www.ThePharmaJournal.com

The Pharma Innovation

Nilesh S Gangurde
BAIF-Disease Surveillance
(D.S.) Laboratory, Vihar.
Gujarat, India

Shabbirrodin H Shaikh
BAIF-Disease Surveillance
(D.S.) Laboratory, Vihar.
Gujarat, India

Sachin S Waghmare
BAIF-Disease Surveillance
(D.S.) Laboratory, Vihar.
Gujarat, India

Dhananjay S Shinkar
BAIF-Disease Surveillance
(D.S.) Laboratory, Vihar.
Gujarat, India

Amol P Wagh
BAIF-Disease Surveillance
(D.S.) Laboratory, Vihar.
Gujarat, India

Incidence of haemoprotozoan and haematological alteration in crossbred cattle of Mehsana district, Gujarat

Nilesh S Gangurde, Shabbirrodin H Shaikh, Sachin S Waghmare, Dhananjay S Shinkar, Amol P Wagh

Abstract
A study was conducted on Incidence of Haemoprotozoan diseases and Haematological alteration in crossbred cattle of Mehsana district, Gujarat from April, 2017 to March, 2019. A total 2885 (6 talukas) suspected blood samples examined at BAIF-Disease Surveillance. Laboratory, Vihar for the presence of haemoprotozoan infection by the Giemsa staining method. Total 742 samples found positive for protozoan infection. Incidence of haemoprotozoan infection was found highest for *Theileria* spp. (52.70 percent), followed by *Anaplasma* spp. (41.37 percent), mixed *Theileria* and *Anaplasma* spp. (3.10 percent) and *Babesia* spp. (2.83 percent). Incidence of haemoprotozoan infection was higher in winter season (30.29%), followed by monsoon (28.10%) and less in summer (19.96%). Lactation wise higher incidence of haemoprotozoan infection for 0-2 lactations group, 3-6 lactations and low in above 6th lactations were 27.56%, 24.77% and 13.70% respectively. Mehasana taluka (38.71%) 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
The three most common tick-borne haemoprotozoan infections of cattle in tropical and subtropical areas of the world are babesiosis, theileriosis, and anaplasmosis (Velusamy *et al*., 2014) [7]. Population growth and the admission of exotic/crossbred cattle, particularly in endemic areas, have increased vulnerability to haemoprotozoan infection. Due to animal death, decreased output, and decreased working efficiency, haemoprotozoan infection results in significant losses. The vulnerability of haemoprotozoan illnesses transmitted by vectors rises by interbreeding. Ticks, which serve as organic disease-transmission vectors, can develop and multiply under the agro-ecological and geo-climatic conditions of the Indian subcontinent (Kohli *et al*., 2014) [3]. Animals from various locations of India have been shown to have a high prevalence of haemoprotozoan parasites (Velusamy *et al*., 2014; Kohli *et al*., 2014; Sharma *et al*., 2015) [7, 3, 2]. Hence this study was conducted to investigate the prevalence of haemoprotozoan infection in crossbred cattle of Mehsana district, Gujarat.

Material and Methods
Geographical area: The study was conducted in around of Mehsana district covering six (6) talukas that is Mehsana, Kalol, Mansa, Vadnagar, Vijapur and Visnagar from April 2017 to March 2019.

Sample collection: A total 2885 samples were collected from crossbred cattle from six cluster of Mehsana district, Gujarat.

Corresponding Author:
Nilesh S Gangurde
BAIF-Disease Surveillance
(D.S.) Laboratory, Vihar.
Gujarat, India

Cluster	Total suspected samples
Kalol	282
Mansa	1361
Mehsana	31
Vadnagar	7
Vijapur	976
Visnagar	228

Processing of Blood samples: Prepared thin blood smears and processed through Giemsa stained were magnified at a 100X magnification to look for any hemoprotozoan parasites. Blood auto-analyzer was used to measure a variety of hematological parameters, including total erythrocyte count (TEC), haemoglobin (Hb), total leucocyte 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).

Result and Discussion
Incidence of haemoprotozoan infections: Out of 2885 suspected blood samples examined, Giemsa stained blood samples showed that overall haemoprotozoan prevalence was 25.72%, highest prevalence of *Theileria* spp followed A*naplasma* spp. and less prevalence of *Babesia* spp and mixed infection were 52.70%, 41.70%, 3.10% and 2.83% respectively (Table 1).

Table 1: Incidence of haemoprotozoan infections in cross bred cattle

Suspected Blood Samples	Positive cases	Negative case
2885	742	2143
Protozoa		**Positive cases (% of prevalence)**
Theileria spp.		391 (52.70)
Anaplasma spp.		307 (41.37)
Anaplasma spp.+ *Theileria* spp.		23 (3.10)
Babesia spp.		21 (2.83)

Seasonal prevalence of haemoprotozoan infection: Higher prevalence of haemoprotozoan infection was in winter (30.69%), followed by monsoon (28.10%) and low haemoprotozoan prevalence in summer (19.96%) season. The prevalence of *Theileria* spp infection was higher in monsoon followed by winter and summer season were 57.98%, 49.76% and 47.39% respectively. Prevalence of *Anaplasma* spp infection was higher in summer and winter season and less in monsoon season were 45.97%, 45.85% and 35.58% respectively. *Babesia* spp infection was in summer, monsoon and winter were 4.27%, 2.45% and 1.95% respectively. Prevalence of mixed infection was 3.99%, 2.44% and 2.37% were monsoon, winter and summer respectively (Table 2).
During the present study season and incidence haemoprotozoan infection is significant (P value <0.00001) while season and species of haemoprotozoan infection is not significant (P value <0.0704)

