PARASITISM

Correlation between anti-*Babesia bovis*, *Babesia bigemina* and *Anaplasma maginale* antibodies from calved cows and the serum immunoglobulins in calves obtained via colostrum.

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INTRODUCTION

The tick-borne diseases *Babesia bigemina*, *Babesia bovis* and *Anaplasma* spp. are endemic in Brazil, resulting in high economic losses of livestock and production each year. Calves younger than 2 months are more resistant to bovine babesiosis due to maternal antibodies they receive through colostrum from cows immune to babesiosis. IgG is the main immunoglobulin found in the colostrum, being absorbed by calves in the first six hours after birth. Calves younger than 6 months are more resistant to anaplasmosis irrespective of the immune status of the cows. Calves separated from their mothers after birth, and being fed with bottles or buckets, may receive lower quantities of colostrum and most likely absorb insufficient antibodies from their mothers. Consequently, they would be more susceptible to pathogens such as babesiosis.

OBJECTIVE

The objective was to study the correlation between anti-*Babesia bovis*, *Babesia bigemina* and *Anaplasma maginale* antibodies from calved cows and the serum immunoglobulins in calves obtained by colostrum using an indirect ELISA test.

MATERIALS AND METHODS

Blood samples from 25 cows and 25 calves were collected on a dairy farm in the south-eastern part of Brazil. The animal management system was of type “compost barn”, used for pregnant and lactating females. In addition, grazing of native field was allowed from weaning to puberty of calves. Blood samples from the cows were collected 72 hours before calving and on the day of calving. Blood samples from the calves were collected on the day of birth until 84 days after birth at intervals of 14 days. EDTA blood was used for blood extensions and hematological parameters (total erythrocyte and leukocyte , hemoglobin concentration and globular volume) and whole blood serum to prepare the indirect ELISA assay. Antibody titers were determined by ELISA using positive controls of bovine sera with high parasitemia and negative controls from sera from newborn animals that did not ingest colostrum and were negative on PCR and ELISA / RIFI. The microplates were sensitized with crude *B. bigemina* and *B. bovis* extract antigens and purified from *Anaplasma*. Anti-bovine IgG labeled with alkaline phosphatase conjugate produced in rabbits was used. Statistical analysis was performed according to the type of comparison using the Fisher and Chi-square ($\chi 2$) tests. The ELISA cut-off was established with a 99.99% of confidence. The blood samples and the stages of parasites were evaluated and the parasitemia determined.

Specific antibodies for *Babesia bigemina* and *Babesia bovis* were detected in a few cows whereas no antibodies against any of the parasites were detected in the calves, suggesting that there was no passive transfer of antibodies to the neonates from their mothers via colostrum.
The type of management on the property may have influenced this result due to the reduced contact of animals with the vectors, as well as the low intake of colostrum.

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RESULTS

Erytrocytes parasitized with *Babesia bigemina* were found in seven cows (28%). *Anaplasma* spp. was not found in cows. No calves showed positivity for the parasites by blood extention **(Table 1)**.

Parasitemia (counted by the number of parasitized cells in 200 microscopic fields) of all positive cows with *B. bigemina* was observed and expressed as a percentage and ranged from 0.5% to 1.5%.

Hematological parameters were evaluated, and no changes were observed in the animals. No cows or calves showed changes in hematological parameters. The values obtained were within the normal range (reference values).

In cows, only the presence of IgG antibodies to *B.bigemina* (5/20%) and *B.bovis* (2/8%) were observed, with significantly different results ($p < 0.0001$). IgG antibodies to *A. marginale* were not observed.

In calves, no seropositivity for the parasites analyzed was detected. Although animals were not positive for *A. marginale*, there was a significant difference in medians Optical Density of IgG recorded for cows and female calves (OD = 0.115 and OD = 0.088, respectively) **(Figure 1)**.

No positive correlations were observed for cows and calves between IgG antibodies to *A. marginale*, *Babesia bigemina* and *B. bovis* ($p > 0,005$) **(Figure 2)**.

TABLE 1. Positivity for *Babesia bovis*, *B. bigemina* and *Anaplasma* spp. in blood samples from cows and calves.

Analyzed groups	Positivity			%		
	B.bovis	*B.bigemina*	*Anaplasma* spp	*B.bovis*	*B.bigemina*	*Anaplasma* spp
Cows	(2/25)	(5/25)	(0/25)	8%	20%	0%
Calves	(0/25)	(0/25)	(0/25)	0%	0%	0%

FIGURE 1. IgG antibody from *A. marginale* (A), *B. bigemina* (B) and *B. bovis* (C). The results were obtained in an optical density study evaluated through ELISA applied to the sera of cows and calves.

Medians Optical Density are indicated by horizontal bars; the cut-off threshold is indicated by the horizontal dotted line (A) 0.237, (B) 0.228 and (C) 0.252, respectively. *** $p < 0.001$, **** $p < 0.0001$ were determined through Mann-Whitney Test.

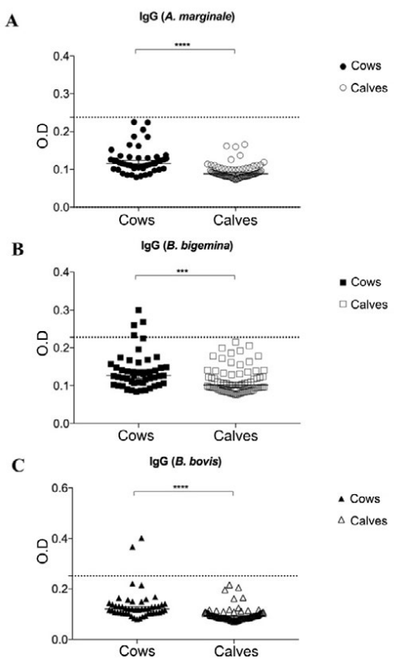
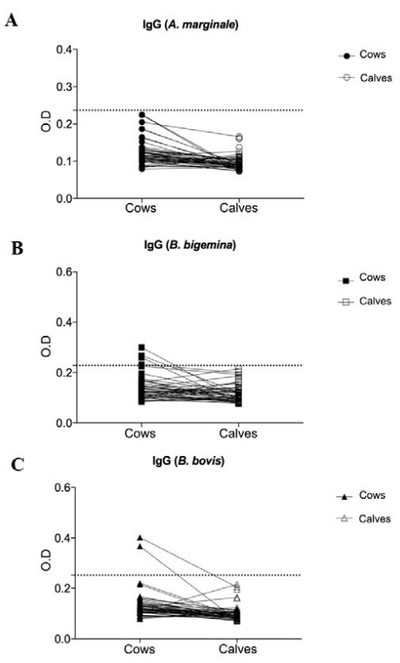


FIGURE 2. Correlation between IgG antibody levels from *A. marginale* (A), *B. bigemina* (B) and *B. bovis* (C). The results were obtained in an optical density study evaluated through ELISA applied to sera of cows and calves. The cut-off threshold is indicated by the horizontal dotted line (A) 0.237, (B) 0.228 and (C) 0.252, respectively. The correlation coefficient (r) was calculated based on the Spearman Correlation Test.



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