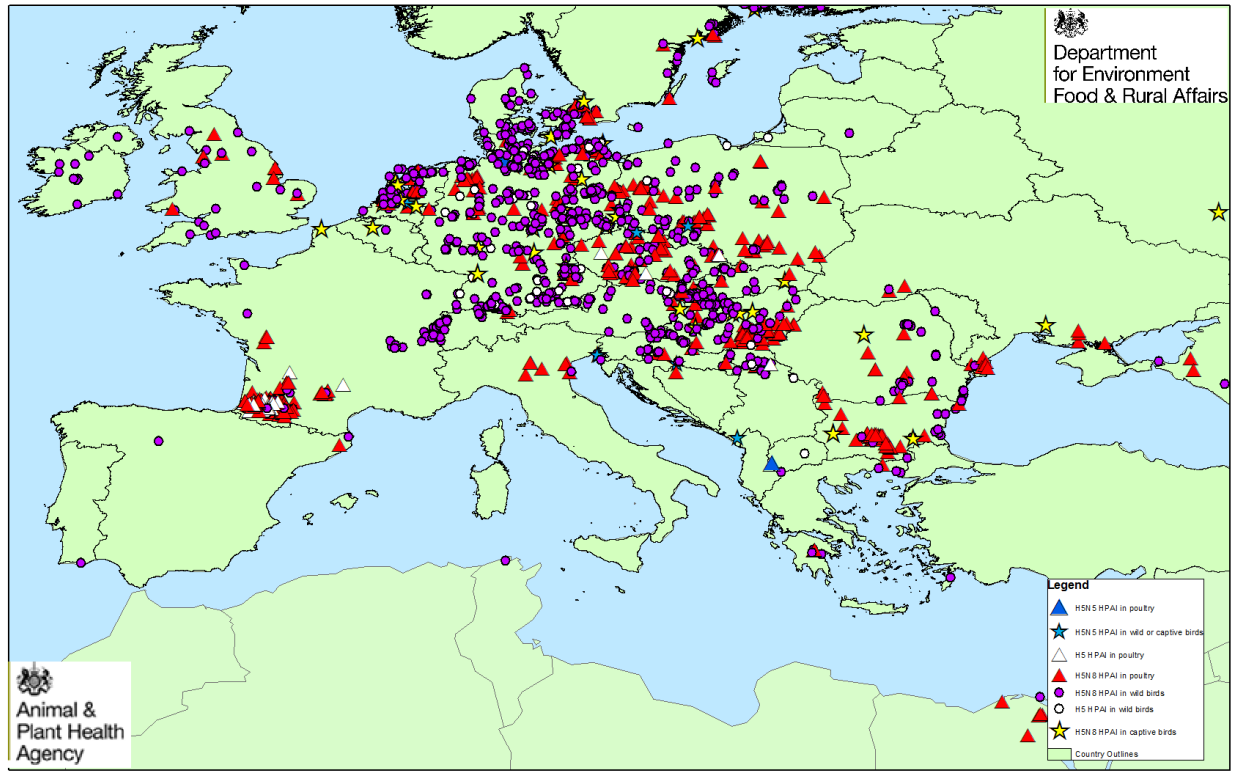
In December 2005, it was decided to move to a single general licence which allowed all gatherings to take place (apart from gatherings for international pigeon races) providing that organisers adhered to the conditions in the licence. International pigeon racing is covered by EU trade rules, under EC/92/65 and is currently allowed (see page 10).

Pigeon racing usually starts in April although birds will train all year round, but longer competition racing occurs during the months where the day light is longer. This time of year should also signal a reduction in the environmental contamination as virus persistence is reduced. See Annex 1 for more information on the way that pigeon racing is organised.

The consequence of avian influenza in birds either at or having attended a gathering during the risk period is potentially serious. 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 and is particularly true for poultry gatherings. 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 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.”] This is based on outbreaks in commercial poultry where disease control zones are put in place. For captive birds, including racing pigeons, zones may not be necessary, according the EU AI Directive (2005/94/EC), but it is also important to note that pigeons will return to the same area they came from and will be individually identified and therefore the impact would not be as severe.

Hazard identification

The hazard identified is the avian influenza virus, H5N8 HPAI strain which is readily spread by wild birds. The virus has been isolated from outbreaks and wild birds in the EU during the current epizootic and has been sequenced by the EURL. Results show the virus is similar to one reported in Russia in July, 2016 which was also associated with wild waterfowl die-offs at Lake Tyva but these virus isolates cluster separately to those detected in 2014/2015 in Asia and Europe. Two clusters are circulating in the EU – one in the more northerly countries of the EU (including the UK) and one in the more southerly countries. See map below (date of map is 27/02/2017).



