2022

Annual Report on Animal Infectious Disease Surveillance in 2022

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Animal Health Division, Food Safety and Consumer Affairs Bureau, Ministry of Agriculture, Forestry and Fisheries

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Shooting location: NLBC Iwate station

Preface

The eradication and control of livestock infectious diseases such as foot and mouth disease, classical swine fever, African swine fever, and highly pathogenic avian influenza has become a global challenge from the perspective of ensuring a stable supply of safe livestock products. In Japan, the outbreak of highly pathogenic avian influenza in the 2022 season, the largest ever, resulted in the culling of approximately 17.71 million birds and a temporary spike in the price of eggs, which significantly impacted on the Nation's food supply. In addition, although the outbreak of classical swine fever, which re-emerged in Japan in September 2018 for the first time in 26 years, has been largely controlled by thorough vaccination of domestic pigs, in August 2023, the first outbreak in the Kyushu region since September 2008 was confirmed at a domestic pig farm in Saga Prefecture. Furthermore, the infection of classical fever virus continued to spread within the wild boar population, which is a major concern.

Meanwhile, looking at the global situation, outbreaks of contagious diseases such as foot and mouth disease and African swine fever, which have not occurred in Japan, have been reported and expanded throughout Asia and Europe. Since the Chinese government lifted the ban on group travel to Japan in August 2023, the number of visitors to Japan is expected to increase. In addition, the risk of viral infections due to the effects of global warming has been increasing and we always need to be on the lookout for new outbreaks of infectious diseases in livestock due to the changes in the habitats of virus-transmitting insects and diversification of hosts as a result of changes in pathogenicity.

Under these circumstances, effective surveillance is a key to monitoring the introduction and occurrence of livestock infectious diseases and preventing their spread. Therefore, the Ministry of Agriculture, Forestry and Fisheries prepares surveillance plans for relevant livestock infectious diseases every year and conducts surveillance in cooperation with prefectural governments. This annual report on animal infectious disease surveillance aims to provide relevant information related to animal infectious diseases in Japan, including the outbreak situations, surveillance results, and recent topics. We hope this annual report will be informative and helpful to all those involved in livestock production and animal health.

Director, Animal Health Division, Food Safety and Consumer Affairs Bureau,
Ministry of Agriculture, Forestry and Fisheries
Masatsugu Okita

Terms of Use

In principle, this report summarizes livestock infectious disease surveillance and other activities conducted in fiscal year 2022 (April 1, 2022 to March 31, 2023). Since some disease outbreaks and surveillance results are required to be reported on an annual basis, while others are required to be reported on a yearly basis, the figures in this report are aggregated on a yearly or annual basis, depending on the item. Please note that figures aggregated on an annual basis are clearly marked with "year" and figures aggregated on a fiscal year basis are marked with "fiscal year".

Please also check the website of the Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF) for the latest information on disease outbreaks. The URLs and QR codes of the websites mentioned in this document are current as of the publication of this document and may be changed or deleted in the future.

Shooting location: Hiraguchi Pig Farm
(Wakasa-town, Tottori-Pref.)
Photo by: Misaki Amano

CONTENTS

Special Feature 1

The largest highly pathogenic avian influenza epidemic in Japan

An excerpt from the Report on the epidemiological investigation of the highly pathogenic avian influenza outbreaks during the 2022-2023 season

In the 2022-2023 season (hereinafter referred to as "this season"), Japan experienced the largest highly pathogenic avian influenza (HPAI) epidemic in its history. Between the first outbreak in the poultry farm on October 28,2022, and the last outbreak on April 7 of the following year, a total of 84 outbreaks in 26 prefectures were confirmed in poultry premises, and approximately 17.71 million birds were culled. A total of 242 cases of HPAI virus infection were also confirmed in wild birds.

Outbreaks in domestic poultry

The first two outbreaks of this season occurred in October 28, 2022, at a layer farm in Okayama Prefecture and a broiler farm in Hokkaido, which was the earliest date in comparison to previous years. Subsequently, until April 7 of the following year, a total of 84 cases (83 cases of H5N1 and 1 case of H5N2) were confirmed at poultry premises for layers, broilers, breeders, domestic ducks, quails, ostrich, emus, and guinea fowls, and approximately 17.71 million domestic birds were subjected to culling. Although two consecutive seasons of outbreaks were previously confirmed in 2016-2017 and 2017-2018, this is the first time that three consecutive seasons have occurred, counting from the 2020-2021 season.

