

Article

## Prevalence of gastrointestinal parasitic infestation in cattle and goat at Boalia upazilla in Rajshahi district of Bangladesh

Chalantika Sarker<sup>1</sup>, Maria Akter<sup>1</sup>, Ashraful Kayser<sup>1</sup>, Md. Ali Asgar<sup>2</sup> and Mohammad Lalmoddin Mollah<sup>1\*</sup>

<sup>1</sup>Department of Medicine, Surgery and Obstetrics, Faculty of Animal science and Veterinary Medicine, Patuakhali Science and Technology University, Barisal-8210, Bangladesh

<sup>2</sup>Department of Physiology and Pharmacology, Faculty of Animal science and Veterinary Medicine, Patuakhali Science and Technology University, Barisal-8210, Bangladesh

\*Corresponding author: Mohammad Lalmoddin Mollah, Department of Medicine, Surgery and Obstetrics, Faculty of Animal Science and Veterinary Medicine, Patuakhali Science and Technology University, Barisal-8210, Bangladesh. Phone: +8801775455609; E-mail: belalcnu6@pstu.ac.bd

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**Abstract:** The study was conducted to determine the prevalence of gastrointestinal parasitic infestation in cattle and goat at Metro Livestock Office, Boalia in Rajshahi District for 22 weeks from 1<sup>st</sup> December, 2020 to 30<sup>th</sup> April, 2021. A total number of 240 animals were included in the study. The overall prevalence of helminthes infestation was recorded 70 % (168) under semi-intensive system. The trematodal infestations (*Fasciola* & *Paramphistomum*) were found in cattle 37.64% and 20% and in goat 21.29%, 18.06% respectively. The nematodal infestations (*Ascaris* and *Trichuris*) were found of 12.94% & 3.52% in cattle and 25.16% & 3.22% in goat respectively. The highest prevalence was recorded in goat 43.75% than cattle 26.25%. In case of cattle the highest prevalence rate was recorded in female 65.07% than the male 34.92% and in goat 55.23% and 44.76%. In breed wise susceptibility of helminth parasite, cross bred 60.31% were comparatively have higher prevalence than local bred cattle 39.68% and in case of goat Black Bengal goat 45.71% was less susceptible to Gastrointestinal parasitic infestation than Jamunapari goat 54.28%. The study suggests that importance should be given to proper management, improved hygiene and regular deworming to prevent the parasitic infestation in cattle. Therefore, the results of this study will help to the veterinary practitioner's and researchers for management of gastrointestinal parasitic infestation in this area.

**Keywords:** gastrointestinal parasite; cattle; goat; prevalence

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### 1. Introduction

Livestock is an important sub-sector considered to be the backbone of agriculture. Parasitism is one of the most vulnerable causes of livestock diseases which are the major obstacle in the growth and development of animal health (Mahfooz *et al.*, 2008). Helminthiasis has long been recognized and still are problems resulting in losses in ruminant production in almost all regions of the world including Bangladesh (Alawa *et al.*, 2010).

Agriculture is considered as the key driver of economic growth in Bangladesh. The contribution of agriculture sector to Gross Domestic Product (GDP) in Bangladesh is 12.65%. Bangladesh is currently estimated to comprise 234.88 lakh cattle, 254.39 lakh goats and 32.06 lakh sheep (BER, 2014). The livestock sub-sector provides a significant contribution in terms of fulfilling the demand of daily requirement of animal proteins.

Internal or gastrointestinal parasitism adversely affects the health and productivity of animal worldwide including Bangladesh (Kakar *et al.*, 2008). The climatic condition of Bangladesh favors the growth, development and survival of various parasites or their intermediate hosts.

