

## Seroepizootiologic Survey of Bovine Leukemia Virus Antibody in Kagoshima Prefecture

Yasuho TAURA, Masami MOCHIZUKI\*<sup>1</sup>, Tsutomu SHIMIZU\*<sup>2</sup> and Katsumi HAMANA  
 (Laboratories of Veterinary Reproduction, \*<sup>1</sup> Veterinary Microbiology, and \*<sup>2</sup> Veterinary Pathology)  
 Received for Publication September 5, 1988

### Introduction

Bovine leukemia virus (BLV) is responsible for a disease known as enzootic bovine leukosis (EBL) or bovine lymphosarcoma in cattle. The disease was originally endemic in eastern Europe, but has spread worldwide, including Japan<sup>1,3,7)</sup>. Kagoshima Prefecture, located at Southern Part of Japan, is the major base of the Japanese livestock industry and has been considered to be an EBL-free area until quite recently. However 7 EBL-infected cattle were detected among the leukosis cases examined at the Department of veterinary medicine (Kagoshima University) as shown in Table 1. This brief communication presents serological evidence that indicates BLV is now becoming endemic in the area.

### Materials and Methods

A total of 460 serum samples, having been collected for 8 years from 1981 till 1988, were tested by agar gel immunodiffusion (AGID) test. Two hundred eight samples were taken from dairy cattle (Holstein) which had been raised in breeding heads (5-54 heads/herd) and 252 samples were from beef cattle (Japanese Black) raised singly-or in small group (less than 4 heads/herd) breeding

Table 1. Enzootic bovine leukosis cases observed in Kagoshima Prefecture

Case No.	Date of Examination	Breed	Age (years)	Clinical signs			Pathological findings	BLV antibody* <sup>2</sup>
				EPLN* <sup>1</sup>	Leuko-cytosis	Lympho-blastosis		
1	26th Dec., 1984	H* <sup>3</sup>	4	+	-	+	Lymphosarcoma	+
2	13th May, 1985	H	6	-	+	+	Reticulum cell sarcoma	+
3	13th Jan., 1986	H	8	+	-	+	Lymphosarcoma	+
4	7th Jul., 1986	H	7	+	+	+	Reticulum cell sarcoma	+
5	5th Nov., 1986	H	6	+	-	+	Lymphosarcoma	+
6	13th Jan., 1988	H	5	+	-	+	Lymphosarcoma	+
7	25th May, 1988	H	1	+	+	+	Lymphosarcoma	+

\*<sup>1</sup>: EPLN; Enlargement of peripheral lymph nodes.

\*<sup>2</sup>: Antibody against bovine leukemia virus glycoprotein with agar gel immunodiffusion test.

\*<sup>3</sup>: H; Holstein.

herds. All the cattle were over 1 year of age. The AGID test was performed by the method as described by Kono *et al.*<sup>4)</sup>. The glycoprotein antigen of BLV and positive reference serum used in the test were furnished by the Natl. Inst. Anim. Health, Ibaraki, Japan.

### Results

The AGID-positive sera were primarily detected in the samples collected in 1984, and total of 18.5% (76/410) of the samples since then showed positive as presented in Table 2. All the positive sera were from the dairy cattle which had been raised as breeding herds (more than 12 heads/herd). They were detected in 5 herds and the incidence of AGID-positive cattle in the herd ranged from 20% to 53.7% with an average of 39.4%. None of the beef cattle showed AGID-positive.

The incidence of AGID-positive cattle increased gradually with cattle age, but the peak was noted within an age-grade of 4-6 years as shown in Table 3.

Table 4 shows regional differences in the prevalence of AGID-positive cattle and the evidence indicates a possibility that BLV has not yet been spread to all the districts of the prefecture.

### Discussion

The number of the samples tested in the present study is considered to be insufficient to discuss the entire prevalence of BLV in cattle at Kagoshima Prefecture where 273,460 heads of Japanese Black and 23,810 heads of Holstein (the population as of 1st Feb., 1984) have been raised. However, this preliminary positive results clearly indicate that BLV is getting endemic in cattle at

Table 2. Incidence of agar gel immunodiffusion antibody positive cattle in Kagoshima Prefecture

Date of collection	Number of tested	Number of antibody positive	Rate of positive cattle (%)
1981	2	0	-
1982	2	0	-
1983	46	0	-
1984	46	17	37.0
1985	49	8	16.3
1986	263	47	17.9
1987	28	2	7.1
1988	24	2	8.0
Total	460	76	16.5

Table 3. Incidence of agar gel immunodiffusion antibody in dairy cattle (Holstein) from different age group

Age (years)	Number of the tested	Number of antibody positive	Rate of positive cattle (%)
1-2*	5	2	40.0
2-4	68	23	33.8
4-6	60	28	46.7
6-8	48	16	33.3
8≤	25	7	28.0
Unknown	2	0	-

\*: From 1 year to less than 2 years of age.

