

## 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 *Culicoides* biting midges. Major arbovirus infection 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 de-

velop neurological clinical signs such as paralysis associated with encephalomyelitis, which is called postnatal infection. Both Ibaraki disease and bovine ephemeral fever cause a variety of clinical signs associated with fever when infected. In particular, Ibaraki disease is characterized by difficulty in swallowing, while bovine ephemeral fever is characterized by 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 a 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.

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

		2019	2020	2021
Akabane disease (prenatal infection)	(farms)	0	1	0
	(animals)	0	1	0
Akanabe disease (postnatal infection)	(farms)	0	0	0
	(animals)	0	0	0
Aino virus infection	(farms)	1	0	0
	(animals)	1	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)	4	0	0
	(animals)	7	0	0
Bluetongue (cattle)	(farms)	1	0	0
	(animals)	1	0	0
Bluetongue (sheep)	(farms)	2	2	2
	(animals)	9	6	5

Fig. 2-9-1 Blood-sucking insect (*Culicoides* biting midge) which transmits arboviruses



Photo: NIAH, NARO

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## Objectives and methods of surveillance

Arboviruses are considered to be introduced into Japan each season by vectors carrying virus traveling 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 enabling increasing awareness, facilitating vaccination, supporting proper diagnosis for abortions, and taking other countermeasures. Surveillance is conducted 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 in order to assess the entry of the disease by looking at seroconversion. The target diseases are Akabane disease, Aino virus infection, and Chuzan disease. Based on the disease situation to date, surveillance will be conducted throughout Japan for Akabane disease, and in western Japan for Aino virus infection and Chuzan disease.

### (2) Virus antigen surveillance

Virus antigen surveillance using PCR is conducted

for Kyushu and Okinawa regions, where arboviruses are more likely to enter, to detect virus invasion earlier than by sero-surveillance. The target diseases are Akabane disease, Aino virus infection, Chuzan disease, Ibaraki disease, and bluetongue. In the target prefectures, a total of four consecutive PCR tests are conducted from June to November.

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## Surveillance results

### (1) Sero-surveillance

In FY2021, 2,627 cattle from 847 farms were tested, and positive antibody results were confirmed in Okinawa Prefecture in November for Akabane and Chuzan diseases (Fig. 2-9-2). No positive antibody results were confirmed for Aino virus infection.

### (2) Virus antigen surveillance

In FY2021, 150 cattle from 61 farms were tested, and a positive result was confirmed for bluetongue virus in Okinawa Prefecture in November (Figure 2-9-3). All were negative for Akabane disease, Aino virus infection, Chuzan disease, and Ibaraki disease.

The bovine arbovirus infection surveillance results conducted in previous years can be found below.

<https://www.naro.go.jp/laboratory/niah/arbo/index.html>

Fig.2-9-2 Results of sero-surveillance for Akabane disease and Chuzhan disease in FY2021

