SCIENTIFIC REPORT

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Avian influenza overview May – September 2021

European Food Safety Authority,
European Centre for Disease Prevention and Control and
European Union Reference Laboratory for Avian Influenza

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Abstract

The 2020–2021 avian influenza epidemic with a total of 3,777 reported highly pathogenic avian influenza (HPAI) detections and approximately 22,900,000 affected poultry birds in 31 European Countries appears to be one of the largest HPAI epidemics that has ever occurred in Europe. Between 15 May and 15 September 2021, 162 HPAI virus detections were reported in 17 EU/EEA countries and the UK in poultry (51), in wild (91) and captive birds (20). The detections in poultry were mainly reported by Kosovo (20), Poland (17) and Albania (6). HPAI virus was detected during the summer months in resident wild bird populations mainly in northern Europe. The data presented in this report indicates that HPAI virus is still circulating in domestic and wild bird populations in some European countries and that the epidemic is not over yet. Based on these observations, it appears that the persistence of HPAI A(H5) in Europe continues to pose a risk of further virus incursions in domestic bird populations. Furthermore, during summer, HPAI viruses were detected in poultry and several wild bird species in areas in Russia that are linked to key migration areas of wild waterbirds; this is of concern due to the possible introduction and spread of novel virus strains via wild birds migrating to the EU countries during the autumn from the eastern breeding to the overwintering sites. Nineteen different virus genotypes have been identified so far in Europe and Central Asia since July 2020, confirming a high propensity for this virus to undergo reassortment events. Since the last report, 15 human infections due to A(H5N6) HPAI and five human cases due to A(H9N2) low pathogenic avian influenza (LPAI) virus have been reported from China. Some of these cases were caused by a virus with an HA gene closely related to the A(H5) viruses circulating in Europe. The viruses characterised to date retain a preference for avian-type receptors; however, the reports of transmission events of A(H5) viruses to mammals and humans in Russia, as well as the recent A(H5N6) human cases in China may indicate a continuous risk of these viruses adapting to mammals. The risk of infection for the general population in the EU/EEA is assessed as very low, and for occupationally exposed people low, with large uncertainty due to the high diversity of circulating viruses in the bird populations.

Keywords: avian influenza, HPAI/LPAI, monitoring, poultry, captive birds, wild birds, humans
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Note: Kosovo – this designation is without prejudice to positions on status and is in line with United Nations Security Council Resolution 1244 and the International Court of Justice Opinion on the Kosovo Declaration of Independence.

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Table of contents

1. Introduction

This scientific report provides an overview of highly pathogenic avian influenza (HPAI) virus detections in poultry, captive and wild birds and noteworthy outbreaks of low pathogenic avian influenza (LPAI) virus in poultry and captive birds, and human cases due to avian influenza virus, occurred in and outside Europe between 15 May and 15 September 2021.

The background, Terms of Reference and their interpretation are described in Appendix A and the data and methodologies are reported in Appendix B.

2. Main observation and conclusions

A description of the avian influenza outbreaks in European countries and in other countries of interest occurred between 15 May and 15 September 2021, is presented below.

2.1. Main observations

- In Europe, between 15 May and 15 September 2021 (based on the Animal Disease Information System (ADIS) and information provided by affected countries) 162 HPAI A(H5) detections1 were reported in poultry, and captive and wild birds:
  - 51 outbreaks in poultry, in Kosovo[2] (20), Poland (17), Albania (6), Czechia (2), Germany (2 each), Denmark, France, Lithuania and Netherlands (1 each);
  - 91 detections in wild birds, in Finland (34), Germany (19), Netherlands (11), Sweden (11), Estonia (7), Norway (6), United Kingdom (2) and Latvia (1);
  - 20 outbreaks in other captive birds in Lithuania (7), Belgium (5), France (3), Netherlands (2), Estonia, Luxembourg and Poland (1 each).
- HPAI A(H5N8) was also confirmed in three harbour seals (*Phoca vitulina*) found dead in August in the Wadden Sea, Germany (Ärzteblatt, online).
- Based on reported notifications, HPAI A(H5) viruses are still circulating in domestic and wild bird populations in Europe; within the current reporting period last detections were until 9 August in poultry, 11 September in other captive birds, and 8 September in wild birds.
- For the first time during this avian influenza epidemic, Albania and Kosovo[2] were affected by HPAI (H5N8) virus, primarily in backyard farms with outdoor access in late spring and early summer.
- The 17 HPAI A(H5N8) poultry outbreaks notified by Poland in this reporting period are the last of a total of 357 poultry outbreaks affecting more than 14,000,000 domestic birds since October 2020, which makes Poland the country with the highest number of poultry affected during this avian influenza epidemic.
- In comparison with the last report (EFSA et al., 2021b) and also with EFSA reports covering the same reporting period in previous years (EFSA et al., 2018; EFSA et al., 2020c), an increased number of outbreaks of HPAI A(H5Nx), A(H5N1), A(H5N2), A(H5N5), A(H5N6) and A(H5N8) in domestic birds were notified from Asia, Africa and Russia. Most outbreaks have been reported from countries in Africa. Furthermore, the number of the global reports of HPAI virus positive wild birds has also increased in contrast with the reporting periods between May and September in previous years (EFSA et al., 2018; EFSA et al., 2020c).

[1] The date of suspicion was used as the reference date, when the date of suspicion was not available then the date of confirmation was used as the reference date.

[2] This designation is without prejudice to positions on status and is in line with United Nations Security Council Resolution 1244 and the International Court of Justice Opinion on the Kosovo Declaration of Independence.

- Russia notified to the OIE detections of HPAI A(H5Nx) and HPAI A(H5N1) in domestic and wild birds near the western and eastern border with Kazakhstan and Mongolia respectively. The areas where these birds were found are important staging sites for several migratory bird species before moving to wintering areas in Western European countries.
- Whole genome sequencing of 2.3.4.4b HPAI A(H5) viruses collected in Europe and Central Asia since July 2020 revealed the co-circulation of 19 distinct genotypes, confirming a high propensity of this virus to undergo reassortment events. The most widespread genotype belonged to the A(H5N8) subtype, which was also responsible for the previously reported cases in wild mammals and humans. All the genetically characterised viruses collected from poultry outbreaks in this reporting period belonged to this A(H5N8) genotype, while three distinct genotypes, A(H5N1), A(H5N5) and A(H5N8), have been identified in samples collected from wild birds.
- Fifteen human infections due to HPAI A(H5N6) and five human cases due to LPAI A(H9N2) virus have been reported from China since the last report.
- The genetic characterisation of three A(H5N6) viruses responsible for the human cases in China revealed that the infections were caused by reassortant clade 2.3.4.4b viruses, which possessed an HA gene closely related to the A(H5) viruses circulating in Europe and Asia.

2.2. Conclusions

- Following the first report of human cases due to avian influenza A(H5N8) virus, the risk of infection for the general population in the EU/EEA is assessed as *very low*, and for occupationally exposed people *low* with high uncertainty due to the high diversity of circulating avian influenza viruses in bird populations. The viruses characterized to date retain a preference for avian-type receptors; however, the high level of reassorted viruses currently circulating in Europe, the reports of transmission events of A(H5) viruses to wild mammals and to humans in Russia and the recent A(H5N6) human cases in China, caused by a virus with an HA gene closely related to the A(H5) viruses circulating in Europe, underlines a continuous risk that these viruses may adapt and transmit to mammals.
- The risk of transmission to humans by exposure to contaminated poultry products is considered *negligible* as also outlined in a previous EFSA assessment (EFSA AHAW Panel, 2017).
- The presence of HPAI virus in western Russia and north of the Mongolian border with Russia, linked to key migration areas of wild waterbirds, is of concern due to the possible spread of the virus via wild birds migrating to the EU. Autumn migration from breeding sites to wintering sites is ongoing, and the low temperature of autumn and winter may facilitate the environmental survival of avian influenza virus potentially introduced to Europe. According to data available, the northern and eastern areas of Europe are likely to be the first places of new virus introduction. However, despite the increasing number of HPAI A(H5)-affected countries and outbreaks outside Europe, there is considerable uncertainty about the real geographical distribution of these viruses, particularly in wild birds and along the flyways.
- During summer, HPAI A(H5) viruses were detected at lower levels than in winter and spring in resident wild bird populations in Europe, primarily in northern areas. HPAI outbreaks also occurred in poultry and captive birds in a few European countries. Despite this, the observed persistence of HPAI in wild birds in northern Europe into September 2021, in contrast with previous years, may indicate a risk for virus entry into poultry farms not only from wild birds migrating into Europe in the autumn and the winter, but also from wild birds that are resident in Europe.
- The occurrence of HPAI A(H5) virus incursions in commercial farms even where birds are kept indoors raises concern about the capacity of applied biosecurity measures in effectively prevent virus exposure. Biosecurity standards should be revised and reinforced, and their implementation regularly checked, primarily in poultry production systems at high risk of avian influenza.
- The 2020–2021 epidemic with a total of 1,298 outbreaks in poultry, 22,9 million birds affected, 85 detections in captive birds, and 2,394 events in wild birds in 31 European countries appears

to be one of the largest HPAI epidemics that has ever occurred in Europe. Note that the number of reported wild bird events is an underestimate of the total number of wild birds that have died from HPAI during this epidemic.

3. Options for response

- Appropriate biosecurity and early detection measures should be applied to reduce avian influenza risk, particularly in high-risk areas and production sectors. To promote the implementation of effective measures, farmer awareness needs to be strengthened. Strict controls on their application should be planned by the veterinary authorities in each country. These actions will also contribute to minimise exposure risk for farmers and other occupationally exposed people.
- Cross-sectoral cooperation and communication between animal and public health and occupational safety and health (OSH) authorities is recommended (One Health approach) to initiate rapid response, follow-up, and control measures.
- Passive surveillance should still focus on sick or dead birds of the target species (EFSA et al., 2017), but also consider other wild bird species, based on the detection of new species with HPAI infection during the 2020–2021 epidemic. According to past experience and available data on wild bird movements, the northern and eastern European areas might be at higher risk of virus introduction in this autumn–winter season and should be the key regions where prompt response measures for early detection of the virus should be set up. A subsequent involvement of the more southern and western areas is very likely.
- As the autumn migration is ongoing, continued surveillance of avian influenza virus in wild birds and poultry in Europe, combined with a timely generation and sharing of complete viral genome sequences, is crucial to promptly detect novel virus introductions (i.e. distinguishable from viruses that have remained present in birds in Europe since winter 2020–2021) and to detect emergence of novel reassortant viruses. Continued monitoring together with in-depth analyses on virus evolution and genetic mutations, resulting in changes in viral properties that are relevant for animal and public health, are of utmost importance. More efforts should be made by reporting countries to genetically characterise a significant number of samples based on the size, duration, and relevant features of the epidemic in each country.
- Besides surveillance in birds, surveillance in mammals and humans that can potentially be exposed to infected birds should be strengthened. This would facilitate the early identification of virus transmission events from birds to wild or domestic mammals and/or humans, and subsequently between humans.
- Avian influenza viruses have been identified in different wildlife species such as wild birds, seals and foxes. People living in areas where avian influenza outbreaks have been detected should avoid touching such sick (e.g. showing neurological symptoms) or dead animal species or bird droppings unprotected. Wearing personal protective equipment (PPE, face mask, goggles/face shield/protective glasses, gloves and gown/overall) when directly exposed to birds, their products or droppings, which may potentially be infected or contaminated with avian influenza viruses, will minimise any residual risk.
- People potentially exposed to infected birds, e.g. during culling operations, should be adequately protected and actively monitored or at least self-monitor for respiratory symptoms or conjunctivitis for 10 days following exposure and immediately inform local health and occupational health or other preventive services to initiate testing and follow-up. Antiviral pre- or post-exposure prophylaxis should be considered for exposed people according to national recommendations.
- Occupational health and safety measures should be set according to national legislation. Health monitoring should be offered according to national requirements (see Section 4.6.1 for more detail).

- The initiation of sero-epidemiological studies in exposed people following HPAI outbreaks is strongly encouraged to identify transmission events and support risk assessments.

4. Results

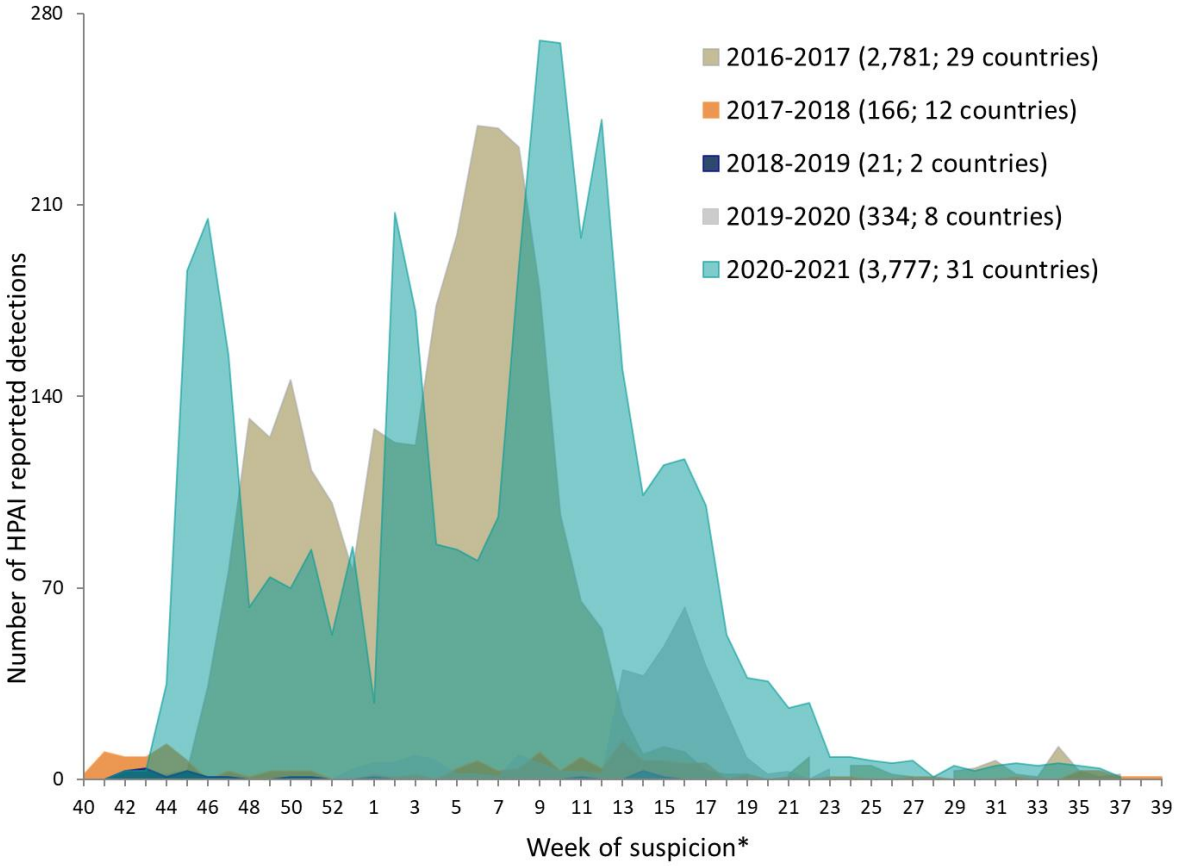
4.1. Overview of HPAI outbreaks in Europe during the previous and current seasons

Figures 1 and 2 show the HPAI outbreaks detected in birds (poultry, and wild and captive birds) in Europe and reported via ADNS, ADIS or OIE for seasons 2016–2017, 2017–2018, 2018–2019, 2019–2020 and 2020–2021 by week of suspicion and geographical distribution, respectively. A season is in this document considered as the period that starts in week 40 (the beginning of October) and ends in week 39 (the end of September) of the following year. For the current season, 2020–2021, data reported are truncated in the middle of week 37 (on 15 September 2021), as the season is still ongoing. A comparison among the geographical distribution of HPAI detections from May to September 2021 and the same period during the 2016–2017 epidemic which was the previous largest recorded in the EU/EEA in terms of number of poultry outbreaks, geographical spread and number of dead wild birds, is shown in Figure 3.

The analysis of the characteristics of the current 2020–2021 avian influenza season, from October 2020 to 15 September 2021, is reported in Figure 4 by week of suspicion, virus subtype and host population; the distribution of HPAI outbreaks in poultry in Europe by affected bird species and sampling programme leading to the outbreak detection is showed in Figure 5.

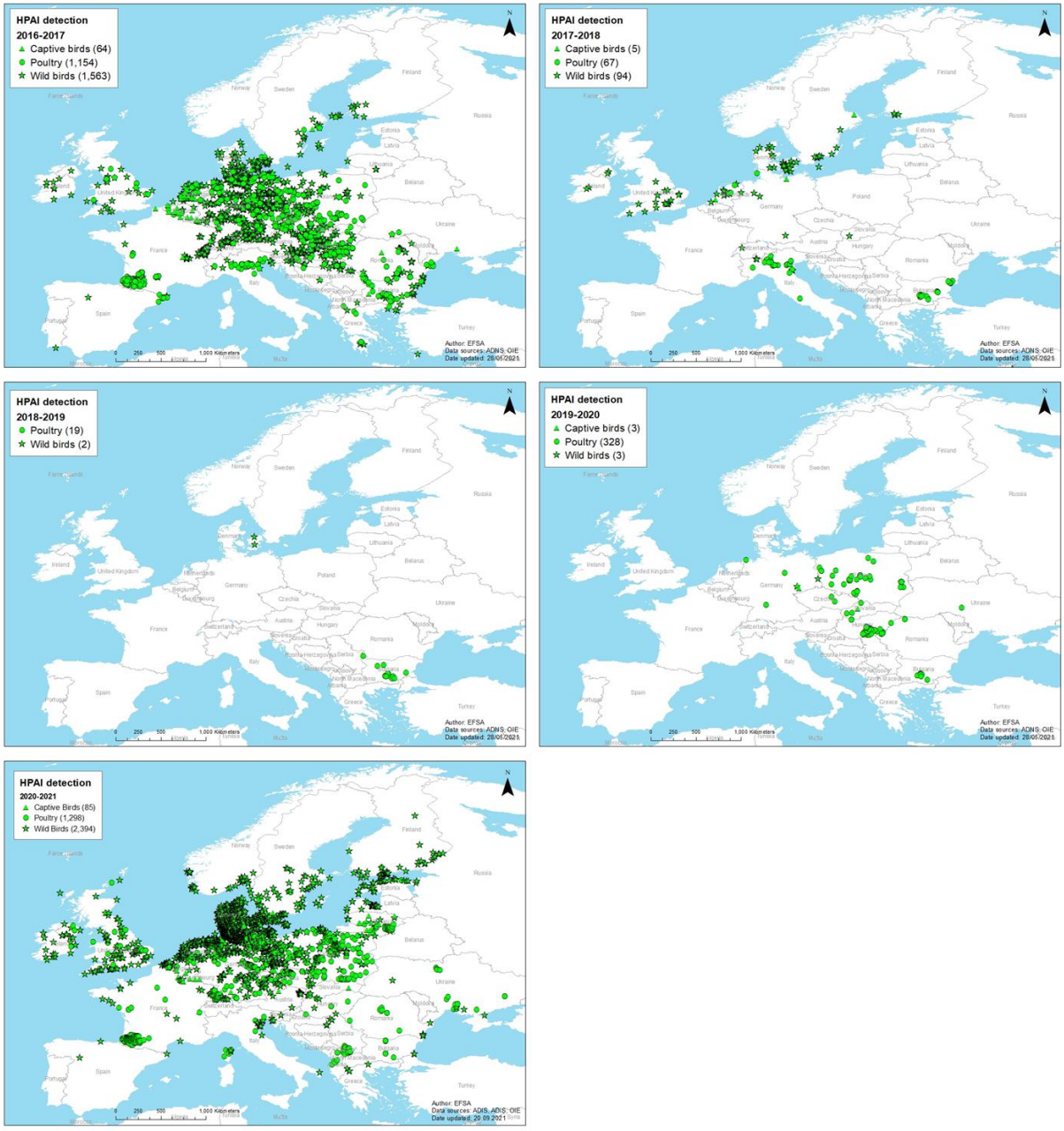
Comparison of the HPAI detections in wild birds and poultry between 2016–2017 and 2020–2021 (Figure 1, 2 and 3) shows differences in the start, spread and course of the overall epidemic in Europe (the end cannot yet be compared because the 2020–2021 epidemic is still ongoing). Overall, the numbers of HPAI outbreaks detected in poultry in 2020–2021 (1,298) is comparable to that observed in 2016–2017 (1,154), whereas in wild birds a much higher number of HPAI notifications were reported in 2020–2021 (2,394) compared with 2016–2017 (1,563) (Figure 2). From May to October 2017, HPAI was only sporadically detected in wild birds and, with the exception of a notification in May in Finland, all others HPAI-positive wild birds were detected in more southern areas (e.g. Switzerland, Italy, the Netherland), whereas in the same period in 2021, a much higher number of detections in wild birds were reported from countries bordering the Baltic Sea and Skagerrak (Figure 3). In the current reporting period (from 15 May to 15 September 2021), there were about 10-fold more reported detections at the beginning of the reporting period in 2021 (160 in May) than in 2017 (11 in May), and about the same number of reported detections in 2021 and 2017 at the end of the reporting period (26 and 5 in August and September 2021 and 26 and 9 in August and September 2017, respectively) (Figure 3).

Considering only HPAI outbreaks in poultry, so far approximately 22,900,000 birds have been affected in the current epidemic season since October 2020.



*When the date of suspicion is not available then the date of confirmation is used to assign the week of suspicion.
United Kingdom data are from ADNS up to 31 December 2020. From 1 January 2021 onwards, the data source was ADNS for Northern Ireland and OIE WAHIS for Great Britain.
Data source: ADIS and OIE (data extraction carried on 20 September 2021).

Figure 1: Distribution of total number of HPAI virus detections reported in Europe in the seasons 2016–2017 (green), 2017–2018 (orange), 2018–2019 (blue), 2019–2020 (grey), and 2020–2021 (turquoise) by week of suspicion, 28 September 2016 to 15 August 2021 (n = 7,079)



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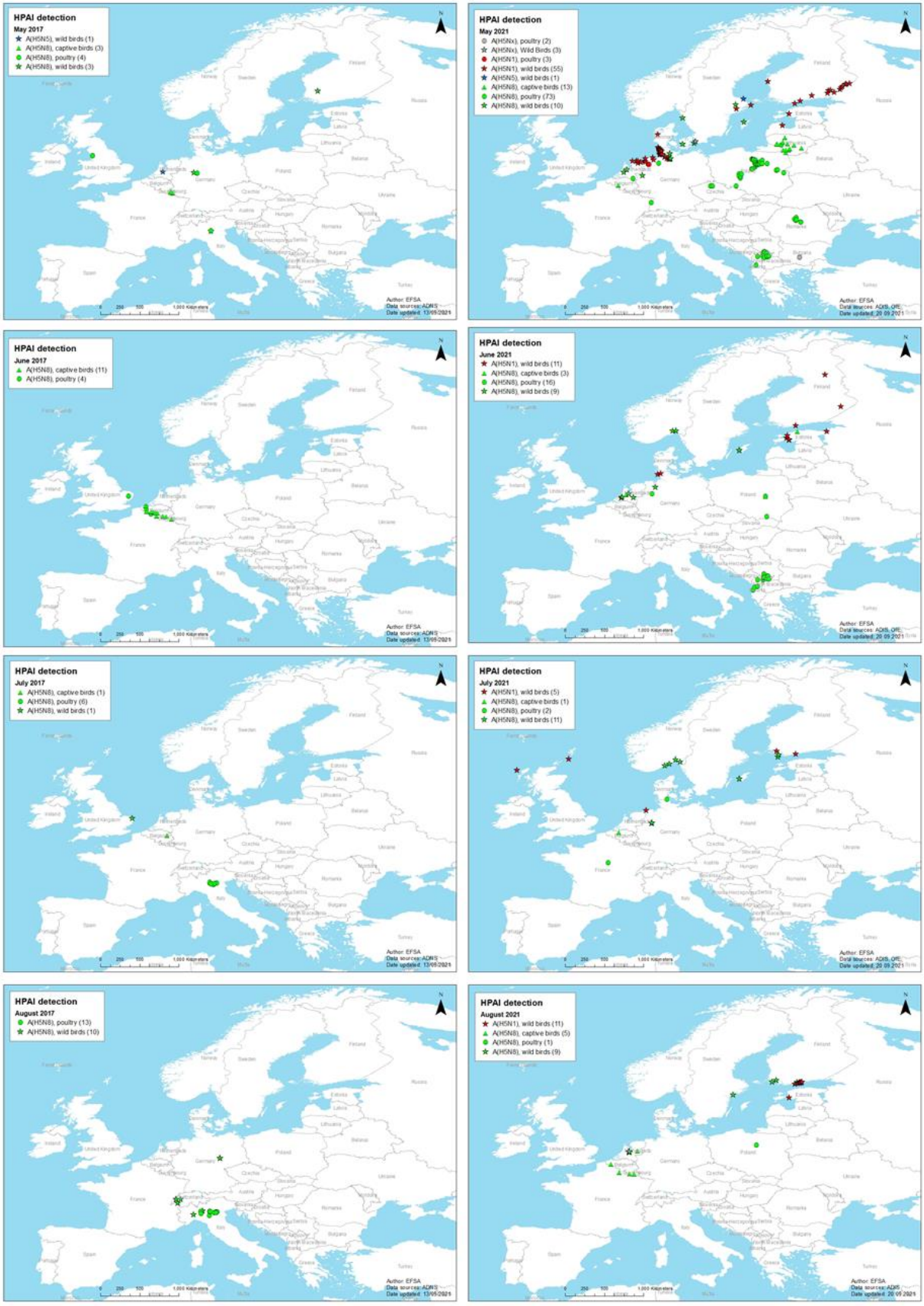
United Kingdom data are from ADNS up to 31 December 2020. From 1 January 2021 onwards, the data source was ADNS for Northern Ireland and OIE WAHIS for Great Britain.

Figure 2: Geographical distribution, based on available geocoordinates, of HPAI detections in Europe in seasons 2016-2017 (n = 2,781), 2017–2018 (n = 166), 2018–2019 (n = 21), 2019–2020 (n = 334) and 2020-2021 (n = 3,779) in poultry (circles), wild birds (stars) and captive birds (triangles) (1 October 2016 to 15 September 2021)


HPAI detection
May 2017
A(H5N5), wild birds (1)
A(H5N8), captive birds (3)
A(H5N8), poultry (4)
A(H5N8), wild birds (3)
HPAI detection
May 2021
A(H5Nx), poultry (2)
A(H5Nx), Wild Birds (3)
A(H5N1), poultry (3)
A(H5N1), wild birds (55)
A(H5N5), wild birds (1)
A(H5N8), captive birds (13)
A(H5N8), poultry (73)
A(H5N8), wild birds (10)
HPAI detection
June 2017
A(H5N8), captive birds (11)
A(H5N8), poultry (4)
HPAI detection
June 2021
A(H5N1), wild birds (11)
A(H5N8), captive birds (3)
A(H5N8), poultry (16)
A(H5N8), wild birds (9)
HPAI detection
July 2017
A(H5N8), captive birds (1)
A(H5N8), poultry (6)
A(H5N8), wild birds (1)
HPAI detection
July 2021
A(H5N1), wild birds (5)
A(H5N8), captive birds (1)
A(H5N8), poultry (2)
A(H5N8), wild birds (11)
HPAI detection
August 2017
A(H5N8), poultry (13)
A(H5N8), wild birds (10)
HPAI detection
August 2021
A(H5N1), wild birds (11)
A(H5N8), captive birds (5)
A(H5N8), poultry (1)
A(H5N8), wild birds (9)

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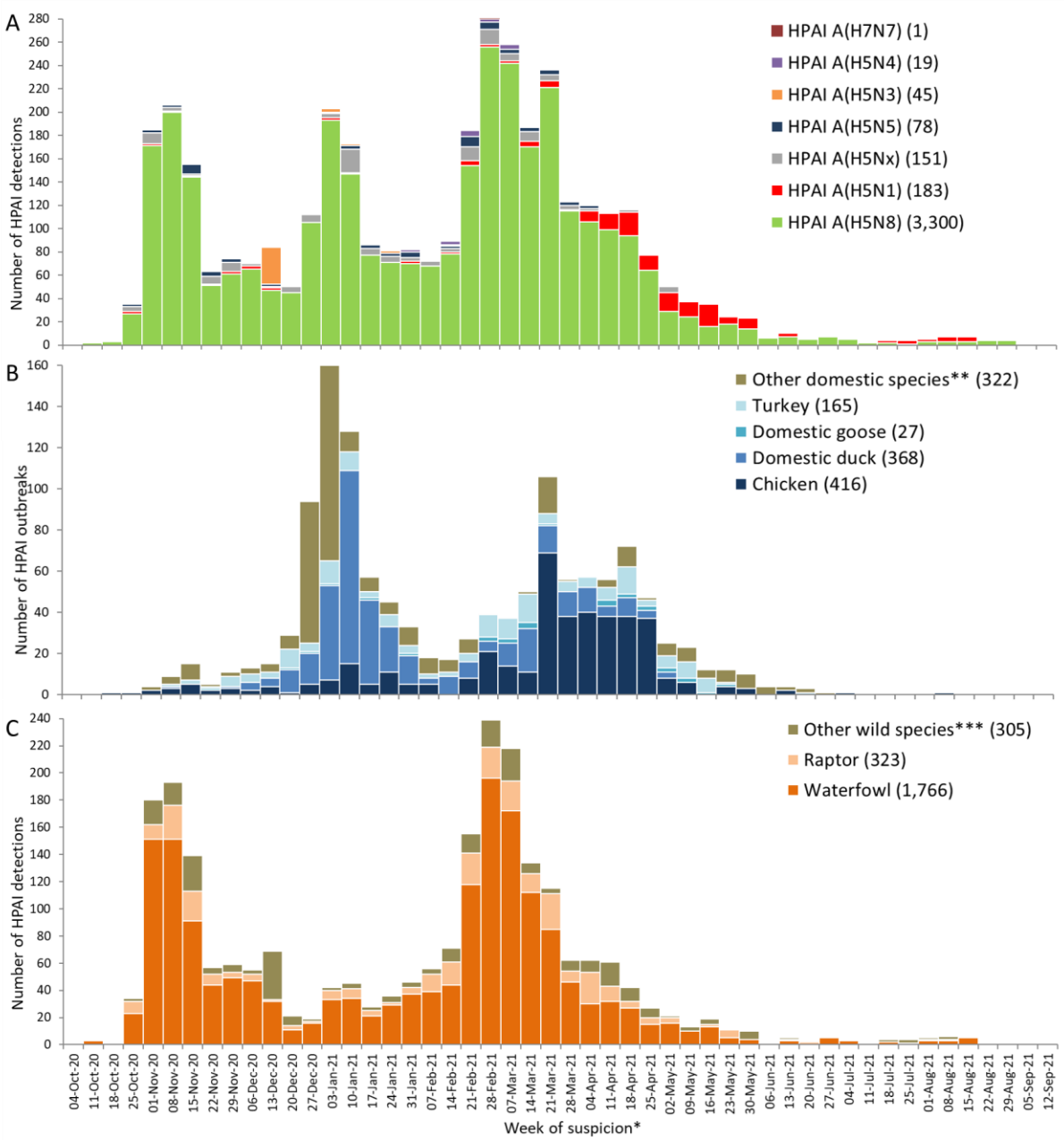
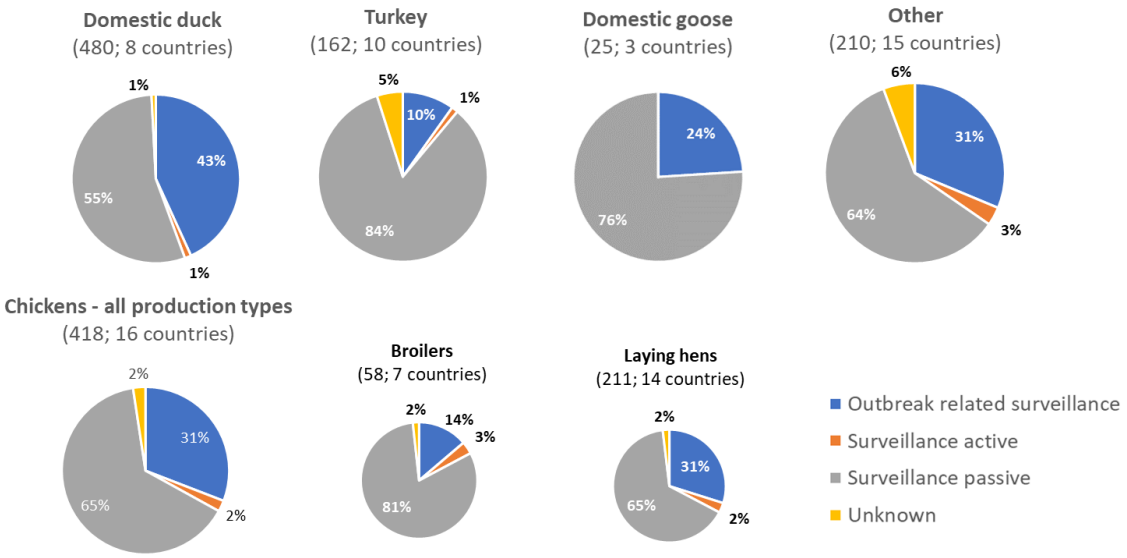
United Kingdom data are from ADNS up to 31 December 2020. From 1 January 2021 onwards, the data source was ADNS for Northern Ireland and OIE WAHIS for Great Britain.