The current epizootic is spreading rapidly in a wide range of migratory and non-migratory wild waterfowl in Europe (see Annex 2 for the species involved) causing mortalities in these birds. This is strikingly different to previous years and indicates a change in the virus pathogenicity for certain species of bird. What is unknown at present, and very hard to ascertain, 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. However there have been a handful of outbreaks in pigeons (see Annex 2; <1.5% of poultry outbreaks and <1% of wild bird findings) and as far as information is available, in all cases there was observable morbidity and / or mortality

Expert opinion is that the virus will retain infectivity in the environment at low temperatures, for up to 55 days at 4^{o}C, in reduced sunlight and with high humidity (Ian Brown, EURL, Pers. Comm.). This means the environment could remain contaminated for several weeks at least. The pattern of geographical distribution follows that seen for the epizootic of H5N1 HPAI in 2005/2008 in Europe. In those years, spread occurred along a similar route of migratory wild waterfowl causing wild bird die-offs in North and Central Europe. Published data from the outbreaks in Germany suggested two separate incursions happened, following the two migration pathways, into North and South Germany. The same can be inferred with this new strain. Therefore this new epizootic is following a similar pattern of transmission in wild birds and spill-over into domestic poultry as observed with H5N1 HPAI in 2005 – 2008 and it can be expected that the H5N8 HPAI epizootic will continue to cause issues with the poultry sector for several months to come, if not for many months, if the virus continues to circulate in non-migratory waterfowl in Europe. However the rate of

reporting outbreaks may be expected to fall away in the coming summer months, as environmental contamination is reduced.

Poultry and other captive birds are moved legally between Member States of the European Union between areas not under disease control restrictions. This continuous activity poses the inherent risk that birds may be moved from areas where disease is present but not yet detected. Such undisclosed disease may be the consequence of the incubation period or a subclinical form of avian notifiable disease.

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. Traceability of birds is one of the control measures which improves our ability to control disease. For poultry and other captive birds at gatherings, this can be very difficult to enforce, but for racing pigeons entering a competition, which are individually identified, this process is easier. Due to their lower susceptibility to avian influenza viruses, a licence for gatherings of pigeons is available.

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. 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. In addition, the way that racing pigeons are transported means they also share airspace and are in close contact within the baskets on the lorry, which makes the likelihood of disease spreading during a journey greater but it is still limited by the very low risk of birds being infectious.

The UK has now reported 10 outbreaks of H5N8 HPAI in commercial and backyard poultry and wild bird findings in 20 regions. Therefore the risk of infected wild birds present in the UK is now **HIGH** and the risk to poultry has been raised to **LOW to MEDIUM**, depending on the proximity of the premises to wild bird assemblages and the biosecurity level.

Risk Question

Given the implementation of all relevant national and EU legislation on movements and disease control:

a) What is the risk of further spread of highly pathogenic avian influenza (HPAI) in the United Kingdom by domestic pigeon racing? That is where pigeons could acquire virus after release and bring it back to the loft or have contact with poultry.

b) What would be the additional risk of introducing highly pathogenic avian influenza (HPAI) to the United Kingdom by pigeons returning (released to fly back) from other EU Member States?

c) What would be the additional risk of introducing highly pathogenic avian influenza (HPAI) to poultry or captive birds in GB through contact with racing pigeons?

Scope

This qualitative risk assessment covers the risk of introduction and subsequent spread of avian notifiable disease as a result of racing pigeons either in Great Britain or legally moved to an event from GB to another Member State and thence to race back.

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

The pigeon racing season in GB begins in April and finishes in late September, but training flights will be carried out all year round, therefore this assessment focuses mainly on the racing events, where birds are moved several hundred kilometres and across the Channel in some cases. Most races take place during the summer months. International races are scheduled for mid-summer when day length allows birds to cover greater distances in a day. Young bird races commence in July.

EU rules - pigeon movements (including racing pigeons)

From areas of EU Member States not under official disease control restrictions

Currently applicable EU rules (Council Directive 92/65/EEC) allow movement of captive birds (including racing pigeons) to another EU country if they:

a) Come from a holding in which Avian Influenza has not been diagnosed in the previous 30 days;

b) Come from a holding and an area not subject to disease control restrictions for Newcastle disease;

c) Show no signs of disease on the day of export.

Under these rules, pigeons may be moved from one EU Member State to another, subject to the owner's declaration that the above conditions have been fulfilled. The same Directive requires Community-wide surveillance in both poultry and wild birds for avian influenza. The surveillance is carried out in all Member States of the EU and programmes have to be accepted by the European Commission before they are implemented. This surveillance is conducted within a standard framework in all Member States aiming to provide uniformity in evidence supporting similar risk for undetected presence of HPAI across the EU.