It has been estimated that about 10% animals die annually due to parasitic diseases in the world (Chavhan *et al.*, 2008). Previous studies in Bangladesh revealed that gastro-intestinal parasitic infections are widely prevalent in the country (Siddiki *et al.*, 2009). In Bangladesh, 80% people in rural areas rear indigenous livestock animals (Siddiki *et al.*, 2009), and most of them have been originated from primitive and low productive ancestors. The farmers usually rear their cattle under traditional husbandry practices. Nutritional status of the animals in general is not satisfactory as they are over-worked but under-fed or half-fed, which makes the animals susceptible to diseases including different parasitic diseases. About 50% calves until 1-year of age die due to GP. Besides, adult cattle are severely affected by parasitism resulting enormous economic losses in Bangladesh (Sardar *et al.*, 2006). Unfortunately, in Bangladesh these problems are neglected or overlooked sometimes as the animals show little or no clinical signs after infected with parasites (Raza *et al.*, 2010). Losses associated with parasitic infections include the reduction in productive potential such as decreased growth rate, weight loss, diarrhea, anorexia, and sometimes anemia.

Several epidemiological studies have been carried out on gastrointestinal parasites of small ruminants in different regions of Bangladesh (Poddar *et al.*, 2017; Sangma *et al.*, 2012; Hasan *et al.*, 2011; Islam and Taimur, 2008; Mohanta *et al.*, 2007) but limited attempt have been taken to study the prevalence of parasites in Boalia upazilla of Rajshahi district.

Despite routine vaccination against major infectious diseases, ruminants are still suffering from poor body condition state due to parasitism. However, there is limited information about the infection prevalence of gastrointestinal parasites in ruminants in the study area. The environmental conditions such high and low temperature, humidity during rainy season, environmental temperature of this area are suitable for growth and survivable of parasites and their intermediate hosts. However, very few reports were published on parasitic infestation of this area. Therefore, the present study was conducted to investigate the gastrointestinal parasites prevalent in ruminants at Boalia upazilla of Rajshahi district and identify associated risk factors such as age, sex, season, species and nutritional condition.

- i. To determine the prevalence of gastrointestinal parasitic infestation at Boalia upazilla in Rajshahi district of Bangladesh.
- ii. To determine the effect of different risk factors such as breed, age, sex, etc. in the occurrence of parasitic infection.

## 2. Materials and Methods

### 2.1. Study area and duration

The study was conducted at Metro Livestock Office, Boalia at Rajshahi, the north west part of Bangladesh and surrounding regions have a tropical wet and dry climate, with a maximum and minimum temperature of 39°C and 5°C respectively. The period of study was about 22 weeks, starting from 1<sup>st</sup> Dec, 2020 to 30<sup>th</sup> April, 2021.

### 2.2. Study Population

The present study was done through examination of faecal sample which were brought by the animal owner and also from clinically affected animal which were brought to the hospital. During the study period, a total of 115 cattle and 425 goat were examined among them 85 cattle and 155 goat were selected for examination of fecal sample. Fecal sample of different ages, sexes and breeds were examined clinically among them 63 cattle and 105 goat were diagnosed positive with internal parasite egg in their fecal sample. All of them were treated in Metro Livestock Office, Boalia, Rajshahi, Bangladesh.

### 2.3. Study design

A questionnaire was developed for data collection from the owners along with other necessary records. Physical examination was done and faecal sample examination was also performed to examine the animals. The data were collected from the farmer directly through interview. The tentative diagnosis was done by owner's complains, clinical signs, physical and clinical examination of cattle. During data collection age, sex, breed was considered.

### 2.4. Collection of fecal sample

Fecal samples were collected from fresh feces immediately after voiding or directly from the rectum of animal.

### 2.5. Fecal sample examination

The fecal sample was grossly examined for the presence of adult parasites or segment of tape worms and foreign particles. The following methods were used to detect parasitic eggs in fecal samples:

- i. Direct smear method.
- ii. Simple sedimentation method.

#### I. Direct smear method:

A loop of fecal sample was taken on a glass slide thoroughly diluted with few drop of water, covered with cover slip and examined under microscope using both low and high power magnification for the presence and identification of egg.

#### II. Simple sedimentation method

Ten grams of feces were taken in cylinder. Water was added ten to twenty times of feces. A uniform solution of fecal particle was made by thoroughly stirring. The solution was passed through a sieve (30-50 meshes to the inch) into another glass cylinder and then allowed to stand for half to one hour so as to form a clear sediment. The supernatant fluid was carefully poured off, a small amount of the sediment is taken out with the help of medical dropper and spread out on the clean glass slide. After spread out of fecal samples, the slide was covered with a suitable cover slip and placed under the microscope for examination.