Figure 3: Geographical distribution, based on available geocoordinates, of HPAI detections in Europe by month of suspicion in season 2016-2017 (left column, from May to September 2017) and in season 2020-2021 (right column, from May to 15 September 2021)



*When the date of suspicion is not available then the date of confirmation is used to assign the week of suspicion.
**'Other domestic species' category contains mixed, unknown bird species, or categories different from those displayed (i.e guinea fowl, peacock, pheasant and quail).
***'Other wild species' category contains mixed, unknown bird species, or categories different from those displayed. The complete list of species by each wild bird category is reported in table C.1 in Annex C.
United Kingdom data are from ADNS up to 31 December 2020. From 1 January 2021 onwards, the data source was ADNS for Northern Ireland and OIE WAHIS for Great Britain.
Data source: ADNS, ADIS and OIE (data extraction carried on 20 September 2021), EFSA.

Figure 4: Distribution of total number of HPAI virus detections reported in Europe by week of suspicion (dates indicate the first day of the week) and (A) virus subtype (n = 3,777), (B) affected poultry categories (n = 1,298), (C) affected wild bird categories (n = 2,394), 4 October 2020 to 15 September 2021



*'Other poultry species' contains mixed, unknown, or bird species different from those displayed.
Data source: EFSA.

Figure 5: Frequency distribution of HPAI outbreaks in poultry in Europe, by bird species (domestic goose, domestic duck, chicken, turkey and other poultry species) and sampling programme leading to the outbreak detection, in season 2020–2021 (October 2020 to 15 September 2021; n = 1,298)

4.2. HPAI and LPAI detections in Europe, 15 May to 15 September 2021 (TOR 1 and TOR 2)

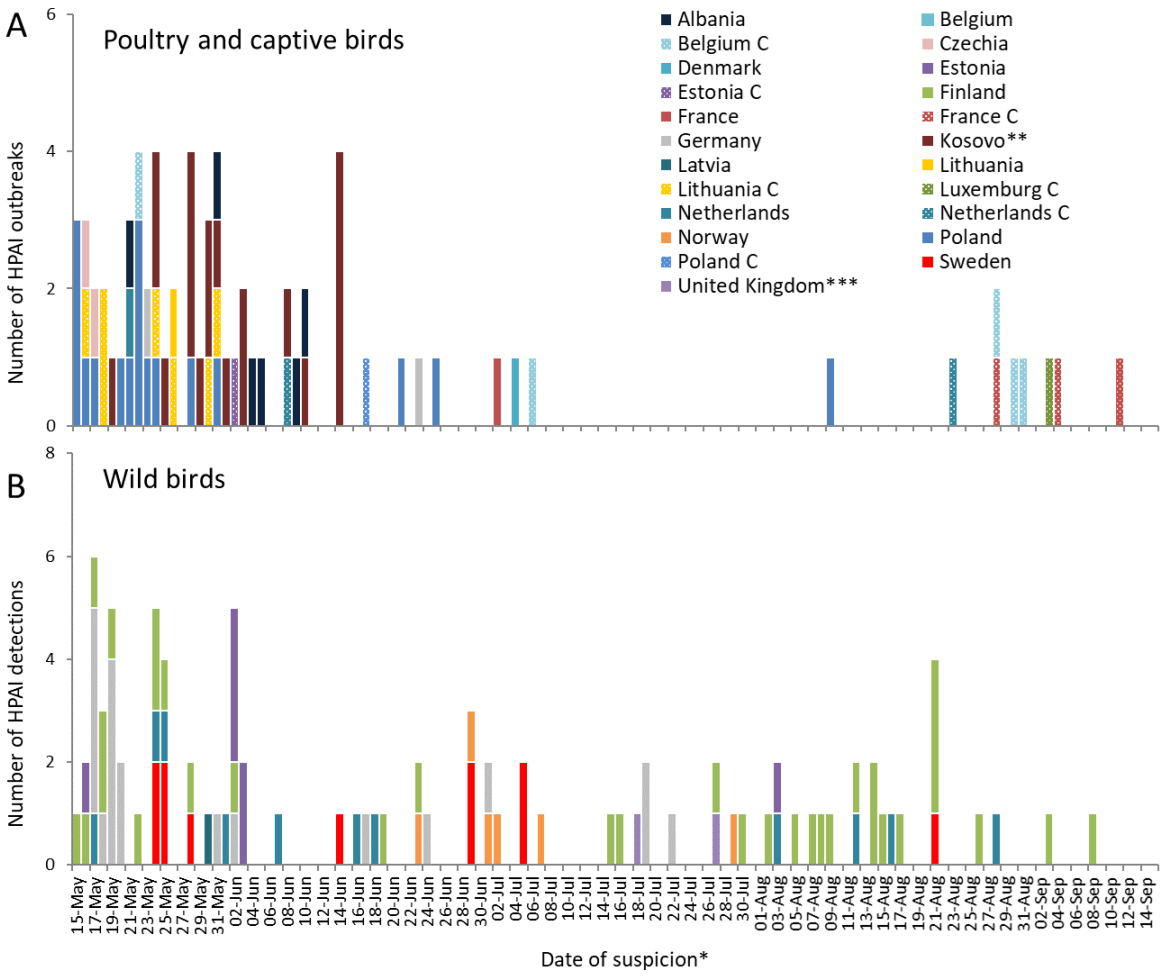
4.2.1. HPAI detections in poultry, other captive birds and wild birds

From 15 May 2021 to 15 September 2021, 162 HPAI A(H5) virus detections were notified in poultry (51), captive (20) and wild birds (91) in Europe, and were reported via the ADIS or OIE, as presented in Table 1. Overall, approximately 390,000 birds were affected in HPAI poultry outbreaks. An animated map showing the temporal and geographical distribution of HPAI detections by affected host population and virus subtype can be visualised here: https://youtu.be/kt2vWFHN7C4.

The timeline, location and affected bird category of the avian influenza detections are presented in Figures 6 and 7. The characterisation of HPAI-affected poultry establishments[3] is reported in Section 4.2.1.1; the description of the HPAI detections in wild birds is reported in Section 4.2.1.2.

In this reporting period, 10 outbreaks were notified as secondary, six in poultry in Poland and four in captive birds in Belgium and France. Of the six secondary outbreaks notified in Poland, four occurred in commercial turkey establishments and two in non-commercial establishments rearing mixed poultry species. Out of the four secondary outbreaks notified in captive birds, three (two in Belgium and one in France) were linked to the same trader in Belgium and that was later identified as an outbreak. Also, HPAI A(H5N8) was confirmed in two out of three dead seals (*Phoca vitulina*) found in the Schleswig-Holstein Wadden Sea in August 2021, Germany (Ärzteblatt, online).

[3] According to Regulation (EU) 2016/429 'establishment' means any premises, structure, or, in the case of open-air farming, any environment or place, where animals or germinal products are kept, on a temporary or permanent basis, except for: (a) households where pet animals are kept; (b) veterinary practices or clinics. Regulation (EU) 2016/429 of the European Parliament and of the Council of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health ('Animal Health Law'). OJ L 84, 31.3.2016, p. 1–208.



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***United Kingdom data were extracted from ADNS until 31 December 2020. From 1 January 2021 onwards, the data source was ADNS for Northern Ireland and OIE WAHIS for Great Britain.
Data source: EFSA, ADIS and OIE (data extraction carried on 20 September 2021).

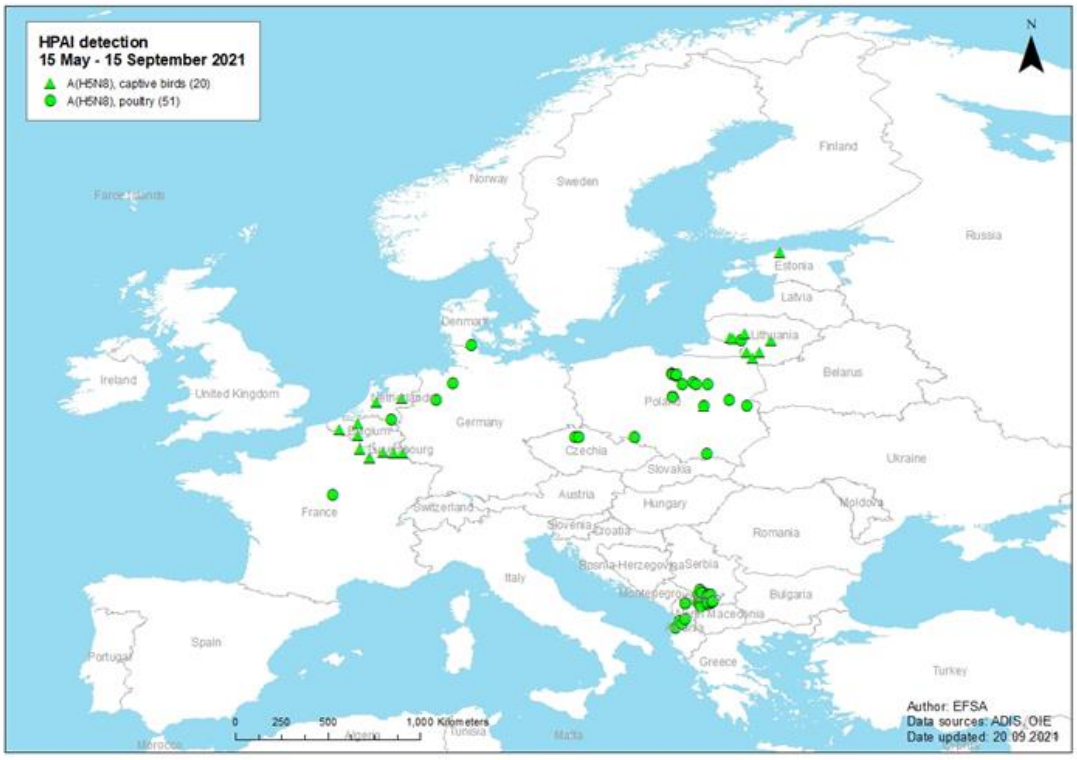
Figure 6: Distribution of the highly pathogenic avian influenza detections in Europe, by day of suspicion and country in (A) poultry (51) and captive birds (20) and (B) wild birds (91), from 15 May to 15 September 2021

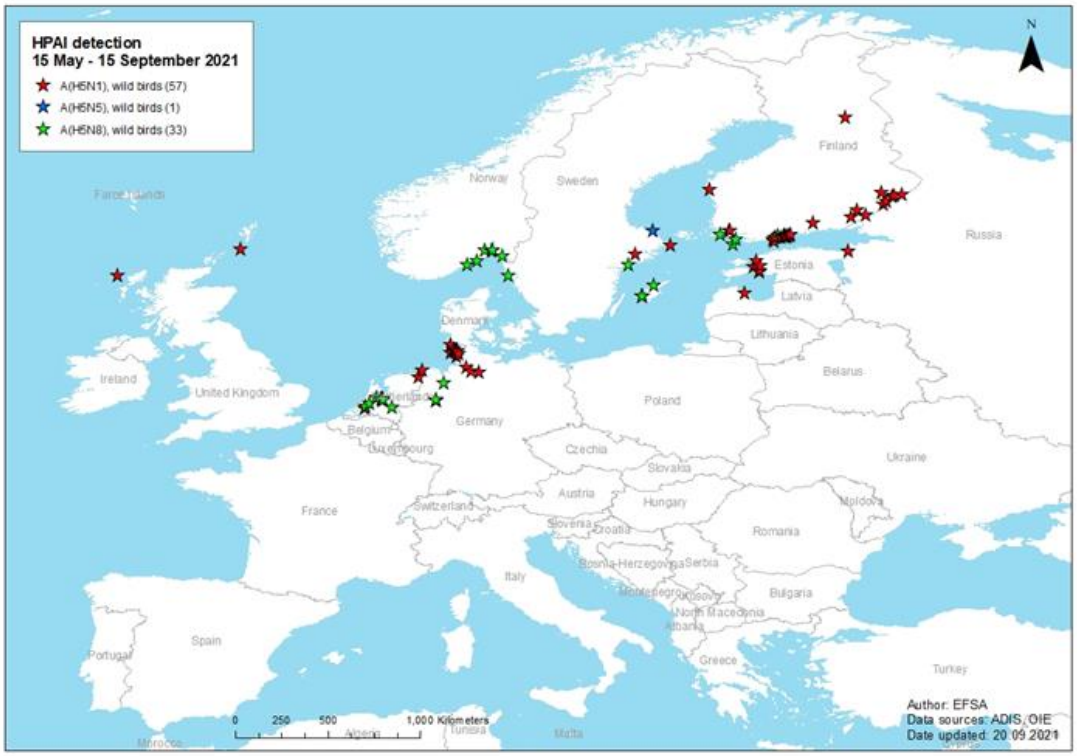
Table 1: Number of highly pathogenic avian influenza outbreaks in Europe, by country, virus subtype and affected sub-population, 15 May to 15 September 2021. Cumulative numbers for the whole 2020-2021 season are reported in brackets (5 October 2020 – 15 September 2021)

Country	Captive birds - 20 (85)			Poultry - 51 (1,298)				Wild birds - 91 (2,393)							Total
	A(H5Nx)	A(H5N5)	A(H5N8)	A(H5Nx)	A(H5N1)	A(H5N5)	A(H5N8)	A(H5Nx)	A(H5N1)	A(H5N3)	A(H5N4)	A(H5N5)	A(H5N8)	A(H7N7)	
Albania							6 (6)								6 (6)
Austria			(1)					(7)				(3)	(19)		(30)
Belgium	(1)		5 (7)			(1)	(1)	(4)					(21)		5 (35)
Bulgaria				(2)			(6)					(2)			(10)
Croatia							(1)						(3)		(4)
Czechia			(1)				2 (37)					(1)	(26)		2 (65)
Denmark		(1)	(2)				1 (13)	(9)	(3)	(2)		(6)	(295)		1 (331)
Estonia			1 (1)				(2)	(2)	7 (7)				(25)		8 (37)
Finland							(1)	(4)	28 (31)				6 (18)		34 (54)
France			3 (4)	(38)			1 (455)		(1)	(1)			(18)		4 (517)
Germany			(24)		(7)	(2)	2 (226)	(37)	15 (81)	(38)	(14)	(25)	4 (1,115)		21 (1,569)
Greece													(4)		(4)
Hungary					(1)		(6)					(1)	(2)		(10)
Ireland							(1)			(1)			(26)		(28)
Italy							(3)		(5)			(1)	(13)		(22)
Kosovo[a]							20 (20)								20 (20)
Latvia									1 (1)				(36)		1 (37)
Lithuania			7 (15)				1 (39)	(1)					(10)	(1)[c]	8 (66)
Luxembourg			1 (1)												1 (1)
Netherlands	(1)		2 (13)		(1)		1 (11)	(6)	2 (31)	(1)	(2)	(1)	9 (60)		14 (127)
Norway	(1)												6 (36)		6 (37)
Poland			1 (2)				17 (357)		(1)			(1)	(90)		18 (451)
Romania						(1)	(7)	(5)				(3)			(16)
Serbia													(3)		(3)
Slovakia			(1)		(1)	(1)						(4)	(1)		(8)
Slovenia												(1)	(5)		(6)
Spain													(3)		(3)
Sweden		(3)	(4)			(2)	(14)	(16)	2 (2)		(1)	1 (15)	8 (71)		11 (128)
Switzerland											(2)				(2)
Ukraine				(10)			(4)	(4)							(18)

United Kingdom[b]			(2)		(2)		(19)	(3)	2 (8)	(2)		(3)	(93)		2 (132)	
Total	(3)	(4)	20 (78)	(50)	(12)	(7)	51 (1,229)	(98)	57 (171)	(45)	(19)	1 (67)	33 (1,993)	(1)	162 (3,777)	

(a): This designation is without prejudice to positions on status, and is in line with United Nations Security Council Resolution 1244 and the International Court of Justice Opinion on the Kosovo Declaration of Independence.
(b): United Kingdom data were extracted from ADNS until 31 December 2020. From 1 January 2021 onwards, the data source was ADNS for Northern Ireland and OIE WAHIS for Great Britain.
(c): The HPAI A(H7N7) outbreak notified by the Lithuanian Health Authorities on 26 March 2021 was not confirmed by AI-ND EURL due to the very low viral load in the samples and the lack of other samples on which to repeat the analysis.
Data source: EFSA, ADNS and OIE (data extraction carried on 20 September 2021).





*This designation is without prejudice to positions on status, and is in line with United Nations Security Council Resolution 1244 and the International Court of Justice Opinion on the Kosovo Declaration of Independence.
United Kingdom data were extracted from ADNS until 31 December 2020. From 1 January 2021 onwards, the data source was ADNS for Northern Ireland and OIE WAHIS for Great Britain.

Figure 7: Geographical distribution, based on available geocoordinates, of highly pathogenic avian influenza detections reported by virus subtype in poultry and captive birds (upper panel) and in wild birds (lower panel) in Europe between 15 May and 15 September 2021

4.2.1.1. HPAI in domestic birds

Characterisation of the HPAI-affected poultry establishments

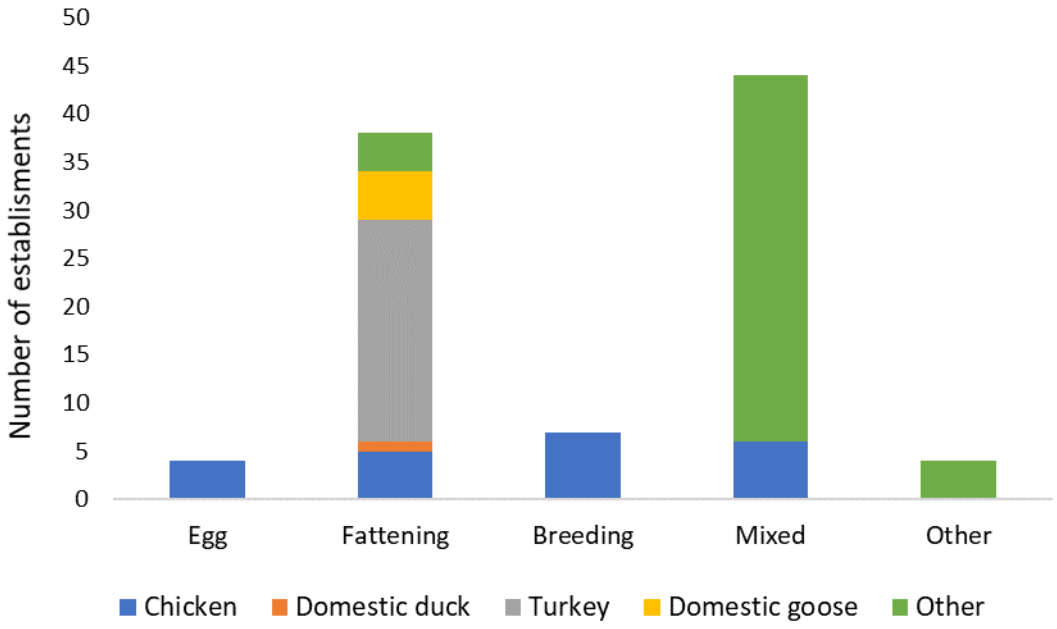
In this section a detailed analysis of the HPAI affected poultry establishments is presented. As in the previous report outbreaks notified until 30 April 2021 were included due to the time needed to carry out the data collection (EFSA et al., 2021b), the reporting period present in this section is longer than that of the whole report, and starts from 1 May. EFSA thanks the affected countries that supported this *ad hoc* data collection.

From 1 May to 15 September 2021, 97 HPAI outbreaks in poultry were notified in 11 countries through ADIS: 51 in Poland, 20 in Kosovo[2], six in Albania, Germany and Romania, two in Bulgaria and Czechia, one in Denmark, France, Lithuania and Netherlands (Figure 9A). During this time, 2,761,543 poultry birds were affected, with outbreaks in Poland accounting for 53% of the number of outbreaks and 87% of the number of poultry birds affected (Figure9B). Compared with the previous reporting period, around one-sixth of the number of outbreaks occurred, with approximately one-quarter of the birds affected (approximately 10 million birds affected in 589 outbreaks in the previous analysed period from 12 February to 29 April 2021) (EFSA et al., 2021b).

Two subtypes were reported: A(H5N8) in 94 outbreaks, and A(H5N1) in three outbreaks in Germany.

The description of the bird species and the production category of these HPAI-affected establishments are shown in Figure 8. In total, eight establishments were housing more than 100,000 birds each, two holdings belong to the housing category of 50,001-100,000 birds, 29 holdings belong to the housing category of 10,001-50,000 birds, 20 holdings belong to the housing category of 1,001-10,000 birds, and 54 establishments were keeping less or equal to 1,000 birds. Data for three farms in Kosovo[2] were not available.

Out of 97 outbreaks, 57 HPAI incurions occurred in commercial farms; of these, six were in farms that had outdoor access (five in Poland and one in Kosovo[2]).



*'Other' species category contains mixed, unknown bird species, or categories different from those displayed (i.e guinea fowl, peacock, pheasant, pigeon, and quail). 'Other' production type contains unknown or different production type from those displayed (i.e. egg, fattening, breeding and mixed).

Figure 8: Poultry species and production category of holdings affected by HPAI between 1 May 2021 and 15 September 2021 (n=97).

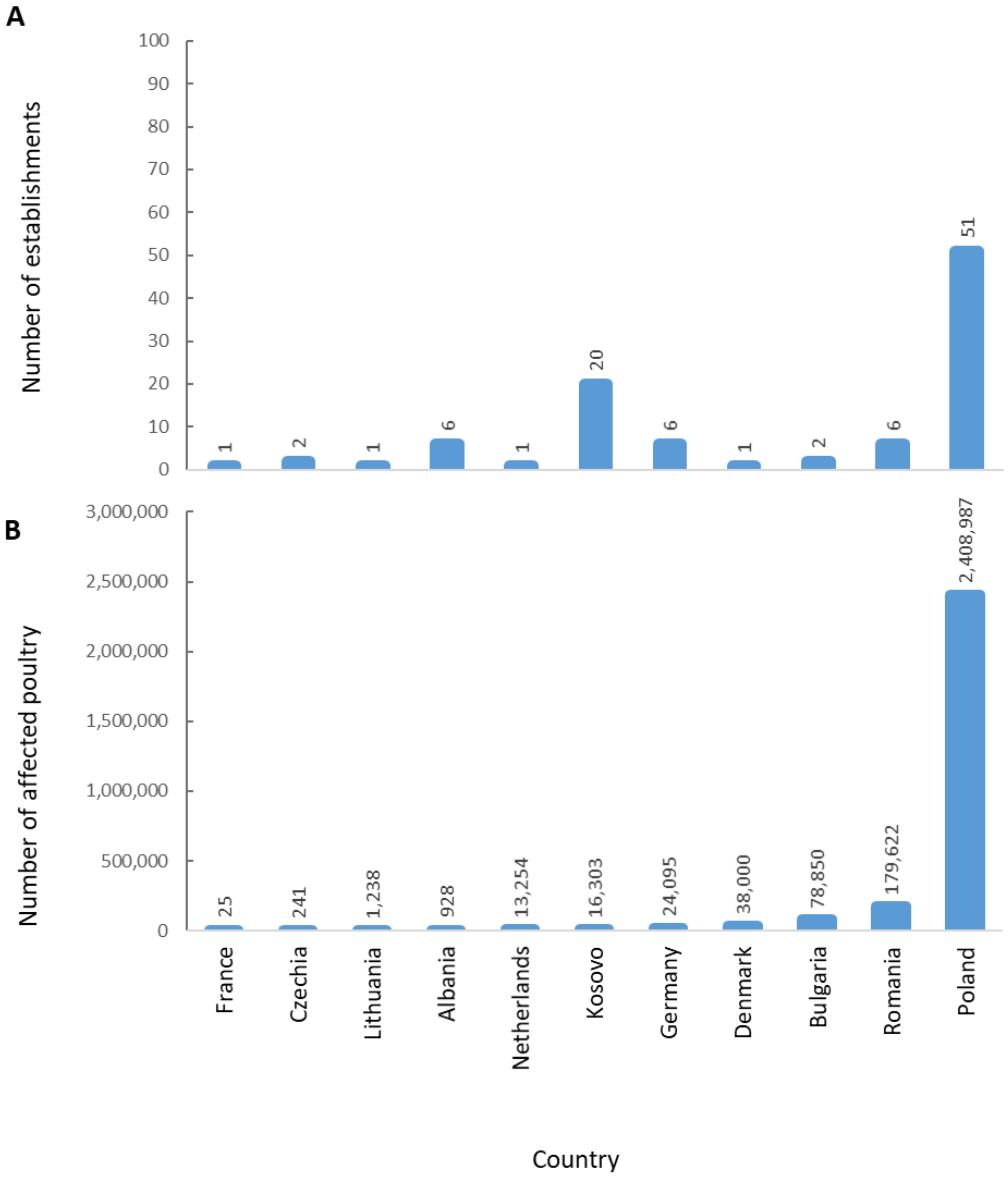


Figure 9: Number of establishments (A) and domestic birds (poultry) (B) affected by HPAI in the EU between 1 May 2021 and 15 September 2021.

HPAI A(H5N8)-affected poultry establishments in Albania

Between 15 May and 15 June 2021, 6 HPAI A(H5N8) outbreaks were reported in backyard farms with outdoor access in the four regions of Diber, Durres, Kukes, and Tirane in Albania. The housing order immediately entered into force in the whole country with the first case confirmation. In total, 928 birds were affected, with an average mortality rate of 34%. No data were available on the type of outbreak, the poultry species involved, the number of exposed people and the source of infection. The characteristics of the affected establishment and species reared are presented in Table A.1 in Annex A.

HPAI A(H5N8)-affected poultry establishments in Bulgaria

On 5 May 2021, two primary HPAI A(H5) outbreaks were reported in two poultry farms located in the Plovdiv region in Bulgaria, with 140 and 57 cases being reported (out of 62,478 and 16,372 respectively). Neither farm had outdoor access. The source of infection in the holdings had not been determined at the time of publication of this report, but indirect contact with wild birds was considered the most likely

source of virus. No data were available on the number of exposed people in HPAI outbreaks in poultry in Bulgaria. The characteristics of the affected establishment and species reared are presented in Table A.1 in Annex A.

HPAI A(H5N8)-affected poultry establishments in Czechia

On 17 and 18 May 2021, 2 HPAI A(H5N8) outbreaks were confirmed in poultry holdings in the Central Bohemian region. The outbreaks occurred both in backyard holdings.

