Special Feature 2

Highly pathogenic avian influenza in the 2021-2022 season

In 2004, the outbreak of highly pathogenic avian influenza (HPAI) was reported in Japan for the first time in 79 years. Since then, HPAI outbreaks have been repeated every few years from late autumn to early spring. In the 2021-2022 season (hereinafter referred to as "this season"), a total of 25 outbreaks were confirmed in 12 prefectures from November 2021 to May 2022, marking the second consecutive year of outbreaks following the 2020-2021 season, in which a total of 52 outbreaks were confirmed.

Overview of outbreaks during this season

In this season, a total of 25 outbreaks (H5N8 and H5N1 subtypes) have been confirmed in 12 prefectures across Japan from Kyushu to Hokkaido, starting from the layer farm in Akita Prefecture on November 10, 2021, caused by H5N8 virus.

In the past seasons, the last outbreak of the season was reported in April. However, this season, 8 cases (32% of the total) occurred in April or later, and the last outbreak occurred on May 14, indicating a prolonged outbreak season (Table S2-1, Fig. S2-1). 12 of the 25 cases (48%) occurred in Hokkaido and Tohoku regions.

Table S2-1 List of HPAI outbreaks in poultry during the 2021-2022 season

	area	date of confirmation	use	No. of animals (ten thousands)	subtype
1	Yokote-shi, Akita	11/10	Layer	14.3	H5N8
2	Izumi-shi, Kagoshima	11/13	Layer	3.9	H5N1
3	Izumi-shi, Kagoshima	11/15	Layer	1.1	H5N8
4	Himeji-shi, Hyogo	11/17	Layer	15.5	H5N1
5	Nankan-machi, Kumamoto	12/3	Broiler	6.7	H5N1
6	Ichikawa-shi, Chiba	12/5	Duck (Aigamo)	0.03	H5N1
7	Misato-machi, Saitama	12/7	Layer	1.7	H5N1
8	Fukuyama-shi, Hiroshima	12/7	Layer	3.0	H5N1
9	Sannohe-machi, Aomori	12/12	Broiler	0.7	H5N1
10	Saijo-shi, Ehime	12/31	Layer	13	H5N1
11	Saijo-shi, Ehime	1/4	Layer	8.3	H5N1
12	Saijo-shi, Ehime	1/4	Layer	14.2	H5N1
(12)	Imabari-shi, Ehime	1/4	Layer	0.6	–
13	Nagashima-cho, Kagoshima	1/13	Broiler	5.4	H5N1
(13)	Nagashima-cho, Kagoshima	1/13	Broiler	5.7	–
14	Yachimata-shi, Chiba	1/19	Broiler	6.6	H5N1
15	Sosa-shi, Chiba	1/26	Duck	0.17	H5N1
(15)	Sosa-shi, Chiba	1/26	Duck	0.12	–
(15)	Kasumigaura-shi, Ibaraki	1/26	Duck	0.11	–
(15)	Kasukabe-shi, Saitama	1/26	Duck	0.14	–
(15)	Kumagaya-shi, Saitama	1/26	Duck	0.04	–
16	Kuji-shi, Iwate	2/12	Broiler	4.5	H5N1
17	Ishinomaki-shi, Miyagi	3/25	Broiler	3.2	H5N1
18	Yokohama-machi, Aomori	4/8	Broiler	17	H5N1
19	Yokohama-machi, Aomori	4/15	Broiler	11	H5N1
20	Shiraoi-cho, Hokkaido	4/16	Layer	52	H5N1
21	Abashiri-shi, Hokkaido	4/16	Emu / Layer	0.05 / 0.01	H5N1
22	Daisen-shi, Akita	4/19	Layer	0.04	H5N1
23	Kushiro-shi, Hokkaido	4/26	Emu	0.01	H5N1
24	Ichinoseki-shi, Iwate	5/12	Emu	0.001	H5N1
25	Abashiri-shi, Hokkaido	5/14	Layer	0.08	H5N1

Some prefectures had multiple outbreaks, while others had only one outbreak. There were no outbreaks in the Hokuriku and Tokai regions. In addition to layer and broiler farms, HPAI outbreaks were also confirmed at duck farms, and at ostrich and emu farms.

