

Rapid Risk Assessment

HPAIV H5 in Germany



In Germany, more than 600 HPAIV H5 cases in wild birds, 59 outbreaks in poultry and captive birds have been detected since 30. October 2020. In addition, 25 European countries reported wild bird cases or outbreaks of HPAIV subtype H5 in captive birds. The risk of spread in waterfowl populations and disease introduction in poultry farms and bird populations (e.g. zoological institutions) is considered high. In areas with a high density of poultry farms, there is a high risk of introduction of HPAIV subtype H5 through virus spread between poultry farms (secondary outbreaks). Surveillance measures with regard to dead or sick wild birds should be intensified without delay and biosecurity in poultry holdings should be reviewed and optimized.

Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

Background

Situation in Germany

Since 30 October 2020, HPAIV H5-infected wild birds have been identified predominantly in dead birds on almost a daily basis and subsequently reported via the German Animal Disease Notification System (Tierseuchennachrichtensystem, TSN). Thirteen federal states are affected thus far (here in chronological order of occurrence of cases): Schleswig-Holstein, Hamburg, Mecklenburg-Western Pomerania, Lower Saxony, Brandenburg, Bremen, Saxony, North Rhine-Westphalia, Bavaria, Berlin, Hesse, Baden-Württemberg and Thuringia (see figures 1 and 3).

The following federal states reported a total of 56 outbreaks in poultry and 3 outbreaks in captive birds as of 03 November 2020: Schleswig-Holstein (n=6), Mecklenburg-Western Pomerania (n=14), Lower Saxony (n=28), Brandenburg (n=4), Saxony (n=2), Hesse (n=1), Thuringia (n=1), Bavaria (n=2) and Rhineland-Palatinate (n=1) (Figure 1,3; Table 1). The outbreaks mostly affected commercial farms (n=44) and occasionally small non-commercial farms (n=13). All but one of the outbreaks was caused by the introduction of HPAIV H5N8. In one case, HPAIV H5N5 was detected in samples from a small holding in the district of Vorpommern-Rügen. Between 21.12.2020 and 23.01.2021, Lower Saxony reported outbreaks predominantly in turkeys in the highly poultry-dense counties of Cloppenburg (n=20) and Oldenburg (n=4), with a focus of clustered outbreaks in the municipality of Garrel (12 outbreaks in turkeys, 1 outbreak in ducks).

In wild birds, HPAIV H5 was most frequently detected in samples from dead Barnacle Geese (*Branta leucopsis*), Whistling Ducks (*Mareca penelope*) and other goose species. Other affected bird species groups include gulls, snipe, owl and raptors (Figure 2) including individual peregrine falcons (*Falco peregrinus*), white-tailed sea eagles (*Haliaeetus albicilla*) and eagle owls (*Bubo bubo*). However, HPAIV H5N8/N5 was detected not only in deceased ducks and geese but also in clinically healthy ducks and geese and in faecal samples from these birds.

According to Schleswig-Holstein's 'State Agency for Coastal Protection, National Parks and Marine Conservation' (LKN.SH), more than 16,000 deceased or moribund waders and waterfowl have been identified in the area of the Wadden Sea coast (predominantly in the district of Nordfriesland) since 25.10.2020; this includes around 3,200 dead red knots (*Calidris canutus*), a bird species belonging to the snipe family (*Scolopacidae*), since mid-December. The highest mortalities were found in Barnacle Geese (45%), red knots (18%) and wigeons (10%).

Several virus subtypes circulate in wild bird populations: HPAIV H5N8 (approx. 95%) and, far less frequently represented, HPAIV H5N5 (approx. 3%), H5N3 (approx. 2%, exclusively in the above-mentioned red knots and curlews, *Numenius arquata*) as well as H5N1 and H5N4 (only sporadic detection). Double infections were identified in a wigeon (H5N8+H5N1) and a white-tailed eagle (H5N8+H5N5).

Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

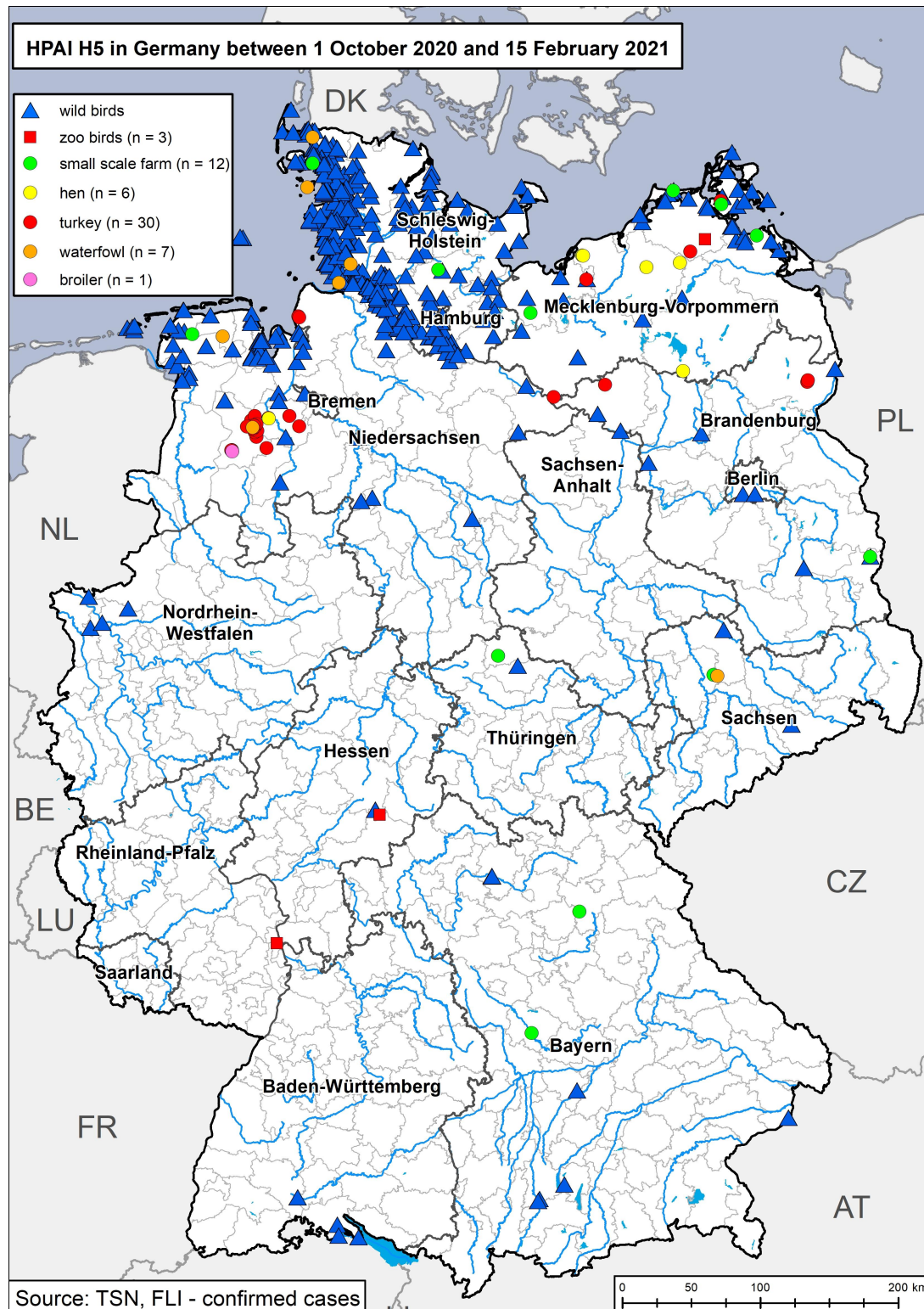


Figure 1: HPAIV H5 outbreaks in poultry and captive birds and cases in wild birds in Germany reported via TSN since 01 October 2020. (date: 15.02.2021). Symbols: See legend. Small-scale farming refers to poultry farms with up to 500 birds.

Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

Table 1: Confirmed HPAIV H5 outbreaks in poultry and captive birds since 01.10.2020 in Germany. Source: TSN (16.02.2021)