The affected holdings were keeping 43 and 198 birds from different species (chickens, domestic ducks, domestic geese, pigeons). Chicken deaths and clinical signs were observed in both the farms, but only in one holding there was mortality in ducks or geese. Pigeons were not affected. In total, five people were exposed to the cases.

As both farms had outdoor access and birds, feed and water were not protected against contact with wild birds, indirect contact with wild birds was considered the most likely source of virus. The characteristics of the affected establishment and species reared are presented in Table A.1 in Annex A.

HPAI A(H5N8)-affected poultry establishments in Denmark

On 5 July 2021, one HPAI A(H5N8) outbreak was confirmed in a commercial farm in the region of Syddanmark (specifically, in the municipality of Sønderborg in the Southern part of Jutland).

The affected population was a poultry breeding holding, producing eggs to the slaughter chicken production, consisting of approximately 40,000 animals. Mortality was reported in 198 birds, and clinical signs were also observed. The establishment did not have outdoor access and the most likely source of viral introduction is indirect contact with wild birds. No data were available on the number of exposed people in HPAI outbreaks in poultry in Denmark. The characteristics of the affected establishment and species reared are presented in Table A.1 in Annex A.

HPAI A(H5N8)-affected poultry establishments in France

On 8 July 2021, one HPAI A(H5N8) outbreak was confirmed in a backyard farm in the region of Centre-Val de Loire with 20 ducks and five chickens. Clinical signs were observed in both ducks and chickens. Mortality was observed in five domestic ducks and two chickens. The farm had outdoor access, but the source of viral introduction was not determined. At the time of the outbreak, the housing order was not in place, as from 28 May up to 9 September 2021 the risk level was assessed to be 'low'. No data were available on the number of exposed people in HPAI outbreaks in poultry in France. The characteristics of the affected establishment and species reared are presented in Table A.1 in Annex A.

HPAI A(H5N8) and HPAI A(H5N1) affected poultry establishments in Germany

Between 4 May 2021 and 25 June 2021, only six outbreaks occurred in Germany (193 outbreaks had occurred during the last reporting period), in the three regions of Niedersachsen, Baden-Württemberg and Bremen. Three outbreaks were caused by A(H5N8) and three by A(H5N1).

Four outbreaks (three H5N1 and one H5N8) were detected in commercial holdings, and two (H5N8) in non-commercial ones.

For the commercial holdings, three outbreaks (H5N1), were detected between 4 and 8 May in farms with respectively 6,333, 3,408 and 13,812 turkeys in the Niedersachsen region. Of these, respectively 52, 50 and 41 animals died. The most recent outbreak (H5N8) in a commercial holding was confirmed on 25 June 2021 and was observed in a farm with laying hens (231), ducks for breeding (40), geese for breeding (20), and pheasants (8). Seven hens and three ducks died, while no mortality nor clinical signs have been registered for geese and pheasants.

For the backyard holdings, two outbreaks were confirmed on 10 and 27 May in Baden-Württemberg and Bremen regions. The first outbreak was observed in a farm with chickens for breeding (132), laying hens (66), geese (15) and ducks (3) for meat production, of which two chickens, three geese and one duck died. Laying hens were not affected by the disease. The second outbreak was observed in farm with 14 laying hens and seven geese for meat production, of which respectively six and one birds died.

For all the outbreaks, the most likely reason for the outbreak was considered to be indirect or direct contact with wild birds. Information on outdoor access was available for three farms, commercial holdings with no outdoor access. No data were available on the number of exposed people in HPAI outbreaks in poultry in Germany. The characteristics of the affected establishment and species reared are presented in Table A.1 in Annex A.

HPAI A(H5N8)-affected poultry establishments in Kosovo[2]

Between 21 May and 15 June 20 HPAI A(H5N8) outbreaks were notified for the first time in poultry farms in Kosovo[2]. Detections of HPAI occurred in five regions: Ferizaj, Gjilan, Mitrovica, Prishtina and Prizren.

All the outbreaks except one occurred in backyard farms. Despite being backyard farms, all of them, except one, sold products either on live bird markets (poultry) or elsewhere (eggs).

Seven backyard farms kept chickens for fattening and egg laying, one farm kept chickens for fattening, 12 farms kept mixed species, including chickens (11/12), domestic ducks (8/12), domestic geese (6/12) and turkeys (5/12) for fattening. Three of the backyard farms also kept quails for egg production. For farms for which data were available (chickens: 4 out of 19, turkeys: 4 out of 5, domestic ducks: 3 out of 7 and geese 4 out of 5), the average mortality rate were: 64% for chickens, 75% for turkeys, 85% for geese and 64% or ducks. Data on mortality of quails were not available.

The outbreak in the commercial holding involved a farm with 8,000 laying hens, of which the 44% died.

All the farms (both commercial and not commercial) had outdoor access, but the cause of the outbreaks has not been identified for none of them. Immediately after the confirmation of the first outbreak, on 21st May, a housing order was applied and remained in place until 13 July 2021, i.e. 25 days after the last confirmed positive case. No data were available on the number of exposed people in HPAI outbreaks in poultry in Kosovo[2]. The characteristics of the affected establishment and species reared are presented in Table A.1 in Annex A.

HPAI A(H5N8)-affected poultry establishments in Lithuania

On 27 May 2021, an HPAI A(H5N8) primary outbreak occurred in a trader's holding in Taurages region, where mixed poultry species were kept (chickens for both egg and meat production, turkeys, domestic ducks and domestic geese). The trader holding had no outdoor access, and clinical signs had been observed for all the species. Mortality was observed for 5/865 chickens, 2/23 domestic ducks and 2/200 turkeys, while no domestic geese died (out of 150 birds).

The most likely source of the outbreak was considered to be direct contact with poultry, and the epidemiological investigation confirmed the outbreak as a consequence of the previous outbreaks in backyard / hobby holdings in the district municipalities nearby. Five people were exposed to the outbreak during the culling and destruction activities. The characteristics of the affected establishments and species reared are presented in Table A.1 in Annex A.

HPAI A(H5N8)-affected poultry establishments in Netherlands

On 22 May 2021, HPAI A(H5N8) was confirmed in a commercial holding keeping 13,254 turkeys without outdoor access in the province Limburg in the Netherlands. Eighty-two turkeys were affected and 50 died. Clinical signs with drop in feed and water intake were also observed. The most likely cause of viral introduction has not been determined by the time of publication of this report. No data were available on the number of exposed people in the HPAI outbreak. The characteristics of the affected establishments and species reared are presented in Table A.1 in Annex A.

HPAI A(H5N8)-affected poultry establishments in Poland

Between 1 May 2021 and 9 August 2021, 51 HPAI A(H5N8) outbreaks were notified in Poland. Thirty-seven of these outbreaks were considered primary and 14 secondary, affecting a total of 2,408,987 birds. Detections of HPAI occurred in five regions of Poland, with the most affected being Mazowieckie, followed by Warmińsko-Mazurskie and Wielkopolskie. Only two outbreaks were registered in the regions of Opolskie and Lubelskie.

All the outbreaks, except five, were in commercial farms. Outdoor access was not available for the 89% of the commercial holdings (41/46).

Out of the commercial holdings affected, the majority (33/46) were fattening holdings (20 kept turkeys, five domestic geese, five chickens, one domestic ducks, and two mixed species), six were breeding establishments keeping chickens, four were egg production facilities (with laying hens), and three were mixed production type with mixed species.

All the five non-commercial establishments kept chickens for fattening and egg laying, with 4 holdings having also other species, including domestic ducks (4/5), domestic geese (2/5), turkeys (2/5), guineafowls (2/5), and pigeons (1/5).

Out of the 33 outbreaks that occurred in fattening establishments, birds had outdoor access only in three farms keeping domestic geese. Housing order was implemented by local authorities in the surveillance and protection zones, which could be different in relation to region.

In 16 outbreaks, indirect contact with poultry (e.g. contact with infected holdings, transmission through strong wind or air ventilation systems) was the source of virus in the holding. The most likely source of introduction in 12 outbreaks was through indirect contact with wild birds (possibly through water reservoir in four cases) and in 1 direct contact with wild birds. Finally, in four cases, the source of introduction remains unknown, possibly due to human vector, the air ventilation system or contact with wild birds. Mortality was observed in all cases (average mortality rate of 12%), except for one farm.

For the six outbreaks detected in breeding establishments, all holdings reported bird mortality, with an average mortality rate of 19%. The assumed reason for viral introduction was through indirect contact through poultry (in particular due to strong wind or air ventilation systems).

In relation to the four outbreaks that occurred in facilities holding laying chickens, mortality was observed in all the cases, with an average mortality rate of 37%. The most likely sources of virus were considered to be: indirect introduction via wild birds (1/4), in which death of birds started to be observed in the proximity of the ventilation system, indirect introduction via poultry birds (1/4), while the source remains unknown for two out of four outbreaks, possibly connected with wild bird presence or the ventilation system.

For the five outbreaks that occurred in backyard farms, the most likely source of viral introduction in three cases was contact with wild birds, in one case the introduction of animals from an affected farm and in one case remains unknown. Mortality was observed in all the affected backyard farms.

The total number of estimated persons exposed to HPAI in the six outbreaks was 664. The characteristics of the affected establishment and species reared are presented in Table A.1 in Annex A.

HPAI A(H5N8)-affected poultry establishments in Romania

Between 6 May and 14 May 2021, six HPAI A(H5N8) outbreaks were confirmed in chicken farms in Harghita (two) and Mures (four) regions. A primary outbreak resulted from the introduction of infected flocks was detected in a large commercial farm of a trader with 179,192 birds (domestic ducks, domestic geese, turkeys and hens) in the Mures region, where 5% of the birds died. In the following days, five secondary outbreaks were detected in backyard farms with chickens with a median number of 66 birds, following the introduction of infected flocks. On average, the 62% of chickens from the backyard farms died.

Clinical signs and drop in feed and water intake were observed in all the affected farms. The total number of estimated persons exposed to HPAI in the six outbreaks was nine. The characteristics of the affected establishment and species reared are presented in Table A.1 in Annex A.

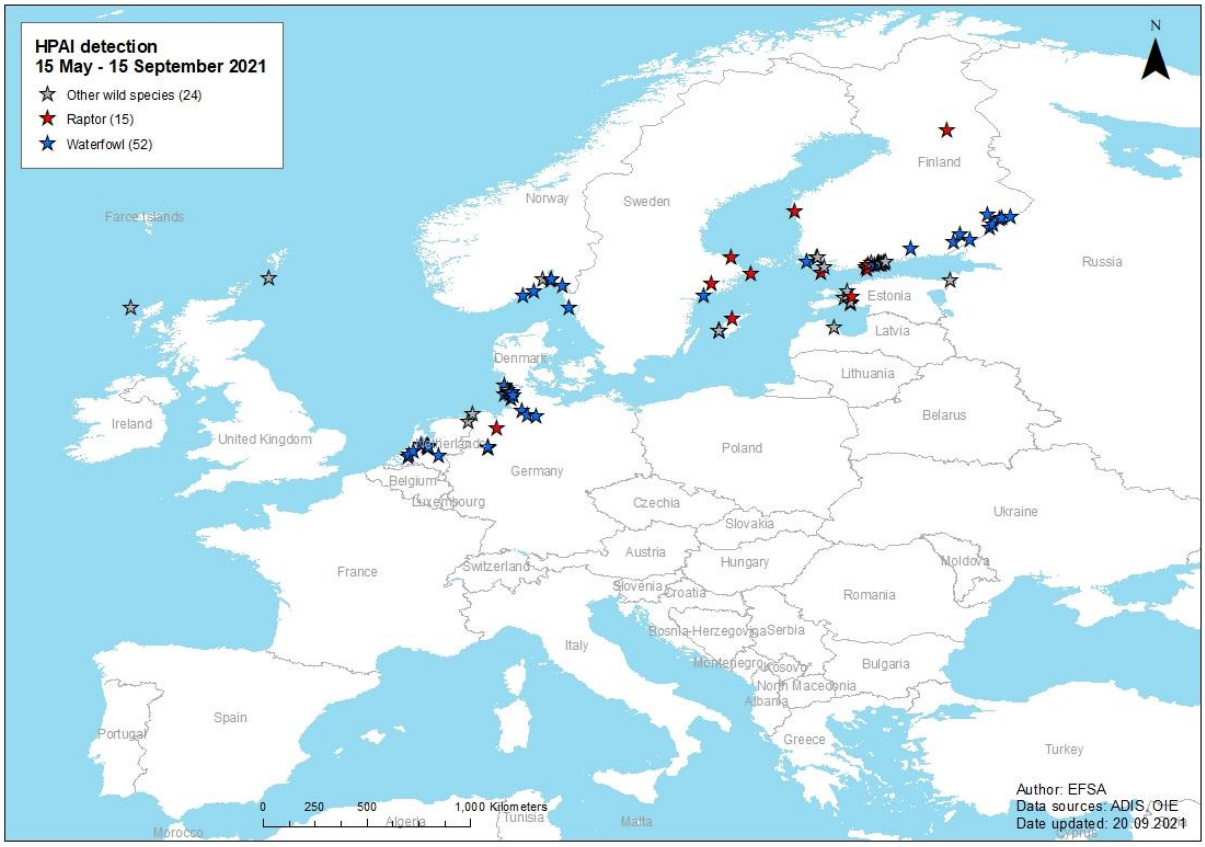
Information extracted from the scientific literature

Lean et al. (2021) described the macroscopic pathological changes of several species of poultry and captive wild birds infected naturally with A(H5N1) and A(H5N8) during the HPAI clade 2.3.4.4b outbreak in the UK Necrosis of pancreas and spleen were common pathological change in galliform poultry, but rare in anseriform poultry. Haemorrhages in heart and serosal linings, as well as ascites, were observed less commonly. They concluded that these pathological data, together with clinical information, are valuable first steps in establishing the diagnosis of HPAI. Zhang et al. (2021) performed experimental

infections with an A(H5N8) isolate (A/duck/southwestern China/B1904/2020) belonging to the same 2.3.4.4b clade as the virus causing the 2020-2021 outbreak in Europe. They inoculated 10^5 $TCID_{50}$ virus in 200 μL intranasally into 6-week-old SPF chickens (breed not specified). They died within 96 hours, with multiple organs being virus-positive, suggesting systemic infection. They inoculated the same virus strain into Pekin ducks (age not specified; inoculation method not specified). In contrast with inoculated chickens, the ducks did not show any clinical signs, yet yet shed virus from throat and cloaca, and contact ducks became infected, indicating efficient virus transmission among ducks. They inoculated 10^6 $TCID_{50}$ virus in 50 μL intranasally into six-week-old female BALB/c mice. The mice died at 7 days after inoculation, with virus in multiple organs, including high titres in the lungs. Molecular analysis of the virus revealed amino acid substitutions in HA, PB1, PA, and M1 proteins associated with increased virulence in mice and transmission in guinea pigs, suggesting an increased threat to human health.

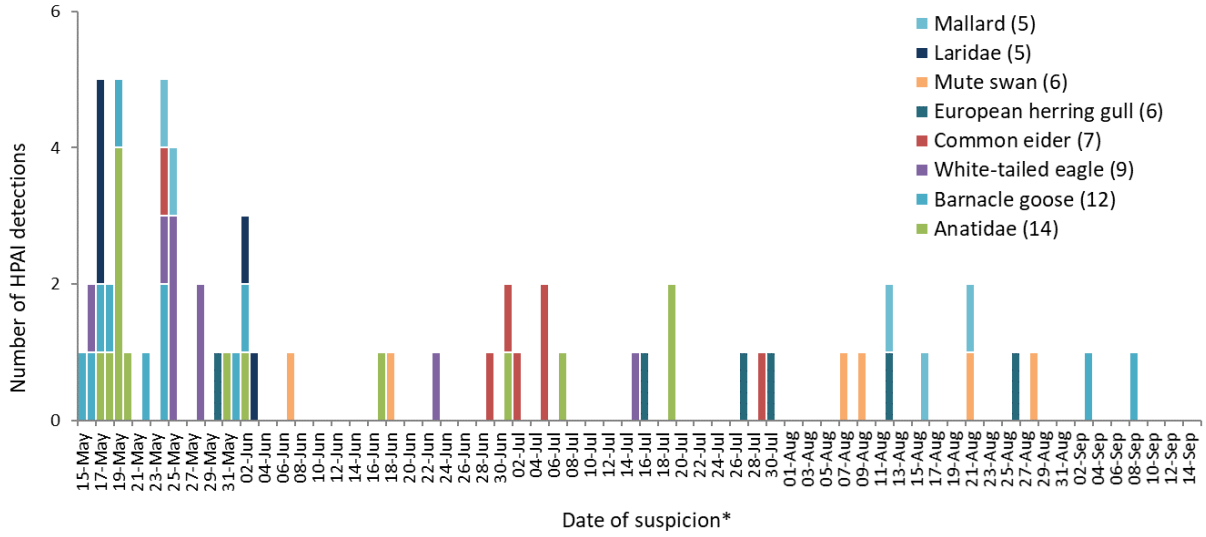
4.2.1.2. HPAI in wild birds

Between 15 May and 15 September 2021, 91 HPAI virus detections in sick or dead wild birds were reported to the ADIS and OIE by EU/EEA and the UK (Figure 10). The overall geographical pattern shows a concentration of reported cases along the North Sea coasts of the Netherlands, Germany and Denmark, and along the coasts of the Skagerrak (Norway and Sweden) and the Baltic Sea (Sweden, Finland, Estonia, Latvia). These reported detections form a broad band on the map, from the Netherlands in the southwest to Finland in the northeast. The overall temporal pattern shows a sharp decline from 15 May to the beginning of June, with sporadic cases still being reported until the end of the reporting period on 15 September. For subtypes involved, A(H5N1) predominated: there were about two-fold more A(H5N1) than A(H5N8) cases in wild birds during the reporting period, in contrast with about 10-fold less A(H5N1) than A(H5N8) cases in wild birds in the whole 2020–2021 epidemic period (Figure 12). At least eight waterfowl species (52 detections), at least five other wild bird species (24 detections) and at least four raptor species (15 detections) were involved. The complete list of HPAI detection by wild bird species is reported in Table C.1, Annex C. This list includes two reported cases in the Shetland Isles and in Flannan Isle (UK) of great skuas (*Stercorarius skua*) and one reported case in Finland of a golden eagle (*Aquila chrysaetos*), both species in which HPAI has not been recorded previously. Of the wild bird species reported, those involved in five or more detections were barnacle goose (*Branta leucopsis*) (12), white-tailed eagle (*Haliaeetus albicilla*) (9), common eider (*Somateria mollissima*) (7; only 3 previous detections, in November 2020 in Germany and Denmark), European herring gull (*Larus argentatus*) (6), mute swan (*Cygnus olor)* (6) and mallard (*Anas platyrhynchos*) (5) (Figure 11). Also, 14 HPAI detections were reported as unspecified Anatidae and 5 as Laridae. The current mortality of wild birds associated with HPAI is much higher than the number in which HPAI has been detected in the laboratory, because in mass mortality events at a specific location and date, only one or a few birds are actually tested for HPAI.



*This designation is without prejudice to positions on status, and is in line with United Nations Security Council Resolution 1244 and the International Court of Justice Opinion on the Kosovo Declaration of Independence.

Figure 10: Geographical distribution, based on available geocoordinates, of highly pathogenic avian influenza detections in wild birds in Europe, by species category, 15 May to 15 September 2021 (n = 965)



* When the date of suspicion is not available then the date of confirmation is used to assign the week of suspicion.
Data source: EFSA, ADIS and OIE (data extraction carried on 20 September 2021).

Figure 11: Number of reported detections of highly pathogenic avian influenza virus A(H5) in wild birds of the most affected wild bird species (i.e. those involved in five or more detections) in the EU/EEA and the UK, by date of suspicion, from 15 May to 15 September 2021. Note that in one single reported detection of HPAI in wild birds more than one bird might be involved

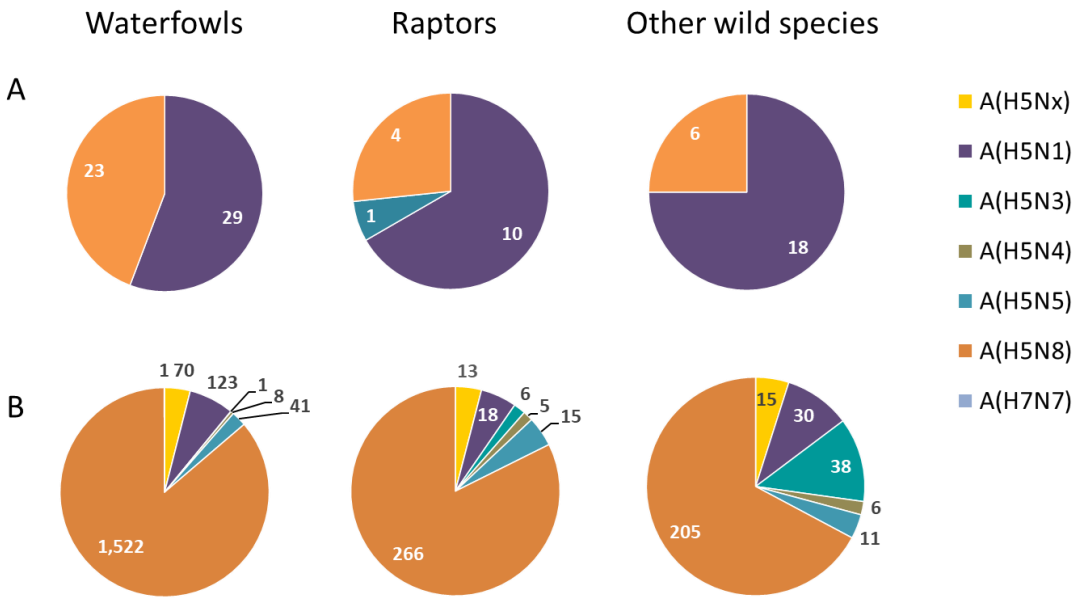


Figure 12: Number of reported detections of highly pathogenic avian influenza virus in wild birds in the EU/EEA and the UK, by virus type in (A) from 15 May to 15 September 2021 (n = 91) and (B) from 1 October 2020 to 15 September 2021 (n = 2,394)

Information extracted from the scientific literature

Liu et al. (2021) described an outbreak in wild mute swans in Shandong, China, in January 2021 of A(H5N8) belonging to the same 2.3.4.4b clade as the virus causing the 2020-2021 outbreak in Europe. The swans had nervous signs including torticollis. The major pathological changes were haemorrhage in multiple organs and necrosis in liver and pancreas, which were consistent with those reported previously in naturally and experimentally infected poultry species. Madslien et al. (2021) reported the first detection of HPAI in Norway in November 2020, both in wild bird species (several goose species, duck species, and gull species) and in poultry (turkeys and chickens). One pink-footed geese (*Anser brachyrhynchus*) with A(H5N8) infection was found in both diseased and dying birds, while another, shot by a hunter, was apparently healthy and displayed no clinical signs. Similarly, six Eurasian wigeons (*Mareca penelope*) with A(H5N8) infection were apparently healthy and shot by hunters, while another was found dead. Other wild birds with A(H5N8) found ill or dead were a barnacle goose (*Branta leucopsis*), a great black-backed gull (*Larus marinus*), and a European herring gull (*Larus argentatus*). It was not clear by which mode the virus reached Norway, but the main hypothesis was northward migration of infected geese or gulls from Denmark or the Netherlands in autumn 2020.

4.2.2. Genetic characterisation of avian influenza viruses

Description of the nomenclature of the HPAI A(H5) viruses used in the document

The HA gene of clade 2.3.4.4 A(H5) viruses has rapidly evolved since the most recent official update of the nomenclature of the A/goose/Guangdong/1/1996-lineage H5Nx virus (Smith et al., 2015). This clade emerged in China in 2008 and since then it has acquired various neuraminidase subtypes, including N1, N2, N3, N4, N5, N6 and N8, by reassortments with other enzootic avian influenza viruses from different regions, and evolved into several subgroups. While a revised nomenclature of clade 2.3.4.4 viruses is pending, in the previous reports we used the genetic clustering described in 2018 by Lee and co-authors, who recognised four groups (a–d) within clade 2.3.4.4 (Lee et al., 2018). Recently, an update to the unified nomenclature for clade 2.3.4.4 A(H5) viruses has been proposed by WHO (WHO, 2020b) and eight genetic groups (a–h) have been recognised. To align the nomenclature system between international organisations this classification has been adopted for this report. Based on this proposed clustering, A(H5) viruses of clades 2.3.4.4a and d–h have mainly been circulating in poultry in Asia,

while clades 2.3.4.4b and 2.3.4.4c have spread globally through wild bird migrations during 2014–2015 (2.3.4.4c) and from 2016to the present (2.3.4.4b)

Genetic characterisation of HPAI viruses of the A(H5) subtype circulating in Europe

The topology of the HA phylogenetic tree shows that all the HPAI A(H5) viruses collected between 31 July 2020 and 15 September 2021 from 24 Member States, the United Kingdom, Norway, Kosovo[2], Albania and Russia (available in GISAID on 12 September 2021 or provided by the National Reference Laboratories) make up a single genetic group within clade 2.3.4.4b. Analyses of the remaining gene segments revealed the co-circulation of 19 distinct genotypes in Europe and Central Asia, which originated from multiple reassortment events with LPAI/HPAI viruses circulating in wild and domestic birds: seven A(H5N8), one A(H5N1), nine A(H5N5), one A(H5N4) and one A(H5N3). The most widespread genotype circulating in wild and domestic birds in Europe belongs to the A(H5N8) subtype, which was also held responsible for some cases in wild mammals (Floyd et al., 2021; WUR, online) and for human cases reported in Russia (Astrakhan region) in December 2020, as previously reported (EFSA et al., 2021b). All the genetically characterised viruses collected from poultry outbreaks in this reporting period (from May 15 to September 15, 2021) belong to this A(H5N8) genotype. Differently, three distinct genotypes of the A(H5N8), A(H5N1) and A(H5N5) subtypes have been identified in samples collected from wild birds during the same period.

Since the end of 2020, the same A(H5N8) genotype has been detected also in Asian countries, including the Republic of Korea (Baek et al., 2021), Japan and China (Zhang et al., 2021). Of note, the genetic characterization of the A(H5N6) viruses responsible of three human cases identified in China in July 2021 demonstrated that these human infections were caused by reassortant viruses belonging to clade 2.3.4.4b, which possessed an HA gene closely related to the A(H5) viruses currently circulating in birds in Europe and Asia (CCDC, 2021a, b).

Mutations recognised as being associated with mammalian adaptation have only been sporadically identified in the analysed viruses from avian species of the current epidemic, as previously reported (EFSA et al., 2021b); however, they appear to rapidly emerge after transmission to mammals. Since the last report (EFSA et al., 2021b), no other genetic mutations of particular concern have been identified.

4.3. Human cases due to A(H5Nx) viruses detected in Europe

Since 1 May and as of 15 September 2021, data from four countries was reported about the total number of people to infected birds (e.g. during culling activities). They reported a total of 683 exposed people.

On 20 February 2021, Russian authorities had identified seven occupationally exposed workers infected with A(H5N8) virus at a poultry farm in south Russia, one of the viruses was further characterised and clustered in clade 2.3.4.4b (Pyankova et al., 2021; WHO, 2021d). The workers were exposed during an outbreak of A(H5N8) in a bird flock in December 2020. The cases were reported as asymptomatic or with mild symptoms. No human-to-human transmission has been observed. ECDC has published a Threat Assessment Brief in February 2021 that assessed the risk as very low for the general public and low for occupationally exposed people (ECDC, 2021). The high diversity and ongoing reassortment events add a high uncertainty to the assessment and transmission events to humans cannot be excluded. The World Health Organization (WHO) assessed the risk as low (WHO, online-b) and a recent risk assessment by the United States Centers for Disease Control and Prevention (US CDC) placed the risk in the low to moderate category (CDC, online).

No human infection with avian influenza viruses, as currently detected in wild birds and poultry in Europe, has been identified in the EU/EEA countries during the period covered by this report or has been previously reported (EFSA et al., 2021a). (WHO, online-b)(WHO, online-b)(WHO, online-b)(WHO, online-b)(WHO, online-a)(WHO, online-a)(WHO, online-b)(WHO, online-c)(WHO, online-c)(WHO, online-b)(WHO, online-a)(WHO, online-a)

4.3.1. Human cases reported within clade 2.3.4.4 A(H5Nx) viruses globally

Viruses within clade 2.3.4.4 have diversified over the last years, so that WHO has suggested a classification system to separate the viruses into subclades a–h (WHO, 2020b). In total, 35 HA sequences from human cases due to H5Nx [33 A(H5N6) and 1 A(H5N8)] viruses of clade 2.3.4.4 have

been submitted to the global sequence database GISAID between 2014 and 2021. Seven A(H5N8) case reported in Russia in 2020, three A(H5) in Nigeria and 10 A(H5N6) cases identified in China in 2017 and 2021 belonged to subclade 2.3.4.4b, which is the same subclade where A(H5Nx) viruses detected in wild birds and poultry in Europe clustered. All other human A(H5N6) cases described in the A(H5N6) Section 4.4.3.2 clustered in other subclades (Table 2). Publications provide further sequence analysis details about recent A(H5N6) cases in China of clade 2.3.4.4b (CCDC, 2021a, b).

Table 2 Distribution of human cases infected by A(H5) viruses within clade.2.3.4.4 based on HA gene analysis

Clade	Year(s)	Number of human sequences	Country
2.3.4.4	2014-2015	6	China
2.3.4.4a	2014	1	China
2.3.4.4b	2017, 2020 and 2021	20	China, Nigeria, Russia
2.3.4.4d	2015, 2016	9	China
2.3.4.4e	2014, 2015	4	China
2.3.4.4g	2016	2	China
2.3.4.4h	2017, 2018, 2020, 2021	10	China

Source: (CCDC, 2021a; WHO, 2021c; GSAID, online)

4.4. Prevention and control measures applied in Europe, 1 May to 15 September 2021 (ToR 3)

The description of the control and prevention measures applied in the affected Member States on outbreaks occurred from 1 May 2021 is presented in Annex B, thanks to the countries that were willing to collaborate with EFSA and kindly provided the information here reported. Outbreaks occurred before 1 May 2021 are covered in the previous EFSA report (EFSA et al., 2021b).