Where HPAI is confirmed in an EU Member State

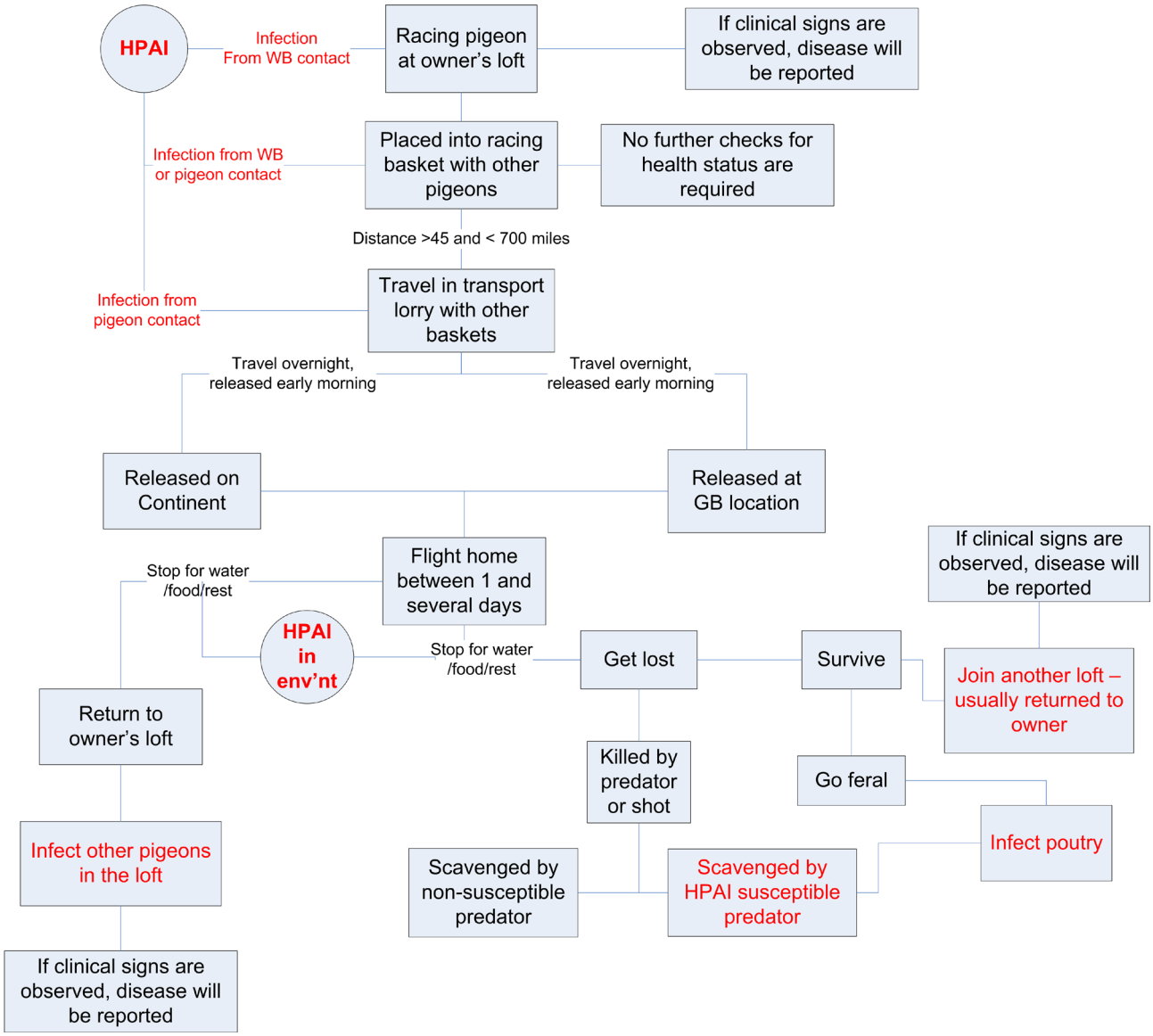
Community legislation for the control of notifiable avian influenza requires EU Member States affected by HPAI to prevent movements of poultry and other captive birds (including racing pigeons) within and from the restricted zones (i.e. protection and surveillance zone). This includes fairs, markets and other gatherings – including pigeon racing (see Articles 21, 30 and 44 of Council Directive 2005/94/EC). Usually, in case of an outbreak of HPAI in poultry, the protection zone is a minimum of 3km in radius from the premises where disease is confirmed and the surveillance zone is at least 10km in radius from the affected premises and includes the protection zone. However, the extent of these zones may vary depending on whether the disease was confirmed in domestic poultry or wild birds (if applicable as currently only HPAI H5N1 in wild birds trigger restrictions) or both. It also takes into account several factors such as results of the epidemiological inquiry, the geographic layout of the areas (e.g. natural boundaries), the location and proximity of other poultry holdings and the estimated number/density of birds kept in the area to mitigate any associated risks.

