



ISSN (E): 2277-7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2022; SP-11(6): 09-12

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www.thepharmajournal.com

Received: 13-03-2022

Accepted: 16-04-2022

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Prevalence of haemoprotozoan diseases in Ahmednagar, district

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Abstract

Haemoprotozoan infections are the primary stumbling blocks to cattle development. By altering animal growth and output, it causes catastrophic losses. Five parasite infections were among the top ten cattle diseases recorded, including fascioliasis, coccidiosis, trypanosomiasis, babesiosis, and theileriosis. Bovine babesiosis and theileriosis, which spread by ticks, are considered economically significant. Clinical signs and microscopic inspection of thin blood smears are used to make the diagnosis in acute cases. Hence, an attempt was made in the present study to find prevalence of tick borne haemoprotozoan diseases in suspected dairy animals in Western Maharashtra, District Ahmednagar. In the present study, 1854 blood samples were collected from 161 villages and screened using Giemsa and Field staining from September 2018 to June 2021. Among the *Theileria* sp, the highest occurrence i.e., 66.16% (1017) was recorded. It will be helpful in biological vector control, early diagnosis and proper treatment, which may reduce mortality and losses.

Keywords: Prevalence, haemoprotozoan, Kopargaon, Maharashtra

Introduction

Haemoprotozoan infections, particularly Babesiosis, Anaplasmosis, Theileriosis, and Trypanosomiasis, are considered severe barriers to the health and productivity of cattle and buffalos (Rajput *et al.*, 2005) [12]. Tick-borne illness costs the livestock business a lot of money all around the world (Ananda *et al.*, 2009) [1]. It is the clear cause of death, decreased productivity, and lower working efficiency have a significant economic impact (Uilenberg, 1995) [15]. Ticks are strongly linked to the initiation of many diseases in the field in this regard. The survival and development of ticks are greatly aided by a humid and hot climate (Kohli *et al.*, 2014) [8]. Ticks that operate as natural vectors of Theileriosis, Babesiosis, and Anaplasmosis thrive in the area's geoclimatic and agroecological settings, which are ideal for their multiplication and expansion (Bhatnagar *et al.*, 2015) [3]. Haemoprotozoan parasites are primarily transmitted by ticks and have significant economic implications in Asia. They have long been a serious obstacle to the survival of crossbred cattle in India (Devendra and Gardiner, 1995) [5]. *Theileria* spp (*Theileria annulata* and *Theileria parva*), which are spherical, ovoid, rod like or irregularly shaped organisms found in lymphocytes, histiocytes, and erythrocytes, cause bovine theileriosis (Durrani *et al.*, 2008) [6]. Babesiidae organisms are spherical to pyriform, with an amoeboid form found in erythrocytes. Anaplasmosis is mostly a disease of adult cattle caused by Ixodid ticks (*Boophilus annulatus*). It develops in erythrocytes through asexual division and is transmitted by Ixodid ticks (*Boophilus annulatus*). *Anaplasma marginale* and *Anaplasma centrale* are two different types of *Anaplasma*. Crossbred cattle and buffalo had a higher incidence of haemoprotozoan diseases, according to the study, which was conducted on a seasonal basis for the prevalence of haemoprotozoan diseases in crossbred cattle and buffalo in Gujarat's Anand and Kaira districts (Vahora *et al.*, 2012) [16]. The incidence of haemoprotozoan diseases in cattle and buffalo was studied from field to Animal Disease Investigation Laboratory (ADIL) from September 2018 to June 2021, and it revealed a greater incidence of haemoprotozoan diseases of cattle and buffalo from September 2018 to June 2021. The goal of this study was to establish the seasonal, age wise and bred wise base incidence of Theileriosis, Babesiosis, Anaplasmosis, and mixed infection in crossbred cattle and buffaloes in Ahmednagar District.

Materials and Methods

Geographical area: The present study to find prevalence of tick borne haemoprotozoan

diseases of bovines in Ahmednagar District from September 2018 to June 2021.

