

Risk assessment of acquiring Avian Influenza from Poultry Products: Statement of Purpose

Locations around the world, including the UK, are currently experiencing a period of prolonged outbreaks of AI in commercial poultry and wild birds. The last FSA risk assessment produced on the risk to consumers of AI exposure via food was published in 2015; this risk assessment was reviewed and endorsed by the Advisory Committee on the Microbiological Safety of Food (ACMSF, 2015). This assessed that the risk from thoroughly cooked poultry products, including eggs, was very low. In 2017, the FSA changed its advice on eating less than thoroughly cooked (LTTC) eggs to indicate that eggs produced under the British Lion Code or equivalent schemes were safe to eat by most vulnerable groups (FSA, 2022a). Given this change in advice on egg consumption, the fact that some poultry meat, like duck, may be consumed pink, and the high number of AI infections in birds in the UK at the present time, this risk assessment was commissioned to determine the risk to UK consumers of acquiring AI from poultry products. This risk assessment did not focus on the currently circulating outbreak strain but considered any AI virus.

1.1 Risk Question

What is the risk to consumers, on a population basis, of becoming ill with AI viruses via consumer handling of feathered birds and food consumption, specifically of poultry, game meat, and eggs, during an AI season?

1.1.1 In scope

- any AI virus. This risk assessment is not focused solely on the HPAI H5N1 clade 2.3.4.4b circulating in the UK during the 2021/22 and 2022/23 AI seasons.
- meat from commercial poultry production (primarily chickens and turkeys, but includes some farmed duck and geese)
- exposure resulting from the preparation and consumption of wild game purchased in-feather by the consumer (obtained from Animal Game Handling Establishments or taken directly home)
- preparation and consumption of poultry products from backyard flocks
- table eggs from UK hen laying flocks
- food made at home using lightly cooked/raw UK hen eggs
- any of the above poultry products consumed less than thoroughly cooked
- cross-contamination from any of the above products

1.1.2 Out of scope

- animal health risks of acquiring AI
- occupational exposure from commercial poultry production
- exposure to birds outside the context of slaughtering, processing or consumption. The risk from general exposure to birds is considered by the UKHSA risk assessment (UKHSA, 2023).

- poultry products cooked by businesses to be consumed ready-to-eat
- eggs other than hen table eggs
- imported poultry products

1.1.3 Key Assumptions

In reviewing the evidence to determine the risk to humans of exposure to AI from poultry products, several key assumptions were made to assist in drawing conclusions when a lack of data was available. These included:

- uncharacterised strains of HPAI or LPAI will behave similarly to strains where clinical signs in birds, viral distribution in tissues, and viral survival have been studied.
- in bird species where AI infection has not been well characterised, that these birds would react to AI infection in a manner similar to well-studied related species (For example, same family or order) with regards to development of clinical signs and viral distribution within tissues.
- that AI viruses would behave similarly to viruses from previous AI outbreaks in their ability to mutate and/or transmit between species.

1.2 Background

Avian influenza (AI) is a disease in birds caused by AI viruses. AI viruses have occasionally infected other species, including humans. They are introduced into the UK via migratory birds, so outbreaks usually show a seasonal nature following migratory patterns. Table 1 provides details of previous outbreaks of AI in the UK for which APHA has produced epidemiology reports (Defra, 2021). Until September 2021, any cases detected in flocks in the UK were able to be relatively controlled through culling of infected premises, increased surveillance, and additional biosecurity measures. During this time, the disease also did not present over the summer months.

Table 1: Reported poultry outbreaks of AI in the UK. Data obtained from (Defra, 2021) and (Defra, 2023a). NR = none recorded

| Avian Influenza season | HPAI | LPAI |
|--------------------------------|-----------------------------|-------------|
| October 2013 to September 2014 | NR | NR |
| October 2014 to September 2015 | 1 IP* - H5N8 1 IP - H7N7 | 1 IP - H7N7 |
| October 2015 to September 2016 | NR | 1 IP - H5N1 |
| October 2016 to September 2017 | 13 IP - H5N8 | NR |
| October 2017 to September 2018 | NR | NR |

| Avian Influenza season | HPAI | LPAI |
|-----------------------------------|-----------------------------|----------------------------|
| October 2018 to September 2019 | NR | NR |
| October 2019 to September 2020 | NR | 1 IP - H5N3 |
| October 2020 to September 2021 | 2 IP - H5N1 20 IP - H5N8 | 1 IP - H5N2 1 IP - H5N3 |
| October 2021 to September 2022 | 152 IP - H5N1 | NR |
| October 2022 to February 6th 2023 | 169 IP - H5N1 | NR |

*IP = infected premises

1.2.1 Current avian influenza outbreak in the UK

The first detection of the currently circulating H5N1 strain in the UK was on October 15th, 2021. Unlike previous years, cases were recorded over summer months in the UK. By the end of the AI season on September 30th, 2022, 152 infected premises (IPs) had been confirmed in the UK. Infected premises can consist of commercial poultry farms or non-commercial operations, such as backyard flocks or zoos. Across England, Scotland and Wales, 1,727 wild birds tested positive for AI, spanning 410 unique locations (Freath et al., 2022).

