

## Trends of Epidemics of Bovine Infectious Diseases in Japan during 1987-1993

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### Abstract

Trends of epidemics of bovine infectious diseases in Japan were investigated using the incidence rates records during the period 1987-1993. For example, infectious bovine rhinotracheitis among the virus diseases predominated in spite of extensive control by vaccination. Outbreaks of corona or bovine RS virus infection were widespread in beef cattle colonies. In the case of bacterial diseases, Johne's disease has recently prevailed nationwide despite the extensive measures of control implemented. Salmonellosis has also spread to adult and growing cattle. These diseases are associated with intensive livestock production and still remain major problems (especially bronchopneumonia, diarrhea and gastroenteritis) for livestock in Japan. On the other hand, the incidence of theileriosis among the parasitic diseases has decreased due to the implementation of effective tick-eradication programs.

**Discipline:** Animal health

**Additional key words:** epidemiology, incidence

### Introduction

Many infectious diseases were either effectively controlled or eradicated from the latter part of the 19th century and the middle of the 20th century in developed countries using new techniques developed during the microbial revolution and older methods, including quarantine, importation restrictions, slaughter and hygiene<sup>5)</sup>. Massive epidemics of bovine infectious diseases still pose problems in South Asia, Africa and South America. For example, foot and mouth disease (FMD) or rinderpest has remained a major disease in the countries of the above regions. In contrast, after the eradication of both diseases in Japan, disease-free conditions were maintained due to effective control of animal quarantine systems and the fact that Japan is an island. However, some infectious diseases, for example brucellosis and tuberculosis, have persisted at low levels, despite the application of various measures of control. Infectious bovine rhinotracheitis (IBR) and Johne's disease have allowed an increase in morbidity and economic loss. These diseases which are associated with intensive livestock production may currently be essentially the major diseases posing problems in Japan.

Therefore, it is important to improve the database on animal disease outbreaks at the national level to identify problems. The purpose of this paper is to summarize the incidence rates of bovine infectious diseases and to describe the trends of epidemics of important diseases.

### Materials and methods

#### 1) *Epidemiological data of bovine infectious diseases*

Morbidity data of designated and notified bovine infectious diseases based on the Domestic Animal Infectious Disease Control Law (No. 166 of 1951) in Japan were summarized from the official reports on outbreaks published in the statistics on animal hygiene<sup>2)</sup> from 1987 to 1993. The other morbidity data except for the above diseases were collected from monthly reports of animal health information in the animal health weekly<sup>1)</sup>; the diagnoses were all carried by the Diagnosis Laboratory of Livestock Hygiene Service Center (LHSC) in each prefecture of Japan.

#### 2) *Animal disease names*

The names of bovine infectious diseases were

**Table 1. Incidence rates of bovine infectious diseases  
(per one million of cattle population)**

Pathogen	Disease name	Year						
		1987	1988	1989	1990	1991	1992	1993
DNA virus	Bovine papular stomatitis	-	-	3.8	-	-	1.0	-
	Pseudo cowpox	5.1	1.9	-	-	-	-	-
	Malignant catarrhal fever	-	0.6	0.9	0.6	0.2	0.2	-
	Aujeszky's disease	-	-	-	-	0.4	-	-
	Infectious bovine rhinotracheitis <sup>b)</sup>	133.8	126.0	79.7	39.3	75.7	143.6	53.1
	Bovine adenovirus infection	1.5	21.4	0.9	1.3	0.4	1.0	0.2
	Bovine papillomatosis	-	0.6	-	-	-	-	-
RNA virus	Ibaraki disease <sup>a)</sup>	57.3	0.2	-	-	-	-	-
	Reovirus infection	4.7	-	-	-	-	-	-
	Bovine rotavirus infection	19.2	23.1	14.3	45.6	86.2	33.9	15.3
	Chuzan disease	0.2	-	-	-	-	-	-
	Bovine viral diarrhea mucosal disease	25.4	15.2	4.1	9.0	11.5	3.6	2.2
	Bovine coronavirus infection	79.7	293.1	198.0	206.1	199.7	49.6	67.5
	Parainfluenza	16.5	-	19.4	12.8	0.8	-	10.4
	Bovine RS virus infection	31.7	48.2	26.3	85.5	36.1	51.2	40.6
	Bovine ephemeral fever <sup>a)</sup>	-	79.7	71.4	-	1.2	-	-
	Akabane disease	2.3	10.5	1.9	2.1	4.3	1.0	1.2
	Ainavirus infection	-	-	-	0.2	0.6	-	-
	Bovine leucosis	14.7	13.5	13.0	15.5	9.2	42.2	43.6
	Bovine rhinovirus infection	0.4	0.2	4.3	-	-	-	-
Rickettsia	Anaplasmosis <sup>a)</sup>	-	-	1.5	0.4	0.4	-	-
	Eperythrozoonosis	0.2	-	-	-	-	-	-
Mycoplasma	Mycoplasma infection	6.8	6.2	10.7	1.3	5.3	17.5	-
Spirochaeta	Leptospirosis	-	1.5	-	-	-	-	-
Spirillum	Genital campylobacteriosis	0.2	-	-	0.4	-	-	-
Gram-negative aerobic bacillus	Bovine infectious keratoconjunctivitis	33.2	21.9	39.1	20.6	3.9	75.9	44.0
	Brucellosis <sup>a)</sup>	-	-	0.2	0.2	0.2	0.2	-
	Pseudomonas infection	0.2	0.2	-	-	0.2	-	0.2
Gram-negative facultative anaerobic bacillus	Colibacillosis	59.7	53.1	98.0	45.2	38.4	40.6	33.0
	Salmonellosis	93.7	70.3	119.8	63.9	114.1	150.2	105.5
	Pasteurellosis	131.2	118.7	78.8	89.7	89.9	153.2	127.6
	Actinobacillosis	0.4	-	-	-	-	0.2	-
	<i>Haemophilus somnus</i> infection	58.0	28.9	15.2	13.2	16.8	10.0	11.3
Gram-negative non-spore bacillus	Fusobacterium infection	0.6	0.9	0.8	0.8	-	0.2	0.2
Gram-positive coccus	Staphylococcosis	1.2	-	1.5	-	-	0.2	-
	Streptococcal infection	1.2	2.6	0.6	1.1	0.8	2.0	-
Gram-positive spore-former anaerobic bacillus	Anthrax <sup>a)</sup>	0.2	0.2	-	-	0.2	-	-
	Enterotoxemias	19.0	4.1	8.3	13.0	27.1	11.2	8.0
	Blackleg <sup>a)</sup>	9.4	2.4	1.5	4.4	4.1	2.4	1.4
	Malignant edema	2.6	2.8	2.8	2.9	1.2	1.8	5.6
	Clostridial infection	3.2	12.9	10.5	4.0	4.9	5.0	10.6
	Tetanus <sup>b)</sup>	6.8	7.3	7.9	8.0	6.2	7.8	7.2