Fig. S2-1 Number of outbreaks per month during the 2021-2022 season

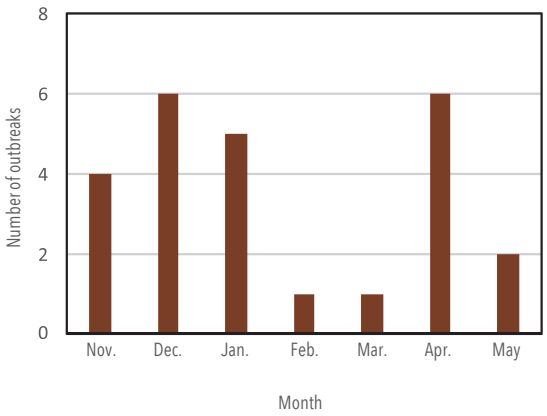
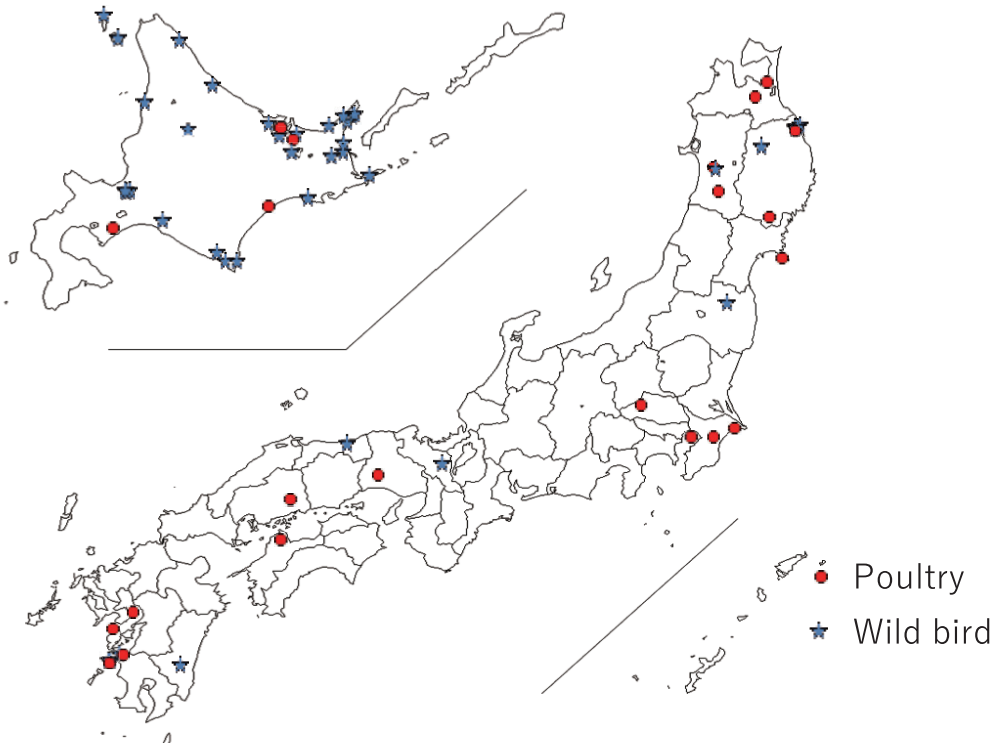


Fig.S2-2 Location of the HPAI confirmation cases in poultry and wild birds during the 2021-2022 season