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

Risk Pathways



Entry assessment

Susceptibility of pigeons to HPAI

There is evidence from laboratory studies and field reports demonstrating different levels of susceptibility of pigeons to infection with different isolates of HPAI virus infection and disease (EFSA, 2006 and 2008; Mansour et al, 2014; Abolnik, 2014).

In summary, the susceptibility of pigeons to infection with AI remains controversial mainly because different studies have used different viruses and different doses of virus to attempt infection. Currently available evidence suggests that infection of pigeons may be established (at least in some birds) if high doses of Asian lineage H5N1 HPAI viruses of clade 2.2 are administered (clade 2.2 H5N1 viruses are those recently isolated from wild birds and poultry; (Sims and Brown 2008). However, as emphasised by Liu and others

(2007) pigeons do appear to be less susceptible to infection. In addition, although virus shedding could be demonstrated in the above study following experimental infection with high doses of the virus, the amount of virus shed appeared to be less than would appear sufficient to infect in-contact sentinel chickens.

Laboratory data

A number of earlier laboratory studies with various virus strains and isolates indicate that pigeons have a low susceptibility to HPAI infection (Panigrahy and others 1996; Perkins and others 2002). Experimental studies with the HPAI H7N7 virus isolate from the outbreaks in The Netherlands in 2003 failed to demonstrate the excretion of virus, clinical or histological signs or seroconversion (Shell, 2005). Similarly, other studies concluded that domestic pigeons are only partially susceptible to infection with H7 subtype of avian influenza virus. Some of the infected pigeons showed clinical signs, shed the virus and seroconverted.

Pigeons appeared to be less susceptible to infection with H5 subtype of avian influenza virus (Kaleta and others 2004). An experiment using an HPAI H5N1 virus isolate from 2003 showed that the virus was primarily associated with nervous tissues only (i.e. the virus appeared to be strictly neurotropic). The presence of the virus could not be demonstrated in the respiratory and digestive tracts (Klopfleisch and others 2006). A more recent study demonstrated that pigeons are susceptible to HPAI H5N1 although the susceptibility varied strongly and was dependent on the virus strain used. The virus could be isolated from pigeon tissues, especially from the glandular stomach, possibly suspecting some limited viral replication. This study concluded that pigeons may be asymptomatic carriers of the avian influenza virus (Liu et al. 2007).

In another study, pigeons were inoculated oculo-nasally with one of the most recent isolates of the highly pathogenic avian influenza H5N1 virus (clade 2.1) from Indonesia. Five out of sixteen pigeons developed clinical including neurological signs. The virus was recovered from all organs sampled from two apparently healthy pigeons at three days post infection. All surviving birds were shown to shed the virus via the oropharynx and the cloaca at low titres and seroconverted. The virus was also recovered from three pigeons that died spontaneously. Nevertheless, no clinical signs or seroconversion was observed in sentinel chickens that were placed in direct contact with the experimentally inoculated pigeons (Werner et al. 2007).

Another study showed that following experimental infection of 187 young and adult pigeons with Asian lineage HPAIV H5N1, no clinical or serological evidence or histopathological changes were observed. Inoculated pigeons remained healthy. Sentinel chickens placed in direct contact with infected pigeons also remained healthy. No virus was recovered or seroconversion observed in the sentinel chickens. This study concluded that pigeons are not susceptible to the above virus (Liu et al. 2007).

Field observations

In the course of outbreaks of Asian lineage HPAI H5N1 in south-east Asia between 2002-2004, H5N1 virus was isolated from a feral pigeon in Hong Kong (Ellis and others 2004). In January 2007, laboratory tests have confirmed that four pigeons died after becoming infected with HPAI H5N1. The birds were part of a group of wild birds that died suddenly in Thailand in December 2006 (Nordqvist, 2007). A small number of deaths in wild pigeons (*Columba livia*) have been reported from various countries in 2006 (Turkey, Iraq and Romania) and in 2007 (Russia, Pakistan, Turkey) to the OIE in the context of larger scale outbreaks in domestic poultry in 2007 (EFSA 2006).

More recently, in Egypt (a country with enzootic avian influenza H5N1 clade 2.2.1.c) a natural infection of pigeons with H5N1 virus resulted in clinical signs (green diarrhoea, respiratory signs and congestion of the lungs and brain), while experimental infections with the same virus also resulted in neurological signs. Systemic infection was confirmed at 5 days post infection, and both infected and sentinel birds tested positive in cloacal and oropharyngeal swabs, suggesting onward transmission was possible (Mansour, et al., 2014).

Annex 2 shows the status of poultry and wild bird cases in the EU since October 2016 until 16th February 2017. A handful of commercial and backyard pigeon premises have had birds testing positive and morbidity was observed as well as a high case fatality rate in some of the outbreaks.

