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# Prevalence of theileriosis in Jaipur region

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**Abstract**
The present study was conducted to record the prevalence of Bovine Tropical Theileriosis (BTT) caused by the protozoan parasite, *Theileria* sp. belonging to the Phylum Apicomplexa. In the present study, blood samples of large ruminants suspected for theilerioisis infection were received from different veterinary hospitals from July, 2019 to June, 2022. They were microscopically examined using Giemsa stain. The blood samples were recorded on the basis of season, breed, age and sex. A total of 1000 blood samples were collected, out of which 20% samples were found infected with theileriosis. Cattle (24%) were found more prone to theileriosis infection than buffalo (8%). The season wise analysis revealed highest prevalence in summer season (33.61%) followed by rainy (18.33%) and winter (4%). The age wise prevalence was found highest in adult (30%) followed by heifers (25%) and <1years (6.66%) of age. The study revealed that female animals harbored more infection than males and cross bred, were found more infected than indigenous livestock. From the study, it was concluded that indigenous breed and younger animal population were less prone to infection than cross bred and older population. Additional care and managemental practices are required in livestock farming to avoid economic losses due to high theileriosis infection in summer and rainy season.

**Keywords:** Prevalence, theileriosis, cattle, buffalo

## Introduction
Among the four major tick borne diseases affecting cattle, Bovine Tropical Theileriosis (BTT) caused by the protozoan parasite, *Theileria annulata* is prevalent in most of the countries of tropical and sub tropical zones across Northern African, West and East Asia including Indian subcontinent as endemic disease (Chen *et al.*, 2000). Tropical Theileriosis is transmitted by tick vector Hyalomma anatolicum anatolicum. *Theileria* spp are small round, ovoid, irregular or bacilliform shaped parasites with an apical complex comprised only of rhoptries. *Theileria* sp can be found in both erythrocytes and lymphocytes of their host. The parasite is associated with infections which range from clinically inapparent to rapidly fatal (Darghouth *et al.*, 1996). Ticks are of great importance to livestock and wildlife health since they act as a vector of many infectious agents along with causing direct injury by piercing host's skin (Khbou *et al*., 2021) [8]. In tropical and sub-tropical countries, ticks and tick borne diseases cause significant adverse effects on livestock population. Variation in the environmental condition in past few years has resulted in increased temperature and humidity which is the favorable condition for the development and multiplication of ticks and hence leads to gradual increase in tick borne diseases in livestock (Kohli *et al*., 2014b) [11]. Theileriosis is one of the economically important haemoprotozoan diseases of large ruminants caused by protozoa of *Theileria* genus transmitted by Ixodid ticks leading to heavy economic losses in terms of morbidity, mortality and decreased milk production in recovered animals. Risk factor associated with stress on ruminants includes low nutrition, high production, poor hygiene and sanitation and increased rate of acaricidal resistance which intensified the adverse impact of theileriosis (Sahoo, *et al*., 2017) [17]. Prior reports of theileriosis infection from different selective areas of Jaipur have been submitted by Rialch *et al*., 2013 [16]; Kohli *et al*., 2014a [10]; Kohli *et al*., 2014b [11]; Arun *et al*., 2018 [3] and Nagar, 2018 [12]. The present study was conducted to know the prevalence of theileriosis season, age, breed and sex wise in large ruminants of different zones of Jaipur.

## Material and Methods Study

### Area and Population

The study was conducted in (Rajasthan) for a period of two years from July 2019 to June 2022. Under this study prevalence of theileriosis in large ruminants (cattle and buffalo) were recorded with respect to their breed, age and sex of animals along with season and location of animals. Among the cattle, there was two breeds i.e. indigenous cattle and Holstein Friesian (HF) crossbred while upgraded Murrah Buffalo was recorded in the study area. On the basis of their age they are grouped into 3 groups i.e. up to 1year of age (calves), 1-3 years of age (heifers) and >3 years (Adult). Blood samples of 1000 animals (cattle and 750 and buffalo 250) clinically suspected for theileriosis having symptoms like fever, anorexia, lacrymation and salivation were screened from different districts of Jaipur, India. The year was divided into three seasons - summer (March to June), rainy (July to October) and winter (November to February). Tick samples were also collected along with blood from suspected animals.

### Collection and Microscopic Examination of Blood Samples

Approximately 1 ml of blood sample was collected from Juglar Vein into BD Vacutainer® tube containing EDTA from the animals suspected for theileriosis and stored at 40 C for further examination. Blood samples were received from Teaching Veterinary Hospital, PGIVER Jaipur and from different Veterinary Hospitals of Jaipur region and were microscopically examined by Giemsa staining method. Blood smears were carefully examined for the presence of *Theileria* sp. piroplasm under oil immersion lens (100 x magnification) (Soulsby, 1982) [18].

