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Incidence of haemoprotozoan diseases with hematological alteration in crossbred cattle of Ahmednagar, Nashik and Aurangabad (Ch. Sambhajinagar) districts, Maharashtra

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Abstract

A study was conducted on Incidence of Haemoprotozoan diseases and Haematological alteration in crossbred cattle Ahmednagar, Nashik and Aurangabad (Ch. Sambhajinagar) districts, Maharashtra from April, 2022 to March, 2023. A total 897 (3 districts) suspected blood samples examined at BAIF-Disease Investigation Laboratory, Kopargaon for the presence of haemoprotozoan infection by the Giemsa staining method. Total 758 samples found positive for protozoan infection. Incidence of haemoprotozoan infection was found highest for *Theileria* spp. (65.21 percent), followed by, mixed *Theileria* and *Anaplasma* spp. (14.49 percent), *Anaplasma* spp. (4.12 percent) and *Babesia* spp. (0.66 percent). Incidence of haemoprotozoan infection was higher in winter season (89.53 percent), followed by summer (86.46 percent) and less in monsoon (75.98 percent). District wise higher incidence of haemoprotozoan infection for 0-2nd lactations group, 3-5th lactations and low in above 5th lactations were 84.81%, 84.36% and 83.89% respectively. Ahmednagar district (85.18%) had higher incidence of haemoprotozoan infection. *Theileria* spp., *Anaplasma* spp., and mixed (*Theileria* spp. and *Anaplasma* spp.) infected cases shows comparatively decreasing the haemoglobin (Hb), pack cell volume (PCV), and total erythrocyte count (TEC) where as total leukocyte count (TLC) and differential leukocyte count was in the normal range (DLC). *Babesia* spp. infected cases showed comparatively decreasing the haemoglobin (Hb), pack cell volume (PCV), and total erythrocyte count (TEC) where as total leukocyte count (TLC) and differential leukocyte count in that the neutrophil cells range increased and the lymphocytes count is decreased.

Keywords: Haematological changes, haemoprotozoan, incidence, cattle

Introduction

Theileriosis, anaplasmosis, and babesiosis are the three most prevalent tick-borne haemoprotozoan illnesses infecting cattle in tropical and subtropical regions of the world (Velusamy *et al.*, 2014) [8]. Interbreeding raises the susceptibility to haemoprotozoan diseases carried by vectors. Ticks can grow and multiply in the agro-ecological and geoclimatic circumstances of the Indian subcontinent, acting as organic disease-transmission vectors (Kohli *et al.*, 2014) [4]. Animals from different parts of India have demonstrated a high frequency of parasitic hemoprotozoan (Velusamy *et al.*, 2014; Kohli *et al.*, 2014; Sharma *et al.*, 2015) [8, 4, 2]. In Asia, haemoprotozoan parasites, which are mostly spread by ticks, have a major economic impact. They have long posed a significant threat to crossbred cattle's continued existence in India (Devendra and Gardiner, 1995). Anand and Kaira districts in Gujarat undertook a seasonal study to determine the prevalence of hemoprotozoan diseases in crossbred cattle and buffalo. The results showed that the incidence of these diseases was greater in these animals (Vahora *et al.*, 2012) [9]. Between April 2022 and March 2023, the incidence of hemoprotozoan diseases in cattle was examined from the field to the Animal Disease Investigation Laboratory. The results showed that during this time, cross-bred cattle had a higher incidence of hemoprotozoan diseases. The purpose of this study was to determine the base incidence of theileriosis, babesiosis, anaplasmosis, and mixed infections in crossbred cattle in Ahmednagar, Nashik and Aurangabad districts, Maharashtra, taking into consideration seasonal variations, lactation sequences, and district-level conditions.

Materials and Methods

- Geographical area – The study was conducted in Ahmednagar, Nashik and Aurangabad
- Period- April 2022- March 2023.
- Sample collection- Total 897 suspected sample tested on the tick infestation history & clinical sign; high temp, lymph node swelling, lacrymation, anorexia etc.
- Process of blood samples- Thin blood smears was prepared and processed through Giemsa staining and observed under 100X magnification for haemoprotozoan parasites. Blood auto-analyzer was used to measure hematological parameters such as total erythrocyte count (TEC), haemoglobin (Hb), total leukocyte count (TLC), differential leukocyte count (DLC), packed cell volume (PCV), thrombocyte count, and erythrocyte indices like mean corpuscular volume (MCV) and mean corpuscular haemoglobin concentration (MCHC).

Results and Discussion

Among 897 blood examined from suspected cases, 758 (84.50%) clinical cases of cattle were found positive for haemoprotozoan infection on blood smear examination (Table No.1). Earlier from different parts of country, the prevalence

of haemoprotozoan infections in cattle ranging from 11.1 to 74.47% was reported. Among different haemoprotozoan diseases, highest (65.21%) incidence was of theileriosis (Table 1) previously recorded the prevalence of theileriosis in crossbred was 63.57% in Bihar.