The outbreak began in the Chugoku and Hokkaido regions, followed by the Shikoku, Kanto, Kinki, Kyushu, Hokuriku, Tohoku, and Tokai regions, and finally, 26 prefectures from Hokkaido to Okinawa were affected (Fig.S1-1). This was the largest outbreak ever recorded in terms of the number of affected prefectures, outbreaks, and culling of birds. In 11 prefectures (Hokkaido, Gunma, Chiba, Niigata, Aichi, Shiga, Okayama, Hiroshima, Kagawa, Fukuoka, and Kagoshima), multiple outbreaks were observed within the 3km radius, and the possibility of disease spread among neighboring farms cannot be denied. There were also cases on farms that had experienced outbreaks in the past.

When affected farms were classified by use, the layer farms accounted for the largest number of cases (61). Ten of them kept more than 500,000 birds, and the number of birds culled on these large layer farms accounted for 54% of the total number of birds culled. When compared by using the existing farm database, the layer farms tended to be more affected by HPAI than broiler farms. In addition, a comparison of the stocking size of affected farms and nearby non-outbreak farms for layer farms and broiler farms, respectively, showed that the stocking size of affected farms tended to be larger than that of non-affected farms in layer farms. Consistent with the outbreaks in the past, many of the affected farms were in the vicinity of ponds, rivers, waterways, rice paddies, etc., to which migratory birds may migrate. Some of the farms were located close to the coast. In addition, many affected farms were located near wooded areas suitable for wildlife, including wild birds. Wild birds such as crows and their traces were observed on the affected premises and surrounding woods at the time of on-site epidemiological investigation conducted following the outbreak. There have been cases where the HPAI virus has been detected in dead crows found near farms or on farm property, and crows are thought to be a possible source of infection.

Many outbreaks were also observed in domesticated birds other than chickens, such as guinea fowl, accounting for 13% of all outbreaks. In addition, 10 cases of outbreaks in birds other than poultry kept at the exhibition facilities were confirmed in 6 prefectures.

Table S1-1 Number of cases in poultry by use

Use	Number of cases
layers(incl.growers)	61
broilers	11
breeding flock for broilers	1
ducks	7
quails	1
emus	2
guinea fowl	1
total	84

Fig. S1-1 Location of the confirmed HPAI cases in poultry and wild birds during the 2022-2023 season

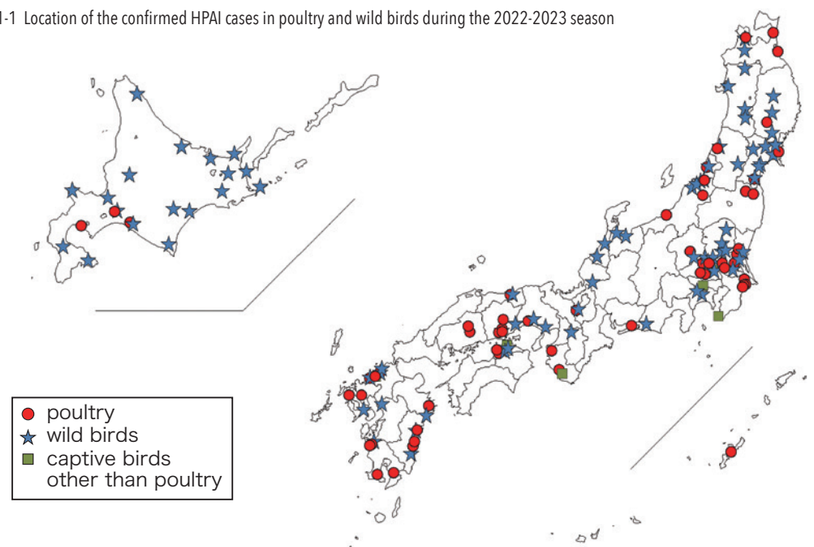
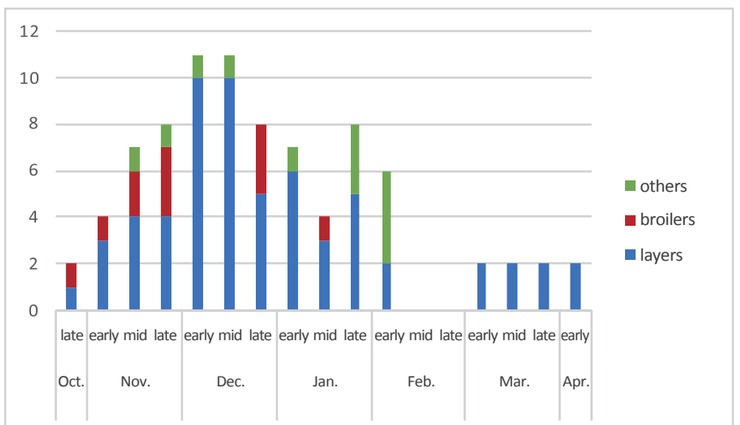