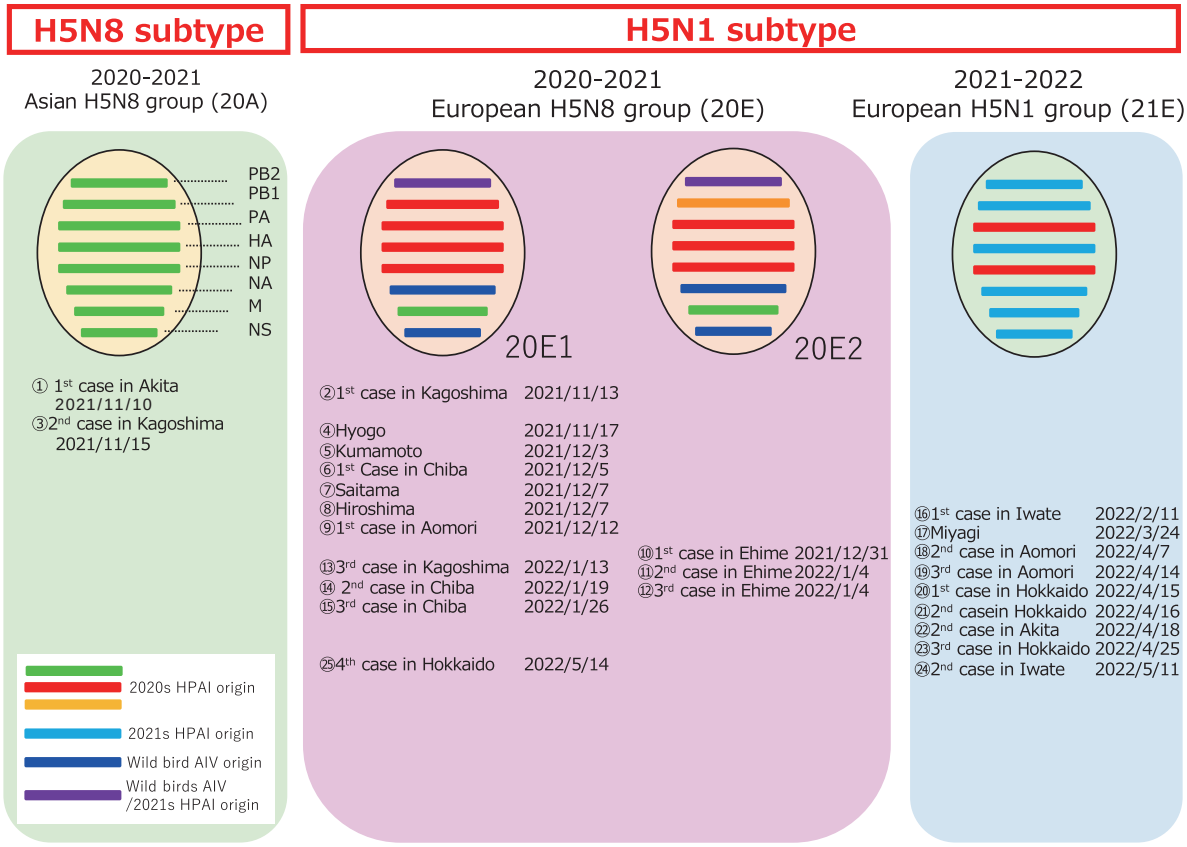
Outbreaks in wild birds

This season, a number of HPAI cases in various wild bird species was confirmed. A total of 107 HPAI cases (84 cases with H5N1, 7 cases with H5N8, 16 cases with H5) were reported in wild birds. Virus was detected in live or dead birds (13 species and 98 cases, respectively), feces (1 case), and environmental samples such as habitat water (8 cases) from November to May of the following year, in 8 prefectures in Japan. In addition to ducks, which are thought to be carriers of the virus through migration, raptors and crows were confirmed to be infected with the virus. Regarding crows, from January to April, HPAI virus infection in jungle crows in northern Tohoku and Hokkaido areas were confirmed in a row. The infection was massive and widely spread, and many carcasses were recovered in the same municipality.