The current October 2022 AI season has proven even more aggressive than the previous year. Based on Defra's February 6th report, there were confirmed cases of H5N1 at 169 infected premises (131 commercial and 38 non-commercial). In that time, 794 wild birds had tested positive for H5N1, spanning 350 unique locations (Defra, 2023a). There has also been one detection of H6N2 at an infected premises in England (UKHSA, 2022), but further information on whether it was HP or LP was not provided so it is not included in Table 1.

1.3 Related legislation

1.3.1 Poultry

Poultry keepers with more than 50 birds in England, Scotland and Wales are required to be registered with British Poultry Register (GOV.UK, 2022a). Given this, data on commercial poultry will not account for production from backyard or smallholder community flocks. The size of the backyard population in total is unknown (uncertainty).

As outlined in the [Avian Influenza and Influenza of Avian Origin in Mammals \(England\) \(No.2\) Order 2006](#), which came into effect on 1st July 2006, commercial poultry premises are defined as "premises where poultry or other captive birds are kept for commercial purposes" and non-commercial premises as "premises where poultry or other captive birds are kept by their owners for their own consumption or use or as pets."

1.3.2 Avian Influenza

[The Avian Influenza and Influenza of Avian Origin in Mammals \(England\) \(No.2\) Order 2006](#) lays down measures to reduce the risk of the transmission of AI by outlining how to deal with suspected outbreaks and provides for surveillance of the disease. Similar measures are provided by Orders in Scotland and Wales ([The Avian Influenza and Influenza of Avian Origin in Mammals \(Wales\) \(No 2\) Order 2006](#) and [The Avian Influenza and Influenza of Avian Origin in Mammals \(Scotland\) Order 2006](#)). Much of the orders focus on how to prevent spread of the disease to other birds, although reference is also made to reduce the risk of spread to other species.

In response to the AI outbreak in the UK in 2022, an amendment was introduced to the above order ([The Avian Influenza and Influenza of Avian Origin in Mammals \(Amendment\) \(England\) Order 2022](#)), which states, “These measures firstly amend the requirement for the Secretary of State to destroy all poultry meat traced from infected premises to allow the Secretary of State the discretion to authorise the movement of this poultry meat to market; secondly the requirement to carry out a physical examination of poultry in protection and surveillance zones in the 24 hours prior to movement for slaughter is amended to allow remote visual inspections where authorised by a veterinary inspector.” This amendment authorises the movement of meat derived from the poultry originating from infected premises (produced in unregulated period) to wholesale or retail premises or for further processing where, following a risk assessment, the Secretary of State is satisfied that such movement does not endanger human or animal health. These measures will remain in effect until April 16th, 2023.

1.3.2.1 UK Biosecurity Measures introduced when avian influenza is detected

Where AI is suspected or confirmed, control zones may be put in place within which measures to reduce the risk of spread are imposed (Defra, 2022a). When highly pathogenic AI has been confirmed in poultry or any other captive birds, the following are put in place around the infected premises:

In the 3km protection zone (PZ), the following biosecurity measures apply: poultry and other captive birds are housed indoors, disposal of any bird carcasses when instructed by a veterinary inspector, poultry litter, manure and slurry must not be spread or removed from the premises, poultry and other captive birds are not to be moved onto or off the premises without a licence, eggs and meat are not to be moved inside/outside a zone without the licence (Defra, 2022a). These measures are in addition to the measures followed for the 10km surveillance zone (SZ).

In the 10km SZ, the movement of all poultry and eggs that enter or leave premises must be recorded (except for table eggs that are being moved direct to wholesale or retail premises to be sold directly to the consumers). Poultry, other captive birds, or mammals (including pigs) are not to be moved to or from premises where poultry or other captive birds are being kept without license. Poultry litter, manure or slurry, is not to be spread or removed from the premises. (Defra, 2022a).

If an LPAI has been confirmed, in poultry or other captive birds, a 1km restricted zone (RZ) may be put in place (Defra, 2022a).

1.3.2.2 Changes to poultry processing during avian influenza outbreaks

Before receiving poultry from premises within AI PZs, SZs, or RZs, slaughterhouses need to be inspected and pre-designated by FSA to then be designated by Defra, Welsh Government, or Scottish Ministers, in order to process such poultry (FSA Manual for Official Controls). These designated slaughterhouses will belong to either Level 1 (receive and process poultry from premises within a SZ or RZ) or Level 2 (handling restricted meat from the poultry originating from a PZ) (FSA, 2022b).