Therefore it is reasonable to suggest that there remains uncertainty in the role pigeons may play in transmission of avian influenza. It may depend on how adapted the viruses are for transmission in poultry species (such as a strain which is enzootic in a particular region) and how much exposure pigeons have to contaminated area or infected birds. Nevertheless there is a low likelihood that if a pigeon is exposed to virus, then they could become infected.

Management of pigeons in races

Pigeon fanciers keep their birds in ‘lofts’. Prior to a race, the fancier will select birds to race and take them to a collection point for their club where race rings are applied and other race administration is undertaken.

The birds from different lofts are placed in release crates and transported to the release site. For larger races, pigeons that have been gathered at club level will then be taken to another location and loaded on to transporters with birds from other clubs for release. Pigeons from one loft will be mixed with pigeons from other lofts in the baskets, and this is considered to constitute a gathering.

In addition to organised races, pigeons are also gathered together for training and exercising flights. This may be done on an informal basis. Birds from several lofts may be gathered together and transported to a location for release. Training flights begin in 3-4 weeks in advance of the racing season. These present the same risks as formal racing

does, with the added concern that this is a less formal process. It should also be noted that training flights have not been banned in the current epizootic. See also Annex 1 for further information.

Exposure assessment

Active virus shedding

As above, there is uncertainty around whether pigeons will actively shed virus during natural transmission although it is possible under experimental conditions. Kept pigeons are no exception to normal notification procedures whenever there is a suspicion of notifiable disease. Such an event would trigger an official follow-up investigation as any such suspicion of avian notifiable disease in poultry and other captive birds.

In the current H5N8 HPAI epizootic, in Europe, there have been seven outbreaks involving pigeons (out of 525 outbreaks where the species is known, which is 1.3%); in two of these the flock had over 50% morbidity (Annex 2) and in four cases, case mortality rate was over 51%. These are understood to be pigeons farmed as poultry for the production of meat, rather than racing pigeons. There has been only one report of a wild pigeon found dead and testing positive for H5N8 HPAI but if these are not target species then some countries will not be picking up and testing these species.

Therefore, we consider that a pigeon, once infected, could become infectious, but would show some kind of clinical signs and therefore would be reported by the owner.

Mechanical transmission

The virus can remain viable for long periods in faecal material. The duration of infectivity is strongly influenced by the strain of the virus, the physical properties and quantity of the material and the temperature and humidity at which it is held. Inhalation and ingestion are considered the main route of transmission from bird to bird, and between birds and mammals.

Therefore there is potential for spread of HPAI viruses via faecal contamination and mechanical transmission of infective faecal material by birds (on their feet and/or feathers) over short distances. This, together with the unique racing practices applied during the sport of pigeon racing suggests that when HPAI viruses are confirmed to be circulating in wild birds, poultry or other captive birds in an area, carriage of infective material out of such areas (i.e. faeces from infective birds) on the feet and feathers (mechanical spread) of pigeons cannot be excluded. However, the likelihood of contact between racing pigeons and poultry during a race appears to be very low and only slightly increasing with longer distances. Biosecurity measures (i.e. feeding of poultry in a way which does not attract free living birds) can further mitigate any such risk.

Expert opinion, as supported by the European Food Safety Authority (EFSA) Expert Group report, suggests that free living pigeons may have the potential to act as one of the potential 'bridging' species between waterfowl and poultry i.e. that they may transfer disease from infective waterfowl to susceptible poultry (EFSA 2006). However, the risk posed by racing pigeons seems to be rather different from that of their feral counterparts. Racing pigeons live in captivity and are generally looked after well. They tend to fly straight back to their loft of origin without substantial detours or stops en route, once released.

There are, however completely unnatural situations that racing pigeons encounter such as the gathering of them prior to a race. For UK races, birds are usually liberated within 24 hours of being placed in the release crates. For longer international races birds are usually released within 72 hours of being placed into release crates. However, this period may be extended if there is a delay to the start of the race (i.e. adverse weather). Following release, pigeons are expected to return within a few days, which may vary from two days to 10 days depending on the site of the release and several other factors including weather conditions. During this period racing pigeons may be expected to rest when night falls. A number of racing pigeons may not return. Should racing pigeons become infected following exposure, they may or may not develop clinical signs of the disease and shed the virus; it is unknow if being infected with H5N8 HPAI would affect fitness. However, should any of them die during the race, they may become available to local scavengers which may become infected. Their role in further spatial spread of infection remains unclear and is not supported by evidence.

If racing pigeons survive infection and are shedding virus, then in principle the disease may be transmitted to cohorts or any other susceptible birds that may come in contact with these pigeons. Additional self-imposed biosecurity measures for such birds might provide a higher level of protection against the introduction of any infection to the loft. If pigeons are resistant to infection, they would not have any effect on the potential introduction and further spread of the virus. However, the risk of mechanical transmission of the virus within HPAI restricted zones cannot be excluded and is difficult to quantify – it would depend on the number of birds which return with contamination on their feet. One single bird is a very low for carrying infection into a loft but thousands of birds would be a different risk level.

