2-8 Highly pathogenic and low pathogenic avian influenza

What is Avian Influenza?

Avian influenza is a disease of avian species caused by influenza A viruses. According to the Act, the disease is classified into three types depending on virulence and probability of mutation. "Highly pathogenic avian influenza (HPAI)" is defined as the highly virulent type with a high fatality rate, and "Low pathogenic avian influenza (LPAI)" is infection H5 and H7 subtype viruses but low virulent type. Other avian influenza subtypes are classified as "avian influenza."

HPAI outbreaks (subtype H5) occur worldwide, and in Japan, a number of HPAI outbreaks are observed from late autumn to early spring (see Special Feature 1) (Chart 2-8-1). On the other hand, in the case of LPAI, although the disease is highly contagious, infected poultry rarely shows clinical signs that delay detection. In other countries, mutations from LPAI into HPAI have been reported. There is no treatment for infected birds, and a stamping-out policy is applied once an infection is confirmed on a poultry premise. Early detection and notification of infected poultry are essential to prevent the spread of disease.

Surveillance methods

In addition to passive surveillance, in which inspections are conducted in response to reports of unusual conditions such as increased mortality, two types of monitoring are conducted to detect infection.

(1) Fixed-point surveillance

Farms with a relatively high risk of infection, such as those near stopover sites of migratory birds, are selected for continuous monitoring. Selected farms are tested for avian influenza (virus isolation and serum antibody test) once a month.

(2) Enhanced surveillance

Serum antibody tests are conducted on selected farms from October to May of the following year, the migration season for wild birds. Farms are selected based on the number of farms in each prefecture.

Surveillance results

All samples collected either in fixed-point surveillance or enhanced surveillance from January to December 2023 were negative for avian influenza (Chart 2-8-2). In addition, for early detection of avian influenza, the Ministry of the Environment is conducting wild bird surveillance for avian influenza by testing the feces and carcasses of wild birds, especially waterfowl in winter.
https://www.env.go.jp/nature/dobutsu/bird_flu/

Chart 2-8-1 Number of avian influenza outbreaks in poultry

	2021	2022	2023
HPAI*	29	66	38
LPAI	0	0	0

*If winter to the following spring is defined as a "season", the number of out breaks during the season is as follows.
2021-2022 season: 25 cases
2022-2023 season: 84 cases
2023-2024 season: 11 cases

Chart 2-8-2 Avian influenza surveillance in 2023

		# of farms	# of birds
Fixed point surveillance	Virus isolation	5,189	51,900
	Antibody test	5,179	52,040
Enhanced surveillance	Antibody test	1,726	17,271

2-9 Arbovirus infection in cattle

What is arbovirus infection in cattle?

Arbovirus infection is a general term to describe viral infections transmitted to humans and livestock by infected arthropods such as mosquitoes, ticks, and biting midges. Most arbovirus infections in cattle are transmitted by tiny blood-sucking insects called *Cullicoides* biting midges. The major arbovirus infections in cattle in Japan are Akabane disease, Aino virus infection, Chuzan disease, Ibaraki disease, bovine ephemeral fever, and bluetongue. Akabane disease, Aino virus infection, and Chuzan disease are associated with abortions, miscarriages, premature births, stillbirths, and births with congenital abnormalities when pregnant cows are infected with the viruses. In addition, some strains of the virus that cause Akabane disease infect calves and develop neurological clinical signs such as paralysis associated with encephalomyelitis, which is called postnatal infection. When infected, disease and bovine ephemeral fever cause various clinical signs associated with fever. In particular, Ibaraki disease is characterized by difficulty in swallowing, while bovine ephemeral fever is characterized by the inability to stand and decreased milk production. Cattle affected with bluetongue develop erosions and ulcers on the tongue, lips, nasal cavity, and oral mucosa. In cattle, the infection is often subclinical. It is more likely to develop clinical signs in sheep. These arbovirus infections are most likely to occur during summer and fall when blood-sucking insects are more active.