## Result and Discussion

In the present study, a total of 1000 blood samples of animals (750 of cattle and 250 of buffaloes) showing clinical signs like fever, anorexia, pale mucous membrane, lacrymation, nasal discharge, swell lymph nodes etc. were examined from two different regions of Jaipur. The overall prevalence of theileriosis in large ruminants of Jaipur is shown in Figure 1. Out of 1000 blood samples of cattle and buffaloes screened, a total of 200 (20%) blood samples were found positive for theileriosis. Out of the positive samples 180(24%) were of cattle and 20 (8%) of buffaloes. The positive animals showed mild to moderate infection of theileriosis. The present study was in the agreement with the findings of Arun *et al*. (2014) [3] who reported higher prevalence of theileriosis in cattle (11.98%) rather than buffaloes (8.90%) from different districts of Jaipur. The high prevalence of theileriosis in cattle may be due to thinner skin and dry habitat of cattle which makes them more prone for tick infestation. Tick infestation higher in cattle than buffalo may be due to the dense hair coat on cattle and besides wallowing nature of buffalo causes dropping of ticks resulting in lower infestation rate (Khan, 1986) [6]. Host-wise seasonal prevalence of theileriosis in large ruminants was found maximum in summer season (33.61% and 10%) followed by rainy (18.33% and 6.6%) and then winter (4% and 3.3%) in cattle and buffaloes respectively as shown in Table 1. The findings are in agreement with Nagar, (2018) [12] and Khatoon *et al*. (2021) [7] who found highest prevalence of theileriosis in cattle (63.73% in Uttarakhand and 45% in Rajasthan respectively) in summer season.

Sex-wise prevalence of theileriosis infection in large ruminants of Jaipur was found higher in females than males in both host species. The overall prevalence was found to be 26.61% and 11.53% in female and male cattle respectively. On the other hand, female and male buffaloes were found 8.37% and 5.7% positive for *Theileria* sp. infection. The findings of the study are in agreement with Velusamy *et al*. (2014) [21] who reported that there is decrease in immunity in high milk yielding stage along with genetic makeup and seasonal stress in summer months as the reason for high susceptibility to haemoprotozoan infections in cattle. Overall age-wise prevalence of theileriosis in cattle and buffaloes of Jaipur was found maximum in the animals above 3 years (25.38%) followed by those between 1-3 years (20.74%) and minimum in the animals belonging to age group less than 1 year (5.71%) as shown in Table-1. Naik *et al*. (2016) [13] also reported highest prevalence in cattle of above 3 years of age (24.34%) followed by 1-3 years and <1 year of age as 23.80% and 14.28%, respectively. Durrani, 2003 [4] reported that the physiological factors like pregnancy, lactation and oestrus leads to the temporary suppression in the immunity of aged animals which causes more chances of getting infection. Morzaria *et al*. (1988) [14] recorded that there is the presence of antibodies against schizonts, sporozoites and piroplasms of *Theileria* sp. in the colostrum of immune cows and in the serum of their calves, which causes low infection of theileriosis in calves. Utech and Wharton (1982) [20] reported that young calves were more resistant to theileriosis than older cows. The breed-wise prevalence of theileriosis infection in clinical cases of cattle and buffalo of Jaipur region by blood smear examination is shown in Table-1. In this study, breeds were categorized as indigenous and cross bred in cattle and upgraded Murrah in buffalo. Out of total 150 indigenous and 600 cross bred of cattle, 13.33% and 26.66%, respectively were found positive for theileriosis infection. Khatoon *et al*., 2021 [7] also reported more prevalence of theileriosis in cross bred than indigenous cattle.

**Table 1:** Season, sex, age and breed wise prevalence of theileriosis in cattle and buffaloes of Jaipur

| | | Cattle | Buffalo | Total |
|---|---|---|---|---|
| **Parameters** | | **NP/NE (%prevalence)** | **NP/NE (%prevalence)** | **NP/NE (%prevalence)** |
| Season | Summer | 121/350 (33.61) | 13/130 (10) | 134/480 (27.91) |
| | Rainy | 55/300 (18.33) | 6/90 (6.6) | 61/390 (15.64) |
| | Winter | 4/100 (4) | 1/30 (3.3) | 5/130 (3.84) |
| Sex | Female | 165/620 (26.61) | 18/215 (8.37) | 183/835 (21.91) |
| | Male | 15/130 (11.53) | 2/35 (5.7) | 17/165 (10.30) |
| Age | <1 year | 10/150 (6.66) | 2/60 (3.33) | 12/210 (5.71) |
| | 1-3 year | 50/200 (25) | 6/70 (8.57) | 56/270 (20.74) |
| | >3 year | 120/400 (30) | 12/120 (10) | 132/520 (25.38) |
| Breed | Indigenous | 20/150 (13.33) | - | 20/150 (13.33) |
| | Cross bred | 160/600 (26.66) | 20/250 (8) | 180/850 (21.17) |

NP: Number of animals positive NE: Number of animal examined

**Conclusion of the study**

The blood samples were recorded on the basis of season, breed, age and sex. A total of 1000 blood samples were collected, out of which 20% samples were found infected with theileriosis. Cattle (24%) were found more prone to theileriosis infection than buffalo (8%). The season wise analysis revealed highest prevalence in summer season (33.61%) followed by rainy (18.33%) and winter (4%). The age wise prevalence was found highest in adult (30%) followed by heifers (25%) and <1years (6.66%) of age. The study revealed that female animals harbored more infection than males and cross bred, were found more infected than indigenous livestock. From the study, it was concluded that indigenous breed and younger animal population were less prone to infection than cross bred and older population.The present study revealed that the infection status of theileriosis in cattle was higher than buffaloes. There is a need of proper management to control this infection by proper management for tick population and prophylactic vaccination of animals by Raksha Vac-T in the flock. There must be prior screening of animals for the presence of infection in a herd so that the carrier animals can be diagnosed timely and removed from the flock. There must be a proper study to find out the vector of this disease since *Rhipicephalus* sp. was the only tick found on the infected animals. In order to reduce the rate of infection of disease, there is a need for further investigation using molecular diagnostic techniques like PCR along with proper control measures should be adopted.

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