Table 1: Overall incidence of haemoprotozoan infection

Screened Sample	897
Positive for protozoa	758 (84.50)
<i>Anaplasma</i> spp.	37 (4.12)
<i>Babesia</i> spp.	6 (0.66)
<i>Theileria</i> spp.	585 (65.21)
Mixed infection	130 (14.49)

Seasonal incidence of haemoprotozoan infection

Season-wise highest incidence of theileriosis was recorded during winter (81.01%) followed monsoon (59.05%) and summer (56.19%) (Table 2). In contrast to our present findings, most of the workers have reported highest incidence of haemoprotozoan diseases during either monsoon (Kohli *et al.*, 2014; Vahora *et al.*, 2012)^[4, 9] or summer (Velusamy *et al.*, 2014)^[8] and attributed it to higher tick activity during these seasons (Ananda *et al.*, 2009)^[1].

Table 2: Season wise incidence of haemoprotozoan infection (% of Incidence)

Season	Screened No.	Positive	<i>Anaplasma</i>	<i>Babesia</i>	<i>Theileria</i>	Mixed infection
Monsoon	254	193 (75.98)	6 (2.36)	3 (1.18)	150 (59.05)	34 (13.38)
Winter	296	265 (89.53)	6 (2.02)	0	240 (81.08)	19 (6.41)
Summer	347	300 (86.46)	25 (7.2)	3 (0.86)	195 (56.19)	77 (22.19)

Districts wise incidence of haemoprotozoan infection

District-wise highest incidence of haemoprotozoan infection was recorded in Ahmednagar (85.18%) followed Aurangabad

(83.91%) and Nashik (82.25%) (Table3). In Maharashtra Ahmednagar district having highest crossbred population (18th livestock census).

Table 3: District wise incidence of haemoprotozoan infection (% of Incidence)

District	Screened No.	Positive	<i>Anaplasma</i>	<i>Babesia</i>	<i>Theileria</i>	Mixed infection
Ahmednagar	641	546 (85.18)	29 (2.36)	5 (0.78)	429 (62.92)	83 (12.94)
Nashik	169	139 (82.25)	6 (2.02)	1 (0.59)	100 (59.17)	32 (18.93)
Aurangabad	87	73 (83.91)	2 (2.29)	0	56 (64.36)	15 (17.24)

Lactation stage wise incidence of haemoprotozoan infection:

Lactation stage wise highest occurrence of haemoprotozoan diseases was observed in early lactation (84.81%) followed by

late lactation (84.36%) and mid lactation (83.89%) (Table4). Haemoprotozoan diseases cause significant morbidity and mortality in dairy animals, especially bovines, which are bearing production stress along with other diseases.

Table 4: Lactation wise incidence of haemoprotozoan infection (% of Incidence)

Lactation Group	Screened No.	Positive	<i>Anaplasma</i>	<i>Babesia</i>	<i>Theileria</i>	Mixed infection
0 - 2nd	507	430 (84.81)	26 (5.12)	4 (0.78)	319 (62.91)	81 (15.97)
3rd - 5 th	211	177 (83.89)	5 (2.3)	2 (0.94)	144 (68.24)	26 (12.32)
5th +	179	151 (84.36)	6 (3.35)	0	122 (68.15)	23 (12.84)

Protozoa	Hb (gm%)	RBC (10*6/cumm)	Total WBC (10*3/cumm)	Neutrophil (%)	Eosinophils (%)	Lymphocytes (%)	Monocytes (%)	HCT (%)	MCV (fl)	MCH (pg)	MCHC (gm/dl)	Platelets (10*3/ul)
<i>Theileria</i> spp.	7.5±1.5	4.81±0.5	6.4±2.0	41.8±5.0	6.5±2.0	51.02±5.0	2.4±1.0	21.45±3.0	39.38±1.0	19.06±2.0	36.19±1.0	195±25
<i>Anaplasma</i> spp.	8.09±1.0	5.53±1.5	9.81±2.0	48.01±5.0	5.13±2.0	43.09±5.0	2.3±1.0	23±3.0	43.03±1.0	17.01±2.0	35.02±1.0	295±25
<i>Babesia</i> spp.	8.12±1.5	5.5±1.5	10.1±2.0	48±5.0	5.08±2.0	44.63±5.0	2.5±1.0	23.01±3.0	42.89±1.0	18.02±2.0	35.17±1.0	365±25
Mixed	8.11±2.3	5.5±1.5	9.84±2.0	47.84±5.0	5.14±2.0	43.25±5.0	2.3±1.0	23.02±3.0	42.09±1.0	19.01±2.0	36±1.0	300±25
Normal	10.1±2.0	6.12±1.0	9.9±2.0	35±5.0	5±2.0	43.11±5.0	2.4±1.0	30.01±3.0	48.06±1.0	15.01±2.0	33.1±1.0	385±25

Haemoglobin (Hb), pack cell volume (PCV), and total erythrocyte count (TEC) decreased significantly in

hemoprotozoal-infected study cases, while differential leukocyte count (DLC) and total leukocyte count (TLC) were

within normal limits. In cases of *Babesia* spp. infection, there was a relative drop in total erythrocyte count (TEC), pack cell volume (PCV), and hemoglobin (Hb). Conversely, total leukocyte count (TLC) and differential leukocyte count indicated an increase in neutrophil cells and a decrease in lymphocyte cells.

Conclusion

In conclusion, the likelihood of hemoprotozoan infections in cattle in the Ahmednagar, Nashik, and Aurangabad region increases everyday because of a vast tick infestation and increased numbers of high yielding crossbred cattle, whose are more prone to lactation stress.

To reduce the financial losses to the dairy business, it is crucial to concentrate on preventive measures like managing stress, controlling tick populations, and using the available vaccinations against theileriosis.

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