Fig. S1-2 Number of HPAI cases in poultry by month

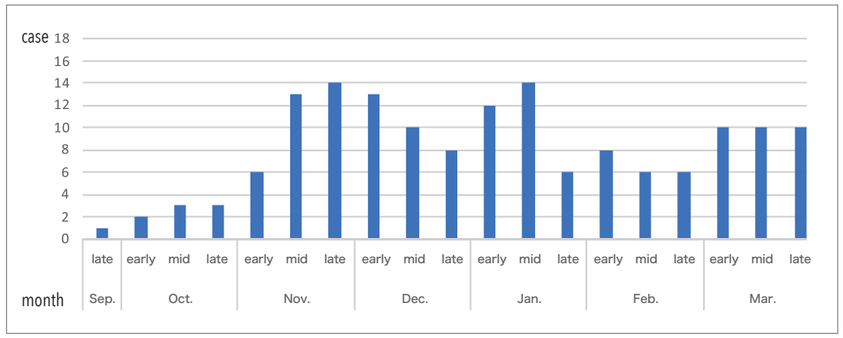


HPAI cases in wild birds

The first confirmed case of HPAIV infection in wild birds this season was a falcon recovered in Kanagawa Prefecture on September 25, 2022. Infections in wild birds were confirmed in 28 prefectures from Hokkaido to Kagoshima, including 19 prefectures where outbreaks in domestic poultry were also confirmed. Out of 242 wild bird cases, 79 cases were confirmed in Kagoshima prefecture. This is due to the large-scale infection of cranes in Izumi City and the regular surveillance of crane roosts for the virus, which makes it easy to detect infection.

Regarding bird species, a total of 242 cases were confirmed in 26 species, including 39 cases in 8 species of ducks (swans, geese, and ducks), 79 cases in 8 species of waterfowl other than ducks, 28 cases in 7 species of raptors, and 72 cases in 3 species of crows. This is the largest outbreak to date, both in terms of the variety of bird species and a number of cases. The fact that the first wild bird case detected in September was a falcon, a resident bird, and that several raptors were confirmed to be infected in other prefectures in October suggests that the infection had spread to some extent among wild birds that are preyed by raptors in the early stages of the fall migration season. In addition, as in the previous season, many cases were detected in crows, drawing more attention to crows as a potential source of infection to poultry. As for wild animals other than wild birds, an HPAIV-positive case of a dead fox in Hokkaido was reported.

Fig. S1-3 Number of HPAI-positive cases in wild birds



Response to HPAI outbreak in poultry

In the event of an outbreak of HPAI on poultry farms, response measures such as stamping-out of birds and proper disposal of carcasses were implemented based on the "Guidelines for the Prevention of Specific Domestic Animal Infectious Diseases Related to Highly Pathogenic Avian Influenza and Low Pathogenic Avian Influenza" (published by the Minister of Agriculture, Forestry and Fisheries on July 1, 2020). Prefectural governments, the MAFF, other relevant ministries and agencies, the National Livestock Breeding Center, relevant institutions and organizations, municipalities, the Self-Defense Forces and other relevant parties cooperated in implementing of these measures. To conduct containment measures on affected farms, prefectural governments, municipalities, Japan agricultural cooperatives and other agriculture-related organizations, construction organizations, carbon dioxide gas suppliers, pest control organizations, DIY stores, and other material suppliers actively cooperated. In addition, personnel and stockpiles were shared from other prefectures. As a result, on-farm containment measures were implemented promptly and smoothly.

Despite the largest epidemics on record, these efforts resulted in an average of 7.1 days to complete on-farm containment measures, compared to 11.0 days in the 2020-2021 season. Containment measures were completed more quickly than in past seasons, particularly for farms with more than 500,000 birds, with 19.6 days this season compared to 28.0 days in the 2020-2021 season. In addition, the National Institute of Animal Health (NIAH) of the National Agriculture and Food Research Organization (NARO) was on duty 24 hours to provide prompt confirmation in order to take response measures as soon as possible. No new outbreaks were confirmed after the outbreak at a layer farm in Hokkaido on April 7, and all containment measures were completed on April 14. All movement restrictions were lifted on May 6. Accordingly, Japan's free status for HPAI has been recovered with a start date of May 13. 2023.

Photo courtesy of Kagoshima Prefecture

Characteristics of the HPAIV isolated in this season

Based on the genomic analysis of the HA gene segment of all HPAIVs isolated from the poultry cases in this season, HPAIVs were classified into three groups (20E, 21E, and 21RC) that are closely related to the European strains of the 2020 season, the European strains of the 2021 season, and the West Siberian and Chinese strains of the 2021 season. Furthermore, the results of the whole genome analysis of the eight gene segments revealed that a total of 17 genotypes including two types of 20E, four types of 21E, and 11 types of 21RC were introduced when classified into genotypes based on their combinations (Fig.S1-4).