4.5. The avian influenza situation in other countries not reporting via ADNS, 15 May to 15 September 2021 (TOR 4)

An overview of the HPAI detections notified from other countries not reporting via ADIS but via the OIE or national authorities from 15 May to 15 September 2021 is presented in Table 3 and Figure 13. For the purposes of this report, only findings of avian influenza viruses occurring in countries that are considered to be of epidemiological interest for the EU/EEA or of public health relevance are described.

Table 3: Number of HPAI detections in other countries not reporting via ADIS, by virus subtype and country, 15 May – 15 September 2021 (n = 166)

Region	Country	Domestic birds (124)						Wild birds (42)					Total
		A(H5Nx)	A(H5N1)	A(H5N2)	A(H5N5)	A(H5N6)	A(H5N8)	A(H5Nx)	A(H5N1)	A(H5N6)	A(H5N8)	HPAI	
Africa	**Benin**	1											1
	Botswana		1										1
	Cote d'Ivoire		1										1
	Ghana	6											6
	Lesotho	2											2
	Nigeria		10										10
	South Africa		45						23				68
	Togo		4										4
Asia	**China**									9	3		12
	Iran						1						1
	Iraq						2						2
	Nepal						2						2
	Pakistan						1						1

	Taiwan			2	3								5
	Vietnamn		4			12	19						35
Europe	**Russia**	1	7					2	4			1	15
Total		10	72	2	3	12	25	2	27	9	3	1	166

Data source: FAO EMPRES-i (data extraction carried on 24 September 2021).

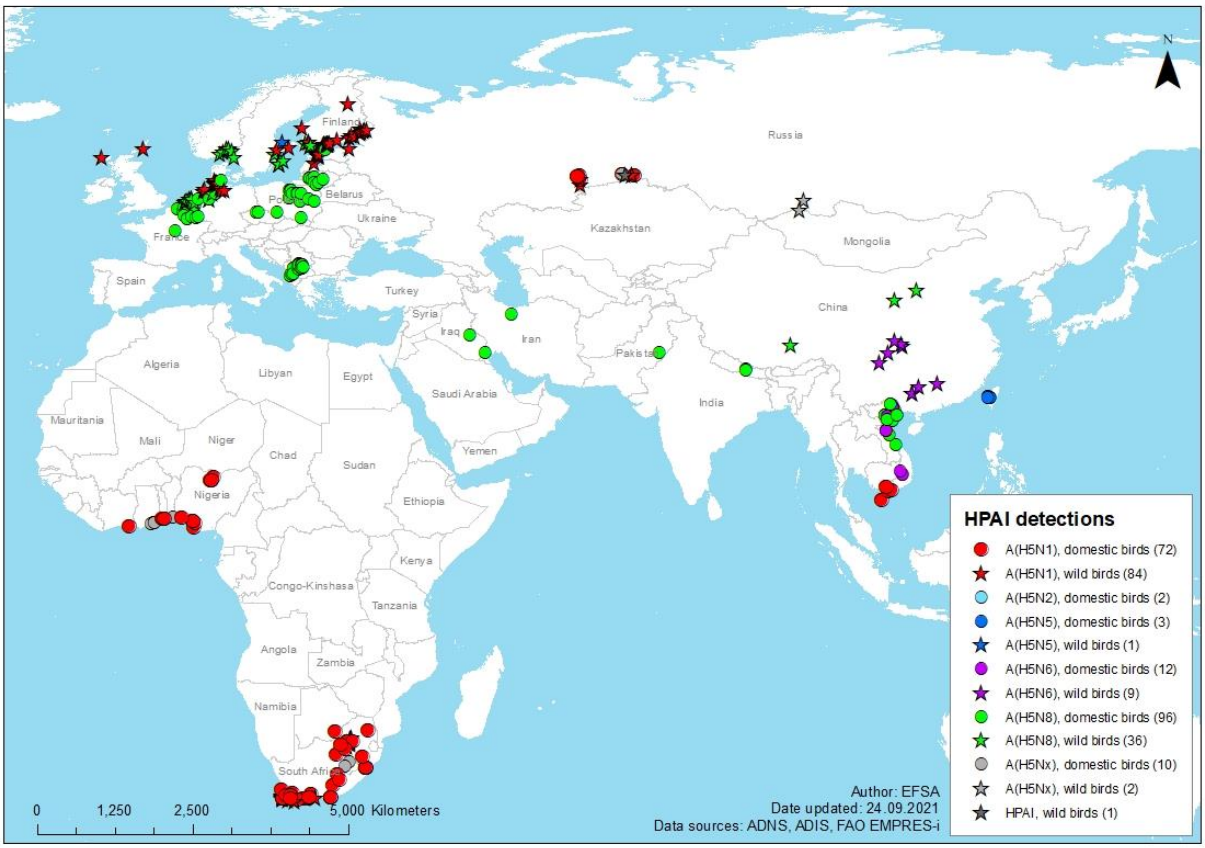


Figure 13: Geographical distribution, based on available geocoordinates, of HPAI detections reported in domestic birds (n = 195) and wild birds (n = 133) in Europe, Asia and Africa, by virus type, 15 May to 15 September 2021

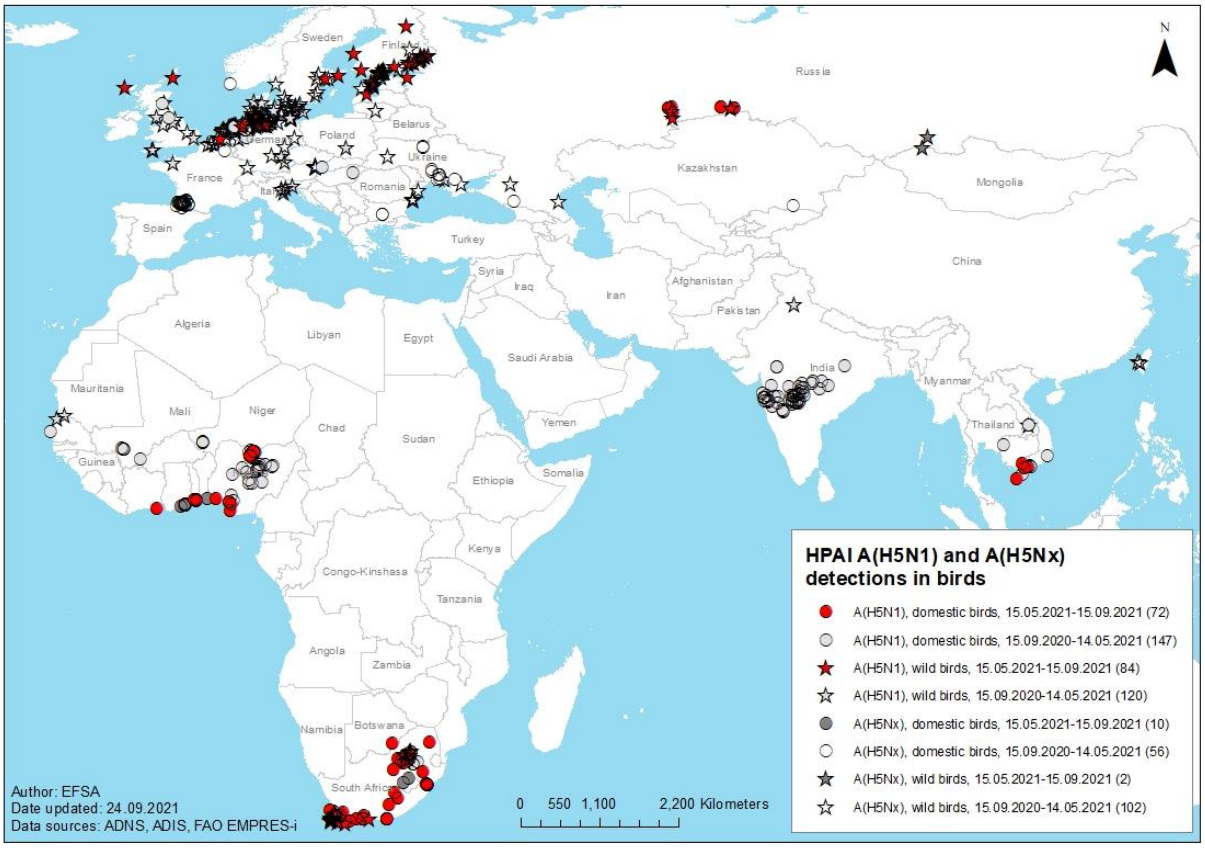
4.5.1. HPAI A(H5N1)

4.5.1.1. Domestic and wild birds in previously affected regions

Detections

The outbreaks of HPAI A(H5N1) and HPAI A(H5Nx) in Africa continued in the relevant time period for this report. In addition to numerous poultry outbreaks in South Africa, HPAI A(H5N1) and HPAI A(H5Nx) have also been detected on farms in Benin, Botswana, Cote d'Ivoire, Ghana, Lesotho, Nigeria and Togo. South Africa reported outbreaks of HPAI A(H5N1) in several wild bird species as e.g., yellow-billed duck (*Anas undulata*), black swan (*Cygnus atratus*), African fish eagle (*Haliaeetus vocifer*), Hartlaub's gull (*Chroicocephalus hartlaubii*), grey headed gull (*Chroicocephalus cirrocephalus*), kelp gull (*Larus dominicanus*), African sacred ibis (*Threskiornis aethiopicus*), rose pelican (*Pelecanus onocrotalus*) and African penguin (*Spheniscus demersus*). Contrary to the last report, Vietnam notified four new outbreaks in poultry of HPAI A(H5N1) in previously infected regions between 15 May and 15 September 2021. Furthermore, HPAI A(H5) and HPAI A(H5N1) was detected in domestic birds and several wild bird species as e.g. tufted duck (*Aythya fuligula*), common pochard (*Aythya ferina*), common teal (*Anas crecca*), mute swans (*Cygnus olor*), little grebe (*Tachybaptus ruficollis*), Dalmatian pelican *(Pelecanus crispus*) and black headed gull (*Chroicocephalus ridibundus*) in southern Russia near to the border of

Kazakhstan and Mongolia, during the same time of the year as in 2018 and 2020 (EFSA et al., 2018b, EFSA et al., 2020) (Figure 14).



Red and dark grey symbols indicate outbreaks that occurred between 15 May and 15 September 2021, grey and with symbols indicate outbreaks that occurred between 15 September 2020 and 14 May 2021 (FAO, online-b).

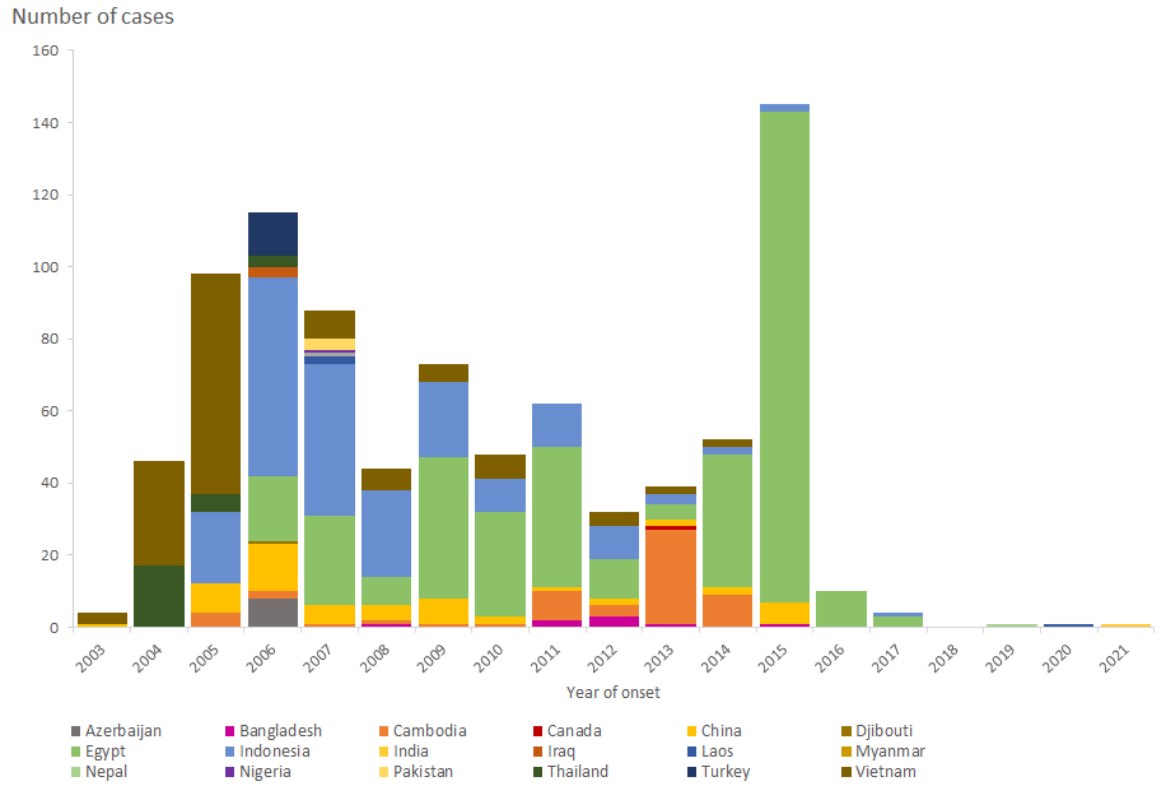
Figure 14: Geographical distribution, based on available geocoordinates, of HPAI A(H5N1) and A(H5Nx) detections reported in domestic birds (circles) and wild birds (stars) (n = 593)

Information extracted from the scientific literature

During the reporting period, no new relevant information has been published on the phenotypic and genetic characterisation of HPAI A(H5N1) viruses circulating in countries outside the EU/EEA, for domestic and wild birds.

4.5.1.2. Human infections due to A(H5N1)

One fatal human case due to avian influenza A(H5N1) has been reported since the last report in a 11 years old boy from India (WHO, 2021b, online-a). Since 2003, and as of 14 September 2021, 863 laboratory-confirmed cases of human infection with avian influenza A(H5N1) virus, including 456 deaths, have been reported from 18 countries outside the EU/EEA (WHO, 2021a) (Figure 15).



Data source: WHO (WHO, 2021b, a, online-a).

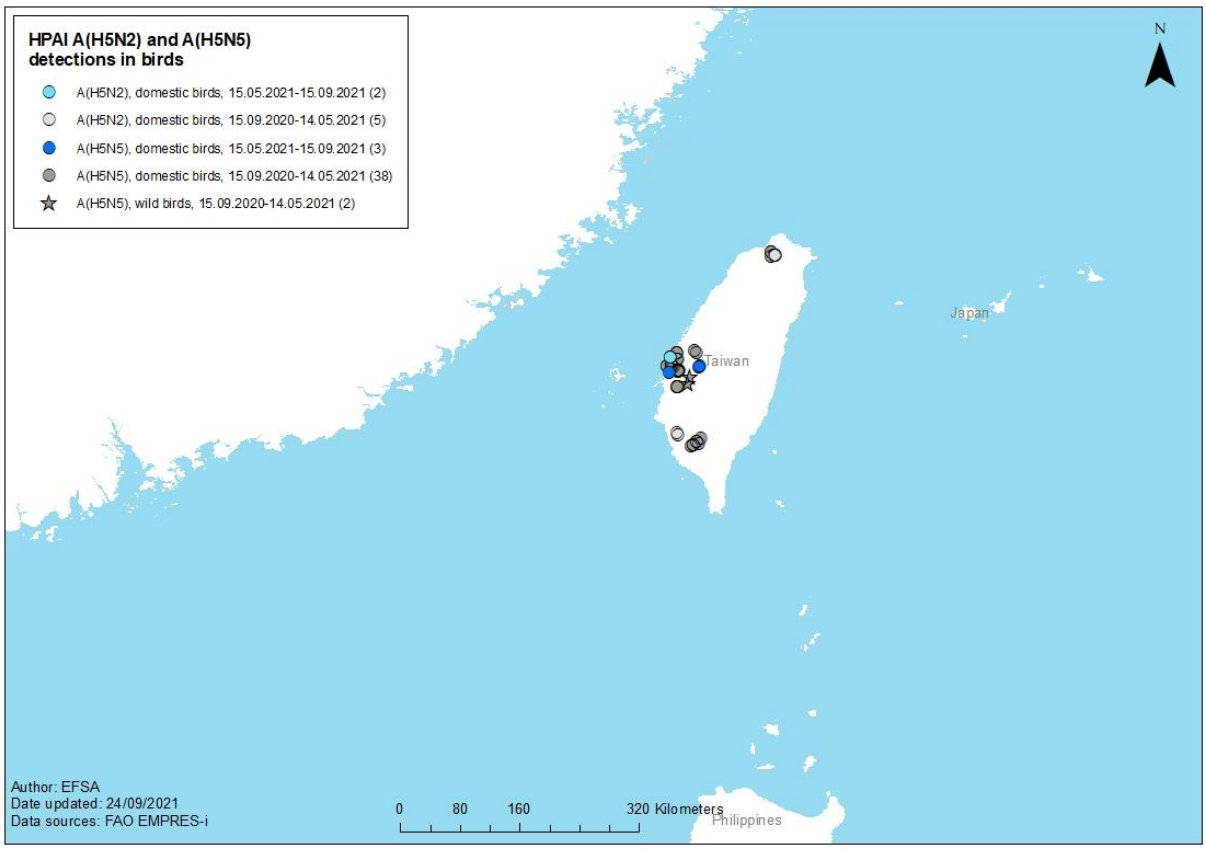
Figure 15: Distribution of confirmed human cases of A(H5N1) by year and country of reporting, 2003 to 14 September 2021 (n = 863)

4.5.2. HPAI A(H5N2) and A(H5N5)

4.5.2.1. Domestic and wild birds

Detections

The Taiwanese lineage HPAI A(H5N2) has been circulating in Taiwan since 2012 and caused severe outbreaks at chicken, domestic duck, domestic goose and turkey establishments. In the relevant reporting period, Taiwan notified two new outbreaks of HPAI A(H5N2) in one duck and one poultry farm to the OIE. The Taiwanese lineages of HPAI A(H5N2) (clade 2.3.4.4) differed from the Eurasian HPAI A(H5N2) lineage (Li et al., 2020); the latter belonging to clade 2.3.4.4b, which has been detected, with different genotypes, in Egypt and Russia as well as in Asian countries between 2016 and 2019 (EFSA et al., 2019) and in Bulgaria in 2020. The outbreaks of HPAI A(H5N5) continued in the western Taiwan and three new outbreaks were reported in chicken, domestic goose and a poultry farm. No wild bird cases of HPAI A(H5N5) were reported between 15 May and 15 September 2021 (Figure 16).



Dark grey symbols indicate HPAI A(H5N5) detections between 15 September 2020 and 14 May 2021, light grey symbols indicate HPAI A(H5N5) detections between 15 September 2020 and 14 May 2021, light blue symbols indicate HPAI A(H5N2) detections between 15 May and 15 September 2021, blue symbols indicate HPAI A(H5N5) detection detections between 15 May and 15 September 2021, (FAO, online-b).

Figure 16: Geographical distribution, based on available geocoordinates, of HPAI A(H5N2) and A(H5N5) detections reported in domestic birds in Taiwan (n=130)

Information extracted from the scientific literature

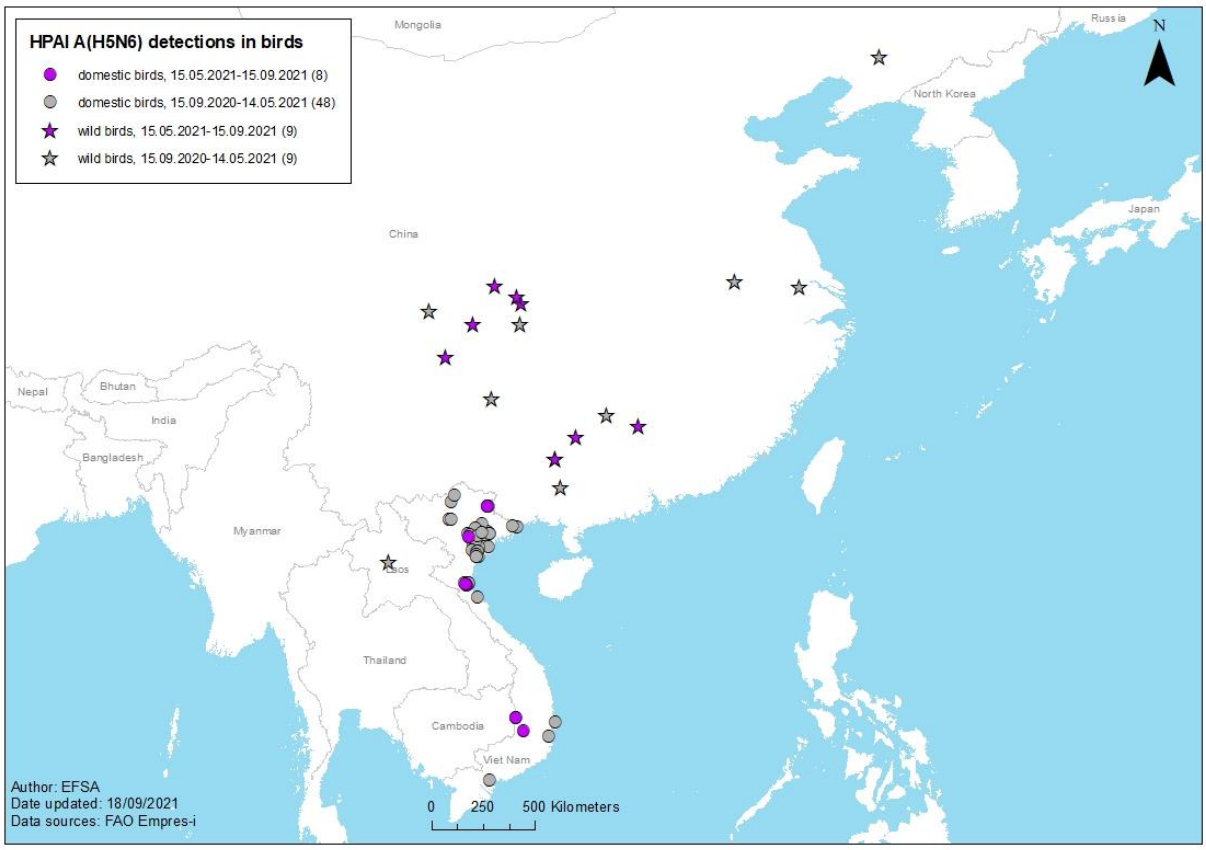
During the reporting period, no new relevant information was published on the phenotypic and genetic characterisation of HPAI A(H5N2) and A(H5N5) viruses circulating in countries outside the EU/EEA, for domestic and wild birds.

4.5.3. HPAI A(H5N6)

4.5.3.1. Domestic and wild birds

Detections

Contrary to the last report, Vietnam notified 12 further outbreaks of the zoonotic reassortment of HPAI A(H5N6) clade 2.3.4.4c on poultry farms in previously affected provinces to the OIE. Furthermore, the Chinese national authorities reported nine HPAI A(H5N6) cases in wild birds to the FAO between 15 May and 15 September 2021. In contrast with the last report, the HPAI positive wild birds were detected in several provinces of China (Figure 17).



Pink symbols indicate outbreaks that occurred between 15 May and 15 September 2021, grey symbols indicate outbreaks that occurred between 15 September 2020 and 14 May 2021 (FAO, online-b).

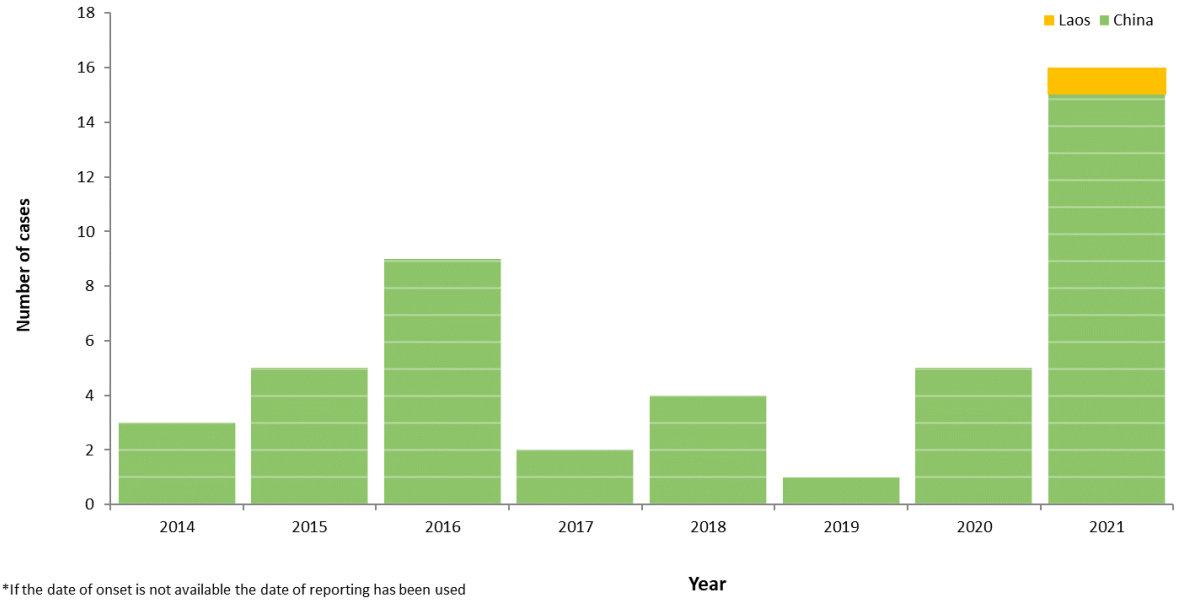
Figure 17: Geographical distribution, based on available geocoordinates, of HPAI A(H5N6) detections reported in domestic birds (n = 78)

Information extracted from the scientific literature

Wen et al. (2021) characterized the HPAI clade 2.3.4.4h A/chicken/Dongguan/1101/2019 (H5N6) virus, sequenced from organ samples collected in October 2019 during outbreak investigation in a chicken farm in Guangdong, south-eastern China. Its genomic constellation was highly similar with strains previously isolated in 2017-2018 from ducks in Hunan. Analysis of selected amino acid residues in the HA sequence of this virus suggested a retained affinity for avian-like α2,3-sialic acid receptors, with a possible increased binding to fucosylated sialosides and α2,6-sialic acids. The NA protein had an 11-amino-acid stalk deletion typically associated with increased virulence in terrestrial poultry and in mice. Only a single mutation in the PA polymerase subunit of this virus had been previously associated with enhanced virus replication in mammalian cells.

4.5.3.2. Human infections due to A(H5N6)

Fifteen new human cases due to avian influenza A(H5N6) have been notified since the last EFSA report, all from China and four of them died). A household cluster with two infections were observed in a couple preparing a duck for meal purchased from a live-bird market (CCDC, 2021b; WHO, 2021f). Five cases detected between May and July 2021 in Sichuan were described in detailed also outlining the genetic composition of the viruses belonging to clade 2.3.4.4b and the exposure to poultry (CCDC, 2021a). Mutations indicating increased virulence and possibly cytokine resistance, but no resistance against antivirals have been observed and the virus profile remains avian host-specific. Since 2014, and as of 22 September 2021, 45 laboratory-confirmed cases of human infection with avian influenza A(H5N6) viruses of clade 2.3.4.4 circulating in South-East Asia have been reported in China and Laos with 21 of them being fatal (CHP, 2021a) (Figure 18). Twelve deaths due to A(H5N6) had been reported between 2014 and 2017 (Jiang et al., 2017).



Source: ECDC line list (see Appendix B.2).

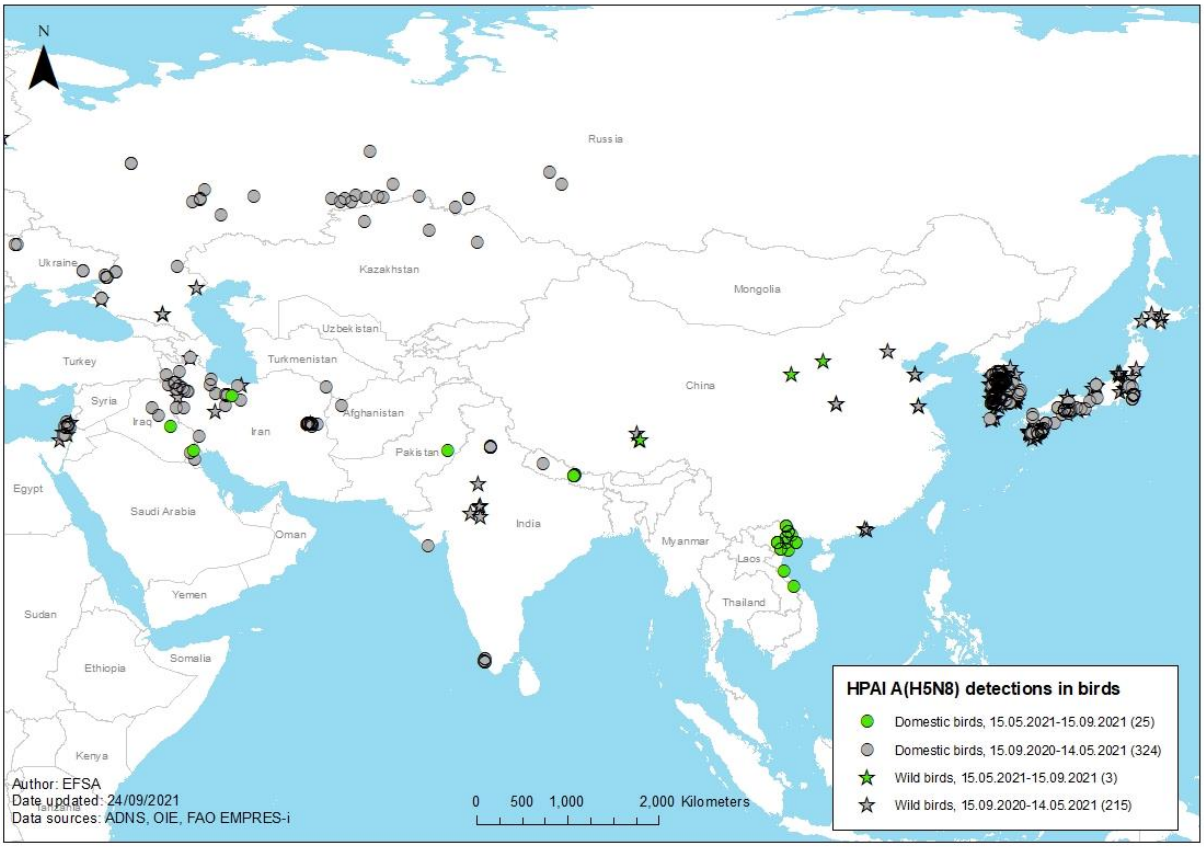
Figure 18: Number of human cases due to A(H5N6), clade 2.3.4.4, infection by year of onset, 2014 to 22 September 2021 (n = 45)

4.5.4. HPAI A(H5N8)

4.5.4.1. Domestic and wild birds

Detections

Further outbreaks of HPAI A(H5N8), clade 2.3.4.4b, from poultry and wild birds were notified from China, Iraq, Nepal and Vietnam in the relevant reporting period. In contrast with the last report, no outbreaks were reported from Iran, Israel, Kuwait, Japan, the Republic of Korea and Russia between 15 May and 15 September 2021. All cases in wild birds have been reported by China to FAO and included outbreaks involving several thousand wild birds [grebes (Podicipedidae) and other unknown species [in national parks in Ningxia, Shaanxi and Tibet province (Figure 19).



