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Short Communication

OCCURRENCE OF HAEMOPARASITIC AND GASTROINTESTINAL PARASITIC INFECTIONS IN BOVINES FROM SLAUGHTER HOUSE INSPECTION, MIZORAM, INDIA

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SUMMARY

The present study was conducted to determine the occurrence of haemoparasitic and gastrointestinal (GI) parasitic infections in bovines from slaughter house inspection, Mizoram, India from May, 2019 to March, 2020. A total 114 blood and 104 faecal samples were collected and processed during the study period. Haemoparasitic infections showed the presence of *Babesia* sp., *Theileria* sp. and *Anaplasma* sp. Overall incidence of haemoparasitic infections were 31.58% (36/114). Among them, Anaplasmosis was the most prevalent and showed higher occurrence during monsoon season as compared to other babesiosis and theileriosis. A total 39 samples (37.5%) were positive for the infection of GI parasites and highest occurrence was observed in monsoon season. Among the GI parasites, Strongyle sp. was found to be more common followed by *Fasciola* sp., *Paramphistomum* sp., *Trichuris* sp., *Eurytrema* sp. and *Toxocara vitulorum*.

Keywords: Bovines, Haemoparasitic, India, Mizoram, Occurrence, Slaughter house

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Cattle and buffaloes are domesticated ungulates, which belongs to the subfamily Bovinae and family Bovidae. They are raised as livestock for milk, meat and leather and also as draught animals. The effective development of any livestock industry depends upon the prevention and control of diseases among the animals. Parasitic diseases are one of the major problems which adversely affect the health and productivity of cattle (Bhatnagar *et al.*, 2015). The diverse climatic zones of India are highly conducive for the survival and propagation of vectors and vector-borne pathogens (Bhattacharjee and Sarmah, 2013; Laha *et al.*, 2015). A slaughter house study helps in the assessment of the disease status of herds and also prevents distribution of the infected meat to human beings (Mellau *et al.*, 2010). To find the occurrence of haemoparasitic and GI parasitic infections in slaughtered animal, the present study is being designed.

Government slaughter house, Mizoram was regularly visited during the study period i.e., from May, 2019 to March, 2020 for collection of samples. Total 114 blood samples were randomly collected in EDTA vials from the cattle andbuffalos being slaughtered, for the study of different haemoparasitic infections. Total 104 faecal samples were also randomly collected for the study of different gastrointestinal parasites.

Blood smear examination: Thin smears were prepared on a clean grease free glass slides from the anticoagulated blood samples and were fixed with absolute methanol for 30 seconds. Fixed smears were stained with 1:10 Giemsa stain for 45 minutes (min). The stained smears were washed under gentle running tap water. Then, the smears were air dried and observed under oil immersion lens (100X magnifications) for the presence of haemoparasites and were identified on the basis of characteristics morphology (Brar *et al.*, 2002).

Faecal sample examination: Formalin fixed faecal samples were processed through floatation method and ethyl-acetate sedimentation technique. The gastrointestinal (GI) parasites were identified on the basis of morphological characters of their eggs (Brar *et al.*, 2002).

Floatation method: Approximately, 2-3 gramsof faeces weretaken in a mortar and 3ml of saturated salt solution was added to it and mixed properly. The mixture was strained and transferred to the flotation tube up to top with the help of pipette forming the meniscus. Glass slide was put on the top of the floatation tube and allowed it to stand for 15 min. The slide was reverted and examined under microscope by putting a coverslip.

Sedimentation method: Approximately, 1-2 grams of the faecal sample weremixed properly with 4 ml of 10% formalin. Then the mixture was strained and 4 ml of ethyl acetate solution was mixed with it, followed by centrifugation at 2000 rpm for 5 minutes. The supernatant was discarded and smear was prepared on a glass slide by taking a drop of sediment. The smear was examined under microscope by putting a coverslip.

Blood smear examination: Blood smear examination

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revealed the presence of *Anaplasma*, *Theileria* and *Babesia* infections. *Anaplasma* sp. appeared as round or oval deep blue coloured bodies in periphery of erythrocytes (Fig. 1). *Theileria* sp. were pleomorphic and appeared mostly round or annular inside erythrocytes (Fig. 2). *Babesia* sp. were intra-erythrocytic (Fig. 3) and appeared as pair with their narrow ends at an acute angle, while small forms formed obtuse angle.