Bundesland	Municipality	Species of captive bird	Utilization	Number of captive birds (*cumulative)	Date confirmation
Brandenburg (4)	Spree-Neiße	Quail	Poultry breeding	44	29.12.2020
	Prignitz	Turkey	Fattening	>8,000	24.01.2021
	Uckermark	Turkey	Fattening	>14,000	01.02.2021
	Uckermark	Turkey	Fattening	>14,000	06.02.2021
Bavaria (2)	Bayreuth	Chicken	Layers	17	29.01.2021
	Weißenburg-Gunzenhausen	Chicken	Hobby	6	08.02.2021
Mecklenburg-Western Pomerania (14)	Vorpommern-Rügen	Waterfowl	Mixed/Hobby	54	10.11.2020
	Vorpommern-Rügen	Turkey	Fattening	>16,000	16.11.2020
	Vorpommern-Rügen	Chicken	Mixed/Hobby	260	12.11.2020
	District of Rostock	Chicken	Layers	>2,800	15.11.2020
	District of Rostock	Chicken	Layers	53,000	16.11.2020
	Mecklenburgische Seenplatte	Chicken	Layers	28,800	01.12.2020
	Nordwestmecklenburg	Chicken	Layers	41	29.12.2020
	Vorpommern-Greifswald	Chicken	Layers	201	30.12.2020
	Landkreis Rostock	Chicken	Layers	37,000	12.01.2021
	Nordwestmecklenburg	Turkey	Fattening	>7,000	27.01.2021
	Ludwigslust-Parchim	Turkey	Fattening	19,000	29.01.2021
	Vorpommern-Rügen	Geese	Zoo	120	03.02.2021
	Vorpommern-Rügen	Turkey	Fattening	>19,000	06.02.2021
	District of Rostock	Chicken	Parent	45,000	09.02.2021
Lower Saxony (28)	Aurich	Chicken	Mixed/Hobby	41	17.11.2020
	17 x Cloppenburg	Turkey	Fattening	>170,000*	21.12.2020-16.01.2021
	Cloppenburg	Duck	Fattening	17,000	05.01.2021
	Cloppenburg	Turkey	Breeder	>13,000	05.01.2021
	Cloppenburg	Chicken	Broiler	72,000	23.01.2021
	2 x Oldenburg	Turkey	Fattening	27,000*	22.12.2020-05.01.2021
	Oldenburg	Turkey	Breeder	7,200	02.01.2021
	Oldenburg	Chicken	Parent	21,000	13.01.2021
	2 x Cuxhaven	Turkey	Fattening	>46,000*	14.-18.01.2021
	Wittmund	Duck	Fattening	>25,000	21.01.2021
Rhineland-Palatinate (1)	Rhein-Pfalz-Kreis	Geese	Zoo	365	23.01.2021
Schleswig-Holstein (6)	Nordfriesland	Chicken	Hobby	68	04.11.2020
	Segeberg	Chicken	Mixed/Hobby	36	09.11.2020
	Nordfriesland	Geese	Fattening	>350	16.11.2020
	Nordfriesland	Geese	Fattening	>65	19.11.2020
	Dithmarschen	Geese	Fattening	>650	24.11.2020
	Dithmarschen	Geese	Breeder	>1,800	28.12.2020
Saxony (2)	Leipzig	Geese	Breeder	>9,000	25.12.2020
	Leipzig	Chicken	Hobby	79	30.12.2020
Hesse (1)	Vogelsbergkreis	Peacock	Zoo	17	07.01.2021
Thuringia (1)	Nordhausen	Chicken	Layers	50	05.01.2021

Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

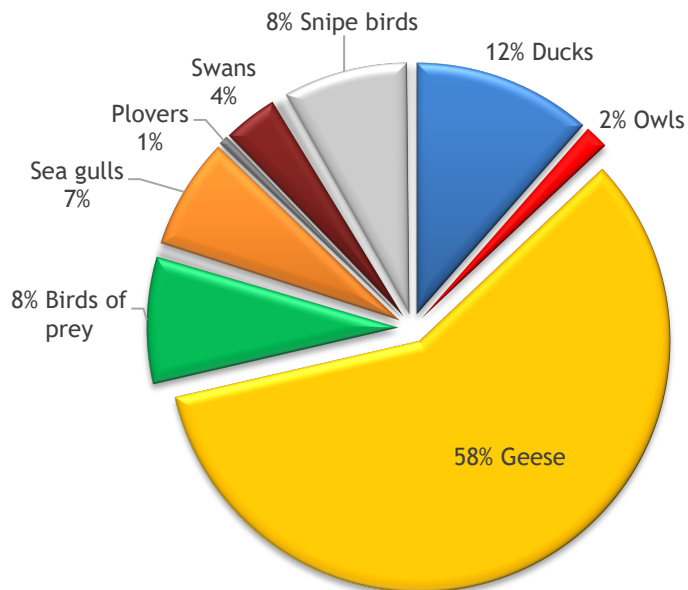


Figure 2: Percentage of confirmed HPAIV H5 detections in wild birds in Germany since 01.10.2021 by groups *. (* Order, family or genus). Source: TSN (as of 15.02.2021).