Green symbols indicate outbreaks that occurred between 15 May and 15 September 2021, grey symbols indicate outbreaks that occurred between 15 September 2020 and 14 May 2021 (FAO, online-b).

Figure 19: Geographical distribution, based on available geocoordinates, of confirmed HPAI A(H5N8) outbreaks in domestic birds (circles) and wild birds (stars) (n=567)

Information extracted from the scientific literature

Three articles described clade 2.3.4.4b A(H5N8) HPAIV viruses, related for all their gene segments with the major genotype circulating in Russia, Kazakhstan and Europe since August 2020, and detected in different bird species and regions of China from November 2020 to January 2021.

Zhang et al. (2021) isolated three A(H5N8) viruses from duck swab samples collected in live poultry markets in northern and southwestern China in December 2020. Analysis of selected genetic markers suggested that the strains had conserved their preferential binding to avian-like α2,3-sialic acid receptors, with a single reported HA mutation associated with increased binding to α2,6-sialic acids and increased transmission in guinea pigs. Some other mutations present in PA, M1 and NS1 were also associated with increased polymerase activity in mammalian cels or increased virulence in mice. One of the isolated strain had a maximal IVPI of 3.0: all six-week old SPF chickens had died within 20 hours after inoculation. The same strain inoculated intranasally to 10 six-week old SPF chickens at a total dose of 10^5 EID_{50} induced mortality of all birds within 4 days post-inoculation (dpi) and tested internal organs and lungs were all positive for the A(H5N8) virus. Directly inoculated (with the same dose and route of inoculation) and contact Pekin ducks did not show any clinical symptoms but all animals shed the virus by both cloacal and tracheal routes. Intranasal inoculation of a total dose of 10^6 EID_{50} to 12 six-week old female BALB/c mice induced weight loss beginning at 2 dpi and mortality of all mice within 7 dpi. Nasal turbinate and lung samples were all positive at 3 and 5 dpi (in 3 mice euthanized at each time point) and heart samples were all positive for A(H5N8) virus at 5 dpi. Spleen samples collected at the same time points were all negative, whereas only some of the collected brain and liver samples were positive.

Cross-HI testing involving the previous poultry-derived clade 2.3.4.4b A(H5N8) virus, as well as 2.3.2 and 2.3.4.4h vaccine antigens and A(H5N8) clade 2.3.4.4b virus strains isolated in China between 2014 and 2016, showed a distinct antigenicity for this first stain compared to the others.

Xiong et al. (2021) reported characterization of 8 full genome sequences obtained from sick or dead tundra swans (*Cygnus columbianus*; n = 7) and a dead whiskered tern (*Chlidonias hybrida*) collected in Hubei, central China, in November-December 2020. Molecular markers were detected in the HA protein, associated with increased binding to α2,6-sialic acids and increased transmission in guinea pigs, and in the PB2, PB1, PA, M1 and NS1 proteins, associated with increased polymerase activity in mammalian cells and increased replication and virulence in mammals. Histopathological modifications in internal organs collected from 3 tundra swans and a whiskered tern included necrosis and inflammatory lesions in the lungs, liver, heart, spleen and kidneys. Virus-specific NP antigen was also detected by immunohistochemistry in the lung samples, and influenza A virus genome was detected in all previously mentioned organs.

Liu et al. (2021) described isolate A/mute swan/Shandong/1/2021 isolated from samples collected on a dead mute swan found in January 2021 in eastern Shandong: phylogenetic analyses were performed on the HA and NA segments only and both segments clustered with Korean, Japanese and European clade 2.3.4.4b viruses identified in late 2020 and in 2021. This virus also possessed the above-described molecular marker in its HA protein, associated with increased binding to α2,6-sialic acids and increased transmission in guinea pigs.

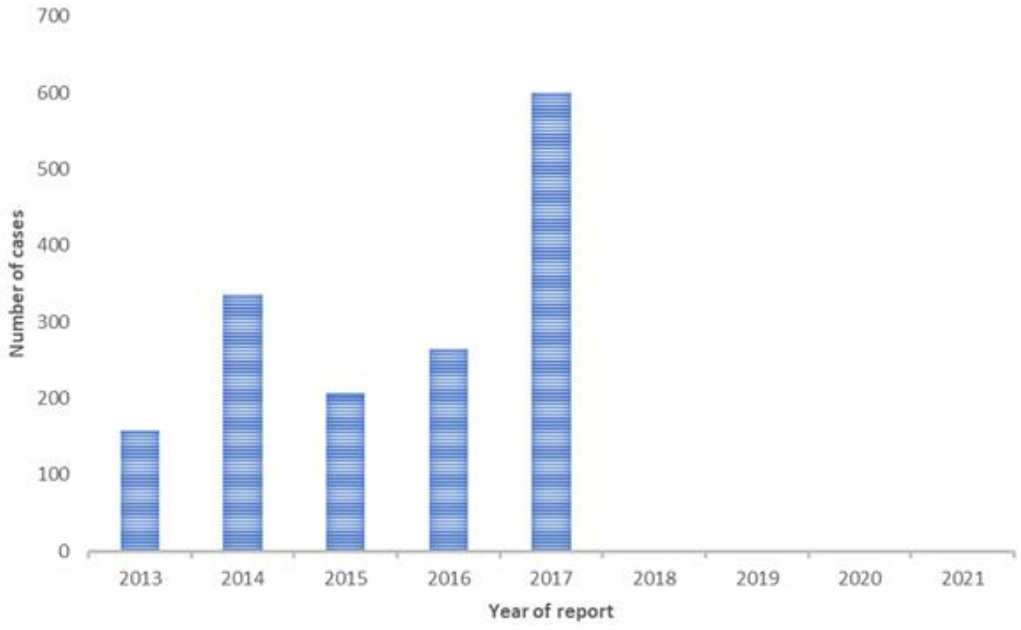
4.5.5. HPAI–LPAI A(H7N9)

4.5.5.1. Domestic and wild birds

No LPAI or HPAI A(H7N9) cases were notified in poultry or wild birds within the relevant time period for this report. The last case was reported from Shandong province, China, in October 2020. The nationwide A(H7N9) vaccination campaigns for poultry, with the exception of poultry in AI-free zones and export farms, started extensively in September 2017 (FAO, online-a).

4.5.5.2. Human infections due to A(H7N9)

No human cases due to avian influenza A(H7N9) have ever been reported from Europe and no human case has been reported globally since 2019 (WHO, 2020a, c). Since February 2013, a total of 1,568 human cases have been reported from outside of Europe (Figure 20), including at least 615 deaths (39%) (CHP, 2021d) (WHO, 2019b, a). The last case was reported in March 2019 (one case). Of all human cases, 32 had been infected with HPAI virus A(H7N9), 13 of them were fatal, according to the Chinese National Influenza Center (Chinese National Influenza Center et al., 2018).



Source: ECDC line list (see Appendix B.2).

Figure 20: Number of human cases due to A(H7N9), infection by year, 2013 to 2021 (n = 1,568)

4.5.6. LPAI A(H9N2)

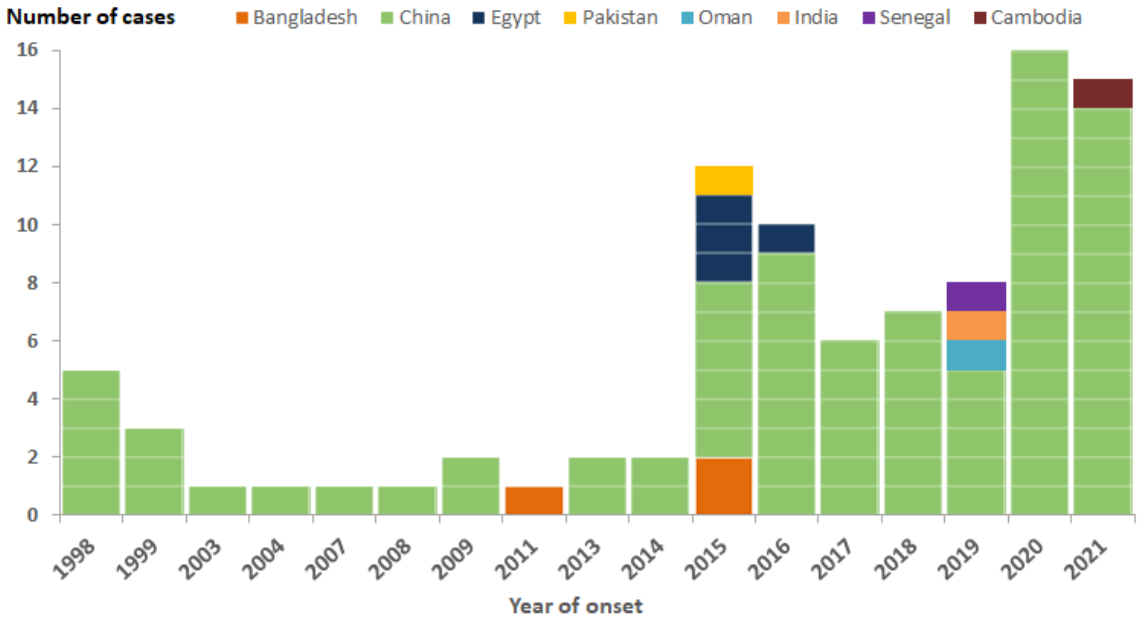
4.5.6.1. Domestic and wild birds

Detection

As mentioned in previous EFSA reports, A(H9N2) is the most commonly detected non-notifiable subtype of influenza virus in poultry in Asia, the Middle East and Africa (Zecchin et al., 2017; Bonfante et al., 2018; Chrzastek et al., 2018; Xu et al., 2018; Zhu et al., 2018; Awuni et al., 2019; Kariithi et al., 2019). These regions remained LPAI (H9N2) endemic at least until 15 September 2021.

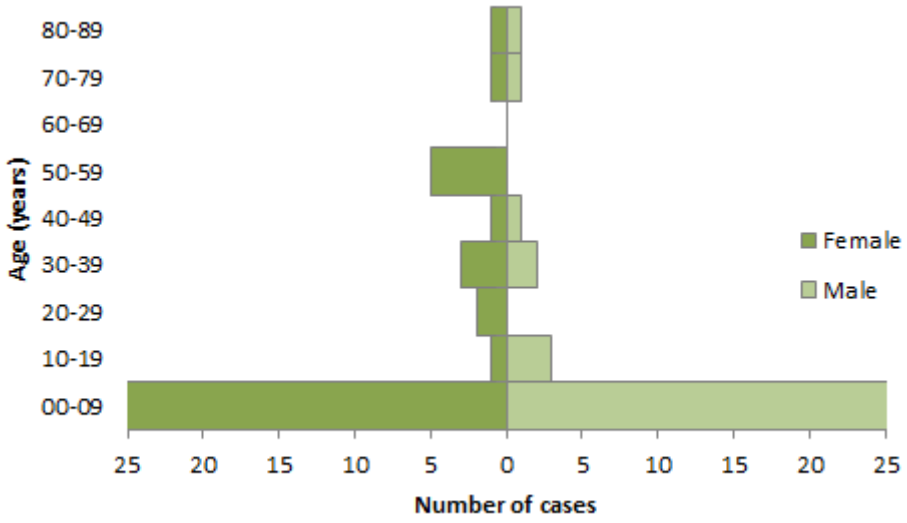
4.5.6.2. Human infections due to A(H9N2)

Since the last EFSA report, five human cases of infection have been reported from China (CHP, 2021b; WHO, 2021e). Since 1998, and as of 21 September 2021, 93 laboratory-confirmed cases of human infection with avian influenza A(H9N2) virus, including one death, have been reported globally. Cases were reported from China (81), Egypt (4), Bangladesh (3), Cambodia (1), India (1), Oman (1), Pakistan (1) and Senegal (1) (ECDC line list; see Appendix B.2) (Figure 20). Exposure to live or slaughtered poultry or contaminated environment has been reported. The age group most affected by A(H9N2) infections in humans was children under 10 years of age, who developed only mild symptoms (Figure 22).



Data source: ECDC line list

Figure 21: Distribution of confirmed human cases of A(H9N2) by reporting country, 1998 to 21 September 2021 (n = 93)



Data source: ECDC line list

Figure 22: Distribution of confirmed human cases of A(H9N2) by age group, 1998 to 21 September 2021 (n = 93)

4.6. Scientific analysis of avian influenza spread from non-EU/EEA countries and within the EU/EEA

The 2020–2021 HPAI A(H5) epidemic with a total of 1,298 HPAI outbreaks in poultry, 22,9 million birds affected, 85 detections in captive birds, and 2,394 HPAI events in wild birds in 31 European countries represents one of the most largest and long-lasting HPAI epidemics that has ever occurred in Europe.

The epidemiological data presented in this report indicates that the virus is still circulating in domestic and wild bird populations in some European countries and that the epidemic is not over yet. During the summer months, HPAI A(H5) viruses were detected at lower levels than in winter and spring in resident wild bird populations, mainly in northern Europe. HPAI outbreaks also occurred in poultry and captive birds in a few EU countries. Based on these observations, it appears that the persistence of HPAI A(H5) in Europe continues to pose a risk of further virus incursions in domestic bird populations.

The HPAI detections in wild birds in the reporting period indicated that the virus is able to persist in wild birds breeding in the EU/EEA, even after a large number of wintering waterbirds (including barnacle geese, greylag geese, Eurasian wigeons, and mallards) have gone away. The persistence of HPAI in wild birds during the 2021 summer (opposite to what occurred in previous years, when HPAI disappeared in spring) suggests that the virus may be adapting to maintenance in wild birds. In coming months, many wild waterbirds, including young birds that hatched in 2021, will again arrive at their wintering areas in the EU/EEA. Because these young birds have never been exposed to HPAI, their presence may result in an increased prevalence of the still present HPAI virus, thereby increasing the risk of incursion into poultry farms.

Furthermore, HPAI A(H5) and HPAI A(H5N1) were detected in domestic and several wild bird species such as tufted duck (*Aythya fuligula*), common pochard (*Aythya ferina*), common teal (*Anas crecca*), mute swans (*Cygnus olor*), little grebe (*Tachybaptus ruficollis*), Dalmatian pelican (*Pelecanus crispus*) and black headed gull (*Chroicocephalus ridibundus*) in summer in Russia, during the same time period as in 2018 and 2020 (EFSA et al., 2018; EFSA et al., 2020c). The presence of HPAI virus in western Russia and north of the Mongolian border to Russia linked to key migration areas of wild waterbirds is of concern for the possible spread of the virus via wild birds migrating to the EU (EFSA AHAW Panel et al., 2017). Autumn migration from breeding sites to wintering sites is ongoing, and cold weather might trigger the rapid westward expansion of the HPAI A(H5) virus by infected migratory birds (Ottaviani et al., 2010; Fusaro et al., 2017; Napp et al., 2018). Aggregation before and during autumn migration, as well as the mixing of wild birds from different geographic origins during migration, will increase the risk of the infection spreading as well as the better environmental survival of avian influenza virus during

the low temperatures of autumn and winter. The incomplete information on the wild bird species found dead in Russia and considerable uncertainty about the real geographical distribution of these viruses makes it difficult to identify the most probable migratory flyways that might lead to the introduction of the virus in the EU and therefore to identify the areas in the EU that are at higher risk of virus introduction. Nonetheless, during the 2005-2006, 2016-2017 and 2020-2021 epidemic waves, HPAI virus detection in the same area of Russia between July and September (OIE, 2005; Lipatov et al., 2007; FAO, 2016; EFSA et al., 2020b, 2021b) led to the involvement of northern and eastern Europe as first places of virus introduction (Cattoli et al., 2009; EFSA AHAW Panel, 2017), and they will probably be the first areas where HPAI viruses might be detected in this autumn-winter season. Among the known wild birds species found HPAI-infected in Russia, data from the Migration Mapping Tool[4] (developed by the British Trust for Ornithology and the Catalan Ornithological Institute, on behalf of the European Union for Bird Ringing (EURING) and the European Bird Census Council (EBCC), and supported by the European Commission and EFSA) were assessed particularly in relation to the focal areas of destination of common teals that had been ringed in Russia during the summer (June-August)(ring recovery data from more than 100 years). It was observed that these common teals were subsequently recovered in Europe in the focal areas of Netherlands-Belgium, Great Britain-Ireland from beginning of August onwards (Table C.2 in Annex C). The same data on ducks (i.e. as a group of species) led to the observation of continuous recoveries in autumn-winter in the focal areas of Great Britain-Ireland, Belgium-the Netherlands, Germany-Denmark, and Italy-Switzerland-Austria (Table C.3 in Annex C). Also, the introduction via the north-eastern and eastern route from Russia has been associated with a high risk of A(H5) HPAI virus-infected wild birds entering the EU in contrast with the southern route associated with the Middle East and Africa (EFSA AHAW Panel, 2017). However, uncertainty remains high and close monitoring of the situation is required. The occurrence of HPAI A(H5) virus incursions in commercial farms where birds are kept indoors raises concern about the capacity of applied biosecurity measures in effectively preventing virus exposure. Either biosecurity standards should be revised and their implementation regularly checked, primarily in poultry production systems at high risk of avian influenza (e.g. domestic ducks, turkeys, and layers), or other types of measures should be considered to protect poultry from HPAI virus infections. Awareness among farmers and other groups of the need to continuously apply strict biosecurity measures should also be strengthened.

For subtypes identified in this reporting period, it should be noted that A(H5N1) predominately in wild birds: there were about two-fold more A(H5N1) than A(H5N8) detections, in contrast to about 10-fold less A(H5N1) than A(H5N8) cases in the whole 2020-2021 epidemic period. While in almost all the outbreaks detected in the same period in poultry and captive birds, only A(H5N8) was involved.

The evolution of HPAI A(H5) viruses in wild birds in Europe should be constantly kept under scrutiny. Since October 2020, HPAI A(H5) viruses of numerous genotypes, which continue to mutate and reassort, have circulated among wild bird and poultry populations in several European countries.

4.7. Monitoring, diagnosis of human infections and public health, occupational health and safety measures for infection prevention and control in the EU/EEA

4.7.1. Occupational health and safety measures

When there is a potential risk of exposure to these viruses from infected birds (whether in an agricultural or other setting), the workplace risk assessment should be revised taking into account all risks, including the increased physical load on workers from wearing PPE and appropriate measures should be taken, prioritising technical and organisational measures over personal measures. The measures should be consulted with the health and safety committee when available or with workers' representatives. These may include technical measures such as physical distancing, enhanced ventilation, dust-and aerosol-avoiding measures (for example when cleaning and handling litter) and using appropriate PPE, when other measures do not sufficiently protect workers. Work clothing and street clothing should be stored separately and a separation of potentially contaminated areas from clean areas ensured (black/white areas) and appropriate hygiene measures applied. In agricultural settings, care should be taken to avoid

[4] This tool is available to Member States and other disease management insitututions by contacting EFSA at ALPHA@efsa.europa.eu

contamination of domestic areas, for example through contaminated work clothing. Appropriate PPE should be provided by employers and properly stored and disposed of, and workers should be trained in its use. Specific measures should be set out for culling operations and for the handling of dead animals and waste.

At premises where workers may be exposed to the above-mentioned viruses, for example when directly exposed to birds, their products or droppings, which may potentially be infected or contaminated with avian influenza viruses, the workplace risk assessment should be revised by employers and appropriate OSH measures should be set[5], taking into account all risks, including those from additional physical load when wearing PPE. Appropriate PPE should be provided by employers and workers should be trained in its use and disposal. PPE should be properly stored. At poultry farms, it should be ensured that living areas are not contaminated, for example through work clothing, e.g. to avoid additional risk to family workers and relatives.

4.7.2. Monitoring and options for public health measures

Surveillance of avian influenza viruses in wild birds and poultry in the EU/EEA is important to detect newly introduced and circulating viruses and reduce the possible risk of exposure of humans to infected birds. Sequencing efforts of avian influenza viruses should be increased related to outbreaks and wild bird detections to monitor the evolution of the viruses and identify mutations in the virus genome that indicate human transmissibility or pathogenicity.

It is important to remain vigilant, to prevent any transmission and identify any possible early transmission events to humans. People at risk are mainly those in direct contact/handling diseased birds or poultry, or their carcasses (e.g. farmers, agricultural workers at poultry farms, veterinarians and labourers involved in culling and rendering).

Avian influenza viruses have been identified in different wildlife species such as wild birds, seals and foxes. People living in areas where avian influenza outbreaks have been detected should avoid touching such sick (e.g. showing neurological symptoms) or dead animal species or bird droppings unprotected. Hunters should be cautious when hunting wild birds and foxes in areas with recent avian influenza detection.

Countries are urged to implement follow-up and testing of exposed people. People developing respiratory symptoms including conjunctivitis within 10 days after contact with infected birds should be tested for influenza viruses. Other A(H5Nx) viruses have shown high severity and mortality, so that the evolution of these viruses needs to be closely monitored and human-to-human transmission identified and reported as early as possibly to implement public health control and worker protection.

Workers should wear PPE (face mask, goggles/face shield/protective glasses, gloves and gown/overall) and avoid unprotected direct contact with sick or dead birds, carcasses, faeces as well as potentially contaminated environments. National public health and OSH guidelines might detail the required level of protection and equipment. Appropriate measures should also be set for culling operations, which should cover the disposal of dead animals and waste. National public health and occupational health and safety guidelines might detail the required level of protection and equipment.

Occupationally and people otherwise exposed to birds with avian influenza virus infection should be identified and monitored for development of influenza-like symptoms. Local health authorities and occupational health services should consider active monitoring these groups, particularly during and after culling operations. Workers should have access to appropriate health surveillance according to national OSH requirements and the occupational health services or physicians should be consulted.

[5] An extensive body of occupational safety and health (OSH) legislation applies to the protection of workers. Employers' obligations are set out in the OSH framework Directive 89/391/EC and its daughter directives, in particular directive 2000/54/EC 000 on the protection of workers from risks related to exposure to biological agents at work. These Directives are minimum requirements and are implemented in national regulations. There may be specific guidance for poultry workers in the Member states and they may also include requirements for appropriate health surveillance for instance.

Health monitoring of exposed workers should be offered in accordance with national OSH requirements at the affected holdings[6].

Additionally, people with direct exposure at affected holdings or to likely infected wild birds should be monitored for a minimum of 10 days to document possible related symptoms, including influenza-like illness (ILI) with fever and cough or conjunctivitis. As a minimum, all persons exposed to the likely infected birds should be instructed to report any symptoms to local health and occupational health or other preventive services.

Avian influenza viruses circulating in the EU/EEA have not shown any resistance to antivirals such as neuraminidase inhibitors. Early or presumptive treatment with neuraminidase inhibitors should always be considered for suspect or confirmed cases, in line with relevant national and international recommendations. Antiviral prophylaxis could also be considered depending on the local risk assessment (i.e. intensity of exposure).

It is recommended that confirmed cases, including family workers at farms and relatives, are followed-up, tested and offered post-exposure prophylaxis as recommended by relevant national/international guidelines. Healthcare workers managing symptomatic exposed (or possible) cases should follow standard, contact and respiratory precautions, depending on the local risk assessment. Workplace prevention measures should be set accordingly. A protocol to investigate non-seasonal influenza has been published by WHO (WHO, 2018).

The initiation of sero-epidemiological studies following HPAI virus outbreaks is strongly encouraged to identify transmission events and support risk assessments. Sero-epidemiological studies should focus on exposed groups like hunters, bird ringers, cullers, farmers and others with relevant bird exposure.

4.7.3. Diagnosis

People in the EU presenting with severe respiratory or influenza-like infection and a history of exposure to poultry or wild birds will require careful investigation, management and infection control. Reports of neurological symptoms in avian influenza virus infected mammals suggested also testing for influenza in severely sick patients with unusual including neurological symptoms. Appropriate samples for influenza tests should be rapidly taken and processed from patients with relevant exposure history within 10 days preceding symptom onset. If positive specimens cannot be subtyped, those should be shared with the national reference laboratory (National Influenza Centres; NICs).

With routine diagnostic laboratory assays, human infection with A(H5Nx) viruses should be detected as positive for influenza A virus, and negative for influenza B, A(H1), A(H1)pdm09 and A(H3) viruses and therefore classified as unsubtypable influenza A virus if no-specific A(H5) diagnostic test is performed. Such unsubtypable influenza A virus isolates or clinical samples that cannot be subtyped should be sent to NICs, and further to a WHO Collaborating Centre for Reference.

4.7.4. Reporting

Human infections with avian influenza viruses are notifiable under EU legislation within 24 hours through the Early Warning and Response System (EWRS) according to EU Decision 1082/2013/EU[7].

Reporting is also required through the International Health Regulations (IHR) notification system (WHO, 2017): 'Each State Party shall notify WHO, by the most efficient means of communication available, by way of the National IHR Focal Point, and within 24 hours of assessment of public health information, of all events that may constitute a public health emergency of international concern within its territory according to the decision instrument, and any health measure implemented in response to those events.'

Information should also be shared with local OSH authorities.

[6] Directive 2000/54/EC of the European Parliament and of the Council of 18 September 2000 on the protection of workers from risks related to exposure to biological agents at work (seventh individual directive within the meaning of Article 16(1) of Directive 89/391/EEC)-*OJ L 262, 17.10.2000, p. 21–45*

[7] Commission Implementing Decision of 8 August 2012 amending Decision 2002/253/EC laying down case definitions for reporting communicable diseases to the Community network under Decision No 2119/98/EC of the European Parliament and of the Council (notified under document C(2012) 5538) - OJ L 262, 27.9.2012

4.7.5. Sharing of sequences

The timely characterisation of viruses and the sharing of sequence information remain crucial for the monitoring of virus evolution and for virus vaccine development. Sharing of sequence data through the GISAID EpiFlu (GSAID, online) or other sequence databases and virus isolates with WHO Collaborating Centres are important for public health assessment, improvement of diagnostics and the development of candidate vaccines. Sharing of influenza viruses is through the Global Influenza Surveillance and Response System (GISRS) (WHO, online-c).

4.7.6. Candidate vaccine viruses

Candidate vaccine viruses (CVV) developed, under development or proposed are listed in a report from WHO (WHO, 2020b).(RGRU, online; TASS, online)(RGRU, online; TASS, online)(RGRU, online; TASS, online)

4.8. ECDC risk assessment for the general public in the EU/EEA

Avian influenza A(H5N8) viruses have caused large outbreaks in birds and poultry since 2014 [14]. ECDC has published a Threat Assessment Brief on 24 February 2021 (ECDC, 2021).

Since 2019, 14 countries have reported more than 3,500 people being exposed to infected birds or involved in and during culling and related activities (data reported to EFSA between 1 January 2019 and 14 September 2021). High levels of testing for seasonal influenza viruses has continued also during the ongoing SARS-CoV-2 pandemic and low levels of influenza circulation (Adlhoch et al., 2021; ECDC, online). Despite this high number of exposure events and ongoing large outbreaks in wild birds and poultry, no documented transmission to humans has been reported in the EU/EEA. The risk assessment is based on the likelihood of infection and disease severity: the likelihood of infection is related to direct unprotected exposure to infected wild birds or poultry and therefore is very low for the general population and low for people directly exposed to infected birds. The disease severity has been described as asymptomatic or mild, therefore the impact based on severity is very low.

This risk to the general public of human transmission due to avian influenza A(H5N8) is therefore assessed as *very low* and to occupationally exposed people *low*.

Avian influenza virus transmission to humans is a rare event and the risk is considered very low for viruses adapted to avian species. However, the detection of viruses carrying markers for mammal adaptation, and correlated with increased replication and virulence in mammals, is of concern. The additional reports of transmission events to mammals, e.g. seals and a fox as well as seroepidemiological evidence of transmission to wild boar, could indicate evolutionary processes including mammal adaptation with the possibility to acquire the ability to transmit to humans. The identification of a A(H5N6) virus in a fatal human case in China with a HA gene closely related to viruses circulating in birds in Europe underlines the possible threat for human health.

However, direct and unprotected exposure to possible infected birds and poultry and their products including blood remains limited to particular mostly occupationally exposed groups of people in the European countries. Therefore, the risk assessment from 24 February 2021 remains valid, these transmission events and findings of relevant mutations and the human transmission to humans have been rare events.