Taking into account the above, racing pigeon lofts should be considered as captive bird premises that are subject to the same statutory requirements regarding disease notification and are exposed to a similar level of background risk of introduction of avian influenza as other such premises with similar husbandry practices.

Contact with poultry

The current Prevention Zone requirements in place in GB, to limit the level of contact between poultry and wild birds, should also apply to the contact between poultry and captive birds. It is unlikely that racing pigeons will visit commercial poultry farms as they are trained to return to their lofts as quickly as possible (see Annex 1 for more information), but there could be backyard poultry present. On short runs, such as training races, this is even less likely. Where pigeons are co-located with poultry, for example on

backyard holdings, the poultry would be at an equal risk from direct or indirect contact with wild birds, as from contact with infected pigeons.

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

Whilst spread from a race may not lead to widespread disease into the commercial poultry sector and may be restricted to pigeon owners, the case in 2007 in the UK involving a market showed that there is a potential scenario for this occurrence (Defra, 2007). While for the majority of pigeon races involve birds classified as not destined for the food chain (as breeders or producers) it is important to note that multiple outbreaks in captive bird premises may lead to implementing disease control measures, as per the EU regulations, as this is a more severe scenario than a single incursion from contact with a wild bird.

Conclusions

a) Domestic pigeon racing – Exposure of pigeons within the UK

There would be a **medium risk** that racing pigeons would be exposed to HPAI infection if they are kept within or released from an area under official HPAI disease control restrictions.

The risk of disease spread from areas under restrictions for disease control purposes by overflying those areas is considered to be negligible as domestic races cover distances which allow pigeons to complete the race without stopping, feeding or resting.

In the current epizootic, and given the overall risk level present in the UK, there would be a **low risk** that racing pigeons would be exposed to HPAI infection outside areas under official disease control restrictions for AI or those which are considered Higher Risk Areas in the Prevention Zone order.

The risk level should be kept under review as it is quite possible that the risk will have reduced by April, when racing starts and as the weather improves and hours of sunlight increase, then viral persistence will have reduced. Furthermore, many of the wintering waterfowl will have returned to their breeding grounds which may reduce the source of virus within GB, although there is a medium level of uncertainty around this.

b) UK racing pigeons flying back from races starting in or overflying other EU countries

The risk that racing pigeons would be exposed to HPAI infection while overflying areas of other Member States under disease control restrictions imposed under EU rules is considered to be **medium** depending on the level of environmental contamination and whether the birds land to drink, feed or rest. For other regions, the risk is considered **low**. This risk level reflects the considerable level of disease being reported in the EU at the present time.

The time that birds may take to travel over to the release site and then to fly is quite variable and may take several hours to many hours before the birds return to their lofts. There is uncertainty over whether infection with H5N8 HPAI reduces fitness of birds to fly home, and whether birds would still be viraemic when the returned. Therefore the risk of their bringing disease back is considered **very low, but with a medium level of uncertainty.**

c) Risk of pigeons transmitting avian influenza to other poultry or captive birds

The risk of active or passive disease spread by racing pigeons from these areas is also considered **very low** and with a medium level of uncertainty around the unknown susceptibility of pigeons to natural infection and their possible role in further disease transmission.

Currently available evidence suggests that pigeons appear to be less susceptible to infection than many other species of birds and are ineffective propagators and disseminators of virus (Abolnik, 2014). There is a **low risk** that racing pigeons become infected, as evidenced by the small number of outbreaks in the current epizootic (<1.5%). However, infected birds may not shed virus for long and given they may show clinical signs as well, they may not be able to fly far and would not be able to the finish the race. While it is theoretically possible that pigeons could be exposed to avian influenza viruses including HPAI while flying over such areas and stopping to feed, water or rest, currently available evidence suggests that pigeons are likely to be less susceptible to infection than many other species of birds therefore they pose very little threat of introducing AI viruses into an area.

There is a higher likelihood that pigeons could, while flying over such areas, act as fomites, carrying the virus on feathers or feet, without becoming infected. Therefore the interaction between such birds and poultry or other captive birds will be an important risk factor. However, these are homing pigeons and are less likely to be found on a poultry farm than a feral pigeon so this is considered a **very low risk**.

There is a **medium level of uncertainty** about HPAI infection in feral pigeons. We are not aware of more than a very few isolations of HPAI viruses from feral pigeons in areas affected by disease outbreaks and the source of disease could be from contact with wild birds themselves rather than other (racing) pigeons. Whilst HPAI is notifiable in all captive birds including racing pigeons in the EU, we are not aware of any reports of the disease

being confirmed in racing pigeons in the European Union during the current epizootic. Nevertheless, these conclusions are subject to review should further scientific information on the HPAI infection in pigeons become available, including a possible confirmation of the disease in racing pigeons.