Chart 2-9-1 Number of cattle infected with arbovirus

		2021	2022	2023
Akabane disease (perinatal infection)	(farms)	0	1	3
	(animals)	0	1	4
Akabane disease (postnatal infection)	(farms)	0	0	3
	(animals)	0	0	10
Aino virus infection	(farms)	0	0	0
	(animals)	0	0	0
Chuzan disease	(farms)	0	0	0
	(animals)	0	0	0
Ibaraki disease	(farms)	0	0	0
	(animals)	0	0	0
Bovine ephemeral fever	(farms)	0	0	0
	(animals)	0	0	0
Bluetongue(cattle)	(farms)	0	0	0
	(animals)	0	0	0
Bluetongue(sheep)	(farms)	2	0	0
	(animals)	5	0	0

Objectives and methods of surveillance

Arboviruses are considered to be introduced into Japan each season by vectors carrying the virus, which travel on wind currents from the East and Southeast Asian region. Thus, surveillance is intended to detect the entry of the virus into Japan at an early point, thereby increasing awareness, facilitating vaccination, supporting proper diagnosis for abortions, and taking other countermeasures. Surveillance is conduct- ed in the following two ways.

(1) Sero-surveillance

Arbovirus infections are more likely to occur from summer to fall when blood-sucking insects are more active. Thus, a total of four consecutive antibody tests are conducted from June to November to assess the entry of the disease by focusing on seroconversion. The target diseases are Akabane disease, Aino virus infection, and Chuzan disease. Based on past disease invasions, surveillance is conducted throughout Japan for Akabane disease. For Aino virus infection and Chuzan, surveillance is conducted in western Japan.

(2) Virus antigen surveillance

Virus antigen surveillance using PCR is conducted in Kyushu and Okinawa regions, where arboviruses are more likely to be introduced, to detect virus invasion earlier than by sero-surveillance. The target diseases are Akabane disease, Aino virus infection, Chuzan disease, Ibaraki disease, and bluetongue (Chart 2-9-2). In the target prefectures, a total of four consecutive PCR tests are conducted from June to November.

Surveillance results

(1) Sero-surveillance

In FY2023, sero-surveillance was conducted on 2,437 cattle from 782 farms. No positive antibody results were obtained for Akabane disease and Aino virus infection(Chart 2.9-3, Chart 2.9-5). Positive results for Chuzan disease were observed in Ehime Prefecture in August, Kochi Prefecture in September, and Saga, Nagasaki, Kumamoto, Miyazaki, and Okinawa Prefectures in November (Chart 2-9-4). As D'Aguilar virus (DAGV) was isolated from seroconverted cattle in Nagasaki and Miyazaki prefectures, these seroconversions observed in the western Japan are likely to be caused by the DAGV infection, which is closely related to Chuzan virus.

(2) Virus antigen surveillance

In FY2023, virus antigen surveillance was conducted on 137 cattle from 55 farms. Epidemic hemorrhagic disease virus (EHDV) genes were detected in Kumamoto and Miyazaki Prefectures in September, and Nagasaki, Kumamoto, and Kagoshima Prefectures in November (Chart 2-9-6). The samples collected in Nagasaki and Kumamoto Prefectures were confirmed to be of EHDV serotype 6. As for Chart serogroup virus, DAGV genes were detected in Nagasaki and Miyazaki Prefectures in November (Chart 2-9-7). For bluetongue virus, the gene was detected in Nagasaki Prefecture in November (Chart 2-9-8). The results of genetic analysis showed that the viral genes of the Simbu serogroup viruses were all negative.

The results of bovine arbovirus infection surveillance conducted in previous years can be found below.
https://www.naro.go.jp/laboratory/niah/arbo/index.html

Chart 2-9-2 Arboviruses subjected to surveillance

Virus group	Virus (Viruses for notifiable infectious diseases are underlined.)
Simbu serogroup virus	Akabane virus, Aino virus, Peaton virus, Sathuperi virus, Shamonda virus
Epizootic hemorrhagic disease virus	Epizootic hemorrhagic disease viruses including Ibaraki disease virus
Palyam serogroup virus	Chuzan vius, D'Aguilar virus
Bluetongue virus	Bluetongue virus