Viruses in groups 20E, 21RC, and 21E were shown to be closely related to viruses isolated from wild birds in Japan this season. The 21RC and 21E groups were also shown to be closely related to viruses isolated from wild birds and poultry outside Japan this season. Some of the viruses were found to have the same origin of all eight gene segments as the viruses from last season's outbreak in domestic birds (Fig. S1-5). It is unlikely, however, that last season's viruses were maintained among poultry and wild birds but instead were transported to breeding sites of migratory birds located outside of Japan during the summer and reintroduced into Japan with the arrival of migratory birds this season. The reason for this assumption is that the virus is difficult to survive in the environment, and it was not detected during the summer months (May to mid-September 2022) when migratory birds, which play an important role in the circulation and maintenance of the virus, were not present. It is considered that these three groups of viruses were introduced into Japan almost simultaneously and have been maintained and spread throughout the country for some period of time.

In terms of virulence, this season marked the most diverse genotypes of viruses ever seen in the country. Although all of them had a 100% fatality rate when successfully infected by inoculation tests on chickens, there were differences in the time to death and potential to spread infection.

Given the current situation of outbreaks in various parts of the world and the emergence of diverse viruses, the risk of an outbreak of HPAI in Japan is still considered high. For more information, please see the Report on the epidemiological investigation or the highly pathogenic avian influenza outbreaks in the 2022-2023 Season.
https://www.maff.go.jp/j/syouan/douei/tori/attach/pdf/220929-301.pdf

Fig.S1-4 Genetic diversity of H5N1 and H5N2 HPAI virus based on phylogenetic analysis targeting 8 segments

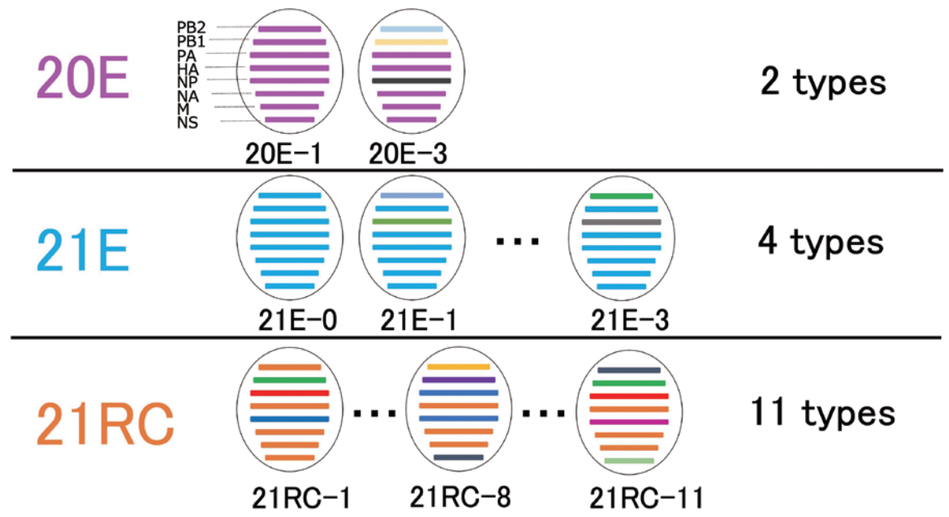
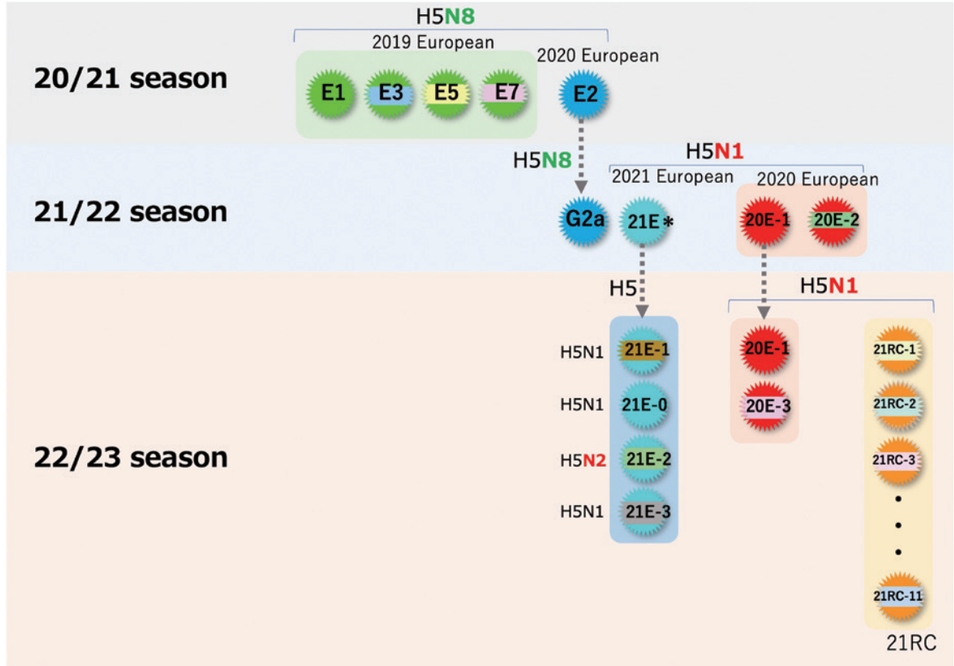