Outbreaks in poultry (red) /
Non-commercial captive birds (yellow) and
zoos (blue) Confirmed cases in wild bird (green)

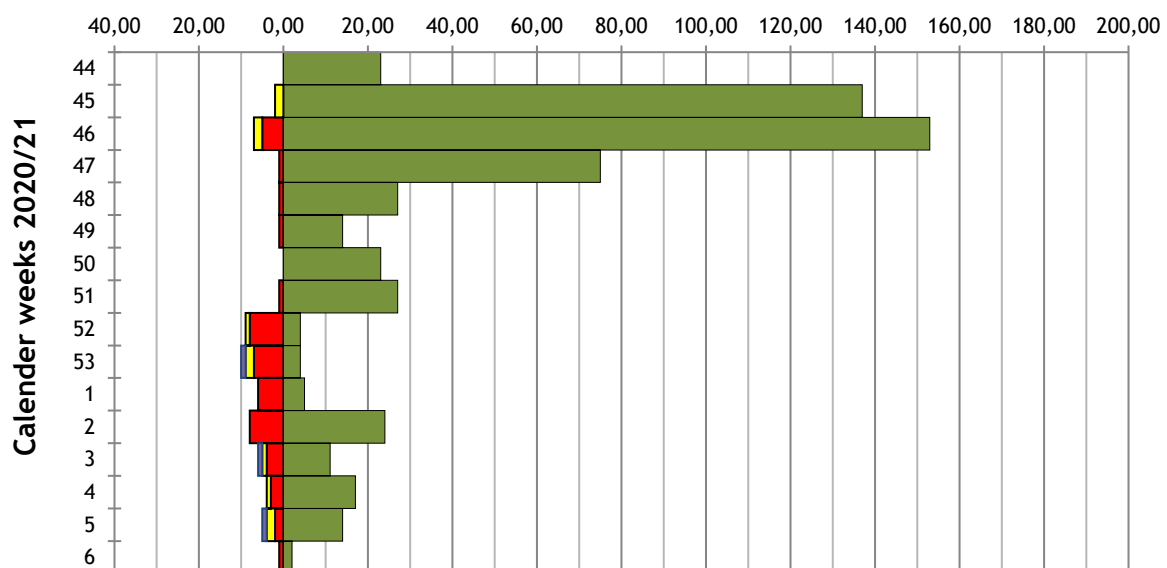


Figure 3: HPAIV H5 cases and outbreaks in poultry/captive birds on a weekly basis (date of sampling) between 26.10.2020 and 16.02.2021. Source: TSN.

Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

Epidemiological situation in Europe (figure 4, table 3)

Many European countries are reporting new cases of HPAI in poultry or wild birds on a daily basis; a total of 557 outbreaks in poultry, amounting to the loss of millions of birds, have been reported from 25 European countries. Since Jan. 7, 2021, Lithuania, Romania, the Czech Republic, Bulgaria, Austria, Switzerland, Finland, Latvia, and Estonia have reported new cases in wild birds, and Lithuania, Romania, the Czech Republic, Bulgaria, and Finland have also reported outbreaks in poultry (Table 3).

In France, 447 HPAI cases (subtype H5N8) have been detected in poultry farms as of Feb. 15, 2021, very predominantly in flocks of ducks (foie gras production) in southwestern France, where there is a very high density of these flocks. Drastic measures were implemented to stop the spread of disease, including the depopulation of all poultry farms within a 1-km radius and the slaughter of all ducks and free-range poultry within a 5-km radius of the index farm. Surveillance areas were extended to include a 20-km radius and movement was banned in those areas.

Poland reported 41 outbreaks in poultry since the beginning of December, including 35 commercial poultry farms (turkeys=18; chickens=13; waterfowl=4).

In Italy, in addition to cases previously detected exclusively in wild birds, an outbreak has also occurred in a backyard holding.

Hungary reported outbreaks of HPAIV H5N8 in laying hens but also in one heron.

Lithuania reported HPAIV H5 cases in mute swans and an outbreak in a small poultry holding since 08/01/2021.

HPAIV H5, H5N5, and H5N8 have been detected since 08/01/2021 in Romania at the Black Sea, predominantly in singing swans.