Table 4. Regional differences in prevalence of agar gel immunodiffusion antibody positive cattle in Kagoshima Prefecture

District	Number of tested	Number of antibody positive	Rate of positive cattle (%)
Sensatsu	47	18	38.3
Hioki	145	50	34.5
Aira	58	5	8.6
Ira	32	2	6.1
So-O	134	1	0.8
Kimotsuki	25	0	-
Kawanabe	17	0	-
Unknown	2	0	-

Kagoshima Prefecture, and its epizootiologic situation is quite similar to those in other parts of Japan where EBL cases have been reported<sup>3,4,6-8)</sup>. These present data also suggest that BLV spreading within a herd occurs quite readily and breeding-method may have influenced the spread of BLV. It is simply true that leaving it as it is creates a vast economic problem and control measures, such as "test and removal method" must be carried out on a large scale without delay since the eradication programs have been shown to be the most effective measure for diminution of BLV and EBL incidences<sup>2,8)</sup>.

### Summary

Seven enzootic bovine leukosis-infected cattle were detected among the leukosis-cases examined at Kagoshima Prefecture. Therefore, a total of 460 serum samples, having been collected for 8 years from 1981 till 1988, were tested by agar gel immunodiffusion test (AGID) for bovine leukemia virus (BLV). The AGID-positive sera were primarily detected in the samples collected in 1984 and total of 18.5% of samples since then have been showed positive. These results indicate BLV is now becoming endemic in the area.

### Acknowledgements

The authors wish to express their gratitude to Drs. Yuji Kono and Hiroshi Sentsui, Natl. Inst. Anim. Health, Yatabe, Ibaraki, Japan for the supply of the glycoprotein antigen of BLV and positive reference serum, and for their kind advice regarding the agar gel immunodiffusion test.

### References

- 1) Burny, A., Bruck, C., Chantrenne, H., Cleuter, Y., Dekegel, D., Ghysdael, J., Kettmann, R., Leclercq, M., Lennen, J., Mammerickx, M. and Portetelle, D.: Bovine leukemia virus: Molecular biology and epidemiology. In *Viral Oncology*, Edited by Klein, G., p.231-289, Raven Press, New York (1980)
- 2) Flensburg, J.C.: Attempt to eradicate leukosis from a dairy herd by slaughter of cattle with lymphocytosis. Report over a ten year period. *Vet. Microbiol.*, **1**, 301-305 (1976)
- 3) Honma, T., Onuma, M., Mikami, T. and Izawa, H.: Bovine leukemia virus infection in Japan: Antibody and virus detection in cattle. *Jpn. J. Vet. Sci.*, **42**, 5-8 (1980)
- 4) Kono, Y., Sentsui, H., Miyamoto, T., Morozumi, K. and Sakamoto, Y.: Changes in antibody titers in cattle infected clinically and sub-clinically with bovine leukemia virus. *Int. J. Cancer*, **30**, 655-657 (1982)
- 5) Ohshima, K., Mitsui, T., Numakunai, S., Okada, K., Yoshikawa, T., Koyama, H. and Tsubaki, S.: An

- epizootiological survey on enzootic bovine leukosis in Iwate Prefecture. *J. Jpn. Vet. Med. Assoc.*, **36**, 74-78 (1983) (in Japanese)
- 6) Onuma, M., Honma, T., Mikami, T., Yoshikawa, H. and Yoshikawa, T.: Survey for antibodies to bovine leukemia virus in dairy and beef cattle in Japan. *Jpn. J. Vet. Sci.*, **40**, 691-696 (1978)
  - 7) Onuma, M., Ishihara, K., Ohtani, T., Honma, T., Mikami, T. and Izawa, H.: Seroepizootiological survey on antibodies against bovine leukemia virus in Japanese black cattle. *Jpn. J. Vet. Sci.*, **41**, 601-605 (1979)
  - 8) Yoshikawa, T., Yoshikawa, H., Koyama, H. and Tsubaki, S.: Preliminary attempts to eradicate infection with bovine leukemia virus from a stock farm in Japan. *Jpn. J. Vet. Sci.*, **44**, 831-834 (1982)