### 2.6. Parasite infested animal showed the following clinical signs

Disease was diagnosed on the basis of certain clinical signs and taking of clinical history from the owner. Following signs to helminthes infestation were taken consideration for tentative diagnosis.

- i. Fasciolosis: Acute case- frothy blood through nostrils and anus, dullness, weakness, lack of appetite, pallor and edema of mucous membrane. Chronic case- Anemic condition with rough & dry hair coat weakness, pale mucous membrane, bottle jaw, shiny colored feces.
- ii. Paramphistomiosis: Affected animals exhibit anorexia, polydipsia, thriftiness, and severe diarrhea. Extensive mortality may occur, especially in young cattle and goat.
- iii. Ascariasis: Affected animal showed that the most common clinical signs in haemonchosis are weakness, lethargy, lack of appetite, Abdominal swelling, abdominal pain, diarrhea, thirst, increased heart rate and breathing, pale conjunctiva and gingiva.
- iv. Trichuriasis: loss of weight, diarrhoea, emaciation, large belly, rough body coat, stunted growth etc.

### 2.7. Statistical analysis

The prevalence of parasitic infestation was calculated by considering total number of samples screened for parasite and number of samples detected positive as per formula. prevalence of parasite (%) = Number of positive cases/Total number of screened sample x 100. Data also analyzed by Chi-square test to observe the significant influence of parameters.

## 3. Results and Discussion

### 3.1. Morphological features of egg

Morphological features of egg as shown in Figure 1. *Fasciola* spp- Eggs are yellowish brown color, thin shelled, oval shaped, located periphery. *Trichuris* spp- Two knobs present externally. *Balantidium* spp- Round and smooth wall. *Paramphistomum* spp- Eggs are greenish brown in colour, germinal center centrally located, knob opposite the operculum end, transparent. *Neoscaris* spp- Eggs are light brown color, thick pitted shell, sub globular in shape.

### 3.2. The prevalence of gastrointestinal parasitic infestation according to species

The gastrointestinal parasitic infestations were found on the basis of species represent in the Table 1. The trematodal infestation such as *Fasciola* & *Paramphistomum* were found of 37.64% & 20% in cattle respectively, 21.29% and 18.06% in goat respectively. The nematodal infestations such as *Ascaris* and *Trichuris* were found of 12.94% & 3.52% in cattle respectively 25.16% 3.22% in goat respectively. *Fasciola*, *Paramphistomum*, *Ascaris* and *Trichuris* were 27.08%, 18.75%, 20.83%, and 3.33% respectively which is almost similar with the present study (Nuruzzaman *et al.*, 2012).

### 3.3. Prevalence of gastrointestinal parasitic infestation according to breed in case of cattle

Occurrence of helminth parasitic infestation found in local breed cattle (Fascioliasis 52%, Paramphistomiasis 28%, Ascariasis 16% and Trichuris 4%) and in case of cross breed cattle (Fascioliasis 50%, Paramphistomiasis 26.31%, Ascariasis 18.42% and Trichuris 5.26%) as showed in Table 2. Alim *et al.* (2012) recorded 39.75% and 46.25% parasitic occurrence in crossbred and local cattle, respectively. These variations might be due to differences in geo-climatic conditions, grazing pattern, rearing and husbandry measures and genetic resistance of the breed.

### 3.4. Prevalence of gastrointestinal parasitic infestation according to breed in case of goat

Occurrence of helminth parasitic infestation found in black bengal breed (Fascioliasis 27%, Paramphistomiasis 29%, Ascariasis 39.21% and Trichuris 3.92%) and in case of jamunapari goat (Fascioliasis 38.29%, Paramphistomiasis 23.40%, Ascariasis 34.04% and Trichuris 4.25%) are shown in Table 3. Black Bengal goats were found less susceptible to gastrointestinal parasitic infestation than jamunapari breeds of goats which is not supported by the findings of Amran *et al.* (2018), observed the occurrence of GI parasites in black bengal 63% and jamunapari 64%. Genetic background of the black bengal goats may have contributed to the lower prevalence of GI infestation in this breed.