The Czech Republic reported HPAIV H5N8 cases in swans and five outbreaks in poultry exclusively in small village holdings as of 21/01/2021.

Since 02/03/2021, Bulgaria reported four outbreaks of HPAIV H5 in broilers, Peking ducks, and laying hens.

Since 02/04/2021, both H5N8 and H5N5 viruses have been detected in mute swans in Austria.

A sample from a sick Mediterranean gull in Switzerland tested positive for HPAIV H5N4 (04.02.2021).

Between 05.10.02.2021, a dead swan and wild pheasants and in a pheasant holding tested H5N8 positive in Finland.

In Latvia, HPAIV H5N8 has been detected in wild waterfowl (mallards, whistling ducks, mute swans) since 09.02.2021.

In Estonia, one HPAIV H5N8-positive swan was reported on 12.02.2021.

From the European part of Russia, 17 outbreaks in poultry and two cases in mute swans were reported to the OIE.

Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

Table 3: Reports of HPAIV H5 outbreaks in captive birds and confirmed cases of HPAIV H5 in wild birds in Europe. Note: The numbers of wild birds are derived in parts from initial reports and present a section of data only. The number of wild birds with confirmed virus detection is much higher. Source: ADNS, OIE (as of 15.02.2021).

Country	Wild bird notifications	Poultry notifications	Captive bird notification (i.e. zoos)	Result
FRANCE	13	447		460
ITALY	18	1		19
NETHERLANDS	50	10	10	70
BELGIUM	19	2	1	22
UNITED KINGDOM	93	15	2	117
IRELAND	28	3		31
DENMARK	129	2	2	133
SPAIN	3			3
AUSTRIA	3			3
FINLAND	3	1		4
NORWAY	13		1	14
SWEDEN	11	4	1	16
CZECH REPUBLIC	5	5		10
ESTONIA	1			1
HUNGARY	1	6		7
POLAND	14	41		55
SLOVENIA	6			6
BULGARIA		4		4
LATVIA	4			4
LITHUANIA	4	1		5
ROMANIA	7	1		8
SLOVAKIA	4	1	1	6
CROATIA		1		1
SWITZERLAND	1			1
UKRAINE		12		12

Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

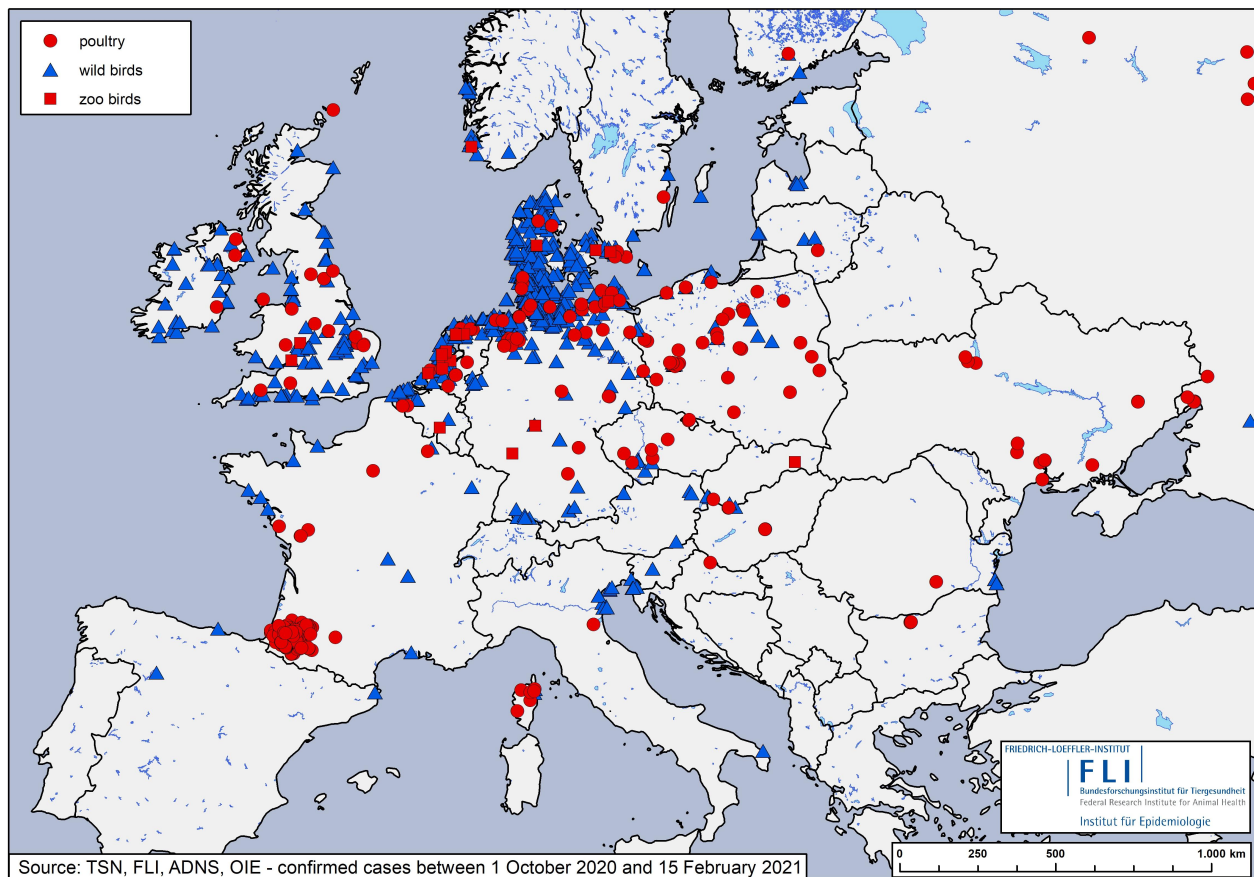


Figure 4: HPAIV H5 outbreaks in poultry, captive birds and cases in wild birds in Europe reported to ADNS, OIE and TSN since 01 October 2020. (As of 02/15/2021). See legend for symbols

Assessment of the situation

An active HPAIV H5 outbreak in the summer of 2020 in southern Siberia and neighbouring northern Kazakhstan had already led to initial concerns that HPAI H5 viruses could reach Europe through the autumn migration. In the past, several such outbreaks have coincided spatio-temporally in line with the autumn migration of waterbirds, leading to the spread of viruses in Europe and Africa.

Subsequently, HPAI H5 could be confirmed from October 2020 onwards; numerous HPAIV H5-positive wild birds were identified in the Netherlands, Germany, the United Kingdom, Ireland, Denmark, Belgium, Sweden, Norway, Finland, Lithuania, Latvia, Estonia - mainly along the coasts - and has continued to spread to the southern and south-eastern parts of Europe to the Czech Republic, Austria, Switzerland, Hungary, Bulgaria, Romania. The acute event seems to be slowing down slightly, yet the number of HPAIV H5-positive birds continues to increase daily throughout Europe, including Germany.

Phylogenetic studies of the HPAI H5 viruses suggest a new entry. Although the viruses analysed so far belong to clade 2.3.4.4b, like the HPAIV H5N8 introduced since 2016, they are not directly phylogenetically linked to the H5N8 viruses that caused outbreaks in Europe in the first half of 2020. Instead, the analysed viruses

Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

have a new genetic signature that show similarities to several viruses from Eurasia in recent years. For the H5N8 viruses, the available full genome sequences show a possible entry from western or central Asia as early as spring/summer 2020 via neighbouring regions of the Russian Federation. The H5N5 viruses show a similar genetic background but with reassortant NA5 and PA segments. These show similarities to NA5 viruses from the Russian Federation, as well as LPAI viruses from Eurasia in 2018, indicating that the current virus strain allows for clustered genetic reassortment (e.g., H5N5, H5N1, H5N3, H5N4), similar to 2016/17. Based on the information relating to deceased birds and species distribution, it can be assumed that the virulence of the new reassortants is comparable to that of the HPAIV H5Nx from 2016 to 2019. So far, there is no evidence that the new reassortants have a zoonotic potential.

On Nov. 16, an outbreak in captive birds was reported in southern Europe (Corsica). Subsequently, Italy, Spain, Croatia, Slovenia, Poland, Slovakia, Hungary, Lithuania, Romania, the Czech Republic, Bulgaria and Finland also reported outbreaks in poultry. Regionally sporadic outbreaks in fattening ducks in southern France and turkey farms in Germany appear to reflect disease spread scenarios similar to those in 2017, when secondary virus transmission between neighbouring flocks was considered a likely factor in spread.