Fig. S1-5 Transition of genotypes of HPAI virus recovered during 2021, 2021-2022 and 2022\2023 seasons based on combination of segments



*21E=21E-0

Special Feature 2

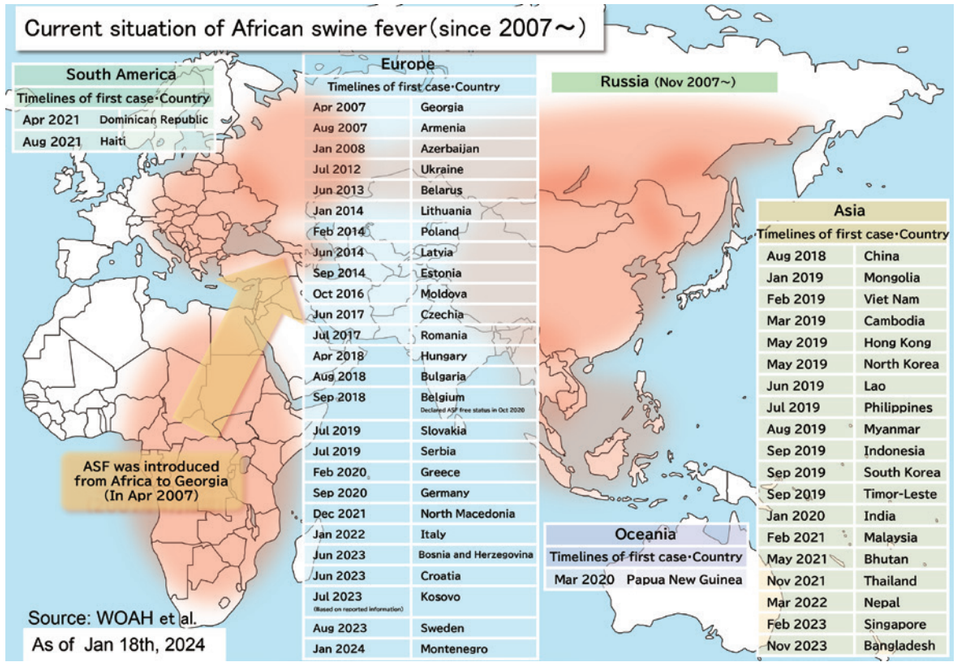
Preparedness for African swine fever

African swine fever (ASF) is a highly pathogenic disease with no effective treatment or prevention methods, and once it spreads, it will cause a long-term decline in productivity in the livestock industry and threaten the stable supply of livestock products to the public. In the Asian region, since the first outbreak was confirmed in China in August 2018, the affected area has continued to spread, increasing the risk of invasion into our country. Although there has never been an outbreak of ASF in Japan, various preparedness efforts are underway.

Situation in Asia

ASF invaded the Caucasus region and Russia in 2007 from the continent of Africa, where it is endemic. Subsequently, outbreaks expanded from Eastern Europe to Western Europe, and in 2018, an outbreak was confirmed in China. Since then, outbreaks have expanded throughout Asia, including South Korea and Vietnam. In particular, in our neighboring country of South Korea, the first outbreak was confirmed in September 2019, and ASF is gradually spreading in domestic pigs and wild boars.

Fig. S2-1 Global spread of ASF



Reinforcement of border control measures

The most important countermeasure against ASF in our country is to prevent the virus from entering. For this reason, the Animal Quarantine Service conducts promotional activities to prevent meat products from being brought into Japan from overseas, as well as border control measures at air and sea ports. In Japan, monitoring tests for the ASF virus are conducted on some pork products carried by passengers on air flights, cruise ships, ferries, that have been detected during animal quarantine inspections at airports, etc. To date, more than 100 cases of ASF virus genes have been detected, and the live virus has been isolated in some cases. For this reason, inspection at the time of entry is being strengthened, including detection activities by animal and plant quarantine dogs and oral questioning by animal quarantine officers. The 140 animal and plant quarantine dogs are engaged in detection activities at air and sea ports throughout Japan and at international post offices. The number of animal quarantine officers was also increased to 526 by the end of FY2022.

In addition, from April 2019, the measures against the importation of illegal livestock products from overseas have been tightened. As of August 2023, there have been 6 cases of 10 arrests for violation of the Act on Domestic Animal Infectious Disease Control on importation of prohibited products for passengers who brought meat products into Japan. In addition, inspections of international postal items have been strengthened in cooperation with Japan Post, resulting in the arrest of four persons in two cases.