### 3.5. Prevalence of gastrointestinal parasitic infestation according to age of cattle

The gastrointestinal parasitic infestation were found on the basis of age represent in the Table 4. The trematodal infestation such as *Fasciola* and *Paramphistomum*, were found of 40%, & 20% at age of 0-1 year respectively, 52.38% & 28.57% at age of 1- 3 years respectively & 55.55% & 29.62% at age of over 3 years respectively. The Nematodal infestation such as *Ascaris* and *Trichuris* were found of 40%, & 0% at age of 0-1 year respectively, 14.28% and 4.76% at age of 1-3 years respectively and 7.40% and 7.40% at age of over 3 years aged respectively. Aktaruzzaman *et al.* (2013) recorded Fascioliasis, Paramphistomiasis were higher in more than two years age and support the present study. Islam *et al.*, (2014) also observed the occurrence of helminth parasites in cattle was highest in adults (>2 years) cattle (85.71%) followed by yearlings (6 months to 2 years) cattle (71.67%), young calves ( $\leq$  6months) (50%). Islam et al (2016) found the overall occurrence of young (<3 years) age group of cattle were infected significantly higher than adult ( $\geq$  3 years). Some variation in present and previous findings might be due to age susceptibility of specific helminth parasite and immunity of animal.

### 3.6. Prevalence of gastrointestinal parasitic infestation according to age of goat

Prevalence of GI parasitic infestation in goats were found on the basis of age represent in the Table 5. The trematodal infestation such as *Fasciola* and *Paramphistomum*, were found of 40%, & 17.24% at age of 0-1 year respectively, 32.43% & 29.72% at age of 1- 3 years respectively & 35.89% & 30.76% at age of over 3 years respectively. The Nematodal infestation such as *Ascaris* and *Trichuris* were found of 55.17%, & 3.44% at age of 0-1 year respectively, 35.13% and 2.70% at age of 1-3 years respectively and 25.64% and 7.69% at age of over 3 years which are closely similar with the report of Hassan et al. (2011) and Uddin *et al.* (2006) who noticed that older goats are more infected by GI parasites than younger animals.

### 3.7. The prevalence of gastrointestinal parasitic infestation in cattle according to sex

The gastrointestinal infestations were found on the basis of sex in cattle represent in the Table 6. The trematodal infestations such as *Fasciola* & *Paramphistomum* were found of 50% & 27.27% in male respectively and 51.21% & 26.82% in female respectively. The Nematodal infestation such as *Ascaris* and *Trichuris* were found of 18.18% & 4.54% in male and 17.07% & 4.87% in female respectively. In the male infection rate was recorded lower by fecal sample examination than the female, which is similar with present data. Paul *et al.* (2011) found significant difference in helminth parasitic infestation between male and female. This variation could be due to the genetics, physiology, immunology, environment and management practices.