Overall occurrence of haemoparasitic infections: There were three types of haemoparasitic infections observed i.e. *Anaplasma* sp., *Babesia* sp. and *Theileria* sp. Among them, *Anaplasma* sp. infections was more common. The percentage of haemoparasitic infections was observed in this study is depicted in Table 1. Overall incidence of haemoparasitic infections was 31.58% (36/114) which was nearly same (33.30%) as reported by earlier authors (Ghosh *et al.*, 2018) in Mizoram. But Velusamy *et al.* (2014) recorded the overall occurrence of 16.64% of haemoparasitic infections in Tamil Nadu, India and in another study by Bhatnagar *et al.* (2015) in Rajasthan, India, the overall occurrence of 9% was recorded. The difference in the results may be due to variations in the climatic and geographical conditions of the study areas and managemental practices of animals. Among the haemoparasitic, *Anaplasma* sp. infections showed highest occurrence followed by *Theileria* sp. and *Babesia* sp. in the present study. Kakati *et al.* (2015) reported that the occurrence of Anaplasmosis (14.03%) and Theileriosis (21.05%) in Assam, whereas Laha *et al.* (2015) reported about 3.6% occurrence of babesiosis in north eastern India.

Season-wise occurrence of haemoparasitic infections: Out of 114 blood samples, 32 were collected in summer (March- June), 43 in monsoon (July-October) and 39 in winter season (November-February). The season wise occurrence is presented in Table 2. The occurrence of haemoparasitic infections was more common in monsoon followed by summer and winter seasons. Occurrence of *Anaplasma* sp. infections was more common in all seasons as compared to infections with *Theileria* sp. and *Babesia* sp. The infections of *Anaplasma* sp. showed more occurrence in the winter season followed by monsoon and summer seasons. *Theileria* sp. infections were more common in the summer followed by winter and monsoon seasons. In case of *Babesia* sp. infections, summer season showed more prevalence followed by monsoon and winter seasons. During particular season, the high occurrence of tick vectors might be responsible for propagation and multiplication of haemoparasites in both hosts and vectors. Similar results were also reported in the previous studies (Mohanta *et al.*, 2011; Kohli *et al.*, 2014; Bhatnagar *et al.*, 2015; Ghosh *et al.*, 2018).

Faecal sample examination: The faecal sample examination revealed the presence of the eggs Strongyle, *Trichuris*, *Toxocara vitulorum*, *Fasciola*, *Paramphistomum* and *Eurytrema* spp. Strongyle sp. eggs appeared as ellipsoid in shape and had an embryonated mass of morula stage inside the transparent wall (Fig. 4). But *Trichuris* sp. eggs were barrel shaped with thick shell and presence of polar plugs in both ends (Fig. 5). The eggs of

Table 1

Species wise occurrence of haemoparasitic infections in bovines

Name of Parasites	Total no. of blood samples	No. of samples with specific infection	Percentage (%)
Anaplasma sp.	114	15/114	13.16
Theileria sp.	114	12/114	10.53
Babesia sp.	114	9/114	7.89
Total	36	31.58	