Table S2-1 Countries of origin of illegal livestock products detected from passengers' luggage and international postal items

○Passengers' luggage as of 2022 (preliminary data)

	country	cases	weight
1	Vietnam	8,121(14.9%)	7,869(22.0%)
2	Philippines	7,411(13.6%)	5,184(14.5%)
3	South Korea	4,907(9.0%)	3,297(9.2%)
4	China	4,217(7.7%)	2,690(7.5%)
5	Thailand	4,059(7.5%)	1,787(5.0%)
6	United States of America	3,802(7.0%)	1,346(3.8%)

○International postal items

	country	cases	weight
1	China	42,020(79.4%)	46,811(54.6%)
2	Vietnam	5,743(10.8%)	33,750(39.4%)
3	United States of America	1,095(2.1%)	496(0.6%)
4	Mongolia	952(1.8%)	691(0.8%)
5	Thailand	891(1.7%)	387(0.5%)
6	South Korea	288(0.5%)	373(0.4%)

Fig. S2-2 Detecting activity by the animal and plant quarantine dog

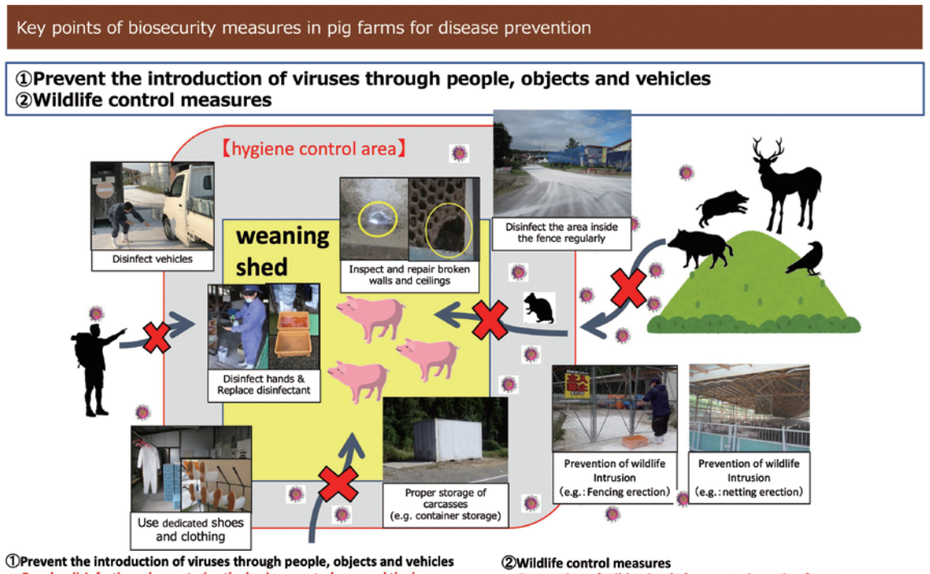
Improvement of animal hygiene management and preparedness for outbreaks

Thorough on-farm hygiene management is a basic measure for combating livestock infectious diseases, especially ASF, which cannot be prevented with a vaccine; it is necessary to improve on-farm biosecurity to prevent the virus from entering farms in case it enters Japan.

In addition to providing farmers with key information on on-farm biosecurity, livestock hygiene service centers (LHSCs) implement quarterly self-inspections at all pig farms nationwide to ensure that they are in full compliance with the standards for animal feeding and hygiene management. Farms that fail to comply will be given guidance, advice, recommendations, and orders based on the Act on Domestic Animal Infectious Diseases Control.

Regarding emergency preparedness, the "Guidelines for the Prevention of Specific Domestic Animal Infectious Diseases Related to African Swine Fever" (published by the Minister of Agriculture, Forestry and Fisheries on July 1, 2020) has been established, which stipulates measures to be taken in the event of an outbreak. A diagnostic manual for ASF has also been developed, and ASF tests are conducted on domestic pigs and wild boars by prefectural and national laboratories. Although there has been no outbreak of ASF in Japan, MAFF and prefectural governments are conducting simulation exercises to prepare for a future outbreak of ASF. Moreover, we are strengthening our preparedness for the occurence of ASF in wild boars by, for example, conducting practical exercises on preventive operations such as proper disposal of wild boar carcasses.

