

Antibody Response to *Mycoplasma bovis* of Calves Introduced in a Farm Contaminated with the Organism

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ABSTRACT. Antibody against *Mycoplasma bovis* in sera of 48 calves introduced to a farm, in which calf pneumonia associated with *M. bovis* had been occurring in the last 3 years, was detected by an indirect hemagglutination test. Significant rises of antibody titers in sera of calves belonging to the groups A (16 calves) and B (14 calves) were recorded by day 60 post-introduction. On the other hand, a significant increase of antibody titers of 18 calves in group C, which had been administered antibiotics as a preventive therapy, was demonstrated at day 248 after arrival. These results indicated that the spread of *M. bovis* infection occurred easily on the contaminated farm, and a preventive therapy could delay the outbreak of calf pneumonia associated with *M. bovis*. — **KEY WORDS:** antibody, calf pneumonia, *Mycoplasma bovis*.

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Mycoplasma bovis has been frequently isolated from pneumonic calf lungs [1, 7, 9-11], and it has been known to play a role as a causative agent of the disease following inoculation into the gnotobiotic calves [4]. The pathogenicity of *M. bovis* for calf pneumonia was also indicated [1, 4, 8, 10], however, there is little information concerning prevention of the disease, and antibody response to *M. bovis* in sera of calves introduced to a contaminated herd.

In the present investigation, we tried to follow the changes of anti-*M. bovis* antibody in sera from calves introduced to a beef-cattle fattening farm suffering from calf pneumonia with *M. bovis*. The test calves of 2 to 3 weeks old were introduced from other prefectures, and they were divided into 3 groups, Groups A, B and C, which consisted of 27, 17 and 18 calves, respectively. At the farm, calf pneumonia associated with *M. bovis* had been occurring for the last three years, and *M. bovis* was isolated from nasal discharges of almost all the calves (90 to 100%) 7 to 12 days after introduction. The death rates of calves introduced in the last 3 years due to pneumonia and diarrhea ranged from 20% to 60%. For detecting the antibody, the indirect hemagglutination (IHA) test with glutaraldehyde-fixed sheep-red-blood cells was carried out. The IHA test was applied by Cho *et al.* [3] and Muenster *et al.* [7] for mycoplasmas, and it was also used for searching for an antibody against *Ureaplasma diversum* infected calf lungs [8].

At first, as shown in Table 1, the specificity of the IHA reaction using the antigen prepared from a Donetta strain of *M. bovis* was confirmed concurrently by demonstrating the metabolism inhibition antibody in sera from 9 pneumonic and 12 normal calves.

Anti-*M. bovis* IHA antibody titers of 16 calves belonging to group A are given in Fig. 1 (1). As seen in this figure, antibody titers of 1:8 to 1:16 were detected in 7 (44%) calf sera taken at day 63, and titers 1:8 to 1:128 were obtained

in 12 (75%) sera taken on day 99 after their introduction. A significant rise ($p < 0.05$) of the geometric mean titers (GMT) from 4 to 6.5 was demonstrated during days 35 to 63 after introduction. Thereafter, GMT increased from 6.5 to 19.8 during days 63 to 99, and was also enhanced from 19.8 to 26.6 from day 99 to 199 post-introduction.

IHA antibody titers of 14 calves in group B are exhibited in Fig. 1 (2). As is clear in this figure, antibody titers 1:8 to 1:128 were demonstrated in 10 (71%) calf sera on the 59th day. A significant increase ($p < 0.01$) of GMT from 4.2 to 12.5 was indicated during days 29 to 59 after introduction, and it also ascended from 12.5 to 33.8 from day 59 to 184 after arrival.

Detection of IHA antibodies in sera taken on the day of arrival and thereafter of 18 calves in group C was conducted. The results obtained are shown in Fig. 1 (3). For preventing calf pneumonia associated with *M. bovis*, on the basis of antibiotics sensitivity tests of the isolates, all calves of this group were injected with the leucomycin (Tanabe

Table 1. Antibody titers to *M. bovis* in normal and pneumonic calf sera measured by IHA and MI tests

Diagnosis	Calf No.	IHA titers	MI ^{a)} titers
Pneumonia	1	128	320
	2	64	320
	3	32	40
	4	128	320
	5	64	80
	6	64	40
	7	64	. ^{b)}
	8	128	80
	9	.	10
Normal	1 ~ 12	.	.

a) Metabolism inhibition test.

b) A point exhibits ≤ 4 of IHA titer or ≤ 5 of MI titer.