The uncertainty of this risk assessment is high due to the high variability of the avian influenza viruses of clade 2.3.4.4 with many reassorted subtypes and genetic lineages co-circulating in Europe and globally. Reassortment events will continue and zoonotic transmission of avian influenza viruses cannot be fully excluded in general when avian influenza viruses are present in birds. People should avoid touching sick or dead birds or their droppings unprotected or wear PPE when in direct contact. Workers should be protected following an updated workplace risk assessment and prevention measures set accordingly[8]. Using personal protective measures for people exposed to birds infected with avian

[8] Council Directive 2005/94/EC of 20 December 2005 on Community measures for the control of avian influenza and repealing Directive 92/40/EEC. OJ L 10, 14.1.2006, p. 16.

influenza viruses will minimise any residual risk. Follow-up measures and testing should be initiated as described above.

The risk of travel-related importation of human avian influenza cases from countries where the viruses are detected in poultry or wild birds is *very low* also considering the generally lower travel volume due to the ongoing COVID-19 pandemic. Sporadic human cases infected with A(H9N2) LPAI, A(H5N1) or A(H5N6) HPAI viruses outside Europe underline the risk of transmission whenever people are exposed to infected birds.

References

Awuni JA, Bianco A, Dogbey OJ, Fusaro A, Yingar DT, Salviato A, Ababio PT, Milani A, Bonfante F and Monne I, 2019. Avian influenza H9N2 subtype in Ghana: virus characterization and evidence of co-infection. Avian Pathology, 48, 470-476. doi:10.1080/03079457.2019.1624687

Bonfante F, Mazzetto E, Zanardello C, Fortin A, Gobbo F, Maniero S, Bigolaro M, Davidson I, Haddas R, Cattoli G and Terregino C, 2018. A G1-lineage H9N2 virus with oviduct tropism causes chronic pathological changes in the infundibulum and a long-lasting drop in egg production. Veterinary Research, 49, 83. doi:10.1186/s13567-018-0575-1

Chinese National Influenza Center, WHO Collaborating Center for Reference and Research on Influenza and National Institute for Viral Disease Control and Prevention China, 2018. Chinese Influenza Weekly Report week 44, 2018. 6 pp. Available online: http://www.chinaivdc.cn/cnic/en/Surveillance/WeeklyReport/20181811/P020181109515197928770.pdf

CHP (Center for Health Protection Hong Kong), 2021. Avian Influenza Report, Reporting period: Jan 31, 2021 – Feb 6, 2021 (Week 06). CHP, Hong Kong. 11 pp. Available online: https://www.chp.gov.hk/files/pdf/2021_avian_influenza_report_vol17_wk06.pdf

Chrzastek K, Lee DH, Gharaibeh S, Zsak A and Kapczynski DR, 2018. Characterization of H9N2 avian influenza viruses from the Middle East demonstrates heterogeneity at amino acid position 226 in the hemagglutinin and potential for transmission to mammals. Virology, 518, 195-201. doi:10.1016/j.virol.2018.02.016

ECDC (European Centre for Disease Prevention and Control), 2021. Threat Assessment Brief: First identification of human cases of avian influenza A(H5N8) infection. 24 February 2021, ECDC: Stockolm. 9 pp. Available online: https://www.ecdc.europa.eu/sites/default/files/documents/First-identification-human-cases-avian-influenza-A-H5N8-infection.pdf

EFSA, ECDC, EURL, Adlhoch C, Brouwer A, Kuiken T, Miteva A, Mulatti P, Smietanka K, Staubach C, Gogin A, Munoz Guajardo I and Baldinelli F, 2019. Scientific Report: Avian influenza overview November 2018 – February 2019. Efsa Journal, 17(3):5664, 35 pp.,doi: doi:10.2903/j.efsa.2019.5664

EFSA, ECDC, EURL, Adlhoch C, Fusaro A, Gonzales JL, Kuiken T, Marangon S, Niqueux E, Staubach C, Terregino C and Baldinelli F, 2020a. Scientific Report: Avian influenza overview August – December 2020. Efsa Journal, 18(12):6379, 57 pp.,doi: 10.2903/j.efsa.2020.6379 Available

EFSA, ECDC, EURL, Adlhoch C, Fusaro A, Gonzales JL, Kuiken T, Marangon S, Niqueux E, Smietanka K, Staubach C, Terregino C and Baldinelli F, 2020b. Avian influenza overview – update on 19 November 2020, EU/EEA and the UK. Efsa Journal, 18(11):6341, 20 pp.,doi: 10.2903/j.efsa.2020.6341

EFSA, ECDC, EURL, Adlhoch C, Fusaro A, Kuiken T, Niqueux E, Staubach C, Terregino C, Munoz Guajardo I and Baldinelli F, 2020c. Scientific Report: Avian influenza overview November 2019 – February 2020. Efsa Journal, 18(3):6069, 54 pp.,doi: doi:10.2903/j.efsa.2020.6069

EFSA, ECDC, EURL, Adlhoch C, Fusaro A, Kuiken T, Niqueux E, Staubach C, Terregino C, Munoz Guajardo I and Baldinelli F, 2020d. Scientific Report: Avian influenza overview May – August 2020. Efsa Journal, 18(9):6270, 40 pp.,doi: doi:10.2903/j.efsa.2020.6270

EFSA, ECDC, EURL, Brown I, Kuiken T, Mulatti P, Smietanka K, Staubach C, Stroud D, Therkildsen OR, Willeberg P, Baldinelli F, Verdonck F and Adlhoch C, 2017a. Scientific Report: Avian influenza overview September – November 2017. 15(12):5141, EFSA Journal 2017. 70 pp.,doi: 10.2903/j.efsa.2017.5141

EFSA, ECDC, EURL, Brown I, Mulatti P, Smietanka K, Staubach C, Willeberg P, Adlhoch C, Candiani D, Fabris C, Zancanaro G, Morgado J and Verdonck F, 2017b. Scientific report: Avian influenza overview October 2016 – August 2017. 15(10):5018, EFSA Journal 2017. 101 pp.,doi: 10.2903/j.efsa.2017.5018

EFSA AHAW Panel (EFSA Panel on Animal Health and Welfare), 2017. Scientific opinion on avian influenza. Efsa Journal, 15, 4991, 233 pp.,doi: 10.2903/j.efsa.2017.4991

EFSA AHAW Panel, Nielsen SS, Alvarez J, Bicout DJ, Calistri P, Depner K, Drewe JA, Garin-Bastuji B, Gonzales Rojas JL, Schmidt CG, Herskin M, Michel V, Miranda Chueca MA, Pasquali P, Roberts HC, Sihvonen LH, Spoolder H, Stahl K, Calvo AV, Viltrop A, Winckler C, De Clercq K, Klement E, Stegeman JA, Gubbins S, Antoniou S-E, Broglia A, Van der Stede Y, Zancanaro G and I A, 2020.

Scientific Opinion on the assessment of the control measures of the category A diseases of Animal Health Law: Highly Pathogenic Avian Influenza. Efsa Journal, 4991, 78 pp.,doi: 10.2903/j.efsa.2021.6372

European Commission, online-a. Animal Disease Notification System (ADNS). Available online: https://ec.europa.eu/food/animals/animal-diseases/not-system_en [Accessed: 29 Sept 2021]

European Commission, online-b. Animal Health - Regulatory Committee presentations. Available online: https://ec.europa.eu/food/animals/health/regulatory_committee/presentations_en [Accessed: 26 June 2020]

FAO (Food and Agriculture Organization), online-a. EMPRES-i - Global Animal Disease Information System. Available online: http://empres-i.fao.org/eipws3g/ [Accessed: 29 Sept 2021]

FAO (Food and Agriculture Organization), online-b. H7N9 situation update. Available online: http://www.fao.org/ag/againfo/programmes/en/empres/h7n9/situation_update.html [Accessed: 29 Sept 2021]

FLI (Friederich-Loeffler-Institut), 2021. Rapid Risk Assessment HPAI H5 in Germany. 12 pp. Available online: https://www.fli.de/de/aktuelles/tierseuchengeschehen/aviaere-influenza-ai-gefluegelpest/

Gabriel G, Abram M, Keiner B, Wagner R, Klenk HD and Stech J, 2007. Differential polymerase activity in avian and mammalian cells determines host range of influenza virus. J Virol, 81, 9601-9604. doi:10.1128/JVI.00666-07

GSAID, online. GISAID EpiFlu™ Database. Available online: https://www.gisaid.org/epiflu-applications/submitting-data-to-epiflutm/ [Accessed: 29 Sept 2021]

Jiang H, Wu P, Uyeki TM, He J, Deng Z, Xu W, Lv Q, Zhang J, Wu Y, Tsang TK, Kang M, Zheng J, Wang L, Yang B, Qin Y, Feng L, Fang VJ, Gao GF, Leung GM, Yu H and Cowling BJ, 2017. Preliminary Epidemiologic Assessment of Human Infections With Highly Pathogenic Avian Influenza A(H5N6) Virus, China. Clinical Infectious Diseases, 65, 383-388. doi:10.1093/cid/cix334

Kariithi HM, Welch CN, Ferreira HL, Pusch EA, Ateya LO, Binepal YS, Apopo AA, Dulu TD, Afonso CL and Suarez DL, 2019. Genetic characterization and pathogenesis of the first H9N2 low pathogenic avian influenza viruses isolated from chickens in Kenyan live bird markets. Infection, Genetics and Evolution, 104074. doi:10.1016/j.meegid.2019.104074

Lee EK, Lee YN, Kye SJ, Lewis NS, Brown IH, Sagong M, Heo GB, Kang YM, Cho HK, Kang HM, Cheon SH, Lee M, Park BK, Kim YJ and Lee YJ, 2018. Characterization of a novel reassortant H5N6 highly pathogenic avian influenza virus clade 2.3.4.4 in Korea, 2017. Emerging Microbes & Infections, 7, 103. doi:10.1038/s41426-018-0104-3

Li T, Ma Y, Li K, Tang X, Wang M and Yang Z, 2016. Death of a very young child infected with influenza A (H5N6). Journal of Infection, 73, 626-627. doi:https://doi.org/10.1016/j.jinf.2016.07.015

Li YT, Chen CC, Chang AM, Chao DY and Smith GJD, 2020. Co-circulation of both low and highly pathogenic avian influenza H5 viruses in current poultry epidemics in Taiwan. Virus Evol, 6, veaa037. doi:10.1093/ve/veaa037

OIE (World Organisation for Animal Health), online. World Animal Health Information Database (WAHIS) Interface. Available online: https://www.oie.int/wahis_2/public/wahid.php/Wahidhome/Home/indexcontent/newlang/en [Accessed: 29 Sept 2021]

RBC TV (РБК), online. Rospotrebnadzor announced a new virus that can infect people. Available online: https://www.rbc.ru/society/20/02/2021/6030ec2d9a79475c973ed1fe [Accessed: 29 Sept 2021]

RGRU (Rossijskaja Gazeta - Российская газета), online. Russia has begun to develop a vaccine against the H5N8 avian influenza strain. Available online: https://rg.ru/2021/02/20/v-rossii-pristupili-k-sozdaniiu-vakciny-ot-shtamma-ptichego-grippa-h5n8.html [Accessed: 29 Sept 2021]

SH (Schleswig-Holstein), online. Current developments on avian influenza in Schleswig-Holstein: nationwide further evidence of wild birds - renewed increase in deaths on the west coast - stables are still compulsory. Available online: https://www.schleswig-holstein.de/DE/Landesregierung/V/Presse/PI/2020/1220/201222_Gefluegelpest_Knutts.html [Accessed: 29 Sept 2021]

Smietanka K, Swieton E, Kozak E, Wyrostek K, Tarasiuk K, Tomczyk G, Konopka B, Welz M, Domanska-Blicharz K and Niemczuk K, 2020. Highly Pathogenic Avian Influenza H5N8 in Poland in 2019-2020. J Vet Res, 64, 469-476. doi:10.2478/jvetres-2020-0078

Smith GJ, Donis RO, World Health Organization/World Organisation for Animal HF and Agriculture Organization HEWG, 2015. Nomenclature updates resulting from the evolution of avian

influenza A(H5) virus clades 2.1.3.2a, 2.2.1, and 2.3.4 during 2013-2014. Influenza Other Respir Viruses, 9, 271-276. doi:10.1111/irv.12324

TASS (Russian News Agency), online. The world's first case of human infection with influenza A (H5N8) has been detected in Russia. Available online: https://tass.ru/obschestvo/10751041 [Accessed: 29 Sept 2021]

Vergne T, Gubbins S, Guinat C, Bauzile B, Delpont M, Chakraborty D, Gruson H, Roche B, Andraud M, Paul M and Guérin J-L, 2020. Inferring within-flock transmission dynamics of highly pathogenic avian influenza (H5N8) in France, 2020. bioRxiv, 2020.2012.2021.423436. doi:10.1101/2020.12.21.423436

WHO (World Health Organization), 2017. Operational Guidance on Sharing Influenza Viruses with Human Pandemic Potential (IVPP) under the Pandemic Influenza Preparedness (PIP) Framework. WHO, Geneva. 20 pp.

WHO (World Health Organization), 2018. Protocol to investigate non-seasonal influenza and other emerging acute respiratorydiseases. Geneva. 73 pp.

WHO (World Health Organization), 2019a. Influenza at the human-animal interface - Summary and assessment, from 25 June 2019 to 27 September 2019. WHO, Geneva. 3 pp. Available online: https://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_27_09_2019.pdf?ua=1

WHO (World Health Organization), 2019b. Avian Influenza Weekly Update Number 713. WHO, Geneva. 3 pp. Available online: https://iris.wpro.who.int/bitstream/handle/10665.1/14328/AI-20191101.pdf

WHO (World Health Organization), 2020a. Antigenic and genetic characteristics of zoonotic influenza A viruses and development of candidate vaccine viruses for pandemic preparedness. Geneva. 8 p

WHO (World Health Organization), 2020b. Influenza at the human-animal interface; Summary and assessment, from 21 January to 28 February 2020. Geneva. 4 pp. Available online: https://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_28_02_2020.pdf?ua=1

WHO (World Health Organization), 2020c. Influenza at the human-animal interface; Summary and assessment, from 28 February to 8 May 2020. Geneva. 3 pp. Available online: https://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_08_05_2020.pdf?ua=1

WHO (World Health Organization), 2020d. Influenza at the human-animal interface - Summary and assessment, from 21 January to 28 February 2020. Geneva. 4 pp. Available online: https://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_28_02_2020.pdf?ua=1

WHO (World Health Organization), 2020e. Antigenic and genetic characteristics of zoonotic influenza A viruses and development of candidate vaccine viruses for pandemic preparedness. Geneva. 11 pp. Available online: https://www.who.int/influenza/vaccines/virus/202009_zoonotic_vaccinevirusupdate.pdf?ua=1

WHO (World Health Organization), online-a. Assessment of risk associated with influenza A(H5N8) virus, 17 November 2016. Available online: https://www.who.int/influenza/human_animal_interface/avian_influenza/riskassessment_AH5N8_201611/en/ [Accessed: 29 Sept 2021]

WHO (World Health Organization), online-b. Global Influenza Surveillance and Response System (GISRS). Available online: https://www.who.int/influenza/gisrs_laboratory/en/ [Accessed: 29 Septemebr 2021]

WUR (Wageningen University Research), online. WBVR tests foxes positive for bird flu. Available online: https://www.wur.nl/en/Research-Results/Research-Institutes/Bioveterinary-Research/show-bvr/Foxes-with-bird-flu.htm [Accessed: 31 May 2021]

Xu C, Ye H, Qiu W, Lin H, Chen Y, Zhang H and Liao M, 2018. Phylogenetic classification of hemagglutinin gene of H9N2 avian influenza viruses isolated in China during 2012–2016 and evaluation of selected candidate vaccine strains. Poultry Science, 97, 3023-3030. doi:10.3382/ps/pey154

Zecchin B, Minoungou G, Fusaro A, Moctar S, Ouedraogo-Kabore A, Schivo A, Salviato A, Marciano S and Monne I, 2017. Influenza A(H9N2) Virus, Burkina Faso. Emerging Infectious Diseases, 23, 2118-2119. doi:10.3201/eid2312.171294

Zhu C, Hu C, Gui B, Chen Q, Zhang S and He G, 2018. Genetic characteristics of H9N2 avian influenza viruses isolated from free-range poultry in Eastern China, in 2014-2015. Poultry Science, 97, 3793-3800. doi:10.3382/ps/pey187

Abbreviations

ADIS	Animal Disease Information System
ADNS	Animal Disease Notification System
AI	Avian influenza
ANSES	Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail
CCA	Central Competent Authority
CVI	Croatian Veterinary Institute
CVO	Chief Veterinary Officer
CVV	Candidate vaccine viruses
DVFA	Danish Veterinary and Food Administration
ECDC	European Centre for Disease Prevention and Control
EEA	European Economic Area
EFSA	European Food Safety Authority
EU	European Union
EURL	European Union Reference Laboratory
EWRS	Early Warning and Response System
FAO	Food and Agriculture Organization
GISRS	Global Influenza Surveillance and Response System
HPAI	Highly pathogenic avian influenza
IHR	International Health Regulations
ILI	Influenza-like illness
IVPP	Influenza Viruses with Human Pandemic Potential
LPAI	Low pathogenic avian influenza
MTD	Mean time to death
NFVRAI	National food and veterinary risk assessment institution
NRL	National Reference Laboratory
NVWA	Netherlands Food and Consumer Product Authority
OIE	World Organisation for Animal Health
OSH	Occupational safety and health
PCR	Polymerase chain reaction
PIP	Pandemic Influenza Preparedness
PPE	Personal protective equipment
PZ	Protection zone
RVO	Regional Veterinary Officer
SCOPAFF	Standing Committee on plants, animals, food and feed
SFVS	State Food and Veterinary Service of Lithuania
SVFA	State Veterinary and Food Administration
SZ	Surveillance zone
ToR	Term of Reference
WHO	World Health Organization

Appendix A – Terms of Reference

A.1. Background and Terms of Reference as provided by the requestor

Avian influenza is an infectious viral disease in birds, including domestic poultry. Infections with avian influenza viruses in poultry cause two main forms of that disease that are distinguished by their virulence. The low pathogenic (LPAI) form generally only causes mild symptoms, while the highly pathogenic (HPAI) form results in very high mortality rates in most poultry species. That disease may have a severe impact on the profitability of poultry farming.

Avian influenza is mainly found in birds, but under certain circumstances infections can also occur in humans even though the risk is generally very low.

More than a decade ago, it was discovered that virus acquired the capability to be carried by wild birds over long distances. This occurred for the HPAI of the subtype A(H5N1) from South East and Far East Asia to other parts of Asia, Europe and Africa as well as to North America. In the current epidemic the extent of the wild bird involvement in the epidemiology of the disease is exceptional.

Since late October 2016 up to early February 2017, highly pathogenic avian influenza (HPAI) of the subtype A(H5N8) has been detected in wild migratory birds or captive birds on the territory of 21 Member States, namely Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom. In 17 Member States the virus has spilled over to poultry holdings leading also to lateral spread between holdings in a few Member States, in particular in those with a high density of duck and geese holdings where the poultry cannot sufficiently be protected against contacts with wild birds. A second HP AI subtype A(H5N5) has been detected in wild birds and recently also in poultry holdings in Germany.

The number of infected migratory wild birds found dead and the geographical extent of these findings are posing an immense threat for virus introduction into poultry or captive birds holdings as demonstrated by the high number of outbreaks (~700 as of 08/02/2017).

In the event of an outbreak of avian influenza, there is a risk that the disease agent might spread to other holdings where poultry or other captive birds are kept. As a result it may spread from one Member State to other Member States or to third countries through trade in live birds or their products.

There is knowledge, legislation[9], technical and financial tools in the EU to effectively deal with outbreaks of avian influenza in poultry and captive birds. However, the very wide virus spread by wild birds and the increased risk of direct or indirect virus introduction into poultry or captive bird holdings has led to the largest HPAI epidemic in the EU so far. This situation calls for a reflection and evaluation how preparedness, risk assessment, early detection and control measures could be improved.

The Commission and Member States are therefore in need of an epidemiological analysis based on the data collected from the disease affected Member States. The use of the EFSA Data Collection Framework is encouraged given it promotes the harmonisation of data collection. Any data that is available from neighbouring third countries should be used as well, if relevant.

Therefore, in the context of Article 31 of Regulation (EC) No. 178/2002[10], EFSA should provide the technical and scientific assistance to the Commission based on the following Terms of Reference (TOR):

1) Analyse the epidemiological data on highly pathogenic avian influenza (HPAI) and low pathogenic avian influenza (LPAI), where co-circulating or linked within the same epidemic, from HPAI disease affected Member States.

[10] Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. OJ L 31, 1.2.2002, p. 1–24.

2) Analyse the temporal and spatial pattern of HPAI and LPAI as appropriate in poultry, captive birds and wild birds, as well the risk factors involved in the occurrence, spread and persistence of the HPAI virus in and at the interface of these avian populations.

3) Based on the findings from the points above, describe the effect of prevention and control measures.

4) Provide for regular quarterly reports updating on the avian influenza situation within the Union and worldwide, in particular with a view to describe the evolution of virus spread from certain regions towards the EU. In case of significant changes in the epidemiology of avian influenza, these reports could be needed more frequently. These reports should in particular closely follow the developments of zoonotic avian influenza viruses (such as HPAI A(H5N6) and LPAI A(H7N9)) in collaboration with the European Centre for Disease Prevention and Control (ECDC).

A.2. Interpretation of the Terms of Reference

In reply to ToR 1 and ToR 2, this scientific report gives an overview of the HPAI and LPAI outbreaks in poultry, captive and wild birds detected in Europe between 15 May and 15 September 2021 and reported by Member States and neighbouring countries via ADNS or OIE. Member States where avian influenza outbreaks have occurred in poultry have submitted additional epidemiological data to EFSA, that have been used to analyse the characteristics of the affected poultry establishments.

It was not possible to collect data for a risk factor analysis on the occurrence and persistence of HPAI virus within the EU. Risk factor analysis requires not only case-related information, but also data on the susceptible population (e.g. location of establishments, population structure), that should be collected in a harmonised manner across the EU. Limitations in data collection, reporting and analysis were explained in the first avian influenza overview report (EFSA AHAW Panel, 2017).

If HPAI outbreaks in poultry are detected in the EU, a description of the applied prevention and control measures (ToR 3) is given in the case report provided by representatives from the affected Member States and attached as an annex. Information was collected for outbreaks that occurred from 15 May up to 15 September 2021. The main topics covered are increasing awareness, release and repeal of housing orders, strengthening biosecurity, preventive culling, implementation of a regional standstill, bans on hunting and derogations from restriction zone implementation after a risk assessment.

Monitoring of the avian influenza situation in other countries (ToR 4) is based on data submitted via the OIE or reported to the FAO. The description focuses only on findings of avian influenza viruses occurring in countries that are considered to be of epidemiological interest for the EU/EEA and the UK or of public health relevance, specifically on HPAI A(H5N1), HPAI A(H5N2), HPAI A(H5N5), HPAI A(H5N6), HPAI A(H5N8), HPAI/LPAI A(H7N9) and LPAI A(H9N2). The background and epidemiology, detections, phenotypic and genetic characterisations are described based on information from confirmed human, poultry and wild bird cases that occurred between 15 May and 15 September 2021. Possible actions for preparedness in the EU are discussed.

This report mainly describes information that has become available since the publication of the EFSA report for the period February to May 2021 (EFSA et al., 2021b) and that might affect the interpretation of risks related to avian influenza introduction and/or spread in Europe.

Appendix B – Data and methodologies

B.1. Data on animals

B.1.1. Overview of avian influenza outbreaks in Europe (ToR 1 and ToR 2)

Data on the avian influenza outbreaks that occurred in Europe from 15 May to 15 September 2021 submitted by Member States to the ADIS (European Commission, online-a) were taken into account for this report. Data extraction was carried on 20 September 2021. The OIE's World Animal Health Information Database (OIE, online) was consulted to complement the information for European countries not reporting HPAI notifications to ADIS (United Kingdom and Albania). In addition, HPAI-affected European countries were asked to provide more detailed epidemiological data directly to EFSA on the avian influenza outbreaks that occurred in poultry during the same period.

The information that EU Member States affected by HPAI and LPAI presented to the Standing Committee on Plants, Animals, Food and Feed (SCOPAFF) meetings, and the evidence on HPAI and LPAI outbreaks provided in the info notes from the affected Member States to the European Commission, were consulted to extract the relevant information which is reported in Section 4.2.2. The PDFs of the SCOPAFF presentations are available on the European Commission website (European Commission, online-b).

Wild bird species have been categorised according to Table B1.

The public GISAID's EpiFlu Database was accessed to download newly released avian influenza sequences.

A descriptive analysis of the data collected is reported in Section 4.2.

Table B1. Categorisation of wild bird species for detection between 5 October 2020 and and 15 September 2021

Other wild bird species	Raptor	Waterfowl
Black-headed gull	Accipitridae	Anserinae
Common eider	Accipitriformes	Barnacle goose
Common gull	Common buzzard	Bean goose
Common pheasant	Common kestrel	Black swan
Common raven	Eurasian eagle-owl	Brant goose
Common starling	Eurasian sparrowhawk	Canada goose
Common wood pigeon	Falco sp.	Charadriidae
Cormorant	Golden eagle	Common eider
Corvidae	Marsh harrier	Common goldeneye
Curlew	Northern goshawk	Common moorhen
Curlew sandpiper	Peregrine falcon	Common guillemot
Dunlin	Short-eared owl	Common merganser
Eurasian curlew	Strigiformes	Common moorhen
Eurasian magpie	Tawny owl	Common shelduck
Eurasian oystercatcher	White-tailed eagle	Duck
Eurasian woodcock		Egyptian goose
European herring gull		Eurasian coot
Fringillidae		Eurasian teal
Great black-backed gull		Eurasian wigeon
Great cormorant		Gadwall
Great skua		Garganey
Great white egret		Goose
Grey heron		Great crested grebe
Gruidae		Greater scaup
Gull		Greater white-fronted goose

Knot		Greylag goose
Lesser black-backed gull		Little grebe
Little egret		Mallard
Mediterranean gull		Muscovy duck
Northern gannet		Mute swan
Northern lapwing		Pink-footed goose
Pheasant		Swan
Red knot		Tufted duck
Scolopacidae		Tundra bean goose
Sparrow		Whooper swan
Turdidae		Wigeon
Water rail		
Western jackdaw		
White stork		
Yellow-legged gull		

B.1.1.1. Literature review on phenotypic characterisation of HPAI viruses circulating in the EU

Information on the phenotypic characterisation of AI viruses circulating in the EU was extracted from the scientific literature by performing a literature review.

Review question Update on the phenotypic characterisation of HPAI viruses circulating in the EU in domestic and wild birds within the last 2 years.

Search The PubMed database was searched using subject index terms and free-text terms combined with the appropriate Boolean operators. Scientific articles added to the database from 1 May to 15 August 2021 were searched; the search was run on 17 August 2021.

Relevance criteria Scientific articles added to the database from 1 May to 15 August 2021 and reporting information on the presence or absence of clinical signs or pathological changes or mortality due to HPAI infection with viruses circulating within the last 2 years in the EU in domestic or wild birds.

Eligibility criteria Host species all domestic birds or wild birds present in the EU; the virus subtype should be reported; for experimental studies only, the age of the infected animals should be reported (at least as juvenile/adult).

Results The search retrieved 98 papers. The articles were subsequently screened against the relevance and eligibility criteria. Four of the screened papers was finally taken into consideration in the description of the phenotypic characterisation of HPAI viruses circulating in the EU in domestic and wild birds in the reporting period.

The search protocol and the results can be consulted at https://doi.org/10.5281/zenodo.5537350.

B.1.2. Overview of avian influenza outbreaks in other countries not reporting via ADNS (ToR 4)

Data from FAO EMPRES-i (FAO, online-b) on HPAI A(H5N1), HPAI A(H5N2), HPAI A(H5N5), A(H5N6), A(H5N8), HPAI and LPAI A(H7N9) in domestic, captive and wild birds, and environmental samples, were used to describe and to map the geographical distribution of avian influenza cases in domestic and wild birds in Africa, Asia and Europe based of the observation dates. Data were extracted on 24 September 2021. The OIE's World Animal Health Information Database (OIE, online) was consulted to complement the information reported by FAO. To avoid over-complication of the maps, captive birds and environmental samples have been mapped as domestic birds. Although some of these kept animals may be wild species, in most cases of captive birds, or, for environmental samples, the birds from which samples have been taken (mainly at live markets) will not move around and not spread the infection by migrating and, for this reason, have been considered as domestic birds in the maps provided in this report. Only when there was a strong discrepancy between the locality, the administrative regions and

geocoordinates, and the outbreaks were not officially reported to the OIE, if the outbreaks were not taken into account in the analysis.

B.1.2.1. Literature review on phenotypic and genetic characterisation of HPAI viruses circulating on other continents

Information on phenotypic and genotypic characterisation of HPAI viruses circulating on other continents and in other regions (Africa, Asia, the Middle East) in domestic or wild birds or mammals (excluding humans) were extracted from the scientific literature by performing a literature review.

Review questions Update on the phenotypic and genetic characterisation of HPAI viruses circulating on other continents and in other regions (Africa, Asia, the Middle East) in domestic or wild birds or mammals (excluding humans) within the last 3 years.

Search The PubMed database was searched by using subject index terms and free-text terms combined with the appropriate Boolean operators. Scientific articles added to the database from 1 May to 15 August 2021 were searched; the search was run on 17 August 2021.

Relevance criteria Scientific articles added to the database from 1 May to 15 August 2021 that report information on the presence or absence of clinical signs, pathological changes or mortality or genotypic characterisation (only new information) due to HPAI infection with viruses circulating within the last 3 years in Asia, Africa or the Middle East in domestic or wild birds or mammals other than humans.

Eligibility criteria Host species all domestic birds or wild birds present in the EU or mammals other than humans; the virus subtype should be reported; for experimental studies only the age of the infected animals should be reported (at least as juvenile/adult).

