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Prevalence of *Theileria orientalis* in crossbred cattle of Kamrup district of Assam

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Abstract

Theileriosis is a tick borne disease of cattle caused by different species of *Theileria*. The present study was carried out to examine the prevalence of *Theileria orientalis* among crossbred cattle in relation to season, age and breed in Khanapara locality of Kamrup District of Assam, India. A total of 563 crossbred cattle were screened, out of 563 crossbred cattle 275 (48.84%) cattle were positive for *Theileria orientalis*. The prevalence of *Theileria orientalis* were recorded 48.84%. The prevalence rate of *Theileria orientalis* were highest (53.85%) in the monsoon season followed by pre-monsoon (48.84%), winter (45.74%) and the lowest (42.27%) rate was in post-monsoon season. The highest (54.04%) prevalence was recorded among Holstein Friesian crossbred, followed by Jersey crossbred (50.26%) and the lowest (41.18%) prevalence was recorded among Sahiwal crossbred. The higher (60.19%) prevalence of *Theileria orientalis* was recorded among aged group of above 3 years old, and lowest (34.54%) prevalence was recorded among age group of up to 3 years old.

Keywords: *Theileria orientalis*, crossbred cattle, prevalence, Giemsa stain, Assam

Introduction

Theileria is an intracellular haemoprotozoan parasites belonging to the phylum *Apicomplexa*. The parasite was transmitted normally through tick bite, but mechanical transmission was carried out by biting flies (*Stomoxys calcitrans*) and sucking lice have also been reported (Fujisaki *et al.*, 1993) [1]. Cattle are infected by many species of *Theileria* organism viz. *Theileria annulata*, *Theileria parva*, *Theileria orientalis* etc. *Theileria orientalis* has been detected frequently in Assam, India (Kakati *et al.*, 2015) [6]. Clinical signs of infected animal include weakness, reluctant to walk, abortion, jaundice, pale mucous membrane, pyrexia and elevated heart and respiratory rate (Izzo *et al.*, 2010) [3]. In the infected animal Piroplasm can be detected in the erythrocytes at approximately 10 days of post infection. The pre-immuned animals there is generally a low level of parasitaemia was observed (Shimizu *et al.*, 1992) [9]. Although, the infected animals can recover from *T. orientalis* infection, but the parasites may persist for remaining part of life. It was recorded that relapses can occur during the times of stress such as pregnancy, lactation or rapid changes of environmental conditions (Sugimoto and Fujisaki 2002) [10].

Materials and Methods

The research study was carried out from 1st March 2016 to 28th February 2017 for a duration of 1(one) year. The study period was divided into 4 (four) seasons viz., Pre-monsoon (March-April- May), Monsoon (June-July-August-September), Post-monsoon (October-November) and Winter (December-January-February).

Blood samples were collected from 51 organized and unorganized farms in Khanapara locality of Kamrup District of Assam was taken for research study. The samples were collected from the animals those exhibiting clinical symptoms like fever, respiratory distress, loss of appetite, reduce milk yield, nasal discharge, depression, pale mucous membrane etc. A total of 563 numbers of suspected crossbred cattle, 563 numbers of blood sample were collected from jugular venipuncture with the help of a precision needle. Collected Blood samples were place into a vacutainer vials containing disodium salt of ethylene diaminetetra acetic acid (Na₂EDTA) as anticoagulant in the proportion of 1mg/ml of blood sample. Collected samples were brought in to the laboratory for parasitological examinations.

A drop of blood sample was taken on a clean grease free microscope glass slide, spread by the edge of another slide at an acute angle, air dried and fixed by absolute methanol for 2-3 minutes. The fixed smear were stained by 10% Giemsa's stains (1 ml of stock Giemsa's stains was diluted in 9 ml of distilled water or phosphate buffered saline-PBS) for 30 minutes. Excess stain was removed by distilled water. The slide were air dried and examined under a compound microscope using oil immersion objective x 100. Each slide was examined covering about 50 microscope fields for detection of *Theileria orientalis* piroplasm.

Results

A total of 563 blood sample were collected from dairy cattle during the study period from 1st March 2016 to 28th February 2017. Out of 563, 275 (48.84%) were detected positive for *Theileria orientalis*. The animal positive with *T. orientalis* reveals the presence of different shaped viz, comma shaped (Fig. 1.A), crescent shaped (Fig. 1.B), and rod shaped (Fig 2).