Characteristics of isolated viruses

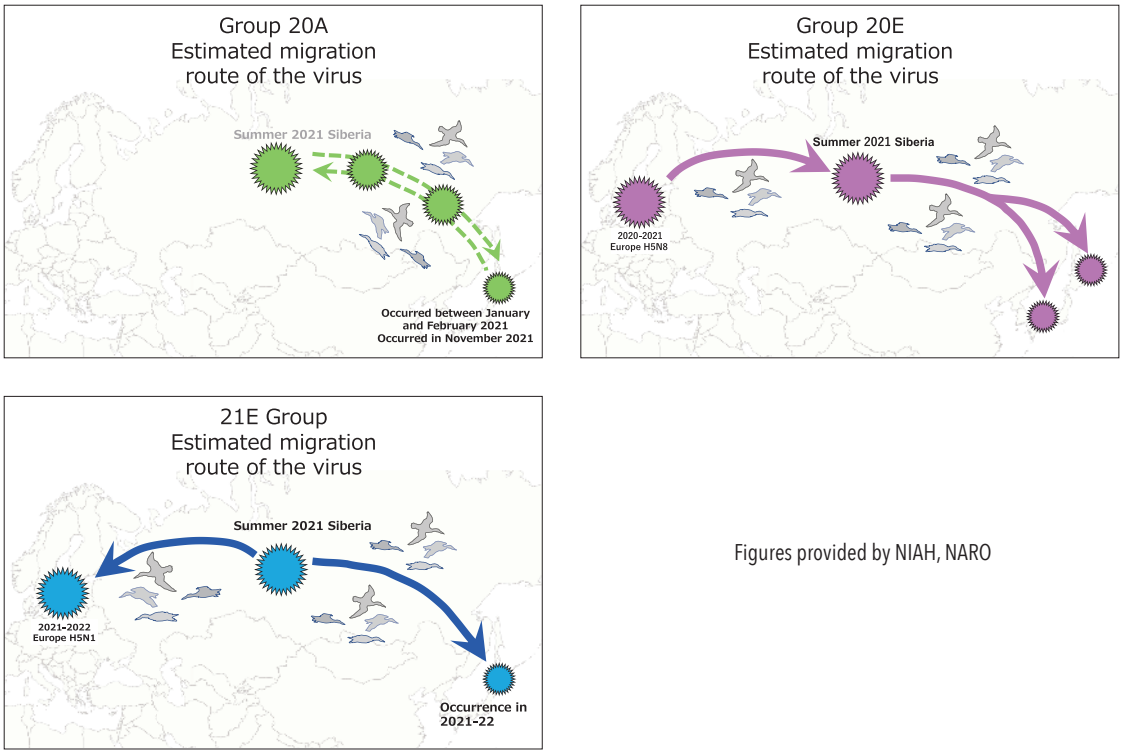
Whole genome sequencing analysis was conducted to genetically characterize avian influenza viruses isolated from 25 outbreaks in poultry this season. Based on the analysis, three groups were identified. The H5N8 subtype was the one isolated in Asia, including Japan, from 2020 to 2021 (2020-2021 Asian H5N8 group: genotype 20A) and H5N1 subtype was further divided into two groups; the H5N8 subtype isolated in the European region from 2020 to 2021 (2020-2021 European H5N8 group: genotype 20E) and H5N1 subtype isolated in European region from 2021-2022 (2021-2022 European H5N1 group: genotype 21E) (Figures S2-3 and S2-4). Furthermore, 2020-2021 European H5N8 group includes two types of gene reassortant virus genotypes 20E1 and 20E2, indicating that four different viruses were introduced into Japan by migratory birds.

Fig.S 2-3 Genetic diversity of H5N8 HPAI virus based on phylogenetic analysis targeting 8 segments



Figures provided by NIAH, NARO

Fig.S2-4



Figures provided by NIAH, NARO

Response to outbreaks

In preparation for HPAI outbreak, taking opportunities such as the national animal health meeting and publishing official notifications, MAFF called on prefectures and relevant organizations to take measures to prevent occurrence and spread of the disease, including ensuring early detection and early notification, before the arrival of migratory birds. In response, all stakeholders took actions for preparedness before the season began. For example, prefectures issued warnings to poultry owners, formulated mobilization and procurement plans to prepare for outbreaks, and secured prefectural stockpiles.

In response to the outbreak on poultry farms, relevant institutions, organizations, municipalities, and the self-defense forces cooperated in taking disease containment measures such as prompt culling of birds and disposal of contaminated items to prevent the spread of the disease. In addition, the National Institute of Animal Health (NIAH) of the National Agriculture and Food Research Organization (NARO) conducted confirmatory tests around the clock to confirm the results of tests conducted by the prefecture and to evaluate pathogenicity so that prompt response measures could be initiated. Furthermore, an epidemiological investigation team consisting of government officials and experts entered the affected farm and conducted epidemiological investigations.

The last outbreak of this season occurred on May 14, 2022, at a layer farm in Hokkaido. Containment measures were completed on May 15, 2022, and all movement restrictions were lifted on June 6. Japan declared HPAI free on June 13, 2022, in accordance with the World Organisation for Animal Health (WOAH) Terrestrial Animal Health Code.

For more information on HPAI, see also following website.
https://www.maff.go.jp/j/syouan/douei/tori/index.html

Photo courtesy of (top) Hokkaido, (right) NIAH, NARO