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Observation on natural resistance to *Babesia bigemina* in calves

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Inverse age susceptibility occurs in *Babesia* infections in cattle wherein young animals are naturally resistant while older animals are fully susceptible. Calves in enzootic areas have a strong natural resistance to babesiosis, which is attributed to passive transfer of antibodies via the colostrum. These calves that have latent infection of babesiosis are free of clinical signs and have a low parasite density. Intercurrent diseases activate these latent infections resulting in recrudescence of the initial latent infection. During the course of establishing experimental *Theileria annulata* infections in cross- bred calves for immunochemical characterization studies, recrudescence of the initial latent infection with *Babesia bigemina* occurred resulting admixed infections of *Theileria annulata* and *Babesia bigemina* in calves which presented in this paper.

Crossbred calves (Jersey crosses) of 2-6 months old were procured from an organized farm (Livestock Research Station, Kattupakkam) and were housed in tick proof conditions for establishing experimental *Theileria annulata* infections. Peripheral blood smear of the above experimental calves were thoroughly screened for 7-10 days for the presence of blood parasites and they were apparently free of haemoprotozoans before their use in the experiment. Six crossbred calves were exposed to *Theileria annulata* infected ticks. Adult *Hyalomma marginatum isacci* ticks (10-15 ticks) whose nymphal instars had previously fed on *T. annulata* infected calves were allowed to engorge on the ears of calves.

All the 6 calves that were exposed to *T.annulata* infected ticks developed theileriosis. Schizonts and merozoites of *Theileria annulata* were seen after 10-15 days and 12-23 post infections respectively. In 4 of the 6 calves (calves 45,40,97, and 82), *Babesia bigemina* were detected in the peripheral blood smear after 40,52,15 and 41 days respectively. In all 4 calves, the parasitaemia of *Babesia bigemina* did not exceed 1-2% and they were detected for a period of 3-8 days in their peripheral blood. In 2 calves, (nos 75 and 69) *Babesia bigemina* were noticed only after splenectomy and the parasites were evident after 6 and 8 days post splenectomy. Clinical signs such as rise of temperature, swelling of superficial lymphnodes, oculo-nasal discharges and swelling of eyelids that are characteristic of theileriosis were noticed in the calves but haemoglobinuria that is characteristic of bovine babesiosis caused by *Babesia bigemina* was not observed in the above calves. Recrudescence of latent infection with *Babesia bigemina* did not appear to influence the course of theileriosis in young calves. All the experimental calves showed the presence of piroplasm of *Theileria annulata* for at least 90 days from the date of tick exposure.

As inverse age resistance is known to occur in *Babesia* infections in young calves, it is evident that these calves would have had latent infections of *Babesia bigemina* and upon subsequent infection and development of theileriosis, recrudescence of the initial latent infection would have occurred resulting in concurrent infection of *Theileria annulata* and *Babesia bigemina*. Inter-current diseases or splenectomy have been reported to cause recrudescence of latent *Babesia* infections. Hall (1960) who re-examined the phenomenon of premunition in respect of young calves with *Babesia bigemina* recorded that only calves born of immune mothers were resistant to *Babesia bigemina*, whereas those born of non-immune mothers developed babesiosis when challenged with infective blood or ticks which made him to opine that passive transfer of antibodies via the colostrums is probably responsible for the natural resistance in young calves. Inverse age resistance is reported to decline after 6-9 months of age (Hall 1963) and in the present case, as the calves were only 2-6 months old and were from enzootic areas, there could have been a strong natural resistance to *Babesia bigemina* and hence these calve were apparently free of babesiosis and did not show the presence of *Babesia* merozoites in the peripheral blood during pretrial screening.

The possibility of ticks being the source of infection for *Babesia bigemina* may also arise, but it is a known fact, that *Hyalomma* spp. of ticks do not transmit *Babesia bigemina* and only *Boophilus* spp. of ticks are vectors for *Babesia*

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bigemina. In the present study, *Hyalomma* spp. of ticks, which are natural, vectors for *Theileria annulata* were used and hence the possibility of *Hyalomma* spp. of ticks being the source for *Babesia* do not arise.

In 2 experimentally infected calves, splenectomy resulted in recrudescence latent *Babesia bigemina* infection. Presumably, the balance in latent infections is provided by the host reticulo-endothelial system in opposition to the parasite and in the present case, splenectomy would have resulted in breakdown in immunity and recrudescence of *Babesia* infection. Antibodies against *Babesia* may be present in the blood but such blood has been shown to be infective by injection to splenectomized calves (Hall 1963).

The above study has shown that latent infections of *Babesia bigemina* in calves in enzootic areas may be activated by intercurrent diseases or by splenectomy. The above problem was solved through administration of diminazene aceturate to eliminate the latent *Babesia* infections in young calves. This phenomenon of inverse age susceptibility has important epidemiological implications since young calves in enzootic areas although apparently free of babesiosis may act as a source of infection for ticks.

SUMMARY

Crossbred calves that were exposed to *Theileria annulata* infected *Hyalomma marginatum isaaci* ticks, developed a mixed infection of *Theileria annulata* and *Babesia bigemina*, owing to recrudescence of initial *Babesia bigemina* infection that was latent in young calves. The development of concurrent *B.bigemina* and *T.annulata* infection is presumably due to activation of the latent *B.annulata* caused by stress associated with development of theileriosis. Piroplasm of *B.bigemina* were detected only after the appearance of *T.annulata* in the peripheral blood and the parasitaemia of *B.bigemina* did not exceed 1-2%. The recrudescence of *B.bigemina* in the calves did not influence the course of theileriosis and clinical signs characteristic of theileriosis were evident in the experimental calves.

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