POULTRY and CAPTIVE BIRDS in Germany

In Germany, 59 outbreaks have occurred so far in poultry, including captive birds in zoological facilities. Almost all of the holdings are located in areas where deceased, HPAIV-positive waterfowl have been found in increasing numbers. Wherever there are potential contacts between wild birds and domestic poultry, especially waterfowl, infections can be introduced and new sources of infection can emerge unless an escape of virus from affected flocks can be prevented. Virus-contaminated material (footwear, vehicles, objects, litter) is considered the most likely source of infection. Poultry farms that share and move litter or other materials or tools, or even batches of birds, between units are particularly at risk.

Between Dec. 21, 2020, and Jan. 16, 2021, a series of 18 HPAI H5 outbreaks occurred in turkeys (mostly fatteners) and one in ducks in the district of Cloppenburg, a region with high poultry density. The sources of infection are unknown. However, the full genome sequences of the viruses from the affected holdings are almost identical, so that secondary spread between the flocks can be assumed.

WILD BIRDS

Similar to the HPAIV H5N8 event in 2016/2017, increased mortality is now observed predominantly in waterfowl and bird species that also feed on carrion, e.g. various raptors, owls and gulls. The range of species affected is similar across Europe. Exceedingly high mortality rates were observed in barnacle geese, wigeons and red knots in the Schleswig-Holstein Wadden Sea National Park in December 2020. The situation there has calmed down in the meantime. Deceased and infected birds of prey, gulls and owls are indicators of a localized outbreak in the area. Multiple findings of HPAIV H5-positive droppings of mallards, teals and wigeons highlight that ducks can excrete the virus without becoming visibly ill or dying.

Infected but asymptomatic wild birds or those incubating the disease can be seen as mobile virus carriers that have the potential to spread the virus further. Many waterfowl species (e.g. geese, swans, some duck

Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

species) move between farmland (especially grassland, maize stubble and winter rapeseed and cereal crops), where they feed during the day, and resting waters, which they visit in the evening and at night. They can excrete the virus via their droppings and contaminate the land and water that they visit. In addition, sick and dead waterfowl that may be predated by mammals such as foxes and martens, but also birds of prey and crows may lead to considerable environmental contamination on arable and grazing land in cases where high viral loads exist. Further indirect spread of virus through people or vehicles entering such areas can lead to the introduction of the virus into poultry farms.

Low temperatures in winter stabilize the infectivity of influenza viruses in the environment. When waterfowl congregate in high numbers, virus transmission and spread between wild bird species is facilitated. Due to the fact that not all wild waterfowl can be fully surveilled, the actual spread of HPAI H5 viruses can only be estimated via sporadic case identifications. It must be assumed that the viruses continue to spread in wild birds in Germany, possibly without a noticeable increase in mortality. The prevailing cold arctic air since the beginning of February has caused snow and ice in northern and central Germany and more dynamic bird movements can be expected as many water bird species seek out ice-free waters. Under such weather conditions, the infection of wild birds may spread inland and further into southern and western Europe.

Risk assessment and recommendations

The large amount of positive HPAI H5 cases identified in waterfowl, raptors, owls and shorebirds, as well as the introduction of the virus into poultry farms in coastal regions of the North Sea and Baltic Sea, can be attributed temporally and spatially to the autumn migration of waterfowl. The distribution of the virus continues unabated.

Driven by the prevailing cold weather, further movement of water birds is to be expected. Climatic conditions favour virus transmission and spread. Deceased and infected wild birds are ingested by scavengers, which subsequently contribute to virus spread within their geography and thus add to environmental viral contamination. This also increases the risk of indirect entry routes into poultry farms. Daily reports from southern Germany and southern Europe indicate that the virus continues to spread and that further cases may occur at any time, even in previously unaffected federal states.

The risk of HPAI H5 viruses spreading to waterfowl populations within Germany and Europe is high.

The risk of HPAI H5 virus incursions into German poultry holdings and bird populations in zoological institutions through direct and indirect contacts with wild birds is also considered high, especially in holdings close to waterfowl resting and wild bird gathering areas, including farmland where wild waterfowl gather.

In areas with a high density of poultry farms, there is a high risk of HPAI H5 disease incursions through the spread of the virus between the farms (secondary outbreaks).

For waterfowl farms, the risk of undetected circulation of HPAI H5 virus and subsequent spread between poultry flocks is also considered high.

Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

The highest priority is to protect farmed birds from HPAI H5 incursions and the associated risk of further spread of HPAIV infections. To this end, the recommended biosecurity measures and surveillance activities must be reviewed and consistently adhered to. Poultry farmers are legally obliged to comply with basic biosecurity rules. In addition, the establishment of a functioning physical barrier between wild waterfowl habitats (e.g. bodies of water, fields where geese, ducks or swans congregate) and poultry holdings is essential. Housing poultry and other biosecurity measures minimize the risk of direct and indirect contact with infected wild birds. Particular focus must be placed on the prevention of virus introduction via contaminated feed, water or contaminated litter and equipment (footwear, wheelbarrows, vehicles, etc.). Virus spread between poultry holdings must be avoided. To this end, strict biosecurity measures must be taken, including continuous cleaning and disinfection of clothing, shoes, equipment and vehicles.

Sick or dead wild birds should be reported without delay to the veterinary authorities for safe removal and examination. Documentation of affected species should, where possible, be carried out in close cooperation with the nature conservation authorities in order to evaluate the occurrence of disease in relation to the occurrence and movements of bird populations. Prompt removal and safe disposal is important to prevent chains of infection from carrion-eating birds. Prevention and biosecurity measures in zoos and poultry farms, especially those with outdoor and free-range systems, should be urgently reviewed and, if necessary, optimized.

Specifically, the following recommendations are made:

- Review the feasibility of the measures prescribed as part of contingency plans in the event of an epidemic and update the plans as necessary.
- Personnel caring for poultry should work exclusively on one farm.
- Veterinarians and other people who visit poultry flocks on a professional basis should refrain from undertaking further visits and observe the 48 hours grace period if they have entered a flock in which clinical signs, including increased mortalities, are suggestive of HPAI.
- To date there is no evidence that the avian influenza viruses considered within this report have caused infections in humans. However, people who come into contact with infected poultry, such as during catching and killing duties, should look out for respiratory symptoms and/or conjunctivitis for at least 10 days. If symptoms occur, they are to seek immediate medical attention and initiate testing. Anyone exposed to prolonged contact with infected birds should consider the use of antiviral medications as a prophylactic measure.
- Increase virological surveillance waterfowl holdings and early testing of sick birds as well as fallen stock in order to identify HPAI infections as early as possible.
- Avoid the sharing of any equipment between holdings, including carcass bins, and vehicles.
- Restrict vehicle access and personnel on poultry farms.
- Ensure risk-based housing of free-range poultry (at least around HPAIV H5 detection sites).
 - Poultry flocks that have been excluded from a housing order should be clinically and virologically tested at a maximum interval of 3 weeks.
- Where possible, house all birds kept in zoos, restrict access to bird houses/bird shows in risk areas. Bodies of water in zoos should be drained or covered with flutter tape to detract wild ducks.

Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

- Minimize direct and indirect contact between poultry and wild waterfowl and natural water bodies (e.g., cover ponds on premises, etc.).
- Restrict the hunting of waterfowl in affected areas so as not to flush out potentially infected animals.
- Hunters and persons who have come into contact with fallen wild birds should not enter poultry buildings for the next 48 hours.
- Review, optimize and consistently implement the correct biosecurity measures in poultry facilities, including the use of available guidelines, e.g. DEFRA (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/953018/biosecurity-poultry-guide.pdf)
Ensure the implementation of minimum biosecurity measures in small holdings, zoological gardens, animal parks and shelters in accordance with the Avian Influenza Protection Order.
- Ensure increased vigilance for rapid detection of suspected cases in poultry and seek diagnostic clarification without delay.
- Ensure intensification of passive and active wild bird monitoring with emphasis on waterfowl and birds of prey:
 - We ask the public to report observations of abnormal behaviour in waterfowl (e.g. head and neck twisting) but also report fallen wild birds to the veterinary authorities as soon as possible in order to accelerate early detection.
 - Dead birds should be collected immediately and sampled for the presence of Influenza-A infection at the state wildlife investigation offices. The birds should then safely be disposed of to avoid environmental contamination or further transmission via carrion-eating birds. At least one swab per geographic area should be taken from each bird species during random testing. All deceased birds should be documented by species, age, and location of their finding.
 - Observations in bird sanctuaries can be particularly helpful: targeted examination of waterfowl (e.g., white-fronted geese, whistling ducks) faeces should also be considered to assess local risk.

Further guidance:

The European Food Safety Authority (EFSA) provides an overview regarding the Avian Influenza situation in Europe/EEA and the UK at the following link:

<https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2020.6341>