(Table 1. continued)

Pathogen	Disease name	Year						
		1987	1988	1989	1990	1991	1992	1993
Gram-positive non-spore bacillus	Listeriosis	1.1	-	-	0.8	0.4	0.2	1.6
	Bovine cystitis and pyelonephritis	1.3	-	0.4	1.3	-	-	-
	Actinomycosis	0.4	0.4	0.2	0.8	0.4	0.6	-
	Dermatophilosis	-	-	-	-	54.2	0.8	-
	<i>Actinomyces pyogenes</i> infection	11.9	1.5	7.7	1.5	1.4	3.6	-
	Tuberculosis <sup>a)</sup>	20.0	9.2	7.7	6.9	7.2	2.8	1.2
	Johne's disease <sup>a)</sup>	34.5	29.8	28.7	38.7	43.5	43.4	45.0
Fungi	Fungal infection	24.3	3.0	6.4	-	9.2	12.2	46.0
Protozoa	Coccidiosis	36.9	48.6	44.2	44.5	67.5	73.7	51.6
	Cryptosporidiosis	1.7	-	0.2	0.4	4.5	-	0.2
	Neosporosis	-	-	-	-	-	0.6	-
	Piroplasmosis <sup>a,c)</sup>	18.3	14.1	16.7	18.5	18.9	11.2	0.2
	Piroplasmosis <sup>d)</sup>	111.0	75.4	70.7	132.1	40.4	17.3	9.2
Nematoda	Mecistocirrus infection	-	0.2	-	0.4	-	-	-
	Bunostomum infection	-	-	-	0.6	-	-	-
	Strongyloides infection	30.9	10.7	24.1	38.2	37.8	1.8	9.6
	Oesophagostomum infection	0.2	-	-	-	-	-	-
	Trichuris infection	0.2	0.9	-	0.2	0.4	-	-
	Dictyocauliasis	0.2	0.9	-	0.2	0.4	-	-
	Thelaziasis	16.8	-	-	-	-	-	-
Ascariasis	-	0.2	-	0.4	-	0.4	0.2	
Cestodia	Cestodiasis	1.7	-	0.2	-	6.2	0.2	-
Trematodia	Fascioliasis	7.3	16.5	9.0	5.0	4.3	1.0	11.3
	Paramphistomiasis	1.7	0.2	-	-	-	0.2	-
	Eurytremaiasis	0.2	-	-	-	-	-	-
Arthropod parasitism	Scabies	2.6	9.0	1.5	1.9	-	3.0	0.8
	Lousiness	2.1	-	1.2	-	-	-	-
	Warble infestation <sup>b)</sup>	3.0	1.5	8.8	3.4	-	-	-

- : No outbreaks.

a): Designated infectious diseases based on the Domestic Animal Infectious Disease Control Law (Law no.166, 1951).

b): Notified infectious diseases based on the same law as above.

c): Designated babesiosis and theileriosis.

d): Excluding designated babesiosis and theileriosis above.

arranged based on the nomenclature of animal diseases in Japan (draft) edited by Hatakeyama and Ogawa (1992), according to the international classification of diseases (ICD) published by the World Health Organization (WHO) and Food and Agriculture Organization (FAO)<sup>6)</sup>.