Results The search retrieved 124 papers. The articles were subsequently screened against the relevance and eligibility criteria. Four papers were in the end taken into consideration in the description of phenotypic and genotypic characterisation of HPAI viruses circulating on other continents and in other regions (Africa, Asia, the Middle East) in domestic or wild birds or mammals (excluding humans) in the reporting period.

The search protocol and the results can be consulted at https://doi.org/10.5281/zenodo.5537350.

B.2. Data on humans

The numbers of human cases caused by infection with avian influenza viruses were collected by ECDC. Multiple sources are scanned regularly as part of Epidemic Intelligence activities at ECDC to collect information on laboratory-confirmed human cases. Data were extracted and line lists developed to collect case-based information on virus type, date of disease onset, country of reporting, country of exposure, sex, age, exposure, clinical information (hospitalisation, severity) and outcome. All cases included in the line list and mentioned in the document have been laboratory-confirmed. Data are continuously checked for double entries and validity. The data on human cases cover the full period of time since the first human case was reported. Therefore, data on human cases refer to different time periods and are included irrespective of whether there have been any new human cases during the reporting period.

Annex A – Characteristics of the HPAI A(H5N8) and A(H5N1)-positive poultry establishments.

Table A.1: Characteristics of the HPAI A(H5N8) and A(H5N1)-positive poultry establishments by affected EU Member State from 1 May to 15 September 2021 (n = 97). Unknown information is left as empty.

Country	Suspicion date	Holding production category	Poultry species	Production type	Susceptible poultry	Presence of clinical signs	Exposed persons number
Albania	15/05/2021	Non comm			120		
	31/05/2021	Non comm			570		
	01/06/2021	Non comm			70		
	05/06/2021	Non comm			2		
	09/06/2021	Non comm			16		
	10/06/2021	Non comm			150		
Bulgaria	03/05/2021	Comm			62,478		
	04/05/2021	Comm			16,372		
Czechia	16/05/2021	Non comm	Other	Mixed	43	Yes	2
	17/05/2021	Non comm	Other	Mixed	198	Yes	3
Denmark	04/07/2021	Comm	Chicken	Breeding	38,000	Yes	
France	02/07/2021	Non comm	Other	Mixed	25	Yes	
Germany	03/05/2021	Comm	Turkey	Fattening	6,333	Yes	
	05/05/2021	Comm	Turkey	Fattening	3,408	Yes	
	06/05/2021	Non comm	Other	Mixed	222	Yes	
	07/05/2021	Comm	Turkey	Fattening	13,812	Yes	
	23/05/2021	Non comm	Other	Mixed	21	Yes	
	23/06/2021	Comm	Other	Mixed	299	Yes	
Kosovo[2]	19/05/2021	Non comm	Other	Mixed	316	Yes	
	24/05/2021	Non comm	Other	Mixed	1,500	Yes	
	24/05/2021	Non comm	Other	Mixed	161	Yes	
	25/05/2021	Non comm	Chicken	Mixed	325	Yes	
	28/05/2021	Non comm	Chicken	Mixed	510	Yes	
	28/05/2021	Non comm	Chicken	Mixed			
	28/05/2021	Non comm	Other	Mixed	132	Yes	
	29/05/2021	Non comm	Chicken	Mixed	328	Yes	
	30/05/2021	Non comm	Other	Mixed	90	Yes	
	31/05/2021	Non comm	Chicken	Fattening	144	Yes	
	31/05/2021	Non comm	Other	Mixed	2,000		
	01/06/2021	Non comm	Chicken	Mixed	15	Yes	
	02/06/2021	Non comm	Other	Mixed	203	Yes	
	03/06/2021	Non comm	Other	Mixed			
	03/06/2021	Non comm	Other	Mixed			
	10/06/2021	Non comm	Other	Mixed	479	Yes	
	14/06/2021	Comm	Other	Mixed	8,080	Yes	
	14/06/2021	Non comm	Chicken	Mixed	1,180	Yes	
	14/06/2021	Non comm	Chicken	Mixed	300	Yes	
	14/06/2021	Non comm	Other	Mixed	540	Yes	
Lithuania	26/05/2021	Comm	Other	Other	1,238	Yes	5
Netherlands	21/05/2021	Comm	Other	Fattening	13,254	Yes	
Poland	01/05/2021	Comm	Chicken	Breeding	10,935	Yes	2
	02/05/2021	Comm	Other	Mixed	4,866	Yes	13
	03/05/2021	Comm	Chicken	Breeding	34,931	Yes	14
	03/05/2021	Comm	Turkey	Fattening	20,443	Yes	17
	04/05/2021	Comm	Chicken	Fattening	246,714	Yes	2
	04/05/2021	Comm	Chicken	Breeding	5,291	Yes	2
	04/05/2021	Comm	Chicken	Breeding	35,822	Yes	5
	04/05/2021	Comm	Chicken	Egg	25,325	Yes	2
	04/05/2021	Comm	Other	Mixed	1,592	Yes	11
	04/05/2021	Comm	Turkey	Fattening	27,695	Yes	4

	05/05/2021	Comm	Chicken	Egg	14,081	Yes	4
	05/05/2021	Comm	Chicken	Breeding	113,385	Yes	7
	05/05/2021	Comm	Chicken	Egg	165,543	Yes	2
	05/05/2021	Comm	Domestic duck	Fattening	18,398	Yes	2
	05/05/2021	Comm	Other	Fattening	13,344	Yes	3
	05/05/2021	Comm	Turkey	Fattening	25,924	Yes	26
	06/05/2021	Comm	Domestic goose	Fattening	5,299	No	14
	06/05/2021	Comm	Turkey	Fattening	40,040	Yes	38
	06/05/2021	Comm	Turkey	Fattening	15,000	Yes	31
	09/05/2021	Comm	Chicken	Fattening	679,586	Yes	8
	10/05/2021	Comm	Chicken	Fattening	28,020	Yes	2
	10/05/2021	Comm	Chicken	Fattening	18,000	Yes	1
	10/05/2021	Comm	Domestic goose	Fattening	6,050	Yes	5
	10/05/2021	Comm	Turkey	Fattening	49,577	Yes	5
	10/05/2021	Non comm	Chicken	Mixed	40	Yes	6
	11/05/2021	Comm	Other	Fattening	11,046	Yes	1
	12/05/2021	Comm	Chicken	Fattening	257,273	Yes	4
	12/05/2021	Comm	Domestic goose	Fattening	5,562	Yes	11
	12/05/2021	Comm	Turkey	Fattening	19,618	Yes	37
	12/05/2021	Comm	Turkey	Fattening	24,019	Yes	31
	13/05/2021	Comm	Turkey	Fattening	101,629	Yes	5
	13/05/2021	Comm	Turkey	Fattening	43,507	Yes	6
	14/05/2021	Comm	Turkey	Fattening	3,834	Yes	27
	14/05/2021	Non comm	Other	Mixed	216	Yes	9
	15/05/2021	Comm	Other	Mixed	1,459	Yes	1
	15/05/2021	Comm	Turkey	Fattening	12,354	Yes	27
	15/05/2021	Non comm	Other	Mixed	141	Yes	2
	16/05/2021	Comm	Turkey	Fattening	2,063	No	24
	17/05/2021	Comm	Turkey	Fattening	2,065	Yes	24
	20/05/2021	Comm	Turkey	Fattening	16,765	No	31
	21/05/2021	Comm	Turkey	Fattening	11,840	Yes	32
	22/05/2021	Comm	Domestic goose	Fattening	1,150	Yes	18
	22/05/2021	Comm	Turkey	Fattening	64535	Yes	104
	22/05/2021	Comm	Turkey	Fattening	49919	Yes	6
	23/05/2021	Comm	Turkey	Fattening	32,355	Yes	3
	24/05/2021	Non comm	Other	Mixed	79	Yes	8
	28/05/2021	Comm	Domestic goose	Fattening	3,139	Yes	5
	31/05/2021	Comm	Chicken	Breeding	19,305	Yes	6
	21/06/2021	Comm	Turkey	Fattening	7,107	Yes	3
	25/06/2021	Non comm	Other	Mixed	106	Yes	6
	09/08/2021	Comm	Chicken	Egg	112,000	Yes	7
Romania	05/05/2021	Comm	Chicken	Mixed	179,192	Yes	4
	09/05/2021	Non comm	Chicken	Mixed	66	Yes	1
	10/05/2021	Non comm	Chicken	Mixed	190	Yes	1
	11/05/2021	Non comm	Other	Mixed	31	Yes	1
	11/05/2021	Non comm	Other	Mixed	122	Yes	1
	13/05/2021	Non comm	Other	Mixed	21	Yes	1

Comm: commercial holding; Non comm: non-commercial establishment.
Source: ADIS and Member States.

Annex B – Applied prevention and control measures on avian influenza

Scope

This document provides a brief overview of specific prevention and control measures applied in Albania, Bulgaria, Czechia, Denmark, France, Kosovo[2], Lithuania, the Netherlands, Poland, and Romania from 1 May to 15 September 2021 in relation to avian influenza outbreaks in poultry and in wild birds. Information is only if it is relevant to the implementation of measures such as increasing awareness of stakeholders and the general public, housing orders, strengthening biosecurity measures (other than poultry confinement), preventive culling, regional stand-stills, derogations on restriction zone implementation after risk assessment, hunting or any other relevant measures that have been applied. This document is made to support the EFSA working group in generating an overview on the application of the selected measures at EU level.

Timing of the applied prevention and control measures

Tables B.1–B.10 of Annex B provide timelines for the prevention and control measures taken by the following countries: Albania, Bulgaria, Czechia, Denmark, France, Kosovo[2], Lithuania, the Netherlands, Poland, and Romania. More information on the actions taken is provided in the sections below the tables.

B.1 Albania

Tana Kika[1], Keti Margariti[2], Ali Lilo[2], Jonida Boci[3], and Erson Dhimespira[4]

[1]National Veterinary and Plant Protection Authority; [2]Ministry of Agriculture and Rural Devolopment; [3]Reference Laboratory, Food Safety and Veterinary institute; [4]National Veterinary and Plant Protection Authority

Timing of the applied prevention and control measures

Table B.1 provides a timeline on the main events that triggered actions in relation to the selected prevention and control measures. More information on the actions taken is provided in the sections below.

Table B.1: Overview of main actions

Date	Event that triggered action	Type of action taken	Target audience
08/06/2021	The origin of the outbreak is thought to be the contact of domestic poultry with wild birds.	Increasing awareness. The measures were taken in accordance with the Ministerial Order no. 406, dated 19.09.2008 on the approval of the Regulation 'On veterinary measures for the control of Avian Influenza in the Republic of Albania', approximated with the EU Directive no.2005/94 and the national contingency plan no.234, dated on 2.6.2021. Ban of movements. Strengthening bio security.	General public Farmers Private and official veterinarians

Increasing awareness of the stakeholders and the general public

Information of the media by the Ministry of Agriculture and Rural Development, Press Office.

OIE official report by the Ministry of Agriculture and Rural Development.

Several media interviews by the General Director, Mrs Kika, and the Deputy Minister of MARD Mrs Gjeci.

To increase awareness of the general public, we have shared information on media and social networks

such as official social media pages on Facebook and Instagram. Information was about the avian influenza disease and the meat consumption.

https://www.facebook.com/164665218587476/posts/277756443945019/

We have shared leaflets and posters with basic information for the disease and contacts of the veterinary service. These have been distributed by veterinarians who have been in constant contact with the farmers.

https://www.facebook.com/164665218587476/posts/296155962105067/

Housing order

The first case was on 8 June 2021 and the end date was on 1 September 2021.

Prohibition of trading live animals in open spaces and live animal markets.

Sampling of all poultry leaving the holding for trade and or slaughterhouses purposes.

An order was drafted by the government to take restrictive measures for the prevention and control of avian influenza.

A ministerial regulation was enforced and implemented on measures for the prevention and control of avian influenza in border crossing points, breeding, movement, and trade of birds.

Risk areas are:

1) Areas that have lagoons, that are close to lakes or rivers where wild birds can visit.
2) High density farms and backyard farms that are not enclosed.

Strengthening biosecurity measures (other than housing orders)

Other than housing orders, these biosecurity steps were taken at the infection zone:

1) The burial of dead birds (accompanied by relevant document).
2) Elimination of infected birds only on the infected area. And the area over 10 km has been supervised.
3) Disinfection of chicken coops, backyards and all equipment used (the disinfectant used was chloroform solution).

Preventive culling

Elimination of positive flocks and suspected/contact poultry was made only on the respective poultry holding/yard, and precautionary measures were applied such as quarantine and sampling from the protected and surveillance areas. The above area radius was 3 km for the protected and 10 km for the surveillance area.

Regional standstill (beyond the restriction zones specified in the EU regulation)

Regionalization is not applied in Albania.Derogations on restriction zone implementation after risk assessment

Was not applied on the restriction zone, was applied only at the infected holding at the area.

Hunting

Hunting is prohibited in Albania.

References (if relevant)

Contingency programme MARD

Minister's order no. 243, dt 08.06.2021

Minister's order no. 241, dt 08.06.2021

Minister's order no. 261, dt 21.06.2021

B.2 Bulgaria

Aleksandra Miteva

Animal Health and Welfare, and Feed Control Directorate – Bulgarian Food Safety Agency

Timing of the applied prevention and control measures

Table B.2 provides a timeline on the main events that triggered actions in relation to the selected prevention and control measures. More information on the actions taken is provided in the sections below.

Table B.2: Overview of main actions

Date	Event that triggered action	Type of action taken	Target audience
05/05/2021	Confirmation of two primary outbreak of HPAI in poultry	• Eradication of outbreaks, control and surveillance according to the Directive 2005/94/EC • Enhanced official inspections for biosecurity • Enhanced passive surveillance in wild birds • Ban for outdoor keeping poultry • Ban for poultry market	Official vets, poultry farmers

Increasing awareness of the stakeholders and the general public

- Meetings with representatives of the poultry associations aimed at keeping them up to date with the epidemiological situation, present and further control measures to be enforced.

Housing order

- Precautionary measures such as keeping poultry indoors, trying to separate them from wild birds and ensuring feed and water is not accessible to wild birds were also required.

Strengthening biosecurity measures (other than housing orders)

Not applied.

Preventive culling

Not applied.

Regional standstill (beyond the restriction zones specified in the EU regulation)

Not applied.

Derogations on restriction zone implementation after risk assessment

Derogation in line with the Directive 2005/94.

Hunting

No restrictions have been implemented.

B.3 Czechia

Lucie Kalášková

State Veterinary Administration

Timing of the applied prevention and control measures

Table B.3 provides a timeline on the main events that triggered actions in relation to the selected prevention and control measures. More information on the actions taken is provided in the sections below.

Table B.3: Overview of main actions

Date	Event that triggered action	Type of action taken	Target audience (if applicable)
Still continuing	New occurrence of HPAI in other birds (non-poultry including wild birds) and in poultry in the EU	Regular updating of the website of the State Veterinary Administration about HPAI situation in EU: https://www.svscr.cz/zdravi-zvirat/ptaci-chripka-influenza-drubeze/vysocepatogenni-aviarni-influenza/	General public, all breeders
Continuously	Lifting of restriction zones in Czechia	Regular updating of the website of the State Veterinary Administration about HPAI situation in Czechia: https://www.svscr.cz/zdravi-zvirat/ptaci-chripka-influenza-drubeze/ptaci-chripka-v-cr/	General public, all breeders

Increasing awareness of the stakeholders and the general public

The information about HPAI situation in Czechia and EU in 2021 is regularly updated on the website of the State Veterinary Administration:

https://www.svscr.cz/zdravi-zvirat/ptaci-chripka-influenza-drubeze/ptaci-chripka-v-cr/

Housing order

Emergency veterinary measures, which are issued by the Regional Veterinary Administration in case of an outbreak and which are binding for a defined restricted area around this outbreak (for protection and surveillance zone), stipulate also for backyard farms in protection zones biosecurity measures that aim to prevent the contact of poultry with wild birds and their subsequent possible infection.

Strengthening biosecurity measures (other than housing order)

On 26 January 2021 the State Veterinary Administration issued emergency veterinary measures for the whole territory of Czechia to control a spread of HPAI in connection with the occurrence of HPAI in wild birds and in poultry (see above). Keeping of poultry (in commercial holdings) in open air was prohibited, unless the birds or feed and drinking water were protected against contact with wild birds with nets and roofs. The gathering of poultry and other captive birds at shows, exhibitions, competitions and other similar events was prohibited. The restriction of poultry movements was in force. The emergency veterinary measures were lifted on 1 May 2021.

Increased control (biosecurity) of poultry holdings in contact with avian influenza affected countries were performed.

General public was informed through the press on compliance with biosecurity in poultry farms, observing the current disease situation on the website of the State Veterinary Administration:

https://www.svscr.cz/zdravi-zvirat/ptaci-chripka-influenza-drubeze/ptaci-chripka-v-cr/

Preventive culling

Not applied.

Regional standstill (beyond the restriction zones specified in the EU regulation)

Regional standstill beyond the restriction zone was not applied in Czechia.

Derogations on restriction zone implementation after risk assessment

Not applied.

Hunting

The release of poultry (pheasant, mallard) and other captive birds for the restocking purpose was forbidden in restricted zones (emergency veterinary measures) set up around outbreaks.

B.4 Denmark

Jonas Berggren Fabricius, Pernille Dahl Nielsen

Danish Veterinary and Food Administration

Timing of the applied prevention and control measures

Table B.4 provides a timeline on the main events that triggered actions in relation to the selected prevention and control measures. More information on the actions taken is provided in the sections below.

Table B.4: Overview of main actions

Date	Event that triggered action	Type of action taken	Target audience (if applicable)
29/05/2021	Rapid risk assessment downgraded the HPAI risk level from high to low	The housing order was lifted together with the ban on fairs, markets, shows or other gatherings of poultry	General public, poultry industry and poultry associations
05/07/2021	HPAI outbreak in poultry in a breeding establishment producing eggs to the slaughter chicken production	Culling of all birds at the infected holding. Establishment of a protection and surveillance zone of 3 and 10 km around the holding and implementation of the necessary measures in accordance with Regulation (EU) 2016/429. Rapid risk assessment: still low risk of HPAI	General public, poultry industry and poultry associations

Increasing awareness of the stakeholders and the general public

DVFA has continuously informed the public and stakeholders about the situation and the importance of high biosecurity in poultry holdings using press releases, news and facts updates on the Danish Veterinary and Food administration (DVFA) homepage, and Facebook.

Housing order

The housing order was lifted on 29 May 2021 following a rapid risk assessment, which downgraded the risk level from high to low.

After the HPA outbreak on 5 July 2021, another risk assessment was conducted. It concluded that the risk from wild birds was still low, based on: the declining number of HPAI-detections in wild birds in European countries, the end of the migratory season for wild birds and the course of HPAI epidemics in previous years.

Strengthening biosecurity measures (other than housing order)

Not applied.

The following risk mitigation measures must always be observed at poultry farms regardless of the AI situation:

- Poultry or other captive birds must be fed and watered indoors or under fixed roofs or fixed coverings, ensuring that larger wild birds cannot get into contact with the feed and water.
- Poultry and other captive birds are not allowed to have access to surface water or rainwater.
- Ponds/lakes in outdoor poultry areas must be shielded from larger wild birds.
- Ducks and geese must be kept separated from other poultry.

Preventive culling

No preventive culling in the report period.

Regional standstill (beyond the restriction zones specified in the EU regulation)

Regional standstill, beyond the restriction zones specified in the EU regulation, was not applied in the report period.

Derogations on restriction zone implementation after risk assessment

Not applied.

Hunting

No restrictions have been implemented.

B.5 France

Béatrice Grasland, Audrey Schmitz, Yves Lambert, Andrea Jimenez Pellicer

General Directorate for Food, Animal Health Office, Ministry of Agriculture and FoodTiming of the applied prevention and control measures

Table B.5 provides a timeline on the main events that triggered actions in relation to the selected prevention and control measures. More information on the actions taken is provided in the sections below.

Table B.5: Overview of main actions

Date	Event that triggered action	Type of action taken	Target audience
27/05/2021	No migratory wild bird case within two months	National decree: low risk level of introduction of HPAI	Public

08/07/2021	HPAI H5N8 outbreak confirmed in a farmyard with no epidemiological link with other poultry holdings.	According to Regulation 2020/687: Culling, disposal of carcasses, cleaning and disinfection procedures. Establishment of protection and surveillance zones (3 and 10 km). Restrictions on movements of poultry and poultry products (with derogations). Epidemiological investigation. Clinical examinations and collection of samples in protection zone. Official notification to EU and OIE	Departmental decree Public
Ongoing	The large regulated zone of the south-west has been mostly lifted.	South-west zoning All outbreaks have been culled	Departmental decree Public

Increasing awareness of the stakeholders and the general public

Frequent communication has been done with all stakeholders via periodic status updates, live exchanges and meetings while major changes in strategy. Press releases have been regularly written and a general presentation of the epizootic and its progress has been updated on the website of the Ministry of Agriculture: https://agriculture.gouv.fr/influenza-aviaire-le-point-sur-la-situation-en-france

Several working groups bringing together public and private stakeholders in the poultry sector have been working together to write new avian influenza roadmap. The new avian influenza roadmap has been approved by the minister of agriculture and validated on July 8 by all relevant stakeholders. The roadmap defines the actions to be taken collectively to improve prevention of the risk of introduction and spread of the avian influenza virus and management in the event of a crisis. Based on ANSES (Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail) recommendations and the expertise of the Toulouse National Veterinary School, the signatories jointly undertook several urgent flagship measures during the summer and other additional measures by the end of the year. They also committed to implementing a short-, medium- and long-term action plan.

One of the main measures concerned the elimination of the exemptions to confinement provided for by the current national regulations in favour of compulsory sheltering arrangements in periods of risk and of preventive measures based on an analysis of risks (biosecurity audit). These methods will therefore be adapted to the species, types and methods of breeding and to the geographical area where the breeding is established.

The roadmap also provides for defining "areas at risk of dissemination", in which the production methods will be the subject of an inter-professional agreement, the objective being to reduce the density of fettering palmipeds in these areas during the period of risk. In these areas at risk of dissemination, specific biosecurity measures will be applied.

Housing order

Since May 1st, 2021, one new outbreak was confirmed on 8th July 2021 in a farmyard with no epidemiological link with other poultry holdings in the department of Loiret (FR246). The origin of the contamination seems to be the contact with wild fauna. Epidemiological investigations have not detected any secondary outbreaks in the regulated zone.

According to Regulation 2020/687, protection and surveillance zones (3 and 10 km) were set up. The protection zone was lifted on the 29 July 2021 and the surveillance zone was lifted on the 9 August 2021.

Culling (on the 3 August 2021) and first final cleaning and disinfection operations (on the 4 August 2021) were carried out in the last outbreak in the south-west. Regulated zones will be lifted according to Regulation 2020/687.

Strengthening biosecurity measures (other than housing order)

Strengthening biosecurity measures were set up in the regulated area including disinfection of all likely animal transports, clinical inspection and analysis of poultry before movement and inspection of all holdings in the regulated zone (commercial and non-commercial holdings in the protective zone, commercial holdings in the surveillance zone).

Preventive culling

No preventive culling in the report period.

Regional stand still (beyond the restriction zones specified in the EU regulation)

No regional stand still, beyond the restriction zones specified in the EU Regulation, was applied in the report period.

Derogations on restriction zone implementation after risk assessment

In the regulated zones, derogations were applied according to Regulation (EU) 2020/687 and to the national regulation.

Hunting

The movements of all game birds in the regulated areas were prohibited in the 21 days after the last outbreak of the zone.

The movement of game birds (galliforms only) from a restricted area to a free disease zone may be subject to a derogation from the movement ban: individual authorisation (clinical examination of game birds and the performance of virological tests less than 48 hours before departure by the designated health veterinarian).

Specific conditions for transport between two farms. No exemption to the movement ban to game birds located in the protection zone.

B.6 Kosovo[2]

Sadik Heta[1], Bafti Murati[1], Armend Cana[2], Kujtim Uka[2], and Xhavit Merovci[2]

[1]Department of Animal Health and Welfare, Kosovo Food and Veterinary Agency
[2]Food and Veterinary Laboratory, Kosovo Food and Veterinary Agency

Timing of the applied prevention and control measures

Table B.6 provides a timeline on the main events that triggered actions in relation to the selected prevention and control measures. More information on the actions taken is provided in the sections below.

Table B.6: Overview of main actions

Date	Event that triggered action	Type of action taken	Target audience
21/05/2021	First detected/confirmed outbreak in the village Kllodernica, Skenderaj, Mitrovica region.	All actions were taken based on ADMINISTRATIVE INSTRUCTION No. 2005/24 AGAINST ZOONOTIC DISEASE AVIAN INFLUENZA and National Contingency Plan for Avian Influenza 2016. Increasing awareness, release housing order, repeal housing order (poultry confinement), strengthening biosecurity. Cooperation with hunting association and fishing association for the monitoring of wild birds and waterfowl. Information about Avian Influenza situation and instructions were published on the official website	Private veterinarians, poultry associations, hunting association, fishing association general public, etc.

		https://auvk.rks-gov.net. Cooperation and sharing information with the National Institute of Public Health to screen for possible human cases.	Through media, meetings and brochures.

Increasing awareness of the stakeholders and the general public

Since 2020, there has been a continuous awareness campaign for the avian influenza threat, targeting private veterinarians, poultry farmers and association and hunter and fishing associations. Immediately after the first detected / confirmed outbreak on 21 May 2021 this campaign was intensified by involving general public as well, to report every suspected death of wild bird, waterfowl and in poultry farms or backyard poultry across the country. This was carried out by regular meetings, media and brochures. Information about the avian influenza situation and instructions were published on a regular basis on the official website https://auvk.rks-gov.net. Moreover, information was shared with the National Institute of Public Health to screen for possible human cases in the infected farms.

Housing order

From 21 May 2021 to 13 July 2021, 25 days after the last confirmed positive case (on 16 June 2021), movement of poultry and all markets involving live poultry were prohibited. All actions were based on Administrative Instruction No. 2005/24 Against Zoonotic Disease Avian Influenza and the National Contingency Plan for Avian influenza 2016. At the beginning, zoning (3 km protection and 10 km surveillance) was tentatively applied. However, shortly afterwards, due to outbreaks in different locations, the whole country was considered as a high-risk area. Preventive culling was not performed, except killing of poultry in the infected farms. All measures were strictly monitored by official state veterinary inspectors.

Strengthening biosecurity measures (other than housing order)

Meetings with poultry association representatives and commercial poultry farmers to refresh and update information on biosecurity measures such as: disinfection protocols (tools, equipment, vehicles etc.), restricted access of unauthorised persons to premises, recording humans and vehicles entering and leaving the farm premises, storage of manure, carcasses and disposal, keeping food indoors, keeping poultry indoors and preventing contact with wild birds. Instructions were given also to small poultry backyard farmers to strictly keep poultry indoors and restrict human and poultry movements, and for all measures to prevent contact with wild birds. Instructions for disinfection were given. All poultry live markets were closed.

Preventive culling

Preventive culling was not applied.

Regional standstill (beyond the restriction zones specified in the EU regulation)

The whole territory of Kosovo[2] is considered as a high-risk area due to the high density of backyard farms and the presence of migratory birds

Derogations on restriction zone implementation after risk assessment

Derogations on restriction zone implementation were not applied. Only movement of the commercial poultry for immediate slaughtering was allowed.

Hunting

No restrictions have been implemented.

B.7 Lithuania

Vilija Grigaliūnienė, Paulius Bušauskas

State Food and Veterinary Service of Lithuania (SFVS) and National Food and Veterinary Risk Assessment Institution (NFVRAI)

Timing of the applied prevention and control measures

Table B.7 provides a timeline of the main events that triggered actions in relation to the selected prevention and control measures. More information on the actions taken is provided in the sections below.

Table B.7: Overview of main actions

Date	Event that triggered action	Type of action taken	Target audience (if applicable)
On 28 May 2021	The outbreak was confirmed as a consequence of the epidemiological investigation of the previous outbreaks in backyard/hobby holdings in the district municipalities nearby.	During the epidemiological investigation of the outbreak LT-HPAI(NON-P)-H5N8-2021-00013, the owner indicated that the birds were purchased from a registered trader and a few days later started to die. The official veterinarians went to the trader's premises, imposed temporal restrictions and took samples from found-dead birds. The results for HPAI were negative. When two other outbreaks (LT-HPAI(NON-P)-H5N8-2021-00014 and LT-HPAI(NON-P)-H5N8-2021-00015) were detected, the owners indicated as well that the birds were recently purchased from the trader, located in Jurbarkas district municipality. The official veterinarians went again to the premises and took samples from nine dead birds and four swabs from live birds on 27 May 2021. The next day, on 28 May 2021, all samples from dead birds and three out of four swab samples were positive for the HPAI virus and the H5N8 strain was detected. All birds were purchased from two Lithuanian commercial poultry farms for further sale on local markets. The commercial farms were inspected and no increase in mortality or morbidity was detected. All birds were killed and destroyed by burying them on the territory of the affected establishment, with a preliminary disinfection carried out. A restricted zone around the affected establishment was set up and all the measures according Commission Delegated Regulation (EU) 2020/687 were applied.	Government, Ministry of Agriculture of the Republic of Lithuania, Fire and Rescue Department of Lithuania, Ministry of Environment of the Republic of Lithuania, Ministry of national defence republic of Lithuania, Lithuanian Poultry Association, Lithuanian Association of Trade Companies, Lithuanian Association of Veterinarians, Lithuanian Association of Ornithologists, general public.

Increasing awareness of the stakeholders and the general public

SFVS informed the public and stakeholders about the situation using press releases, news and facts on the SFVS homepage. Several meetings of the AI expert group and representatives of the poultry associations and Ministry of Agriculture aimed to keep them up to date with the epidemiological situation, and present and further control measures to be enforced.

Housing order

Precautionary measures such as keeping poultry indoors, taking steps to separate them from wild birds and ensuring feed and water is not accessible to wild birds were also required.