### 3.8. The prevalence of gastrointestinal parasitic infestation in goat according to sex

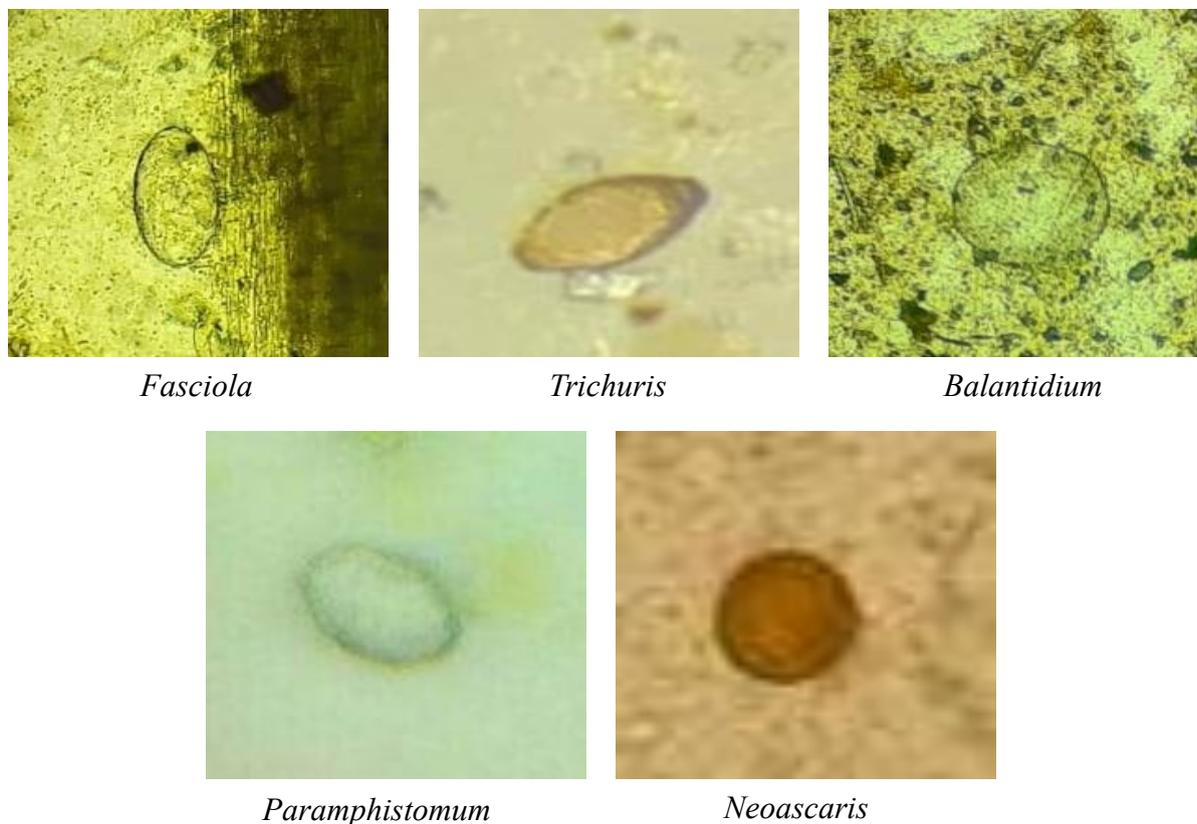
The GI parasitic infestations were found on the basis of sex (in goat) represent in the Table 7. The trematodal infestation such as *Fasciola*, *Paramphistomum* were found of 29.78% & 25.53% in male and 32.75% & 27.58% in female respectively. The Nematodal infestation such as *Ascaris* & *Trichuris* were found of 40.42% & 4.25% in male and 34.48% & 5.17% in female respectively, which are consistent with the records of Uddin *et al.* (2006), Shahiduzzaman *et al.* (2003) who observed that females showed more susceptibility to GI parasites infection than the males. Higher prevalence of GI parasitic infections in female animals of this study might be

due to the variation in sample size, lowered resistance to female animals, temporary loss of acquired immunity near parturition stress, genetic resistance of the host.

**3.9. Drug Sensitivity against different parasites**

The recovery rate such as *Fasciola*, *Paramphistomum*, *Ascaris* & *Trichuris* were found 86.15%, 91.11%, 86%, 100 by the treatment of Nitronex, nitrox-A, Endex, P.C vet, Tremacid and Trisol bolus worm respectively. Due to lack of available literature the result could not be compared as shown in table 8.

**Figure 1**



**Figure 1. Morphological features of various gastrointestinal parasitic egg.**

**Table 1. Prevalence of gastrointestinal parasitic infestation according to species.**

Type of parasite	Species name	Total no. of cattle	No. of affected cattle (63)	Total no. of goat	No. of affected goat (105)
Trematode	<i>Fasciola</i> spp	85	32 (37.64%)	155	33 (21.29%)
	<i>Paramphistomum</i> spp		17 (20%)		28 (18.06%)
Nematode	<i>Ascaris</i> spp	85	11 (12.94%)	155	39 (25.16%)
	<i>Trichuris</i> spp		3 (3.52%)		5 (3.22%)
Prevalence (%)			63 (26.25%)		105 (43.75%)