Therefore in response to the risk questions:

a) What is the risk of further spread of highly pathogenic avian influenza (HPAI) in GB by domestic pigeon racing?

Medium risk of exposure depending on the area; **very low risk** of pigeon becoming infected and infectious.

b) What would be the additional risk of introducing highly pathogenic avian influenza (HPAI) to GB by GB-origin pigeons returning (released to fly back) from other EU Member States?

Low to medium risk of exposure depending on the area; **low risk** of pigeon becoming infected and infectious.

c) what would be the additional risk of introducing highly pathogenic avian influenza (HPAI) to poultry or captive birds through the contact with racing pigeons?

Very low risk of an infectious racing pigeon returning from a race and having direct contact with a poultry farm in GB.

Assumptions and Uncertainties

It is assumed that birds participating in a pigeon race 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 EU is thought to be generally high and suspicions of clinical disease in other captive birds would be reported reasonably quickly, generally within a few days. Pigeon racing is well organised with clear lines and mechanisms for cascading advice. Movement restrictions for disease control purposes would be uniformly implemented based on Community legislation for poultry, but there are derogations available for captive birds which means area restriction zones may not be put in place. Other Member States are kept informed through the regular meetings of the Standing Committee on Plants, Animals, Food and Feed (SCoPAFF) 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 length of the virus incubation period as well as the possibility of virus shedding in pigeons is not well understood and would be an important factor for assessing these risks. However, no incubation period for H5N8 HPAI 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.

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Annex 1

Further information on Pigeon Racing Practices in the United Kingdom

In England, Wales and Scotland pigeon racing is regulated by five independent organisations:

- North of England Homing Union (NEHU)
- North West Homing Union (NWHU)
- Royal Pigeon Racing Association (RPRA)
- Scottish Homing Union (SHU)
- Welsh Homing Union (WPHU)

When a pigeon is six days old a metal registration ring is placed on its leg and thereafter the pigeon is known by the number of its ring. A typical ring number is GB 01 A 12345 where GB indicates a ring issued by the RPRA, 01-the year of birth of the pigeon and A12345- the registration number.

The distance pigeons are called upon to race commences at about 45-50 miles and by progressive stages is increased up to 500 miles plus for old birds and 200 miles for young birds (birds racing in the year when they hatched). The exact location (expressed in terms of latitude & longitude) of the liberation point and each member's loft is known and the distance between the two (race point and loft) is calculated to the nearest yard by computer.

The Royal Pigeon Racing Association (RPRA)[1] has continental race liberation sites in France and Spain. The Welsh Homing Pigeon Union[2] race from Belgium and Germany (the furthest point being Bonn at a distance of 342 miles from the English coast). A pigeon's speed is dependent on the wind speed and direction. With a tail wind they can race ain excess of 60 mph but with a head wind it is more likely to be 30-35mph. They can fly for 15 continuous hours, which means a pigeon could theoretically fly 450 miles in a day with a head wind. Out of 47 liberation points that the RPRA liberate from, only 10 (Barcelona, Palamos, San Sebastian, Marseille, St Nazaire, Perpignan, Tarbes, Pau, Dax and Marmande) are at distances further than 400 miles from the English coast and therefore *may* require the pigeon to stop and rest on the continent. The further the release point the more likely this becomes.

The further the distance to be flown the more specialised the birds are and therefore the number of birds taking part in the race decreases. Pigeon races take place weekly but the longer races are not as frequent. The specialist clubs are: National Flying Club, British Barcelona Club, British International Continental Club, Midland National Flying Club, London and South East Classic, Central Southern Classic.

[1] The Royal Pigeon Racing Association members generally fly their birds South to North.
[2] The Welsh Homing Pigeon Union members generally fly their birds East to West.

The velocity or speed of flight of a pigeon is arrived at by dividing the time taken to fly the race into the actual distance flown. Recordings are precise. Prior to being entered into a race each pigeon has an electronic race ring attached to its leg. On arrival home the ring is automatically recorded when the bird enters the loft.

Typical examples of International Races in 2007 (further than 400 miles from the English Coast):

National Flying Club – release point: Tarbes on 29 June 2007.

Distances covered ranged from 529 miles (Portsmouth) to 773 miles (Whitby). 3444 pigeons were entered. Example: Two pigeons raced back to Trowbridge (569 miles) arriving within 23 minutes of each other taking 8 hrs 9 minutes.

British Barcelona Club – release point: Palamos (Barcelona) on 30 June 2007.

690 pigeons were entered with 840 miles being the furthest flown. The winning pigeon took 33 hours on the wing. The last pigeon on result was 148th which took 125 hours.