### 3) Epidemiological index

Incidence of bovine infectious diseases was expressed as the number of new cases that occurred in the dairy and beef cattle populations at risk each year from 1987 to 1993 in Japan by using the above data of morbidity. The incidence rate per one

million head of dairy and beef cattle populations at risk was calculated as follows:

$$\text{Incidence rate} = \frac{\text{Incidence (number of new cases)}}{\text{Cattle population at risk}} \times 1,000,000.$$

The data of the cattle population used in the above denominator were obtained from annual statistics of livestock, dated 1 February each year from 1987 to 1993 that were provided by the Statistics and Information Department, Ministry of Agriculture, Forestry and Fisheries (MAFF) of Japan<sup>4)</sup>.

## Results and discussion

The incidence rates per one million head of cattle population in Japan during the period 1987–1993, are shown in Table 1.

### 1) *Viral and rickettsial diseases*

**Designated infectious diseases:** Bovine ephemeral fever (BEF) occurred in 1988 after an interval of 12 years (northern part of Kyushu Island), subsequently in 1989 (Okinawa Prefecture) and in small foci in 1991 (Fukuoka and Kochi Prefectures). Ibaraki disease (Bluetongue-like disease) also occurred in 1987 after an interval of 5 years (Kyushu Island and Okinawa Prefecture). Both diseases are caused by viruses with vectors (mosquitoes and Culicoides). Particularly, the BEF epidemics in Fukuoka Prefecture (1988) may have originated from infected vectors carried on low-level jet stream from South Korea epidemics<sup>3)</sup>. It may be desirable to carry out preventive vaccination against the BEF and Ibaraki disease in southwestern Japan. Anaplasmosis occurred continuously during a 3-year period (1989–1991).

**Notified infectious diseases:** Outbreaks of IBR have occurred continuously with fluctuations in spite of extensive vaccination control. It is difficult to eradicate completely viral chronic diseases like IBR that are caused by the herpes virus group. In 1991, an initial case of Aujeszky's disease in calves was reported in Saitama Prefecture.

**Other infectious diseases:** Outbreaks of bovine coronavirus infection occurred with a high incidence rate of about 200 head per one million of the cattle population during the period 1988–1991, and outbreaks of bovine RS virus infection have also been recorded every year. These diseases have occurred mainly within beef cattle colonies. Rota virus infection has occurred continuously in calves in the form of neonatal diarrhea. Outbreaks of bovine leucosis tended to increase after 1992. In contrast, the incidence rates of Akabane disease which causes arthrogryposis-hydranencephaly (AH) syndrome in newborn calves has tended to decrease and eventually bottomed out in 1992. Also, no outbreaks of chuzan disease (with AH-like syndrome caused by orbivirus group) were recorded after 1988. On the other hand, incidence rates of bovine viral diarrhea mucosal disease have decreased due to the improvement of vaccination control after 1992.

### 2) *Mycoplasma and bacterial diseases*

**Designated and notified infectious diseases:** In particular, Johne's disease has prevailed nationwide and the outbreak pattern changed from endemic to epidemic. Further control measures involving test and slaughter procedures should be implemented. In contrast, only one case a year of brucellosis was detected during the period of 1989–1991. Moreover, the causal agent (*Brucella abortus*) has not been isolated from each case. Also, outbreaks of tuberculosis have markedly decreased. Thorough inspections of dairy cattle for the detection of both diseases have been carried out every or every second year by the AHSC in each prefecture under the national disease control programs and measures adopted in Japan. However, the eradication of these diseases has not been completed. Incidence rates of anthrax, blackleg and tetanus remained constant in this period.

**Other infectious diseases:** The incidence rates of salmonellosis and pasteurellosis reached levels of about 100 to 150 head. According to the nationwide surveillance of salmonellosis in 1993, the outbreak pattern has changed; the disease is not limited to nursery calves, but has spread to adult or growing cattle. The change in the outbreak pattern is a matter of concern for the epidemic of salmonellosis. In 1991, a rare case of dermatophilosis in Japan was reported in growing cattle in Aomori Prefecture in Japan. The incidence of other kinds of infectious diseases (especially colibacillosis, *Haemophilus somnus* infection, enterotoxemia, clostridial infection) has not changed.

### 3) *Parasitic diseases and arthropod parasitism*

**Designated and notified infectious diseases:** Incidence rates of designated piroplasmiasis (babesiosis) which remained at a level of 10 head per one million of cattle population until 1992 decreased to 0.2 head (only one case with morbidity) in Okinawa Prefecture in 1993. Warble infestation was eradicated after 1991.

**Other infectious diseases:** Outbreaks of theileriosis (non-designated piroplasmiasis) have decreased. In 1991, 9.2 head per one million of cattle population were affected, presumably due to the dissemination of the effective tick-eradication program with pour-on application of flumethrin. On the other hand, outbreaks of coccidiosis have remained unchanged. In 1990 and 1991, strongyloides infection spread to calves.

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