**Table 2. Prevalence of gastrointestinal parasitic infestation according to breed in case of cattle.**

Type of parasite	Species name	Total no. of cattle	No. of affected cattle (63)	
			Local	Cross breed
Trematode	<i>Fasciola</i> spp	85	13 (52%)	19 (50%)
	<i>Paramphistomum</i> spp		7 (28%)	10 (26.31%)
Nematode	<i>Ascaris</i> spp		4 (16%)	7 (18.42%)
	<i>Trichuris</i> spp		1 (4%)	2 (5.26%)
Prevalence (%)		25 (39.68%)	38 (60.31%)	

**Table 3. Prevalence of gastrointestinal parasitic infestation according to breed in case of goat.**

Type of parasite	Species name	Total No. of goat	No. of affected goat (105)	
			Black Bengal	Jamunapari
Trematode	<i>Fasciola</i> spp	155	14 (29.16%)	19 (33.33%)
	<i>Paramphistomum</i> spp		13 (27.08%)	15 (26.31%)
Nematode	<i>Ascaris</i> spp		19 (39.58%)	20 (35.08%)
	<i>Trichuris</i> spp		2 (4.16%)	3 (5.26%)
Prevalence (%)		48 (45.71%)	57 (54.28%)	

**Table 4. Prevalence of gastrointestinal parasitic infestation according to age in case of cattle.**

Type of parasite	Species name	Total no. of cattle	No. of affected cattle (63)		
			0-1 year	1-3 year	> 3 year
Trematode	<i>Fasciola</i> spp	85	6 (40%)	11 (52.38%)	15 (55.55%)
	<i>Paramphistomum</i> spp		3 (20%)	6 (28.57%)	8 (29.62%)
Nematode	<i>Ascaris</i> spp		6 (40%)	3 (14.28%)	2 (7.40%)
	<i>Trichuris</i> spp		0 (0%)	1 (4.76%)	2 (7.40%)
Prevalence (%)		15 (23.80%)	21 (33.33%)	27 (42.85%)	

**Table 5. Prevalence of gastrointestinal parasitic infestation according to age in case of goat.**

Type of parasite	Species name	Total no. of goat	No. of affected goat (105)		
			0-1 year	1-3 year	> 3 year
Trematode	<i>Fasciola</i> spp	155	7 (40%)	12 (32.43%)	14 (35.89%)
	<i>Paramphistomum</i> spp		5 (17.24%)	11 (29.72%)	12 (30.76%)
Nematode	<i>Ascaris</i> spp		16 (55.17%)	13 (35.13%)	10 (25.64%)
	<i>Trichuris</i> spp		1 (3.44%)	1 (2.70%)	3 (7.69%)
Prevalence (%)		29 (27.61%)	37 (35.23%)	39 (37.14%)	

**Table 6. Prevalence of gastrointestinal parasitic infestation in cattle according to sex.**

Type of parasite	Species name	Total no. of cattle	No. of affected cattle (63)	
			Male	Female
Trematode	<i>Fasciola</i> spp	85	11 (50%)	21 (51.21%)
	<i>Paramphistomum</i> spp		6 (27.27%)	11 (26.82%)
Nematode	<i>Ascaris</i> spp		4 (18.18%)	7 (17.07%)
	<i>Trichuris</i> spp		1 (4.54%)	2 (4.87%)
Prevalence (%)		22 (34.92%)	41 (65.07%)	

**Table 7. Prevalence of gastrointestinal parasitic infestation in goat according to sex.**

Type of parasite	Species name	Total no. of goat	No. of affected goat (105)	
			Male	Female
Trematode	<i>Fasciola</i> spp	155	14 (29.78%)	19 (32.75%)
	<i>Paramphistomum</i> spp		12 (25.53%)	16 (27.58%)
Nematode	<i>Ascaris</i> spp		19 (40.42%)	20 (34.48%)
	<i>Trichuris</i> spp		2 (4.25%)	3 (5.17%)
Prevalence (%)		47 (44.76%)	58 (55.23%)	

