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Diagnosis and therapeutic management of *Theileria* induced secondary peritonitis in bovines

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Abstract
Cattle presented with the history of digestive disorders along with lymphadenitis, anaemia and pyrexia to the large animal medicine unit of VCRI, Tirunelveli during the time period from January 2016 to December 2016 were taken for the present study. 40 cases were found to have such ailments. 21 animals among them were found to be positive for *Theileria annulata*. Out of which, dung samples of 12 animals showed positive result for occult blood test, suggestive of ulcerated abomasum and intestine. Liptak test, radiography, ultrasound examination, haematological analysis, peritoneal fluid analysis was done to rule out other etiologies. Based on the results of these diagnostic aids, twelve animals were found to have peritonitis. The affected twelve animals were divided into two groups. One group was treated with regular Buparvaquonone therapy. Along with Buparvaquonone, the animals in the other group were treated for septic peritonitis and abomasal ulcers. Efficacy of the treatment were compared with normal animals.

Keywords: lymphadenitis, peritonitis, *Theileria annulata*, Buparvaquonone

Introduction
Theileria annulata and *Theileria parva* are considered to be the most pathogenic species of Theileria. In India the annual loss reported due to tropical Theileriosis is approximately US$ 800 million (Devendra, 1995) [1]. Mortality in Theileria is mainly due to anaemia (Fadden *et al.*, 2011) [2]. Apart from haemolytic anaemia, animals which develops abomasal ulcers have hemorrhagic anaemia. Further the condition is worsened in animals which develop secondary peritonitis (Fadden *et al.*, 2010). In cattle, peritonitis is often attributable to a reticular foreign body that has penetrated the reticular wall, rarely caused by the penetration of the wire through the skin, with subsequent migration into the peritoneal cavity (Sojka *et al.*, 1990) [5]. The present paper describes the diagnosis and therapeutic management of *Theileria* induced secondary peritonitis in bovines. Occurrence of ulcers and secondary peritonitis in animals affected with *Theileria* and effectiveness of use of antiulcer drugs and antibiotics in such cases were also analysed in present study.

Materials and Methods
The study was conducted in Veterinary Medicine division of Veterinary College and Research Institute, Tirunelveli during the time period of January 2016 to January 2017. Animals with the history of digestive disorders along with lymphadenitis, anemia and pyrexia were taken for the present study. General clinical examination was performed in the animals that had pyrexia, Lymphadenitis and signs of peritonitis. Liptak test was done as per standard procedure to rule out Abomasal displacement. Occult blood test was performed to confirm the presence of ulcer. X-ray, Ultrasound examination were used to rule out other possible etiologies and to confirm the presence of peritonitis. Peritoneal fluid, Dung sample, peripheral blood smear, serum and whole blood were collected. Hematology was analyzed using Auto analyzer. Biochemical analysis was done as per standard procedures using semi auto analyzer.

Results and Discussion
40 animals which had the history of anorexia, reduced milk yield, abnormal dung and fever were taken for the present study. These animals had pale mucous membrane, abnormal rumen motility, lymph node enlargement, pyrexia up to 105 ° F and abnormal dung. 21 out of 40 animals were found to be positive for *Theileria annulata* on blood smear examination. (Fig. 1). Breed wise occurrence of *Theileria* is depicted in Table 1.

Occurrence of *Theileria* is found to be more in cross bred animals (95.24%).

Table 1: Breed wise Occurrence of Theileria

Breed	Number	%
Cross bred	20	95.24
Indigenous	1	4.76
Total	21	100

21 animals that are positive for *Theileria annulata* were subjected to occult blood test to confirm the presence of Ulcer. Among 21 animals, 12 animlas showed positive result for occult blood test. Those animals were then subjected X-ray and Ultrasound examination to confirm the presence of peritonitis (Fig. 2 and 3). Six out of twelve animals were found to have peritonitis. Among those six animals two animals had diffuse peritonitis. The results were shown in Table 2.