Chart 2-9-3 Results of sero-surveillance for Akabane disease in FY2023

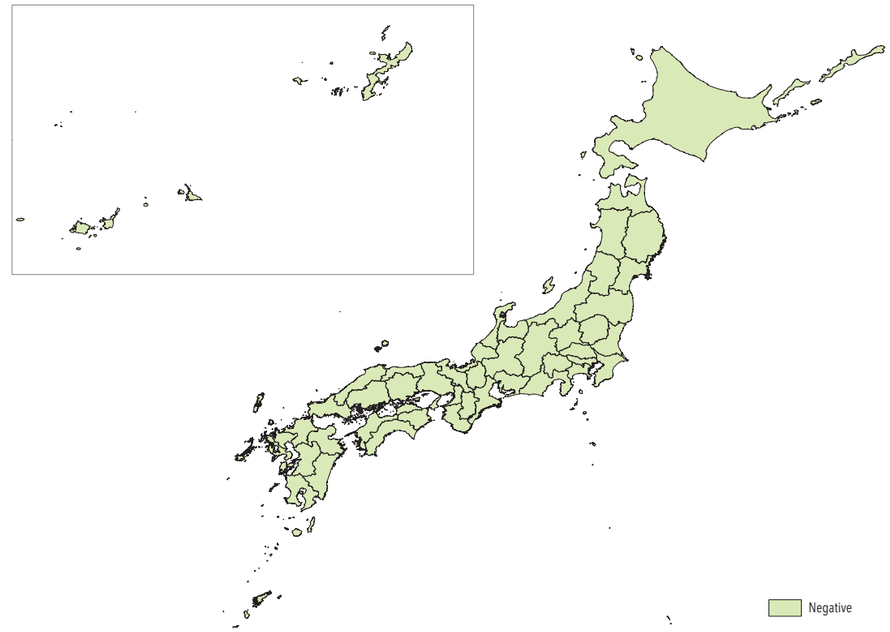


Chart 2-9-4 Results of sero-surveillance for Chuzan disease in FY2023

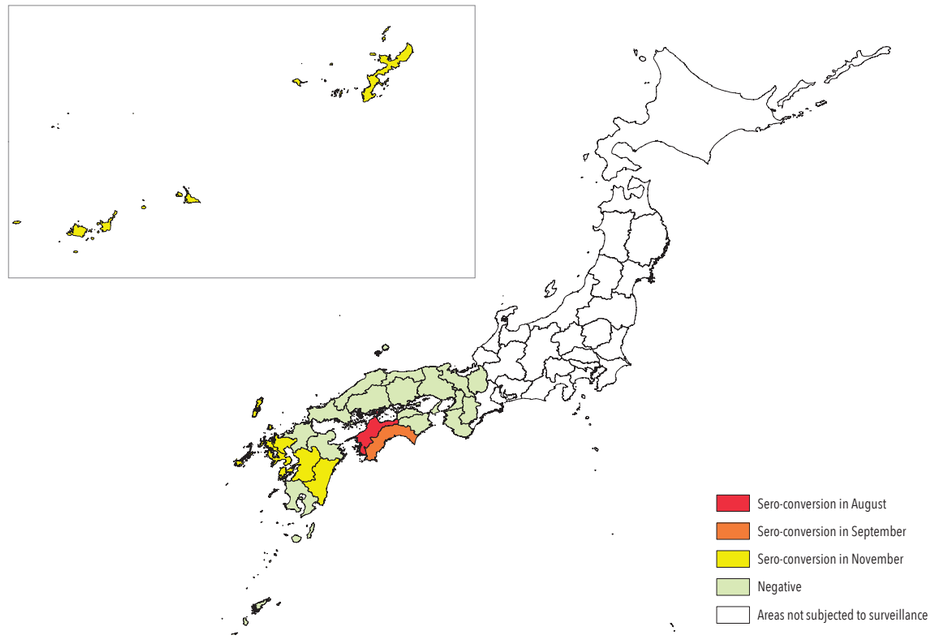


Chart 2-9-5 Results of sero-surveillance for Aino virus infection in FY2023

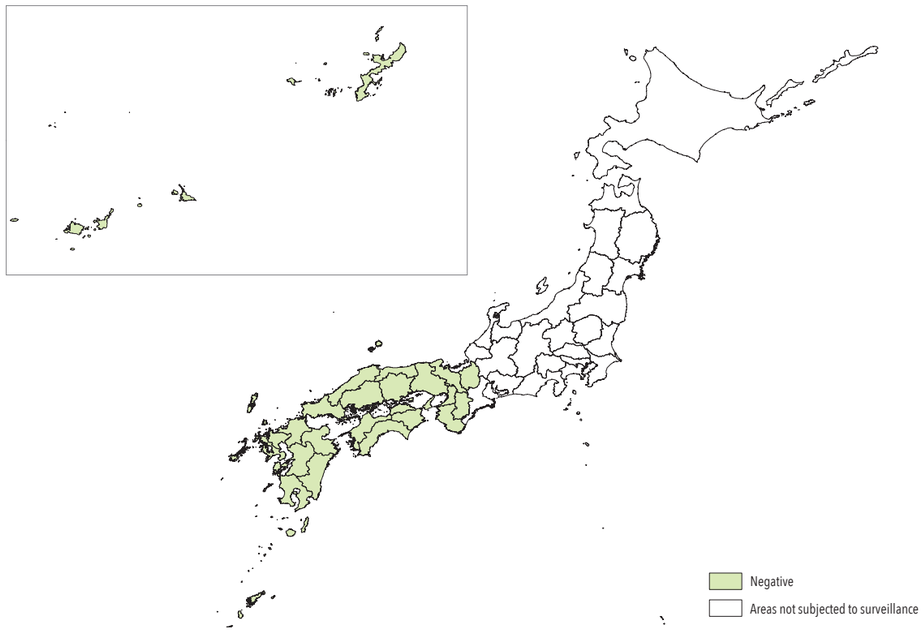


Chart 2-9-6 Results of virus antigen surveillance for EHDV in FY2023

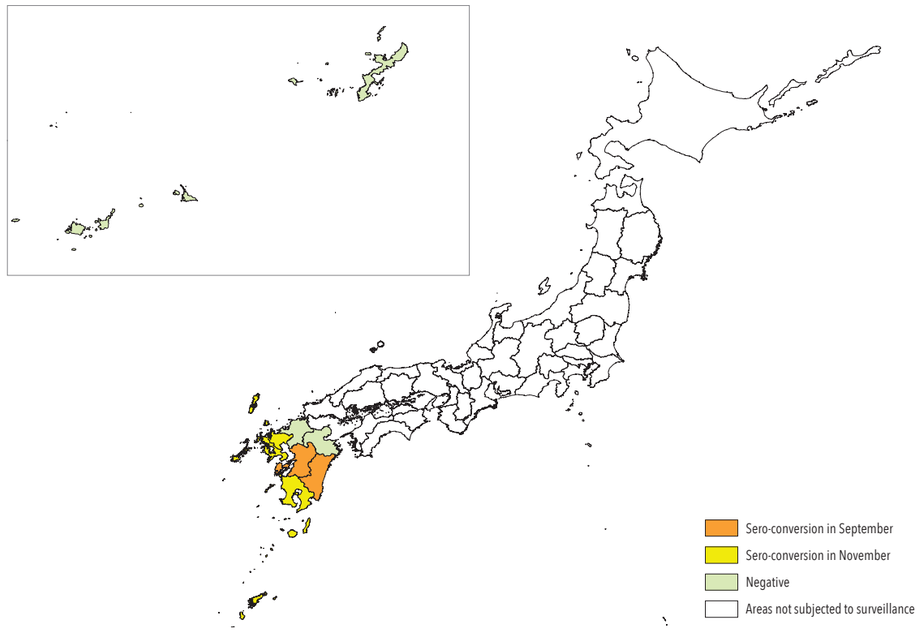


Chart 2-9-7 Results of virus antigen surveillance for DAGV in FY2023

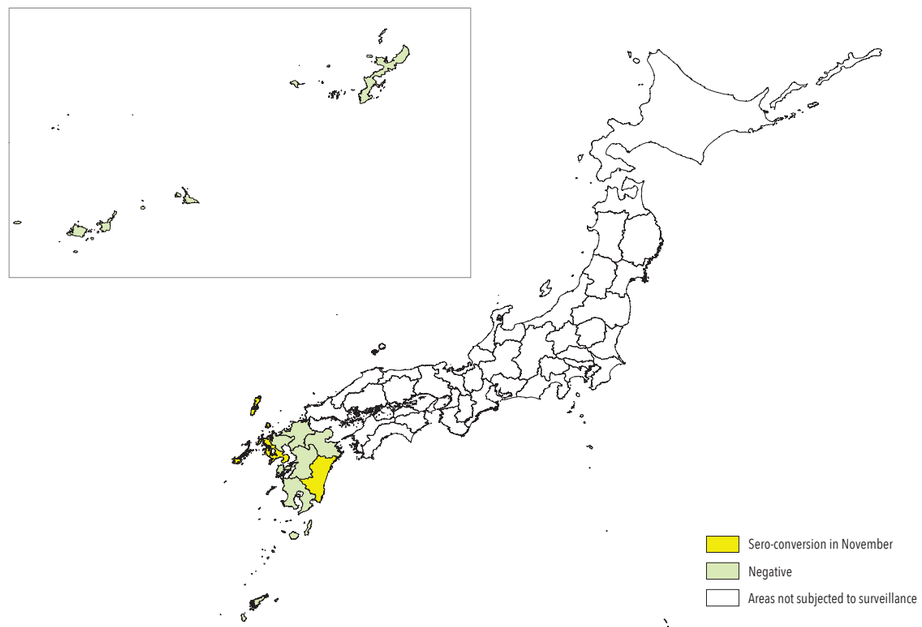
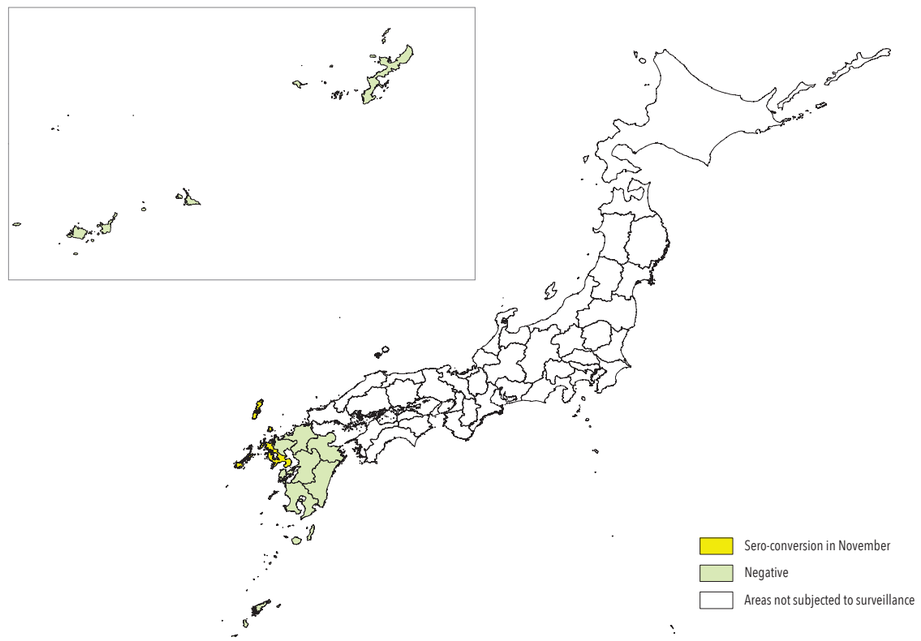


Chart 2-9-8 Results of virus antigen surveillance for BTV in FY2023



COLUMN

Animal Husbandry and Hygiene Standards in Japan

It is essential to keep livestock in a hygienic and healthy condition in order to prevent outbreaks of livestock infectious diseases. In Japan, the Act stipulates the biosecurity standards called Animal Husbandry and Hygiene Standards (hereinafter