Table 2: Seasonal incidence of haemoprotozoan infection

Season	*Theileria* spp.	*Anaplasma* spp.	*Anaplasma* spp.+ *Theileria* spp.	*Babesia* spp.	Total positive case	Total negative cases	Total suspected cases
Summer (% prevalence)	100 (47.39)	97 (45.97)	5 (2.37)	9 (4.27)	211 (19.96)	846	1057
Monsoon (% prevalence)	189 (57.98)	116 (35.58)	13 (3.99)	8 (2.45)	326 (28.10)	834	1160
Winter (% prevalence)	102 (49.76)	94 (45.85)	5 (2.44)	4 (1.95)	205 (30.69)	463	668

Prevalence of haemoprotozoan infection according to lactation length: Higher prevalence of haemoprotozoan infection seen in 0 to 2nd numbers of lactation group (27.56%) followed by 3rd to 6th number of lactation group (24.77%) and less prevalence of haemoprotozoan infection in above 6th lactation number (13.70%).

Higher prevalence of species of haemoprotozoan infection in 0 to 2nd lactation was *Theileria* spp. (61.43%) and in 3rd to 6th lactation was *Anaplasma* spp. (48.17%) (Table 3).
During this study group of lactation and species of haemoprotozoa is significant (P value 0.000176).

Table 3: Prevalence of haemoprotozoan infection according to lactation length

Grops of Lactation length No.	*Anaplasma* spp.	*Anaplasma* spp.+ *Theileria* spp.	*Babesia* spp.	*Theileria* spp.	Total positive case	Total negative cases	Total suspected cases
0 - 2 Lact. (% of Prevalence)	118 (33.71)	6 (1.71)	11 (3.14)	215 (61.43)	350 (27.56)	920	1270
3 - 6 Lact. (% of Prevalence)	184 (48.17)	17 (4.45)	9 (2.36)	172 (45.03)	382 (24.77)	1160	1542
Above 6 Lact. (% of Prevalence)	5 (50.0)	0 (0)	1 (10.0)	4 (40.0)	10 (13.70)	63	73

Haematological changes in haemoprotozoan infection: During the study haemoprotozoan 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 is in the normal range (DLC). Babesia 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 is in the neutrophils cell range are increased and lymphocytes cells count is decreased (Table 3).

Table 3: Haematological value of haemoprotozoan infected cases

	HB (gm%)	PCV (%)	TEC M/µl	TLC T/µl	Neu %	Lym %	Mon %	Eos %	Basophylls/µl
Theileria spp.	5.7	17.1	2.8	8.0	45.2	54.3	0.1	0.4	0.0
Anaplasma spp.	5.8	17.4	2.9	10.4	38.0	59.0	2.0	1.0	0.0
Babesia spp.	5.4	16.3	2.7	7.6	59.3	39.5	0.1	0.0	0.0
Theileria spp. & *Anaplasma* spp.	4.4	13.1	2.2	8.0	47.1	52.2	0.0	1.0	0.0

Conclusion

The present study concluded that in Mehsana district clusters haemoprotozoan infection incidence was 25.72%. *Theileria* spp infection was higher in monsoon and according to the lactation group 0-2nd lactation was highly infected with haemoprotozoan infections. This research could helps to predict the haemoprotozoan infection outbreaks based on season and lactation number in crossbred cattle.

For early diagnosis and tick-borne disease prevention, screening for tick-borne disease carriers is essential. Control measures to prevent livestock from suffering financial losses by immunizing the animals.

Acknowledgements

References

1. Ananda K, D'souza PE, Puttalakshmamma G. Prevalence of haemoprotozoan diseases in crossbred cattle in Bangalore North. Vet World. 2009;2:15-16.
2. Bhatnagar C, Bhardawaj B, Sharma DK, Meena SK. Incidence of Haemoprotozoan diseases in cattle in Southern Rajasthan, India. Int. J Curr. Microbiol. App. Sci. 2015;4:509-514.
3. Kohli S, Atheya U, Thapliyal A. Prevalence of theileriosis in cross-bred cattle: Its detection through blood smear examination and polymerase chain reaction in Dehradun district, Uttarakhand, India. Molecular Biology, 2014, 2(1).
4. Modi DV, Bhadesiya CM, Mandali GC. Hematobiochemical changes in crossbred cattle infected with Theileria annulata in Banaskantha district of Gujarat. Int J Sci Res. 2015;5(1):1-4.
5. Patel MD, Kumar N, Rathod PH, Tyagi KK, Sorathiya LM. Incidence and Haematological Changes in Haemoprotozoan Bovines of South Gujarat. Indian Journal of Veterinary Sciences & Biotechnology. 2017, 13(2).
6. Vandna B, Anita G, Paresh S. Haematological alterations and molecular detection of theileriosis in crossbred cattle. Indian Journal of Animal Sciences. 2019;89(6):615-618.
7. Velusamy R, Rani N, Ponnudurai G, Harikrishnan TJ, Anna T, Arunachalam K, *et al*. Influence of season, age and breed on prevalence of haemoprotozoan diseases in cattle of Tamil Nadu, India. Vet. World. 2014;7:574-578.
8. Waghmare SS, Shaikh SH, Khadse JR, Jiglekar BD. Prevalence of haemoprotozoan diseases in Ahmednagar, district. 2022;11(6):9-12.