Fig.S2-3 Key points on on-farm biosecurity



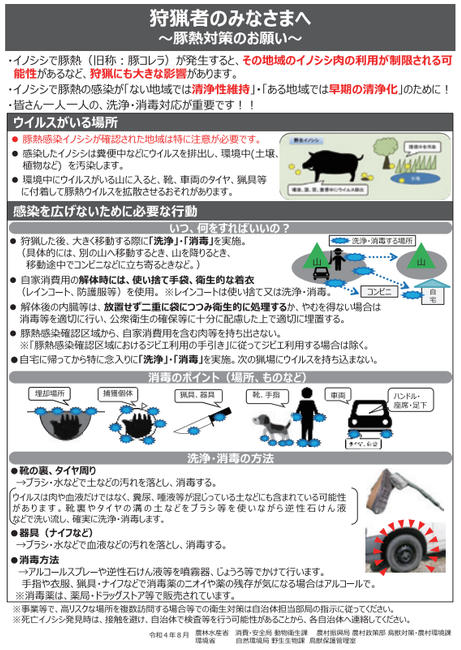
Surveillance and measures on wild boar

Prefectures conduct on-site inspections of pig farms once a year in principle to monitor the introduction of ASF. The purpose of these inspections is to detect abnormal conditions in pig populations and to conduct diagnostic tests on such pigs. In addition, all cases of pathological appraisal at the LHSCs are tested for antigens of ASF after autopsy examination.

Since early identification of infection in wild boars through surveillance is crucial in the fight against ASF, each prefecture has been conducting antigen testing for both CSF and ASF in pigs or dead wild boars since September 2018. A new test method has been developed that allows for easier and faster genetic testing for CSF and ASF, and efforts are underway to strengthen surveillance. Furthermore, in preparation for the case of a positive test in a wild boar in Japan, specific response procedures have been established, and video materials are provided to wild boar trappers and hunters to inform precautions against cross-contamination. In addition, information on the prevention of disease spread among wild animals through human activities is disseminated to the public who enter mountain forests for the purpose of outdoor activities such as trekking.

Fig.S2-4 Study of burial method (above) and training of burial (below) of dead wild boars as preparedness for ASF outbreak in Japan

Fig.S2-5 Poster targeting hunters



1 Occurrence of animal infectious diseases in Japan

In Japan, under the Act on Domestic Animal Infectious Diseases Control (Act No. 166 of 1951), 28 diseases of particular importance for the livestock sector, including foot and mouth disease (FMD), classical swine, fever (CSF) and HPAI, are designated as "Domestic animal infectious diseases." In addition, 71 relevant infectious diseases following domestic animal infectious diseases are designated as "Notifiable infectious diseases," and their occurrences are monitored by mandatory notification.

In terms of Domestic animal infectious diseases, 2022 marked the largest-ever outbreak of HPAI from fall to the following spring (see Special Feature 1). With regard to CSF, which occurred in Japan in September 2018 for the first time in 26 years, the number of outbreaks has decreased, but sporadic outbreaks continue to be reported. As for FMD and ASF, which continue to occur in the Asian region, Japan remained disease-free. Surveillance of bovine tuberculosis and brucellosis has continued after disease-free status was achieved, and no new outbreaks have occurred. As for Johne's disease, outbreaks have been continuously observed.

Among Notifiable infectious diseases, lumpy skin disease, which has recently been spotted in the Asian region, has not yet occurred in our country. The number of bovine leukosis cases has remained high.

The WOAH grants official disease status for certain diseases upon request from the member countries, and Japan is officially recognized as free from FMD, BSE and African horse sickness as shown in Table 1-1.

Tables 1-2 and 1-3 show the annual number of cases of major Domestic animal infectious diseases and Notifiable infectious diseases.

Table 1-1 Official recognition of specific disease status by WOAH

FMD	Free country without vaccination (2011)
BSE	Negligible risk (2013)
African horse sickness	Free country (2014)

Table 1-2 Number of reported major Domestic animal infectious diseases outbreaks (year)

		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Foot and mouth disease	# of farms	0	0	0	0	0	0	0	0	0	0
	# of animals	0	0	0	0	0	0	0	0	0	0
Enzootic encephalitis (Swine)	# of farms	4	6	2	5	0	0	0	1	0	1
	# of animals	8	8	3	17	0	0	0	2	0	1
Brucellosis (Cattle)	# of farms	0	0	0	0	0	0	0	0	0	0
	# of animals	0	0	0	0	0	0	0	0	0	0
Tuberculosis (Cattle)	# of farms	0	1	0	0	0	0	0	0	0	0
	# of animals	0	1	0	0	0	0	0	0	0	0
Johne's disease (Cattle)	# of farms	294	326	327	315	374	321	380	399	446	519
	# of animals	573	783	691	624	817	831	1066	809	957	1147
Bovine spongiform encephalopathy	# of farms	0	0	0	0	0	0	0	0	0	0
	# of animals	0	0	0	0	0	0	0	0	0	0
Scrapie (Sheep)	# of farms	0	0	0	1	0	0	0	0	0	0
	# of animals	0	0	0	1	0	0	0	0	0	0
Equine infectious anemia	# of farms	0	0	0	0	0	0	0	0	0	0
	# of animals	0	0	0	0	0	0	0	0	0	0
Classical swine fever*	# of farms	0	0	0	0	0	6	45	10	15	9
	# of animals	0	0	0	0	0	9	102	23	43	29
African swine fever	# of farms	0	0	0	0	0	0	0	0	0	0
	# of animals	0	0	0	0	0	0	0	0	0	0
Highly pathogenic avian influenza*	# of farms	0	4	2	5	5	1	0	33	25	66
	# of animals	0	18	13	27	33	8	0	113	152	255
Low pathogenic avian influenza	# of farms	0	0	0	0	0	0	0	0	0	0
	# of animals	0	0	0	0	0	0	0	0	0	0
Newcastle disease	# of farms	0	0	0	0	0	0	0	0	0	0
	# of animals	0	0	0	0	0	0	0	0	0	0
Foulbrood	# of farms	49	57	59	42	30	42	33	39	33	26
	# of animals	230	168	130	89	74	135	104	127	110	106