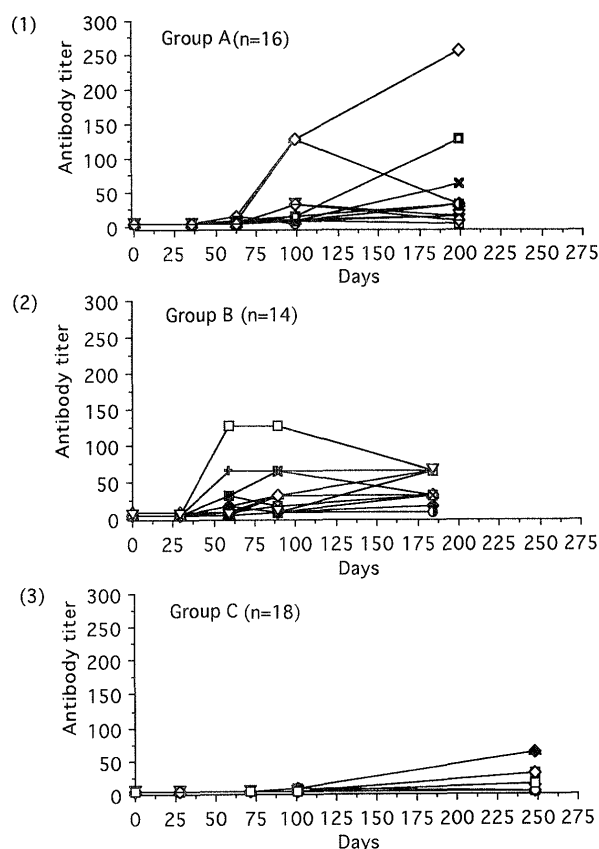


Fig. 1. Antibody response to *M. bovis* of calves in groups A, B and C. IHA antibody titers of calves in groups A (16 calves), B (14 calves) and C (18 calves) were plotted in (1), (2) and (3), respectively.

Pharmaceutical Co., Ltd.) at a dosage of 8 mg/kg intramuscularly everyday from days 28 to 31 after their introduction. As is clear in the figure, no antibodies were detected in the sera taken on days 0, 28 and 71, but an antibody titer of 1:8 was shown in 5 (28%) sera taken at day 101, and titers from 1:16 to 1:64 were obtained in 6 (33%) sera on day 248 post-introduction. A significant rise ($p < 0.05$) of GMT from 4.9 to 9.2 was observed during days 101 to 248 after introduction, and we consider that the preventive administration of the antibiotics effective against the pathogens seemed to delay the outbreak of the *M. bovis* infection.

Throughout the present experiment, all calves exhibiting some symptoms such as coughing, nasal discharges and diarrhea were treated immediately. Nevertheless, 11 calves

(41%) in group A and 3 (17.6%) calves in group B died of diarrhea and pneumonia during days 14 to 63 after introduction. All calves in group C survived, though they did show slight coughing and nasal discharges. In group C, it was considered that the administration of antibiotics might have been effective against both *M. bovis* and the other organisms, therefore, none of the calves died of pneumonia and diarrhea, even though infection with *M. bovis* was indicated by antibodies detected from day 101 to 248 after introduction. From the results, it may be suggested that preventive therapy, before the showing of symptoms, could delay the outbreak of pneumonia or diarrhea in calves, and as a result the prevention of the diseases might be possible.

In the case of experimental tracheal inoculation in calves [5, 6], an antibody against *M. bovis* was demonstrated on day 21 after infection, and in another case of experimental inoculation, reported by Bennett and Jasper [2], an antibody response to *M. bovis* in sera of mastitis bovine was also observed on day 21 after inoculation. From the present and reported results, and if an antibody titer 1:8 was regarded as a positive level, it is suggested that infection of the test calves with *M. bovis* might have occurred from day 38 to 42 in groups A and B, and in the case of group C, from day 80 to 227 after their introduction.

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