Sample collection: A total of 1845 blood samples were taken from Cattle and 9 from Buffalo, with blood drawn from the ear vein and the jugular vein of animals suspected of having a haemoprotozoan infection based on clinical indications such as anorexia, weakness, fever, anemia, and lymph node swelling. With an 18G/16G needle, an ear vein was punctured aseptically, and a drop of blood was smeared on a grease-free micro slide, dried, and wrapped in clean paper.

Processing of Blood Samples: The smears were fixed with methanol, Giemsa stain was used for its staining, examined under microscope (100X), immersion oil used for identification of blood parasites as described by (Benjamin, 1978)^[2] and (Soulsby, 1982)^[14].

Result

The present research work entitled "Prevalence of haemoprotozoan diseases in Ahmednagar, District" was conducted. In the present study, 1854 blood samples were collected from 161 villages and screened using Giemsa and Field staining. Animals with signs such as anorexia, weakness, pallor of the conjunctival mucous membrane,

enlargement of superficial lymph nodes, respiratory distress, presence of ticks on the animal bodies, and high fever were chosen for blood collection. In a peripheral blood smear examination, animal blood samples were analyzed for the presence of haemoprotozoan infection using Giemsa staining procedure. The haemoprotozoan parasites, the highest occurrence i.e., 66.16% were recorded for *Theileria* spp. followed by 7.35% *Babesia* spp. and 5.59% *Anaplasma* spp. Further study revealed the mixed pattern of haemoprotozoan diseases and concurrent infection of *Babesia* spp. and *Theileria* spp., *Theileria* and *Anaplasma* spp. and *Babesia* and *Anaplasma* spp. were recorded as 6.89%, 11.77% and 2.21% respectively.

Seasonal wise incidence of Haemoprotozoan diseases

The current study found the maximum frequency of 78.92 percent *Theileria* spp., 12.55 percent mixed protozoal followed by 5.1 percent *Anaplasma* and 3.36 percent *Babesia* spp. infection in cattle during the monsoon months (June to September), followed by 63.56, 21.89, 8.91 and 5.62 percent of *Theileria* spp., mixed, *Babesia* and *Anaplasma* respectively during the winter months and a lower prevalence of *Theileria* spp, mixed protozoal infection, *Babesia* spp. and *Anaplasma* spp. i.e. 56.60, 26.43, 7.41 and 5.91 percent respectively during the summer season. (Table1 and Figure1).

Table 1: Seasonal wise incidence of Haemoprotozoan diseases, detected in cattle during September 2018- June 2021.

Season	Total Sample Examine	Total Positive Sample (% of incidence)	<i>Theileria</i> spp. (% of incidence)	<i>Anaplasma</i> spp. (% of incidence)	<i>Babesia</i> spp. (% of incidence)	Mixed Infection (% of incidence)
Monsoon	527	446 (84.62)	352 (78.92)	23 (5.1)	15 (3.36)	56 (12.55)
Winter	626	516 (82.42)	328 (63.56)	29 (5.62)	46 (8.91)	113 (21.89)
Summer	701	575 (82.02)	337 (58.60)	34 (5.91)	52 (7.41)	152 (26.43)
Total	1854	1537 (82.90)	1017 (66.16)	86 (5.55)	113 (7.35)	321 (20.88)