Table 2

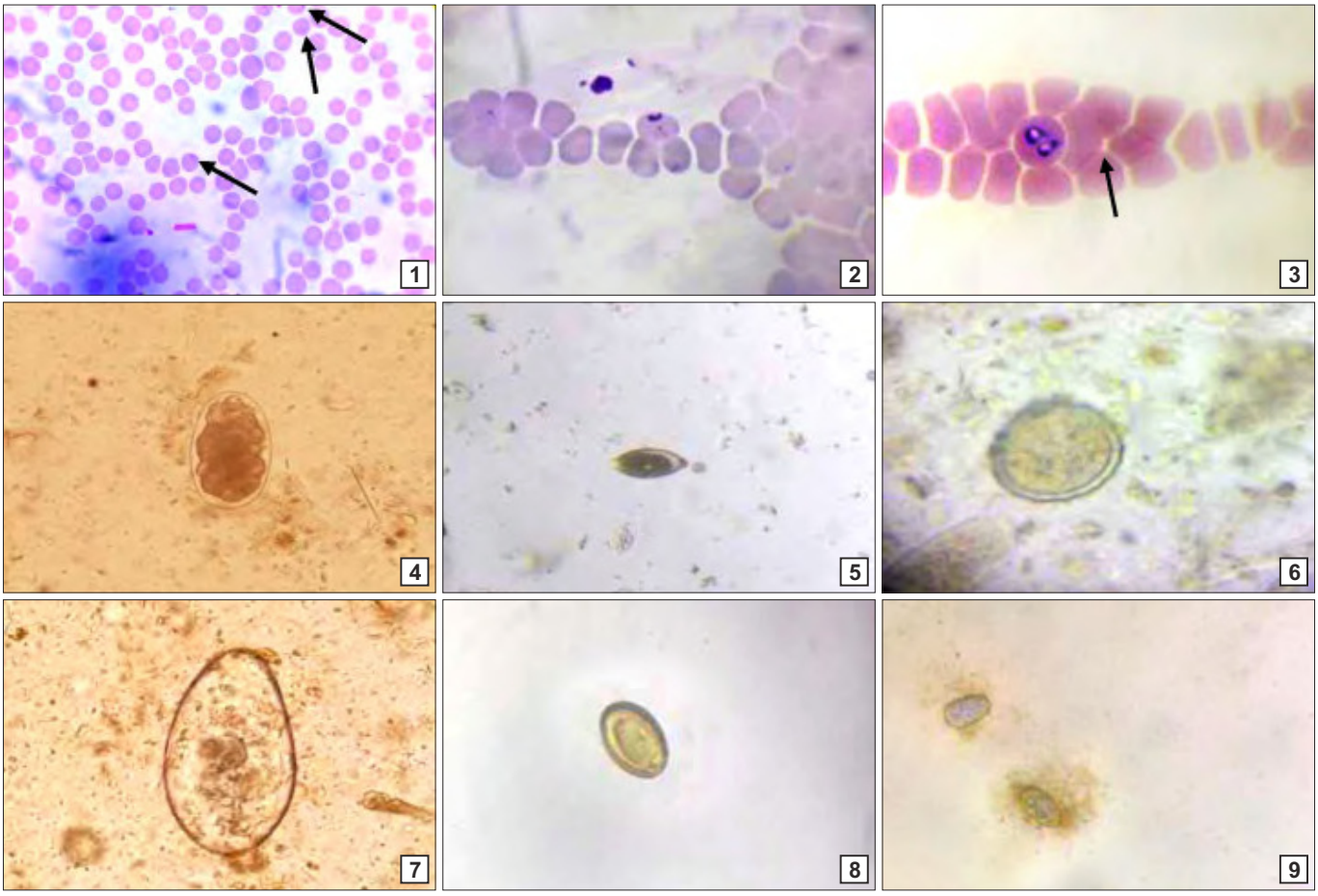
Season wise occurrence of haemoparasitic infections in bovines

Season	Name of haemoparasite	No. of animals infected	Percentage (%)
Summer N=11	*Anaplasma* sp.	4/11	36.36
(30.55%)	*Theileria* sp.	4/11	36.36
	Babesia sp.	3/11	27.28
MonsoonN=19	*Anaplasma* sp.	8/19	42.10
(52.78%)	*Theileria* sp.	6/19	31.58
	Babesia sp.	5/19	26.32
WinterN=6	*Anaplasma* sp.	3/6	50
(16.67%)	*Theileria* sp.	2/6	33.33
	Babesia sp.	1/6	16.67

Table 3

Species wise occurrence of gastrointestinal parasitic infections in bovines

Name of Parasites	Total no. of faecal samples	No. of samples with specific infection	Percentage (%)
Strongyle sp.	104	17/104	16.35
Fasciola sp.	104	8/104	7.69
Paramphistomum sp.	104	6/104	5.77
Trichuris sp.	104	4/104	3.85
Eurytrema sp.	104	2/104	1.92
Toxocara vitulorum	104	2/104	1.92
Total	39/104	37.5	



Figs. 1-9. **(1)** *Anaplasma marginale* inside RBC (Giemsa, 1000x); **(2)** *Theileria* sp. inside RBC (Giemsa, 1000x); **(3)** *Babesia* sp. inside RBC (Giemsa, 1000x); **(4)** Egg of Strongyle sp. (Sedimentation, 400x); **(5)** Egg of *Thrichuris* sp. (Floatation, 200x); **(6)** Egg of *Toxocara vitulorum* (Sedimentation, 400 x); **(7)** Egg of *Paramphistomum* sp. (Sedimentation, 1000x); **(8)** Egg of *Eurytrema* sp. (Sedimentation, 1000x); **(9)** Egg of *Fasciola* sp. (Sedimentation, 1000x)

Toxocara vitulorum appeared as sub globular, and single celled with a thick pitted shell (Fig. 6). The eggs of *Paramphistomum* sp. appeared as transparent, pear shaped with operculum in one end (Fig. 7). *Eurytrema* sp. eggs were of golden-brown colour, thick walled with an operculum in one side (Fig. 8). The eggs of *Fasciola* sp. were broadly ellipsoidal, operculated and yellowish brown in colour (Fig. 9).