Strengthening biosecurity measures (other than housing order)

Regardless of the AI situation, the following measures always have to be followed in all poultry farms: poultry or other captive birds must be kept indoors or fenced area, ensuring that wild birds cannot come into contact with domestic birds, poultry and other captive birds are not allowed to have access to surface water, ducks and geese have to be kept physically separated from other poultry.

In addition to the strengthened surveillance activities in all types of the establishments, the strengthened control over the markets and poultry traders was imposed from 24 April 2021 in the entire territory of the country with the increased control over the poultry traders and the origin of birds intended for local trade. In the district municipalities, where the infected poultry were distributed, the trade in live poultry without a permission of the SFVS is prohibited.

Preventive culling

Not applied.

Regional standstill (beyond the restriction zones specified in the EU regulation)

Regional standstill beyond the restriction zones was not applied.

Derogations on restriction zone implementation after risk assessment

SFVS imposed the measures listed in Regulation (EU) 2020/687.

Hunting

No restrictions have been implemented.

B.8 The Netherlands

MAH Spierenburg DVM LLM

Netherlands Food and Consumer Product Authority (NVWA), Ministry of Agriculture, Nature and Food Quality (Min LNV)

Timing of the applied prevention and control measures

Table B.8 provides a timeline on the main events that triggered actions in relation to the selected prevention and control measures. More information on the actions taken is provided in the sections below.

Table B.8: Overview of main actions

Date	Event that triggered action	Type of action taken	Target audience (if applicable)
20/10/2020	First HPAI-positive wild bird finding on 17 October, 1 mute swan (*Cygnus olor*) was found dead in a wetland area. On 20 October the national reference laboratory confirmed HPAI virus H5N8 in the samples from the swan	Measurements for the whole country, as of 20 October 2020: 1) Housing order commercial poultry confinement and housing order hobby birds and other non-commercial captive birds confinement. 2) Measures for cover and application of litter on duck holdings	e.g. poultry associations, general public, etc.
28/10/2020	First outbreak HPAI serotype H5N8 positive commercial poultry holding (parent breeding)	Measurements for protection and surveillance zone, as of 28 October 2020: 1) Culling HPAI-positive commercial poultry holding, implement protection (3 km) zones and surveillance (10 km)	

		zones around HPAI-positive commercial poultry holding with transport restrictions for all birds inclusive of commercial poultry and poultry products, sperm, manure and feed, as well transport restrictions for domestic mammals, feed, sperm, milk and manure of these domestic mammals. 2) Ban hunting of ducks or hunting in general in wet areas with waterfowl. Measurements for the whole country, as of 28 October 2020, next measures were also implemented: 3) Ban for visiting commercial poultry holdings and other holdings or locations where birds are held. 4) Mandatory visitors registration. 5) Ban races and exhibitions with birds. 6) Ban hunting ducks or hunting in general in wet areas with waterfowl. 7) Mandatory clinical examination of birds for transport to or from commercial poultry holdings. 8) Mandatory intensive clinical examination ante mortem of ducks and turkeys at slaughterhouses. 9) Using a hygiene protocol for visiting of commercial poultry holdings. 10) Increasing awareness, repeal housing order (commercial poultry confinement), strengthening of biosecurity, intensive wild bird monitoring	
04/11/2020	Second outbreak HPAI serotype H5N8 positive commercial poultry holding (laying hen holding)	Measurements for protection and surveillance zone: same as above. Measurements for the whole country: same as above	
09/11/2020	Third outbreak HPAI serotype H5N8 positive commercial poultry holding (laying hen holding)	Measurements for protection and surveillance zone: same as above. Measurements for the whole country: same as above	
13/11/2020	Fourth outbreak HPAI serotype H5N8 positive commercial poultry holding (fattening duck holding)	Measurements for protection and surveillance zone: same as above. Measurements for the whole country: same as above	
20/10/2020–15/11/2020	30 HPAI H5N8 positive wild bird findings and 4 HPAI H5N1 positive wild bird findings	Measurements for the whole country: same as above	
21/11/2020	Fifth outbreak HPAI serotype H5N8 positive commercial poultry holding (fattening chicken holding)	Measurements for protection and surveillance zone: same as above. Measurements for the whole country: same as above	
22/11/2020	Sixth outbreak HPAI serotype H5N8 positive commercial poultry holding (laying Hen chicken holding)	Measurements for protection and surveillance zone: same as above. Measurements for the whole country: same as above	
7/12/2020	Seventh outbreak HPAI serotype H5N8 positive commercial poultry holding (mixed chicken holding)	Measurements for protection and surveillance zone: same as above. Measurements for the whole country: same as above	

7/12/2020	Eighth outbreak HPAI serotype H5N8 positive commercial poultry holding (fattening chicken holding)	Measurements for protection and surveillance zone: same as above. Measurements for the whole country: same as above	
14/12/2020	Ninth outbreak HPAI serotype H5N1 positive commercial poultry holding (breeding chicken holding)	Measurements for protection and surveillance zone: same as above. Measurements for the whole country: same as above	
5/1/2021	Tenth outbreak HPAI serotype H5N8 positive commercial poultry holding (fattening turkey holding)	Measurements for protection and surveillance zone: same as above. Measurements for the whole country: same as above	
20/2/2021	Eleventh outbreak HPAI serotype H5N8 positive commercial poultry holding (laying hen chicken holding)	Measurements for protection and surveillance zone: same as above. Measurements for the whole country: same as above	
22/5/2021	Twelfth outbreak HPAI serotype H5N8 positive commercial turkey holding (fattening turkey holding)	Measurements for protection and surveillance zone: same as above. Measurements for the whole country: same as above	

Increasing awareness of the stakeholders and the general public

Development of biosecurity measures during crisis in contact with poultry sector. Communication by both Ministry and poultry sector as follows: Directly published on government website (www.rijksoverheid.nl): Legal information/Information to Parliament/Information for press/Questions & Answers/Phone centre for questions from both poultry owners and general public, in direct contact with poultry advisers/Communication department in close contact with press/Meeting for all stakeholders and communication by media with general public.

Housing order

The housing order was implemented in mandatory national legislation as 20 October 2020 after an executed risk assessment by the Commission of Animal Disease Experts that consisted of avian influenza experts. This Commission advised the Chief Veterinary Officer and the Minister to introduce measures against HPAI. The trigger of implementing the housing order was the HPAI H5N8 wild bird finding [one mute swan (*Cygnus olor*) was found dead in a wetland area] on 20th October 2020.

Strengthening biosecurity measures (other than housing order)

We have concluded multiple years' service level agreements with suppliers who can deliver cleaning and disinfection equipment 24 hours/7 days within 4 hours after calling by Dutch government for culling at every location in the whole country.

Preventive culling

This was applied in the second outbreak HPAI serotype H5N8-positive commercial poultry holding (laying hen holding) on 4 November 2020, there was one other commercial poultry holding in the 1 km zone (chicken breeding holding), which was preventively culled. In the first and third outbreaks there were no other commercial poultry holdings in the 1 km radius zone around the index holdings. In the fourth outbreak there was one other poultry holding in the 1 km zone, but this poultry holding was not culled because this holding was more than 500 m from the index holding and there were no other poultry holdings in the 1 km zone of this holding, and the screening test results were polymerase chain reaction (PCR) and serology AI tested as negative.

Regional standstill (beyond the restriction zones specified in the EU regulation)

No, only the 1 km/3 km and 10 km zones (protection and surveillance zones).

Derogations on restriction zone implementation after risk assessment

No.

Hunting

There was a ban implemented on hunting ducks or on hunting in general in wet areas with waterfowl.

B. 9 Poland

Katarzyna Wawrzak and Magdalena Gawędzka

General Veterinary Inspectorate

Timing of the applied prevention and control measures

Table B.9 provides a timeline of the main events that triggered actions in relation to the selected prevention and control measures. More information on the actions taken is provided in the sections below.

Table B.9: Overview of main actions

Date	Event that triggered action	Type of action taken	Target audience
16.05.2021		On 16.05.2021 GVO ordered culling in 1km around the outbreaks	Veterinary inspection

Increasing awareness of the stakeholders and the general public

Information published on the website of the General Veterinary Inspectorate: https://www.wetgiw.gov.pl/nadzor-weterynaryjny/grypa-ptakow

The local veterinary authorities organised trainings for poultry farmers.

Housing order

Orders and prohibitions for poultry breeders in protection and risk zones designated around HPAI outbreaks are set out in the Regulation of the Minister of Agriculture and Rural Development of 18 December 2007 on eradication of avian influenza (implementation of Council Directive 2005/94/EC).

Requirements in the field of biosecurity applicable to poultry breeders throughout the country are set out in the Regulation of the Minister of Agriculture and Rural Development of April 4, 2017 on the ordinance of measures related to the occurrence of highly pathogenic avian influenza. This regulation imposes the following obligations on breeders:

- An order to keep poultry in a way that limits its contact with wild birds.
- Reporting to the District Veterinary Officer places where poultry or other birds are kept, excluding birds kept permanently in living quarters.
- Keeping the poultry in a way that excludes its access to water bodies to which wild birds have access.
- Storing bird feed in a way that prevents contact with wild birds and their droppings.
- Feeding and watering poultry and captive birds in a manner that protects feed and water from access by wild birds and their droppings.

- Laying disinfection mats in front of the entrances and exits of livestock buildings in which poultry is kept, in a number ensuring the security of entrances and exits from these buildings, for farms where poultry is kept in a non-running system.
- Use by persons entering livestock buildings in which poultry is kept, protective clothing and safety footwear, intended for use only in the given building, for farms where poultry is kept in a non-running system.
- Personal hygiene rules applied by persons performing poultry-handling operations, including washing hands before entering livestock buildings.
- Cleaning and disinfection of equipment and tools used for handling poultry before each use.
- Abstentions by persons who have participated in hunting birds in the last 72 hours from carrying out poultry-handling activities.
- Carrying out daily inspections of poultry flocks and keeping records containing, in particular, information on the number of dead birds, decrease in feed intake or lay.
- A ban on watering poultry and birds kept by humans with water from tanks to which wild birds have access.
- A ban on bringing (on foot or by vehicle) to the holding where poultry is kept, corpses of wild birds or carcasses of game birds.

Strengthening biosecurity measures (other than housing order)

The Regulation of the Minister of Agriculture and Rural Development of 4 April 2017 on the ordinance of measures related to the occurrence of HPAI introduces into the territory of the Republic of Poland, among others an order to keep the poultry in a way that limits its contact with wild birds or to store feed for birds in a way that prevents contact with wild birds and their droppings. The measures specified in the provisions of this Regulation are also applied during the outbreak of HPAI in the territory of the Republic of Poland.

In addition, information on avian influenza is available on the website of the Chief Veterinary Officer (link: https://www.wetgiw.gov.pl/nadzor-weterynaryjny/grypa-ptakow), including a description of biosecurity rules (https://www.wetgiw.gov.pl/nadzor-weterynaryjny/zasady-ochrony-drobiu-przed-grypa-ptakow)

Previously established regulations with additional biosecurity measures as acts of local law, has been upheld depending on current situation on site. These measures cover the following:

1) forbidding pigeon flights, including: regular flights, flights of postal pigeons, flights of racing pigeons (sprint and training flights);
2) minimum biosecurity requirements for releasing geese to outdoor runs, which were developed as guidelines, based on the version of 2017.

Also restrictions in Mazowieckie region has been upheld. It was forbidden to:

1) organise fairs, exhibitions, shows or competitions where poultry or other birds are collected;
2) release poultry or other birds for restocking game birds.

Preventive culling

Under the Regulation of the Minister of Agriculture and Rural Development of 18 December 2007 on eradication of avian influenza, slaughter/preventive killing of poultry may be implemented in an protection zone, i.e. 3 km around the HPAI outbreak. The competent authority to make a decision in this matter is the District Veterinary Officer. Decisions on the slaughter/preventive killing of poultry, related to the occurrence of HPAI in a given protection zone, are taken on the basis of a risk assessment, which takes into account, inter alia, the following areas: the specificity of poultry production in a given district together with the number of commercial/non-commercial farms, possible pathways of the pathogen spread in the environment and potential ways of entering the farm, among others the manner

of its protection, as well as topographic conditions of the area, infrastructure and all other circumstances affecting decision taking in the matter in question.

On 16 May 2021 GVO ordered culling in 1 km around the outbreaks in the territory of Poland.

Additionally, in Mazowieckie voivodeship, preventive culling was applied in 1 km from the outside of protection zone. Also a ban on keeping poultry in non-commercial holdings was applied.

Preventive culling was applied in 3 km around the 2021/339 outbreak.

Regional standstill (beyond the restriction zones specified in the EU regulation)

In the period covered by the report regional standstill was not applied.

Derogations on restriction zone implementation after risk assessment

Under the Regulation of the Minister of Agriculture and Rural Development of 18 December 2007 on eradication of avian influenza, derogations on restriction zone implementation may be implemented if HPAI is confirmed in other birds kept in a non-commercial holding, a zoo, a circus, a pet shop, a wild life park or in a fenced area where other birds are kept or reared for purposes related to shows, education or the protection and conservation of endangered species, or officially registered rare breeds of poultry or other captive birds, and conducting basic or applied scientific research, provided such derogations do not prevent disease control.

In the period covered by the report no derogation was applied.

Hunting

The hunting calendar does not allow hunting of birds until 15 August.

B.10 Romania

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National Sanitary Veterinary and Food Safety Authority in Romania

Timing of the applied prevention and control measures

Table B.10 provides a timeline on the main events that triggered actions in relation to the selected prevention and control measures. More information on the actions taken is provided in the sections below.

Table B.10: Overview of main actions

Date	Event that triggered action	Type of action taken	Target audience (if applicable)
06.05.2021	Confirmation of primary outbreak in a commercial holding, Mureș county, Ungheni	Enforcing the 3 km and 10 km [protection zone (PZ) and surveillance zone (SZ)]; notifying all official and free practice veterinarians to instruct the population to immediately announce any suspicious clinical signs of their poultry and all suspicious mortalities; notifying the public of the current situation and providing general and specific prophylactic measures for safeguard; notifying all competent authorities in the public health domain.	

		All the remaining domestic birds were culled by a team of representatives from the Mureș CSVFSD and the Local Centre for Fight Against Diseases (inter-agency local public health organism). All provisions of Regulation 2020/687 were complied with (disinfections, sampling, neutralisation, restrictions, etc.)	
10.05.2020	Confirmation of the first secondary outbreak (non-commercial), Harghita county, Cristuru Secuiesc	All provisions of Regulation 2020/687 were complied with (disinfections, sampling, neutralisation, restrictions, etc.)	
11.05.2021	Confirmation of the second secondary outbreak (non-commercial), Mureș county, Cozma		
12.05.2021	Confirmation of the second secondary outbreak (non-commercial), Mureș county, Grebenisu de Campie		
12.05.2021	Confirmation of the second secondary outbreak (non-commercial), Mureș county, Sanatana de Mureș		
14.05.2021	Confirmation of the second secondary outbreak (non-commercial), Harghita county, Cristuru Secuiesc		

The confirmation of the primary outbreak from Mureș county generated a linear reaction from the National Sanitary Veterinary and Food Safety Authority in Romania, namely respecting the following actions:

1) Event notification by animal owners and/or food business operators.
2) On-site official inspection by the official veterinarians.
3) Implementation of primary sanitary veterinary measures.
4) Activation of the National Centre for Disease Fight and the Local Centres for Disease Fight (teams of representatives from all official institutions that hold responsibilities in public health, coordinated by the Prefect of the respective county), entities that would draw up, approve and enforce all public health measures in relation to HPAI.
5) Collecting samples from diseased/dead birds and sending them for specific laboratory assays (disease suspicion, the County Sanitary Veterinary and Food Safety Laboratories).
6) Following the positive disease suspicion, most of the culling actions were scheduled at farm level.
7) Notification of all stakeholders (e.g. official institutions, FBOs, animal owners, etc.) of the presence of HPAI suspicion/confirmation in Romania.
8) Drafting and creating the framework for the official enforcement of the necessary sanitary veterinary and food safety measures for the prevention and fight against HPAI.
9) Sending the samples to the National Reference Laboratory for Avian Influenza (the Institute for Diagnosis and Animal Health).
10) Following the official confirmation of the disease, the implementation of the entire set of sanitary veterinary and food safety measures for the prevention and fight against HPAI was enforced.

11) Enforcing the provisions of the European and national legislation, until the moment when the Central Competent Authority considers eligible to lift the restrictions and confirm the absence of the virus in the respective affected areas.

Increasing awareness of the stakeholders and the general public

The National Sanitary Veterinary and Food Safety Authority in Romania adopted three lines of strategy when it came to communication plans and activities in relation to HPAI:

1) Communicating with stakeholders and relevant authorities in the field of public health and veterinary public health:

- Stakeholders: the National Sanitary Veterinary and Food Safety Authority, as a critically important actor for public health, has implemented a series of collaboration protocols with numerous institutions and legal representatives that also provide for securing public health in Romania (e.g. the Ministry of Health, the Ministry of Internal Affairs, etc.); these protocols serve to provide multidisciplinary contingency plans for high-risk situations, when one competent authority cannot provide sufficient human resources, logistics or scientific input to efficiently address such a situation; therefore, the National Sanitary Veterinary and Food Safety Authority issued a series of notifications to these institutions in respect to the evolution of HPAI in Romania, as well as on-point requests for collaboration (e.g. support in monitoring the effectiveness of the ban on poultry markets/fairs, compliance with the restrictions of birds movement, etc.); these notification provisions were also applied for NGOs, associations, professional organisations and other legally established stakeholders.

2) General public: the National Sanitary Veterinary and Food Safety Authority, obliged under the national legislation for release of information of public importance and free data access, namely Law no. 544/2001, has constantly informed the general public of the evolution of HPAI (H5N8) in Romania, through press releases and by using its own website (http://www.ansvsa.ro/), as well as media partners (e.g. newspapers, TV channels, social media, etc.).

3) Local public: where localities and/or commercial establishments were included in the protection/surveillance areas following the confirmation of a wild birds case or an outbreak, the National Sanitary Veterinary and Food Safety Authority, through its territorial representatives, namely the County Sanitary Veterinary and Food Safety Directorates, and with the help of other public institutions, issued and disseminated targeted advice for the economic operators and the people living in these areas, in respect to:

- sanitary veterinary measures for restrictions for the animals in the backyards;
- sanitary veterinary measures for the ban on animal movements;
- sanitary veterinary measures for the movement of objects/materials/feed that could act as vectors for the disease;
- sanitary veterinary measures for specific rules for consuming poultry and the risks that HPAI poses for human health;
- sanitary veterinary measures for the mandatory notification of the empowered free practice veterinarians or the official veterinarian when noticing any change in the health status and/or other health criteria (a drop in the intake of feed, water and any other abnormal behaviour) in backyard birds. However, the latter have not been reported in any of the notifications made by animal owners, rendering them of little statistical significance for backyards;
- sanitary veterinary measures for basic food safety and hygiene rules.

The above-mentioned were disseminated via broadcasts on public radios and TV stations and by door-to-door verbal communications done by official teams.

Figure B.1: Example of a public warning of the evolution of HPAI in Romania

Housing order

For the housing orders, it is imperative to acknowledge the fact that the backyards husbandry system has several particularities that require a special set of measures to prevent and combat infectious diseases. In detail, the legal, social and economic aspects are primordial:

- The legal aspect: backyards do not possess a legal personality and the vast majority of the national and international regulations are inapplicable to them; therefore, it is difficult to enforce strict sanitary veterinary measures and even more problematic to supervise the enforcement of these actions, due to reasons as is the necessary high input of human resources; however, specific parts of the national legislation have been especially adapted to address the particular issue of backyards (e.g. sanctions and fines, animal movement, transport, welfare, etc.).
- The social and economic aspects: the foremost important aspect is that animal husbandry is a vital part of the subsistence for these backyards, the animal owners being totally dependent on the products of animal origin obtained from these animals; therefore, the backyard animals cannot be regarded as hobby, sport or companionship animals from the view of animal owners.

Considering the above-mentioned, after the confirmation of the primary outbreak, the National Centre for Disease Fight issued a national confinement order to ban for 30 days the selling of poultry from certain business operators directly to the general public/backyards (non-commercial farms).

Strengthening biosecurity measures (other than housing order)

For commercial establishments

The veterinary officials verified the commercial establishments in the PZ to have no breaches in the three levels risk biosecurity system:

1) Administrative zone: offices and administrative spaces

- Restricting access to these spaces and installing a sign that clearly informs of these restrictions.
- Ensuring that allowed personnel has clean clothing and footwear (no organic materials that could contaminate the area).

2) Professional zone: the area that separates the production zone from the administrative zone

- Preventing the access of mammals (rodents control and other companionship animals).
- Providing cover for storage spaces.
- Clean clothing and footwear when passing through the sanitary filter.
- Creating an environment less propitious for wild birds (cleaning adjacent spaces, cutting the grass, trimming the trees, collecting fallen leaves and installing devices destined to scare off wild birds).
- Draining existing water surfaces, as well as preventing their accumulation following rain.
- Eliminating all spaces destined for non-commercial birds (e.g. companionship birds or those used for various hobbies).
- Training all personnel in complying with the specifics of the disease and redefining their roles and responsibilities within the commercial establishments.

- Contracted personnel and visitors would only be allowed inside this area an in the production zone if 72 hours have passed since their last contact with any domestic or captive birds, with products of avian origin or avian by-products (including manure).
- Exaggerating the disinfection of all transport means and their annexes, as well as all types of equipment and by-products not destined for human consumption.
- Where it is possible, the transport of birds, hatchery eggs and manure should avoid passing through this zone; if it is not possible, cleaning procedures must be in place.

3) Production zone: halls for animal husbandry, physically separated from the two previously mentioned zones:

- Limiting the production to a single category, without mixing several categories (e.g. broilers with laying hens).
- Preventing the access of mammals (rodents control and other companionship animals).
- Restricting the access of visitors and of any other personnel that do not work in these premises.
- Using strictly single-use footwear and clothing, hand washing and an appropriate hair grip under a bonnet, both for personnel as well as for visitors.
- Clothing and footwear would be specific for each individual hall and at the entrance of every hall there would be filter destined for change of clothes and footwear.
- Using strictly potable water in the halls and restricting access to surface waters.
- Farm production management based on the all full/all empty principle.
- Cleaning and disinfecting mobile equipment following each use (entry–exit).
- Transport means carrying feed and different materials are banned from entering this area, all necessary actions being done through reloading.
- Carcass disposal was carried out at a significant distance from the production halls and close to a public road (accessible from outside the commercial establishment); freezing was recommended, because it facilitated long-term storage and a low frequency transport rate that involved a significantly lower risk.
- For web-footed birds (e.g. ducks, geese, etc.), in addition to the specific biosecurity measures, all contact of the birds with any type of water surface will be prohibited.

For backyards

The veterinary officials verified in the PZ the following:

- Preventing any direct or indirect contact between wild birds and domestic or captive birds.
- Prohibiting the access to any type of water surfaces for domestic or captive birds.
- Separating, within the same backyard, laying hens/broilers from web-footed birds.
- Prohibiting the keeping birds in backyards in open spaces.
- Prohibiting using water surfaces as water reservoirs for domestic and captive birds.
- Limiting human circulation inside the backyard only to the owner and family members.
- Preventing contact with other domestic animals.
- Using different clothing and footwear when entering the premises where the birds are kept.
- Prohibiting the use of Anseriformes and Charadriiformes as decoy birds.
- Prohibiting the organisation and participation of animal owners to public manifestations as exhibits, markets, exhibitions of domestic and captive birds.

At least one official inspection and census was performed in every commercial establishment and every backyard in the surveillance and protection areas, while conducting a bird census and verifying biosecurity measures all together.

Preventive culling

Preventive culling following these outbreaks has not yet been enforced in Romania, as the epidemiological investigation did not conclude any direct risk towards other commercial farms or backyards that did not buy day-old chicks from the affected holding in Mureș county.

Regional standstill (beyond the restriction zones specified in the EU regulation)

Regional stand still was not applied, mainly by considering the fact that the outbreaks were isolated both in terms of region, number of affected animals as well as the spread of the disease. But the direct selling of poultry with uncertified health status from business operators to the general public was banned for 30 days.

Derogations on restriction zone implementation after risk assessment

NA

Hunting

No restrictions have been implemented.

Annex C – Data on wild birds

Table C.1: Highly pathogenic avian influenza notifications in wild birds in Europe from 15 May to 15 Septemebr 2021. On one single reported detection of HPAI in wild birds, more than one bird might be involved. For 7 notifications the wild bird species was unknown or mixed, those notification are not included in the table.

Category of wild bird species	Wild bird species	Number of HPAI detections where the wild bird species was reported
Waterfowl	Anatidae	14
	Barnacle goose (*Branta leucopsis*)	12
	Common eider (*Somateria mollissima*)	7
	Mute swan (*Cygnus olor*)	6
	Mallard (*Anas platyrhynchos*)	5
	Whooper swan (*Cygnus cygnus*)	4
	Greylag goose (*Anser anser*)	2
	Common merganser (*Mergus merganser*)	1
	Greater white-fronted goose (*Anser albifrons*)	1
Raptor	White-tailed eagle (*Haliaeetus albicilla*)	9
	Accipitridae	2
	Eurasian eagle-owl (*Bubo bubo*)	2
	Golden eagle (*Aquila chrysaetos*)	1
	Northern goshawk (*Accipiter gentilis*)	1
Other wild bird species	Laridae	5
	European herring gull (*Larus argentatus*)	6
	Common gull (*Larus canus*)	2
	Great skua (*Stercorarius skua*)	2
	Eurasian Oystercatcher (*Haematopus ostralegus*)	1
	Great cormorant (*Phalacrocorax carbo*)	1
Total		84

Data source: ADIS and OIE (data extraction done on 20 September2021)

Table C.2 Data from the Migration Mapping Tool[11] showing movements for common teals moving from Russia east of 45 degrees East in Summer (June - August) to destination areas in Europe

Destination	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Iceland & Faeroes	.	.	.	.	.	.	.	.	.	.	.	.
Great Britain & Ireland	6	5	.	.	.	.	.	.	7	4	2	6
Spain & Portugal	.	1	.	.	.	.	.	.	.	.	1	.
France & Channel Islands	.	3	.	.	.	.	.	.	.	1	.	.
Belgium & The Netherlands	4	1	2	1	.	.	.	2	5	5	5	2
Norway & Sweden	.	.	.	.	.	.	.	.	1	.	.	.
Germany & Denmark	.	.	.	.	.	.	.	2	.	.	.	.
Italy, Switzerland & Austria	1	.	.	.	.	.	.	2	3	1	.	.
Svalbard	.	.	.	.	.	.	.	.	.	.	.	.
Poland, Czech Republic & Slovakia	.	.	.	.	.	.	.	1	.	.	.	.

[11] This tool has been developed by the British Trust for Ornithology and the Catalan Ornithological Institute, on behalf of the European Union for Bird Ringing (EURING) and the European Bird Census Council (EBCC) and supported by the European Commission and EFSA). This tool is available to Member States and other disease management insitututions by contacting EFSA at ALPHA@efsa.europa.eu

Hungary, Croatia, Bosnia-Herzegovinia, Slovenia, Montenegro, Serbia	.	.	.	.	.	.	.	.	.	.	.	.
Greece, Albania & Macedonia	.	.	.	.	.	.	.	.	.	.	.	.
Romania, Bulgaria, Moldova, Ukraine, European part of Turkey	4	.	2	.	.	.	.	4	8	.	.	.
Finland, Estonia, Latvia, Lithuania & Kaliningrad	.	.	.	.	.	.	1	.	.	.	.	.
Russia (not Kaliningrad) & Belarus west of 45 degrees East	.	.	.	.	.	.	.	.	.	.	.	.
Russia east of 45 degrees East	.	.	.	.	.	.	.	.	.	.	.	.
Nearctic	.	.	.	.	.	.	.	.	.	.	.	.
Africa and Middle East	1	1	.	.	.	.	.	.	.	.	.	2
Asia	.	.	.	.	.	.	.	.	.	.	.	.
Other	.	.	.	.	.	.	.	.	.	.	.	.

Data extraction carried on 27 September 2021

Table C.3 Data the Migration Mapping Tool[11] showing movements for ducks moving from Russia east of 45 degrees East in Summer (June - August) to destination areas in Europe

Destination	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Iceland & Faeroes	.	.	.	.	.	.	.	.	.	.	.	.
Great Britain & Ireland	41	49	17	4	2	3	.	5	18	25	30	36
Spain & Portugal	.	1	.	.	.	.	1	.	.	.	1	1
France & Channel Islands	1	6	1	.	.	.	.	.	.	1	3	2
Belgium & The Netherlands	35	35	19	3	.	1	1	5	15	31	34	47
Norway & Sweden	4	6	5	2	.	.	.	1	3	1	.	.
Germany & Denmark	3	18	11	20	8	2	7	5	3	6	5	2
Italy, Switzerland & Austria	46	45	29	9	.	.	.	2	3	3	14	23
Svalbard	.	.	.	.	.	.	.	.	.	.	.	.
Poland, Czech Republic & Slovakia	.	2	2	.	.	.	5	1	.	.	3	3
Hungary, Croatia, Bosnia-Herzegovinia, Slovenia, Montenegro, Serbia	.	.	.	.	.	.	1	.	.	.	1	.
Greece, Albania & Macedonia	.	.	.	.	.	.	.	.	.	.	.	.
Romania, Bulgaria, Moldova, Ukraine, European part of Turkey	11	8	6	3	1	.	1	16	17	20	7	8
Finland, Estonia, Latvia, Lithuania & Kaliningrad	.	.	.	.	1	7	4	.	.	.	.	.
Russia (not Kaliningrad) & Belarus west of 45 degrees East	.	.	.	.	.	.	.	.	.	.	.	.
Russia east of 45 degrees East	.	.	.	.	.	.	.	.	.	.	.	.
Nearctic	.	.	.	.	.	.	.	.	.	.	.	.
Africa and Middle East	1	1	.	.	.	.	.	.	.	.	.	2
Asia	.	1	.	.	.	.	.	.	.	.	.	1
Other	.	.	.	.	.	.	.	.	.	.	.	.

Data extraction carried on 27 September 2021