British International Continental Club – release point: Barcelona on 6 July 2007. 220 pigeons were entered and the winning pigeon flew 708 miles.

London & South East Classic – release point: Pau on 22 June 2007.

615 pigeons were entered and the winning pigeon flew 568 miles

For longer races the result is kept open until about the 3rd or 4th day after liberation. Some birds take longer to return and others do not return.

Racing pigeons are trained to fly directly home and two common methods are used to encourage the birds to return quicker:

The widowhood method: After rearing one set of youngsters the hens are taken away from the cocks which are kept in separate nest boxes. Only the cocks are then raced. They are only allowed access to their hen when they return from a race. This incentive to return to the hen to mate is an effective incentive. Sometimes the fancier will show the hen to the cock through an adjacent pen just before the cock is basketed for the race.

The natural method: is pairing pigeons (old birds) so that they have the desire to return home to their nest mate. A fancier will use the fact that the nest has young or indeed eggs in it and by taking away the cock or the hen for race day encourages the racing bird to get home.

Homing pigeons use their natural homing ability, a combination of their magnetic compass, solar compass, use of landmarks and sense of smell.

Annex 2

Cases in farmed pigeons

Size of farm (as of 16/02/2017)

Flock size	Pigeons	All other poultry
<200 birds	6	180
200-1,000	0	71
1,000 – 10,000	1	267
>10,000	0	185

Morbidity on farm (as of 16/02/2017)

Morbidity	Pigeons	All other poultry
<1%	3	519
1-5%	1	25
6-25%	1	50
26-50%	1	31
51-75%	0	18
>75%	1	24

Findings in wild birds, including pigeons

Table of wild bird findings in Europe (as of 16/02/2017)

Species	Number of events*	% High Risk Species not detected positive to date in the current epizootic
Mute swan (Cygnus olor)	176	21%
Duck spp	102	12%
Tufted duck (Aythya fuligula)	77	9%
Unspecified	77	9%
Swan spp	59	7%
Gulls spp	49	6%
Whooper swan (Cygnus cygnus)	32	4%

Goose spp.	30	4%
Herring gull (Larus argentatus)	24	3%
Mallard (Anas platyrhynchos)	22	3%
Eurasian wigeon (Anas penelope)	19	2%
White-tailed eagle (Haliaeetus albicilla)	19	2%
Black-headed gull (Chroicocephalus ridibundus)	17	2%
Common buzzard (Buteo buteo)	12	1%
Great black-backed gull (Larus marinus)	11	1%
Great crested grebe (Podiceps cristatus)	11	1%
Greylag goose (Anser anser)	11	1%
Common pochard (Aythya farina)	8	1%
Heron spp.	8	1%
Great cormorant (Phalacrocorax carbo)	7	1%
Grey heron (Ardea cinerea)	7	1%
Greater White-fronted Goose (Anser albifrons albifrons)	7	1%
Common coot (Fulica atra)	5	1%
Common magpie (Pica pica)	4	<1%
Lesser white-fronted goose (Anser erythropus)	4	<1%
Little grebe (Tachybaptus ruficollis)	4	<1%
Peregrine falcon (Falco peregrinus)	4	<1%
Eurasian teal (Anas crecca)	3	<1%
Owl spp.	3	<1%
Buzzard spp	2	<1%
Common gull (Larus canus)	2	<1%
Common moorhen (Gallinula chloropus)	2	<1%
Hooded crow (Corvus cornix)	2	<1%
Red-crested pochard (Netta rufina)	2	<1%
White stork (Ciconia ciconia)	2	<1%
Canada Goose (Branta Canadensis)	2	<1%
Carrion crow (Corvus corone)	1	<1%
Common eider (Somateria mollissima)	1	<1%
Common goldeneye (Bucephala clangula)	1	<1%
Common raven	1	<1%
Common tern (Sterna hirundo)	1	<1%
Curlew (Numenius spp.)	1	<1%
Eagle (spp. unspecified)	1	<1%
Eurasian Eagle-Owl (Bubo bubo)	1	<1%
Eurasian Sparrowhawk (Accipiter nisus)	1	<1%
Eurasian white fronted goose (Anser	1	<1%

albifrons)		
Green sandpiper (Tringa ochropus)	1	<1%
Lesser black-backed gull (Larus fuscus)	1	<1%
Shelduck (Tadorna tadorna)	1	<1%
Song Thrush (Turdus philomelos)	1	<1%
Wigeon spp.	1	<1%
Common Kestrel (Falco tinnunculus)	1	<1%
Wood pigeon (Columba palumbus)	1	<1%
Common Blackbird (Turdus merula)	1	<1%

[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).

[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 (Preventative Measures in Zoos) (Scotland) Regulations 2005 (as amended)