Overall Occurrence of GI parasites: A total of 39 out of 104 samples (37.5%) were positive for eggs of GI parasites. The species wise occurrence of helminth infections in bovines is presented in Table 3. Out of six different helminths infections, there were three species each of nematodes and trematodes. Overall occurrence of nematodes was higher in comparison to trematodes. Among nematodes, Strongyle sp. infection was highest followed by *Trichuris* sp. and *Toxocara vitulorum*. Similar to present study, Godara and Manohar (2004) also reported the highest occurrence of Strongyle sp. In a study, occurrence of nematode infection in livestock from Mizoram, Yadav *et al.* (1999) reported the infection with *Mecistocirrus digitatus*, *Bunostomum* sp. and *Setaria cervi*. But these

Table 4

Season wise occurrence of gastrointestinal parasitic infections in bovines

Season	Name of the parasite	No. of animal infected	Percentage (%)
Summer N=10 (25.64%)	Strongyle sp.	5/10	50
	Fasciola sp.	2/10	20
	Paramphistomum sp.	1/10	10
	Trichuris sp.	0/10	0
	Eurytrema sp.	2/10	20
	Toxocara vitulorum	0/10	0
Monsoon N=22 (56.41%)	Strongyle sp.	10/22	45.45
	Fasciola sp.	4/22	18.18
	Paramphistomum sp.	3/22	13.64
	Trichuris sp.	3/22	13.64
	Eurytrema sp.	0/22	0
	Toxocara vitulorum	2/22	9.09
Winter N=7 (17.95%)	Strongyle sp.	2/7	28.57
	Fasciola sp.	2/7	28.57
	Paramphistomum sp.	2/7	28.57
	Trichuris sp.	1/7	14.29
	Eurytrema sp.	0/7	0
	Toxocara vitulorum	0/7	0

were not observed during the present study. Three species of trematode infections i.e., *Fasciola* sp., *Paramphistomum* sp. and *Eurytrema* sp. were observed. Among these, *Fasciola* sp. infections were more common than other two species. Among trematode infections *Fasciola* sp. infections (7.69%) were more followed by *Paramphistomum* sp. (5.77%) and *Eurytrema* sp. (1.92%). Mizoram is a hilly state having subtropical forest with heavy rainfall and moderately warm to cool climate in summer which helps in propagation of Strongyle and *Fasciola* sp. (Lalrinkima *et al.*, 2016). Similarly, Kashyap *et al.* (2017) reported the overall occurrence of 40.3% in Madhya Pradesh with prominent infections of Strongyle.

Season-wise occurrenceof GI parasites: In the present investigation, out of total 104 faecal samples; 30, 40 and 34 were collected in summer, monsoon and winter seasons, respectively from the slaughter house. The season wise occurrence of GI is depicted in Table 4. The occurrence of helminth infections was more common in monsoon followed by summer and winter. Nematode infections showed more occurrence in monsoon season followed by summer and winter. But occurrence of trematodes was more in winter followed by summer and winter. Strongyle sp. infection was more common in summer season followed by monsoon and winter season whereas *Fasciola* sp. infections were more common in winter followed by summer and monsoon. Occurrence of *Paramphistomum* sp. was more in winter seasonand followed by monsoon and summer season. Similar results of seasonal variations of helminths infections were reported by Patel *et al.* (2015) in Gujarat, India. The previous study by Wadhwa *et al.* (2003) reported that the higher occurrence was more in monsoon. These variations in the findings may be due to sample size, environmental factors, breed of animals and various other factors.

CONCLUSION

The present study showed the presence of *Babesia* sp., *Theileria* sp. and *Anaplasma* sp. Among them Anaplasmosis was more prevalent. Among seasons, monsoon season showed higher prevalence of infections as compared to others. Among GI parasites, *Strongyle* sp. was found to be more common followed by *Fasciola* sp., *Paramphistomum* sp., *Trichuris* sp., *Eurytrema* sp. and *Toxocara vitulorum*. Like haemoparasitic infections, monsoon season showed highest occurrence of GI parasitic infections as compared toother seasons.

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