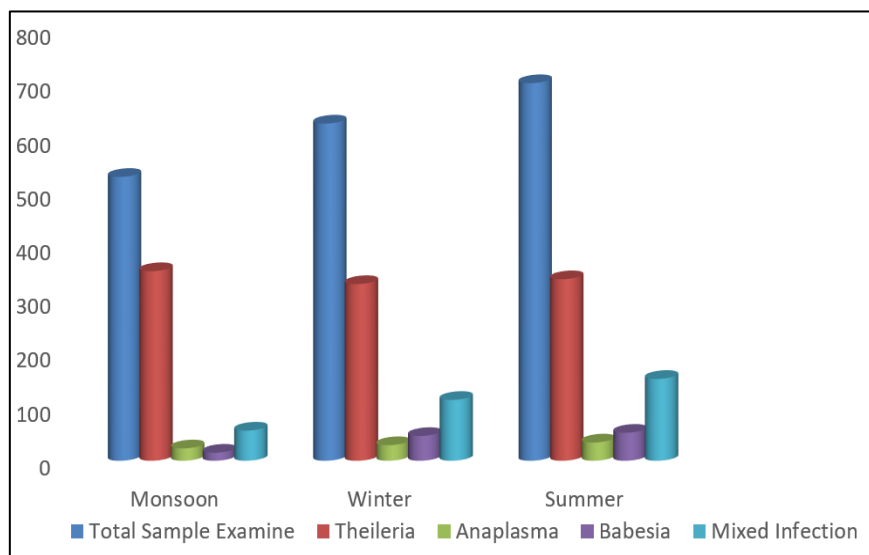


Fig 1: Seasonal wise incidence of Haemoprotozoan diseases

Age wise incidence of Haemoprotozoan diseases

The prevalence of haemoprotozoan infection was investigated in three age groups of cattles: younger than 24 months, older than 2 – 3 years, and older than 3 years.

In present study, a total of 1854 blood samples collected were examined for the presence of haemoprotozoan infection. Among 1854 animals, 1537 bovines were found positive. The higher rate of incidence (85.66 percent) was recorded in above 3 years age group of animals includes high prevalence

of *Theileria* spp. (65.04%) followed by Mixed protozoal infection (21.8%), *Anaplasma* spp. (7.75%) and *Babesia* spp. (6.16%) whereas, in animals of older than 2-3 year of age group the incidence was 81.27 percent including 68.62, 20.83, 5.88 and 4.65 percent of *Theileria* spp., Mixed protozoal infection, *Anaplasma* spp. and *Babesia* spp. infection respectively. The lowest (57.28 percent) occurrence noticed in 0-24 months age group of animals in that incidence of *Theileria* spp. infection was high (Table 2 Figure 2).

Table 2: Age wise incidence of Haemoprotozoan diseases, detected in cattle during September 2018- June 2021.

Age	Grand Total	Positive	Absent	<i>Theileria</i> spp. (% of incidence)	<i>Anaplasma</i> spp. (% of incidence)	<i>Babesia</i> spp. (% of incidence)	Mixed protozoal Infection (% of incidence)
0 - 24 Month	103	59 (57.28)	44	41 (69.49)	6 (10.16)	1 (1.69)	11 (18.64)
24 - 36 Month	502	408 (81.27)	94	280 (68.62)	24 (5.88)	19 (4.65)	85 (20.83)
36 Month and above	1249	1070 (85.66)	179	696 (65.04)	83 (7.75)	66 (6.16)	225 (21.8)
Grand Total	1854	1537 (82.90)	317	1017 (66.16)	113 (7.35)	86 (5.59)	321 (20.88)

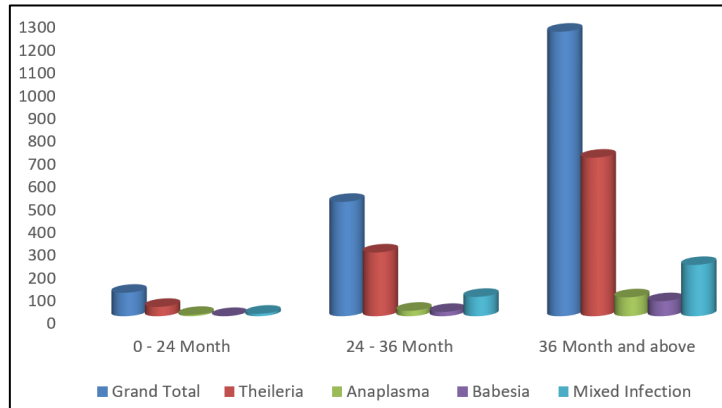


Fig 2: Age wise incidence of Haemoprotozoan diseases

Breed wise incidence of Haemoprotozoan diseases

Blood samples from indigenous/non-descript, Holstein Friesians, Jersey, and buffaloes were examined to determine the frequency of haemoprotozoan illnesses by breed. Jersey

cattle had the highest rate of haemoprotozoan illnesses (84.52 percent), followed by Holstein Friesian (83.05 percent), Buffalo (62.5) and indigenous cattle (54.54 percent) (Table 3 Figure 3).

Table 3: Breed wise incidence of Haemoprotozoan diseases, detected in cattle during September 2018- June 2021.