Based on Defra advice from 2017 regarding rules on meat produced from poultry and farmed game birds originating in PZs, meat from poultry or farmed game birds can be moved or sold, subject to a number of conditions (Defra, 2017a). One requirement is the oval identification mark being replaced with a specific mark (approved by the Secretary of State for each outbreak) which must remain throughout any processing and repacking (Defra, 2017a). Food Business Operators (FBOs) receiving live poultry, live farmed game and farmed game carcasses from protected zones must ensure that they are cut, transported, and stored separately from other meat (Defra, 2017a). Some small throughput slaughterhouses are not eligible to apply a health mark or identification mark to meat as they are under approval of Local Authorities, not the FSA (Defra, 2017a).

Production of poultry meat, minced meat, meat products and meat preparations from PZs, SZs, or RZs, can take place under Commission Regulations 852/2004, 853/2004, and 2017/625 (OCR). Meat from poultry originating from a PZ, meat from poultry originating from an area that subsequently became a PZ and was slaughtered within 20 or fewer days of the date estimated by a veterinary inspector as being the earliest date of infection at a premises in the relevant zone or meat that has not been kept separate from the above becomes “restricted meat” and a special mark is applied (Defra, 2017a). Restricted poultry meat and products from healthy birds originating from a PZ can be marketed within the UK with no further treatment (FSA Manual for Official Controls). Where birds from a PZ are slaughtered and processed, this part of the slaughterhouse and equipment must be cleaned and disinfected before other poultry is slaughtered and processed. Failure in this process can result in cross-contamination. In addition, all biosecurity measures must be implemented, as a failure to adhere to these may result in the spread of avian influenza. Poultry from PZ premises that have arrived at slaughterhouses are under official control, and must be placed in lairage, slaughtered, chilled and stored separately from products that are not under official control, until it is wrapped and packed (FSA Manual for Official Controls). All premises, vehicles and equipment can be a potential source of contamination; for example, mud, slurry, animal faeces, excretions, feathers, or any other similar organic matter may be potential sources of AI.

Meat produced from poultry or farmed game birds originating within a protection zone can be moved or sold, subject to several conditions set out in General Licence EXD249(HPAI)(EV) (Bird flu (avian influenza) movement licences, 2022; EXD249(HPAI)(EW), 2022).

Designated slaughterhouses are required to notify their clients that the slaughterhouse has been receiving and processing poultry from premises within a PZ for avian influenza (FSA Manual for Official Controls). Bird meat originating from the Infected Premises (IP), slaughtered within 21 days of the date estimated as being the earliest date of infection must, be traced and detained, and Defra might decide to dispose of that meat (FSA Manual for Official Controls) or, until 16th April 2023, authorise in writing the movement of such meat to wholesale or retail premises or for further processing where, following a risk assessment, Defra is satisfied that such movement does not endanger human or animal health.

1.4 Previous risk assessments for avian influenza in poultry products

In 2006, the European Food Safety Authority (EFSA) Scientific Panel on Biological Hazards considered the evidence that food could serve as a source of infection with HPAI and concluded that “there was no epidemiological evidence to date that avian influenza can be transmitted to humans through consumption of food, notable poultry and eggs” (EFSA, 2006).

In 2010, the USDA’s Food Safety and Inspection Service (FSIS) published a quantitative risk assessment on the public health impact of HPAI virus in poultry, shell eggs and egg products. For poultry, the model determined that there was about a 5% probability that an infected chicken may

be sent for slaughter undetected. However, this probability of exposure to AI from poultry meat was reduced to negligible if the poultry was cooked to the USDA FSIS recommended 165F (73.9 °C), as that temperature would inactivate the virus. Similarly, they predicted that some HPAI virus-contaminated eggs may be collected for release to market, but that the length of the distribution chain would allow for subsequent detection and removal of these eggs to reduce the risk to public health. Additionally, pasteurisation time and temperature combinations typically used for egg products would inactivate the virus, resulting in negligible risk to public health.

The risk to humans from transmission of low pathogenicity avian influenza in poultry meat and table eggs was considered by EFSA in 2018 (EFSA et al., 2018). They concluded that the probability of infection with LPAI virus from consuming commercial poultry and table eggs was negligible. The risk of infection from handling and/or manipulation of raw poultry meat was very unlikely. The report noted that there was a high level of uncertainty related to the different steps of the transmission pathways due to the limited number of research studies available to inform them (EFSA et al., 2018).

1.5 Current non-UK advice on avian influenza and poultry products

The WHO advice on whether or not it is safe to eat poultry products produced in areas experiencing an AI outbreak, last updated in 2020, says “meat products and eggs can be safely consumed, provided they are properly prepared because influenza viruses are inactivated by thorough cooking.” It recommends against eating raw or incompletely cooked meat and eggs from areas experiencing outbreaks (WHO, 2020).

The CDC is in agreement with the WHO and recommends that all poultry meat and egg products are properly cooked before eating as this will kill any AI virus. Although there is no evidence of human AI infection after eating properly cooked poultry products, they do recognise that uncooked poultry products, like blood, may have contributed to a small number of human infections in Asia (CDC, 2022a).