**Table 8. Drug sensitivity against different parasites.**

Name of parasite	Number of affected animal (cattle & goat)	Use of anthelmintic	Recovery	Not recovery	% of Recovery
<i>Fasciola</i> spp	65(27.08%)	1. Nitronex (Nitroxynil) 2. Nitrox-A (Nitroxynil)	56	9	86.15%
<i>Paramphistomum</i> spp	45 (18.75%)	Endex (Triclabendazole+Livamisole)	41	4	91.11%
<i>Ascaris</i> spp	50 (20.83%)	1. P.C Vet (Piperazine citrate) 2. Tremacid (Piperazine citrate)	43	7	86%
<i>Trichuris</i> spp	8 (3.33%)	Triclazol (Triclabendazole)	8	0	100%

#### 4. Conclusions

The study was performed to determine the prevalence of gastrointestinal parasitic infections in cattle and goat considering species breed, age and sex in areas. Epidemiological study of helminthes infestation is alarming in ruminant at Boalia Upazilla in Rajshahi district of Bangladesh. The helminthes infestations were found on the basis of species; cattle were low infested 26.25% than goats 43.75%. In breed wise susceptibility of helminth parasite, cross bred were comparatively have higher prevalence than local bred and in case of goat black bengal was less susceptible to gastrointestinal parasitic infestation than jamunapari. The infestations were found on the basis of age, over 3 years ruminant were highly infested and 0-1 year aged animal were low infested. The helminthes infestations were found on the basis of sex, the male animals were highly infested than female. Occurrence of parasitic infestation found in this study may be due to hot and humid climate, poor management system, insufficient diet, lack of awareness and irregular de-worming practices in the studied area. For this reason, farmers get low production from their animals. So deworming program, improve awareness is necessary for optimum production. Moreover, the findings have potentials to help formulate strategic control program against GI parasitic infestation in ruminants. The explored information of this study will give an overall idea about the distribution of gastrointestinal parasitic infections among the study areas.

#### Conflict of interest

None to declare.

#### Author's contribution

Mohammad Lalmuddin Mollah designed and supervised the experiment. Chalantika Sarker and Maria Akter carried out the experiment and wrote the manuscript. Md. Ali Asgar and Ashraful Kayser finally reviewed the manuscript. All authors have read and approved the final manuscript.

#### References

- Alawa CBI, AM Adamu, JO Gefu, OJ Ajanusi, PA Abdu and NP Chiezey, 2010. *In vivo* efficacy of *Vernonia amygdalina* (compositae) against natural helminth infection in Bunaji (*Bos indicus*) calves. Pak. Vet. J., 30: 215-218.
- Alim MA, S Das, K Roy, S Sikder, MM Mohiuddin and MA Hossain, 2012. Prevalence of gastrointestinal parasitism in cattle of Chittagong division, Bangladesh. Way. J. Ani. Sci., 4: 247-254.