Animal Species Cow/ Buff	Grand Total	Breed	Positive	Negative	<i>Theileria</i> spp. (% of incidence)	<i>Anaplasma</i> spp. (% of incidence)	<i>Babesia</i> spp. (% of incidence)	Mixed protozoal infection (% of incidence)
Buffalo	9	Buffalo	5	4	3 (60)	1 (20)	0	1 (20)
Cattle	1416	HF crossbred	1176	240	707 (60.11)	109 (9.2)	79 (6.7)	281 (23.89)
	407	Jersey crossbred	344	63	297 (86.33)	3 (0.8)	7 (2.0)	37 (10.75)
	22	Indigenous	12	10	10 (90.90)	0 (0)	0 (0)	2 (16.66)
Grand Total	1854		1537	317	1017 (66.16)	113 (7.3)	86 (5.5)	321 (20.88)

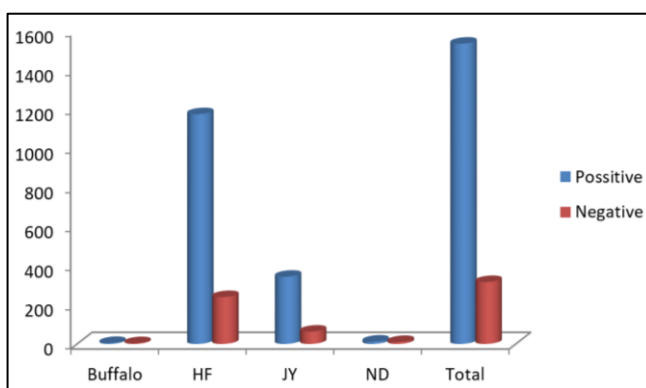


Fig 3: Breed wise incidence of Haemoprotozoan diseases

Discussion

The seasonal change in haemoprotozoan incidence was significant. In cattle, the highest incidence was reported from June to September (Monsoon). As a result, Haemoprotozoan infections differ widely depending on the season. There was a considerable age wise shift in haemoprotozoan occurrence. The highest prevalence was reported in cattle older than 3 years. As a result, haemoprotozoan infections

vary dramatically by age.

The present study revealed that the breed wise haemoprotozoan prevalence was significant. The Jersey cattle were highly susceptible for haemoprotozoan infection.

In cattle, the incidence of Theileriosis was higher than other haemoprotozoan diseases during the summer, monsoon, and winter seasons, at 58.60, 78.92 and 63.56 percent, respectively, as compared to other haemoprotozoan diseases. The new study backs up an earlier study on Theileriosis infection (Jithendran and Sharma, 1998)^[7], in which he stated that theileriosis cases are more common during the rainy season or summer, when tick activity is higher, though rare outbreaks have been reported all year.

The study was observed on age basis, the incidence of Theileriosis infection highly in 0 – 24 months followed by 24 to 36 month and 3 years and above age group, at 69.49, 68.62 and 65.04 percent respectively as compared to other haemoprotozoan infection.

In the present study the breed wise prevalence of Theileriosis infection was highest in Jersey (86.33 percent), followed by Holstein Friesian (60.11 percent) and lowest in Non-Descriptive/Indigenous (41.66 percent) breeds of cattle.

In the present study, 1845 and 9 blood samples examined

from cattle and buffalo concluded that the positive cases of haemoprotozoan diseases in cattle and buffalo were 1532 (83.03%) and 5 (55.55%) respectively.

Conclusion

The present study concluded that in Western Maharashtra was highly endemic for Theileriosis, Babesiosis, Anaplasmosis and mixed infection. The incidence of these diseases was higher in monsoon season, and according to age wise older than 2 years was highly susceptible and on breed base Jersey cattle was highly incidence of haemoprotozoan infection. This research could help predict disease outbreaks based on season, age and breed. Screening for tick-borne disease carriers is critical for early diagnosis and tick-borne disease prevention. Control procedures to keep livestock from losing money through vaccinating the animals before the monsoon season.

Acknowledgements

The authors would like to express their gratitude to Hon. Chairman, and Board members, Godavari Khore, Namdeoraaji Parjane Patil Taluka Sahakari Dudh Utpadak Sangh Maryadit, Kopargaon for providing the facilities and encouragement to conduct present studies.

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