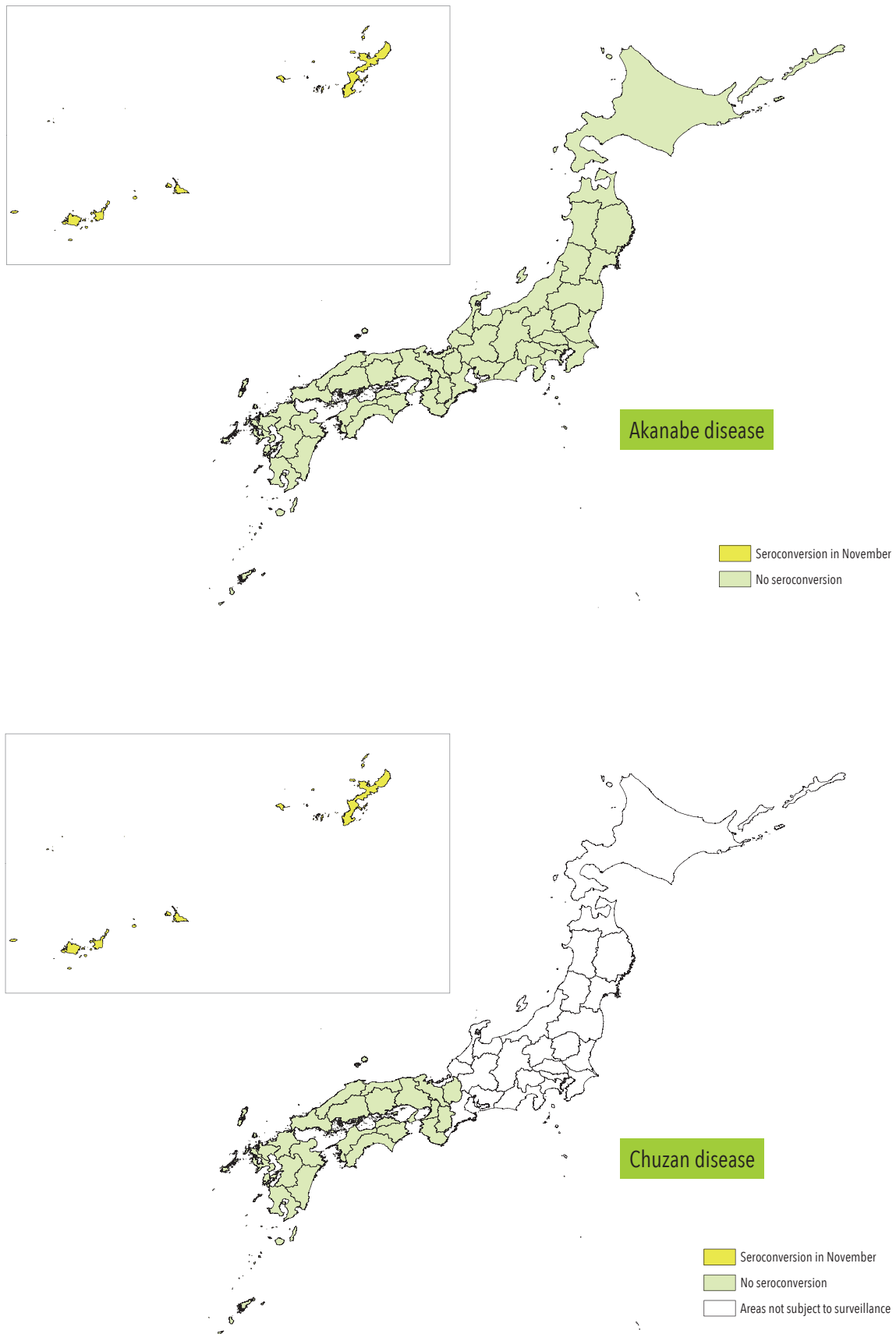


Fig.2-9-3 Results of virus antigen surveillance for bluetongue in FY2021

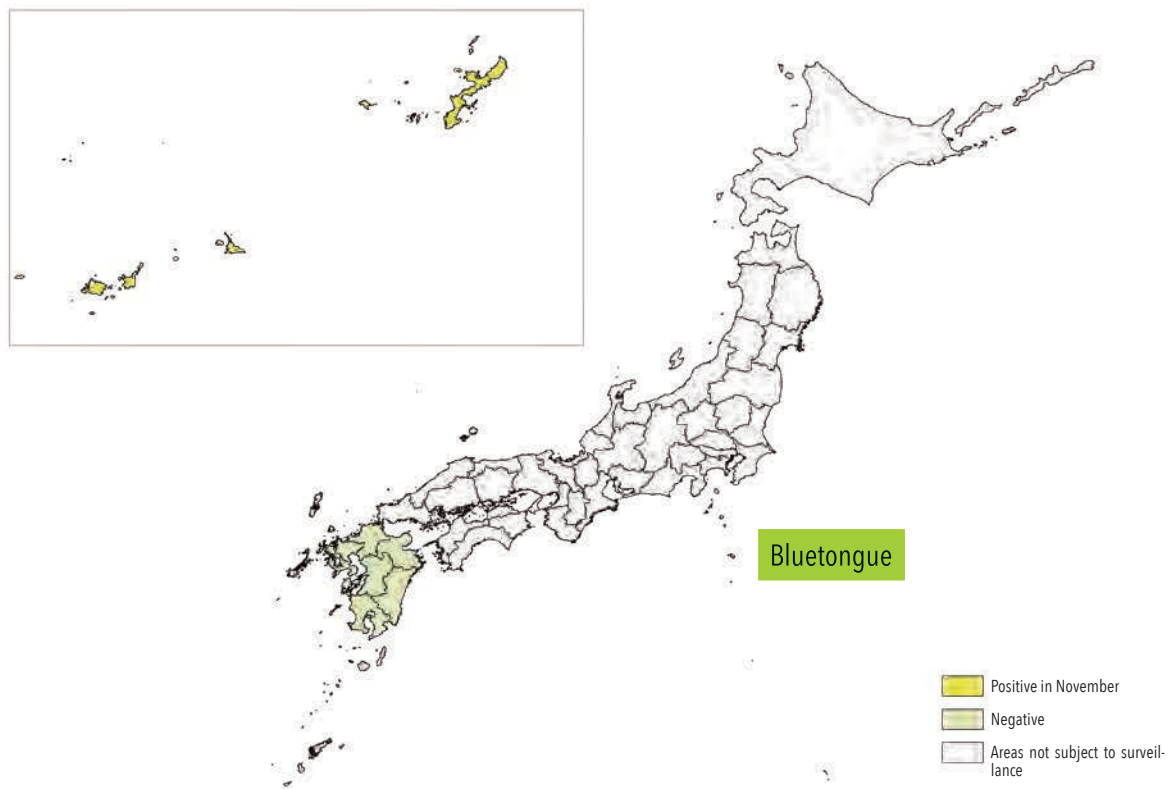


Figure 2-9-4 Blood sampling for arbovirus infection surveillance.



Photo courtesy of NIAH, NARO