- Aktaruzzaman M, SA Rony, MA Islam, MG Yasin and AKMA Rahman, 2013. Concurrent infection and seasonal distribution of gastrointestinal parasites in cross-bred cattle of Sirajganj district in Bangladesh. *Vet. World*, 6: 720-724.
- Amran MA, SK Yadav, F Akter, S Sarkar, MA Hossain, SM Joy and AAK Samrat, 2018. Prevalence of gastrointestinal parasitic infections in different existing goat breeds in different districts of Bangladesh. *J. Adv. Parasitol.*, 5: 11-21.
- BER (Bangladesh Economic Review), 2014. Finance division, Ministry of Finance. Government of the People Republic of Bangladesh.
- Chavhan PB, LA Khan, PA Raut, DK Maske, S Rahman, KS Podchalwar and MF Siddiqui, 2008. Prevalence of nematode parasites of ruminants at Nagpur. *Vet. World*, 1: 140.
- Hassan MM, MA Hoque, SKMA Islam, SA Khan, K Roy and Q Banu, 2011. A prevalence of parasites in black bengal goats in Chittagong, Bangladesh. *Int. J. Livest. Prod.*, 2: 40-44.
- Islam MK, MS Islam, GN Adhikary, KMM Hossain, SMA Rauf and M Rahman, 2016. Epidemiological studies of fascioliosis (*Fasciola gigantica* infection) in cattle. *J. Adv. Paras.*, 3: 10-15.
- Islam KB and MJFA Taimur, 2008. Helminthic and protozoan internal parasitic infections in free ranging small ruminants of Bangladesh. *Slovenian Veterinary Researcher*, 45: 67-72.
- Islam MR, MG Yasin, MAA Noman, N Begum and MMH Mondal, 2014. Prevalence of gastrointestinal parasites in cattle at Vangura upazila in Pabna district of Bangladesh. *Int. J. Nat. Soc. Sci.*, 1: 45-52.
- Kakar MN and JK Kakarsulemankhel, 2008. Prevalence of endo (trematodes) and ectoparasites in cows and buffaloes of Quetta. *Pak. Vet. J.*, 28: 34-36.
- Mahfooz A, MZ Masood, A Yousaf, N Akhtar and MA Zafar, 2008. Prevalence and anthelmintic efficacy of Abamectin against gastrointestinal parasites in horses. *Pak. Vet. J.*, 28: 76-78
- Mohanta UK, A Anisuzzaman, T Farjana, PM Das, S Majumder and MMH Mondal, 2007. Prevalence, population dynamics and pathological effects of intestinal helminths in Black Bengal goats. *Bangl. J. Vet. Med.*, 5: 63-69.
- Nuruzzaman M, MH Haque, S, Sarker and N Begum, 2012. Abomasal nematodes in goats slaughtered at different abattoir of Thakurgaon District, Bangladesh. *J. Sci. Res.*, 4: 491-491.
- Paul AK, M Talukder, K Begum and MA Rahman, 2011. Epidemiological investigation of Paramphistomiasis in cattle at selected areas of Sirajgonj district of Bangladesh. *J. Ban. Agr. Uni.*, 9: 229-232.
- Poddar PR, N Begum, MA Alim, AR Dey, MS Hossain and SS Labony, 2017. Prevalence of gastrointestinal helminths of sheep in Sherpur, Bangladesh. *J. Adv. Vet. & Ani. Res.*, 4: 274-280.
- Raza AM, S Murtaza, HA Bachaya, A Qayyum and MA Zaman, 2010. Point prevalence of *Neoscaris vitulorum* in large ruminants slaughtered at Multan Abattoir. *Pak. Vet. J.*, 30: 242-244.
- Sangma A, N Begum, BC Roy and MO Gani, 2012. Prevalence of helminth parasites in sheep (*Ovis aries*) in Tangail district, Bangladesh. *J. Ban. Agr. Uni.*, 10: 235-244.
- Sardar SA, MA Ehsan, AKMM Anower, MM Rahman and MA Islam, 2006. Incidence of liver flukes and gastro-intestinal parasites in cattle. *Bangl. J. Vet. Med.*, 4: 39-42.
- Sangma A, N Begum, BC Roy and MO Gani, 2012. Prevalence of helminth parasites in sheep (*Ovis aries*) in Tangail district, Bangladesh. *J. Bangl. Agr. Uni.*, 10: 235-244.
- Siddiki AZ, MB Uddin, MB Hasan, MF Hossain, MM Rahman, BC Das, MS Sarker and MA Hossain, 2009. Coproscopic and haematological approaches to determine the prevalence of helminthiasis and protozoan diseases of Red Chittagong cattle (RCC) breed in Bangladesh. *Pak. Vet. J.*, 30: 1-6.
- Shahiduzzaman MA, MA Alim, M Rahman and MH Mondal, 2003. Seasonal influence on the occurrence of *Haemonchus contort* infections in slaughtered Black Bengal goats in Bangladesh. *Bangl. J. Vet. Med.*, 1: 45-48.
- Uddin MZ, T Farjana, N Begum and MMH Mondal, 2006. Prevalence of amphistomes in Black Bengal goats in Mymensingh district. *Bangl. J. Vet. Med.* 4: 103-106.