Table 2: Occurrence of peritonitis

No. of animals Taken for study	Positive for *Theileria annulata*	Positive for occult blood test	Positive for Peritonitis	
40	21	12	6	
			Localized	Diffuse
			4	2

Then the animals were divided in to three therapeutic groups. Group III served as control. Twelve animals which were positive for occult blood test was equally divided and allotted in Group I and II. Among the six animals in each therapeutic groups, three animals had ulcers without peritonitis, two animals had ulcers with peritonitis and one animal with ulcer and diffuse peritonitis (Table 3). Group I was treated with regular Buparvaquonone therapy. Along with Buparvaquonone, the animals in the group II were treated for septic peritonitis and abomasal ulcers. Buparvaquonone was given at the dose rate of 3.5 mg/Kg IM and Penicillin was given at the dose rate of 22000 IU/kg BW IM 8 hours (Radostits *et al.*, 2009) [4]. In addition supportive therapy was also given to those animals.

Table 3: Therapeutic Groups

	Group I- Buparvaquonone therapy		Group II- Buparvaquonone therapy + Penicillin + Pantaprazole		Group III- control Group
Ailment	**No. of animals**	**No. of days taken for recovery**	**No. of animals**	**No. of days taken for recovery**	
Ulcer	3	14	3	14	6
Ulcer + Localized Peritonitis	2	21	2	14	
Ulcer + Diffuse Peritonitis	1	Collapsed on 2nd day of therapy	1	Collapsed on 4th day of therapy	
Total	6		6		

Two animals were diagnosed to have diffuse peritonitis. Each one of them were placed in each treatment regimen group. Both of the animals collapsed despite of vigorous treatment and supportive therapy. This is because in acute diffuse peritonitis, the toxemia is profound; in local inflammation it is negligible. (Radostits *et al.*, 2009) [4]. Postmortem examination was also performed in those animals to find out the extend of peritonitis (Fig. 4). Recovery of animal was assessed based on restoration of normal clinical and hemato-biochemical parameters. Animals that had ulcers without peritonitis showed full recovery on day 14 irrespective of therapeutic group. But the animals with peritonitis recovered better when treated with Penicillin and Pantaprazole. The study shows occurrence of *Theileria* is more in cross bred animals that too in early lactation. The findings were similar with findings by (Nair *et al.*, 2011) [3].

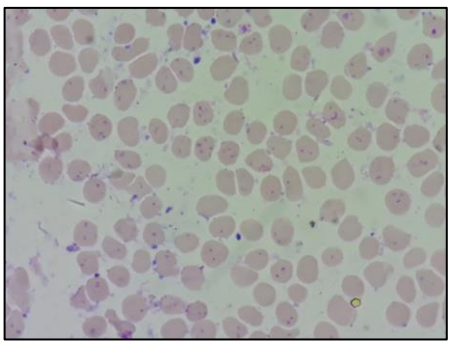

Fig 1: *Theileria* in Blood smear

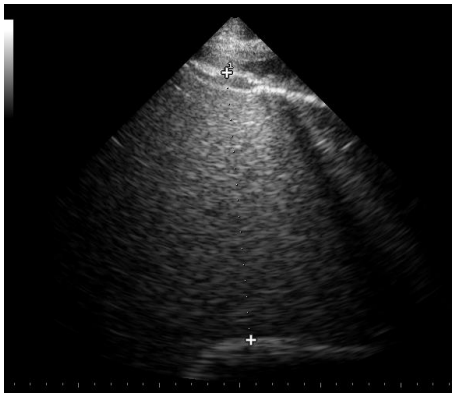

Fig 2: Ultrasound examination- Hyperechoic fibrinous fluid

Fig 4: Diffuse Peritonitis observed in post mortem examination

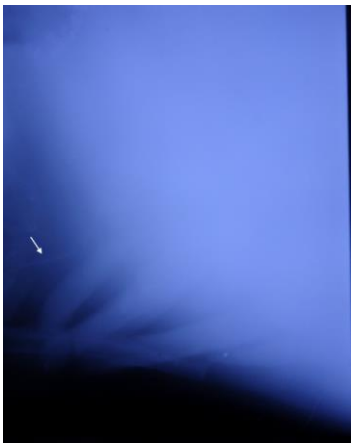

Fig 3: Peritonitis- Ground glass appearance in X-ray

Conclusion

Based on the present study, abomasal ulcer should be considered as a serious complication of Theileriosis and Occult blood test can be employed as a diagnostic tool in diagnosing the presence of ulcer in such cases. Peritonitis is one of the major complication occurring secondary to ulcer. Use of antiulcer drugs and antibiotics helps in effective recovery in cases of *Theileria* induced secondary peritonitis.

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