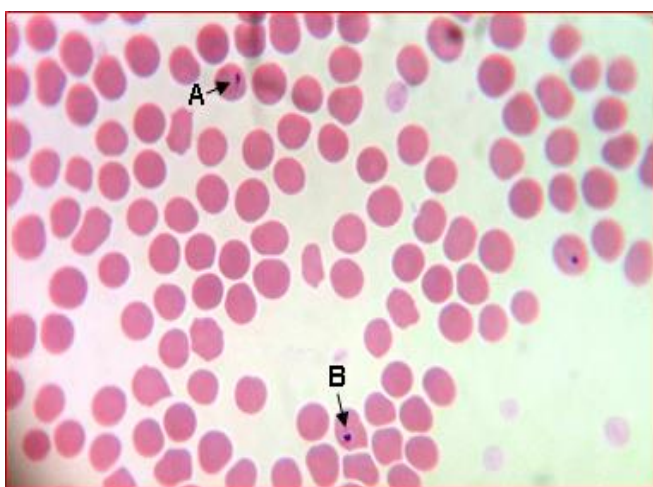


Fig 1: Picture showing intraerythrocytic *T. orientalis* in Giemsa stained blood smear (x1000) a: Comma shaped b: Crescent shaped



Fig 2: Picture showing intraerythrocytic rod shaped form of *T. orientalis* in Giemsa stained blood smear (x1000)

The highest prevalence rate of *Theileria orientalis* was in monsoon season (53.85%) followed by pre-monsoon (48.84%), winter (45.74%) and post-monsoon (42.27%) season.

Table 1: Season-wise prevalence of *Theileria orientalis* in cattle.

Season	No. of animal examined	Nos. positive	Prevalence (%)
Pre-monsoon	129	63	48.84
Monsoon	208	112	53.85
Post-monsoon	97	41	42.27
Winter	129	59	45.74
Total	563	275	

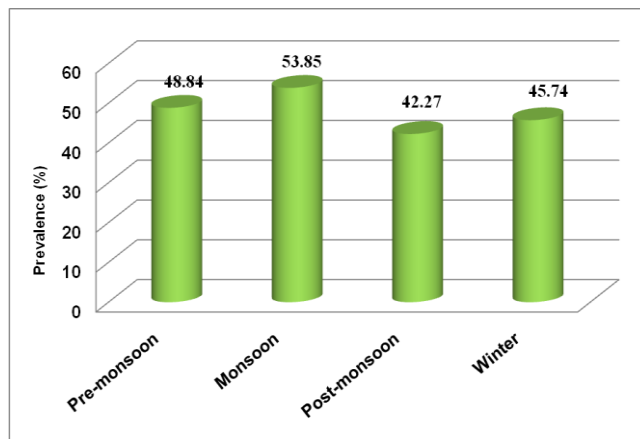


Fig 3: Season-wise prevalence of *Theileria orientalis* in cattle.

Age wise prevalence was recorded highest (60.19%) in the age groups of above 3 years old, and the lowest (34.54%) prevalence was recorded among the age group of up to 3 years old.

Table 2: Age-wise prevalence of *Theileria orientalis* in cattle

Age groups	Nos. of animal examined	Nos. positive	Prevalence (%)
Up to 3 years	249	86	34.54
Above 3 years	314	189	60.19
Total	563	275	

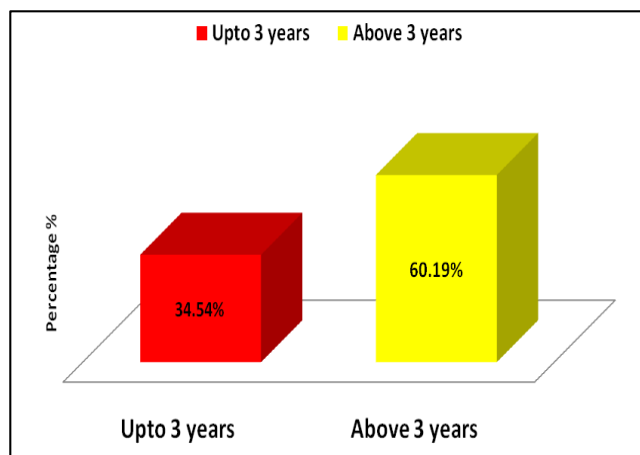
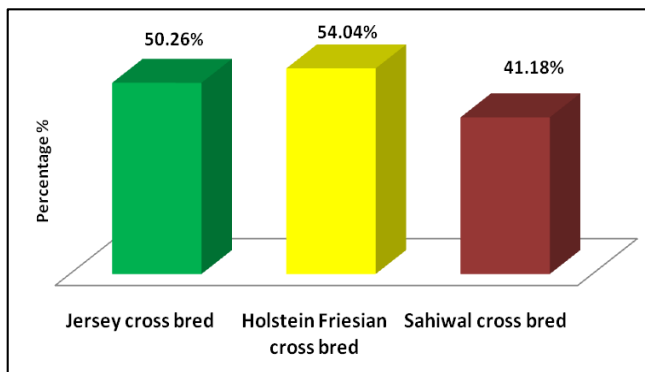