*Only animals diagnosed in accordance with relevant regulations are included in this table(i.e. animals culled as a result of outbreak response are not included in this table.)
There were no outbreaks of the following infectious diseases between 2013 and 2022.
Rinderpest, Contagious bovine pleuropneumonia, Rabies, Vesicular stomatitits, Rift valley fever, Anthrax, Hemorrhagic Septicemia, Glanders, African horse sickness, Ovine rinderpest, Fowl cholera, Avian salmonelosis, Swine vesicular disease.

Table 1-3 Number of reported major Notifiable infectious diseases outbreaks

(year)

		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Bluetongue (Cattle)	# of Farms	0	0	0	0	1	0	1	0	0	0
	# of Animals	0	0	0	0	2	0	1	0	0	0
Akabane disease (Cattle)	# of Farms	7	2	3	2	0	0	0	1	0	1
	# of Animals	8	2	3	2	0	0	0	1	0	1
Malignant catrrhal fever	# of Farms	2	1	1	0	0	1	0	1	0	0
	# of Animals	2	1	1	0	0	1	0	1	0	0
Lumpy skin disease	# of Farms	0	0	0	0	0	0	0	0	0	0
	# of Animals	0	0	0	0	0	0	0	0	0	0
Bovine viral diarrhea	# of Farms	120	134	158	222	221	230	207	148	109	76
	# of Animals	228	259	310	406	380	382	359	265	235	119
Infectious bovine rhinotracheitis	# of Farms	19	19	14	15	13	4	9	5	12	4
	# of Animals	1006	105	129	648	54	7	44	11	36	12
Bovine leukosis	# of Farms	1680	1683	2023	1998	2227	2323	1944	2075	2179	2182
	# of Animals	2310	2415	2869	3125	3453	3859	4113	4197	4375	4334
Bovine ephemeral fever	# of Farms	2	0	11	0	0	0	4	0	0	0
	# of Animals	2	0	22	0	0	0	7	0	0	0
Bovine genital campylobacteriosis	# of Farms	1	0	1	1	3	1	1	0	0	0
	# of Animals	1	0	1	1	3	1	1	0	0	0
Trypanosomiasis	# of Farms	1	1	0	0	0	1	1	0	0	0
	# of Animals	1	1	0	0	0	1	1	0	0	0
Equine influenza	# of Farms	0	0	0	0	0	0	0	0	0	0
	# of Animals	0	0	0	0	0	0	0	0	0	0
Equine rhinopneumonitis	# of Farms	21	19	25	26	18	24	17	19	13	18
	# of Animals	46	54	42	59	34	31	21	37	18	25
Aujeszky's disease	# of Farms	0	0	1	0	1	0	0	0	0	0
	# of Animals	0	0	5	0	4	0	0	0	0	0
Swine transmissible gastroenteritis	# of Farms	8	14	0	1	0	0	1	0	2	0
	# of Animals	70	469	0	63	0	0	4	0	8	0
Porcine reproductive and respiratory syndrome	# of Farms	36	19	34	29	23	27	25	19	18	28
	# of Animals	157	39	131	82	58	80	58	34	72	72
Porcine epidemic diarrhea	# of Farms	44	836	217	87	66	33	137	35	34	6
	# of Animals	180	3885	1088	420	251	173	764	242	202	32
Avian infectious bronchitis	# of Farms	5	13	12	21	25	27	15	25	28	19
	# of Animals	48	1058	4717	3029	545	153	127	705	1417	96
Avian infectious laryngotracheitis	# of Farms	6	4	5	1	10	2	1	7	8	16
	# of Animals	22	15	21	5	13	8	20	16	27	74
Avian mycoplasmosis	# of Farms	5	3	6	16	2	6	7	7	1	5
	# of Animals	218	14	23	58	8	13	25	28	2	15
Nosemosis of bees	# of Farms	3	0	0	5	2	2	3	0	1	1
	# of Animals	3	0	0	8	2	4	4	0	1	8