referred to as "the standards") when keeping livestock such as cattle, pigs, and poultry. Furthermore, the Act requires livestock keepers to comply with the standards and regularly report their compliance status regularly. The standards were first established in 2004 after the BSE outbreaks in Japan. Since then, the contents have been reviewed several times in light of the disease situation in Japan, such as FMD outbreaks in 2010, HPAI outbreaks, and the first outbreak of CSF in 26 years in 2018, as well as the spread of ASF in the Asian region.

There are four major categories of the standards. The first category is the basic requirements, such as establishing of hygiene control areas (areas where livestock are actually kept and must be managed in a hygienic manner). The second category is the ones to prevent introduction of pathogens onto farm, such as preparing dedicated shoes and clothes to be used in a hygiene control area and disinfection of incoming vehicles. The third category is to prevent the spread of pathogens. Even if a pathogen enters a hygiene control area, infection will not occur unless it has access to the animal housing or barns. For this reason, the standards stipulate control of rats that come into animal barns from outside and require livestock keepers to disinfect their hands and change clothes when entering the barn. The last category is to prevent the introduction of pathogens. Pathogens in a hygiene control area may spread to other farms and livestock-related facilities if appropriate measures are not taken. Therefore, the requirements related to prevention of the spread of the diseases are stipulated in this category, such as daily observation of livestock health and immediate notification of any abnormalities to the LHSCs.

MAFF has prepared an illustrated guidebook of the standards, which is available on its website (https://www.maff.go.jp/j/syouan/douei/katiku_yobo/k_shiyou/).

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