Fig 4: Age-wise prevalence of *Theileria orientalis* in cattle

Theileria spp. were prevalent among different breeds of cattle. The highest prevalence was (54.04%) recorded among Holstein Friesian crossbred, followed by Jersey crossbred (50.26%) and the lowest prevalence was (41.18%) recorded among Sahiwal crossbred.

Table 3: Breed-wise prevalence of *Theileria orientalis* in cattle

Breed	Nos. examined	Nos. positive	Prevalence (%)
Jersey crossbred	195	98	50.26
Holstein Friesian crossbred	198	107	54.04
Sahiwal crossbred	170	70	41.18
Total	563	275	

**Fig 5:** Breed-wise prevalence of *Theileria orientalis* in cattle.

Discussion

Tick-borne disease of cattle remain an important impediment to livestock development in Assam, India. Theileriosis in particular is considered as a major obstacle to the development of dairy industry. The study provide prevalence of *Theileria orientalis* among the crossbred cattle in and around Khanapara, Assam.

In the present study revealed that prevalence of *T. orientalis* in cattle was reported (48.84%). Kakati (2013) [5] reported (42.6%) prevalence of *T. orientalis* in Assam which is corroborated with the present finding.

In the current study, theileriosis occurred throughout the year with some seasonal variation. The highest (53.85%) prevalence was in monsoon season, followed by pre-monsoon (48.84%) and winter (45.74%). The lowest prevalence was in post-monsoon season (42.27%). Kakati (2013) [5] recorded highest prevalence in pre-monsoon and monsoon (42.10%) season which resemble with the present finding. The prevalence of Theileriasis in post-monsoon and winter was higher than the finding of Kakati (2013) [5] which might be due to increased temperature and humidity during the study period which favors the growth of tick population (Haque *et al.*, 2010) [2].

The result indicate higher susceptibility of older group of cattle to theileriosis than young. Prevalence was higher (60.19%) in the age group of above 3 years and the lowest (34.54%) in the age group of up to 3 years. The higher prevalence of theileriasis in the age group of above 3 years might be due to stresses, increased number of lactation, weakening of body immune system along with presence of some diseases which depress the immunity (Velusamy *et al.*, 2014) [11]. The higher prevalence of theileriasis was recorded by Velusamy *et al.* (2014) [11] in the age groups of 2-7 years and Naik *et al.* (2016) [8] recorded heighest (24.34%) prevalence of theileriasis in the age group of above 3 years. Breed wise prevalence of theileriasis was recorded highest (54.04%) in *Holstein Friesian* crossbred followed by Jersey crossbred (50.26%) and Sahiwal crossbred (41.18%). The higher prevalence of theileriasis in *Holstein Friesian* crossbred is corroborated with the findings of Velusamy *et al.* (2014) [11] and Naik *et al.* (2016) [8]. The higher prevalence of theileriasis in *Holstein Friesian* is due to high milk yielding of the breed which act as a stress factor.

Conclusion

The study revealed that theileriosis has spread among dairy cattle in Khanapara, Assam and occurrence of the disease was high (53.85%) in monsoon. Out of 563 dairy cattle 275 (48.84%) were found positive for *Theileria orientalis*. *Holstein Friesian* crossbred is highly (54.04%) susceptible to these disease followed by Jersey crossbred (50.26%) and Sahiwal crossbred (41.18%). Cattle in the age group of above 3 years is highly (60.19%) susceptible to *Theileria orientalis*.

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