Rebound Phenomenon of Parasitemia in Splenectomized Calves Primarily Infected with *Theileria sergenti*

Satoshi KAWAMOTO, Kiyoshi TAKAHASHI, Misao ONUMA, Shuichi KUBOTA, Hirokazu NEJO, Takashi KUROSAWA, and Mitsuo SONODA

Department of Veterinary Internal Medicine, School of Veterinary Medicine, Rakuno Gakuen University, Ebetsu, Hokkaido 069 and Department of Epizootiology, Faculty of Veterinary Medicine, Hokkaido University, Sapporo, Hokkaido 060, Japan

(Received 5 December 1989/ Accepted 9 September 1990)


**KEY WORDS:** parasitemia, splenectomized calf, *Theileria sergenti*.

For a longwhile, the theileriosis has brought various kinds of troubles to susceptible grazing cattle in Japan. This protozoan disease is caused by *Theileria sergenti* and characterized mainly by anemia, transitory fever and occasionally subsequent undergrowth in convalescence [3]. It is extremely important to make clear the pathogenesis of *T. sergenti* infection for the development of vaccine and efficient measures against the disease. Therefore, first of all, the clinical signs and hematological changes especially the rebound phenomenon of parasitemia on *T. sergenti* in fecion in splenectomized calves were investigated.

Three Holstein Friesian calves (No. 1, 2, and 4 aged 3–5 months) and a Japanese Black calf (No. 3 aged 5 months) were splenectomized and used for experiment. Larvae of *Heamaphysalis longicornis* were fed on calf experimentally infected with *T. sergenti* Chitose strain, which was kept through ticks and calves in our laboratory. Subsequently, two hundred nymph ticks were attached to each of experimental calves by means of ear bag method. No antiproplasm drugs were administered to the calves during the experimental periods at all.

Pyrexia rising to 40°C or over, as a primary sign, was observed in 2 of 4 calves during the incubation periods. The proplasms were detected in the peripheral erythrocytes of experimental calves on the 11–13th day post inoculation. The changes of parasitized erythrocyte (PE) rates, as a criterion of parasitemia, were shown in Fig. 1. The general clinical signs, such as depression, anemia and jaundice of visible mucosa, were aggravated in proportion to the increase of PE rates. PE rates were kept under 0.1% for a week, subsequently increased and formed the primary peak, ranged 0.6, 4.1, 4.6, and 12.9% respectively. During this period, No. 4 did not show any significant symptoms, while No. 2 and 3 were lying down and fell into critical condition (Fig. 2). Thereafter, the PE rates of all calves decreased to 1% or less. After one week rebound phenomena on PE rates were observed, and formed the secondary peak. Hematocrit (Ht) value fell down to about 10%, and severe signs of theileriosis were observed in all calves during the secondary peak of parasitemia. No. 3 died on the 45th day post inoculation. There was an inverse correlation between Ht and PE rates (Fig. 1). The antibody against *T. sergenti* in the serum began to be detected at 3 weeks post inoculation by the indirect fluorescence antibody test [5], and rapidly increased within a week. Subsequently the antibody titers were kept at × 12,800 to × 25,600.

The clinical signs of *T. sergenti* infection have been reported [3, 4]. According to these reports, pyrexia as a primary sign was observed in the last stage of incubation period. The proplasms of *T. sergenti* usually appear in the peripheral circulation 2–3 weeks after the infestation with the vector ticks, and the symptoms as pyrexia, anemia, and anorexia were observed in parallel with the increase of PE rates [4]. In case of the cattle recovered from acute anemia, PE rate decreased and conversely degree of specific antibody increased followed by being maintained at high level [5]. Apparently, various kinds of stress, such as parturition and a sudden rise or drop of
atmospheric temperature, causes recrudescence in recovered cattle [5]. But the rebound phenomenon is not considered to develop due to the stress, because it regularly occurred in a short period after remarkable decrease of PE rate and no specific stress was observed during this period. It seemed that the rebound phenomenon was enhanced in calf under the immunosuppressive condition induced by splenectomy, but it would actually occur in the intact cattle.

It is considered that in the case of Babesia argentina [1] and Plasmodium falciparum [2] infections, antigenic variations of their intraerythrocytic stages induced the recrudescence of these diseases. However, since etiology of rebound phenomenon of T. sergenti is not yet clarified, further investigation is necessary to elucidate this phenomenon.

ACKNOWLEDGEMENTS. This investigation was supported in part by Grant-in-aid for Scientific Research Nos. 61560357 and 6348004 from Ministry of Education, Science and Culture of Japan.

REFERENCES