Research Article

Prevalence of Gastrointestinal Parasite of Cattle in Ullapara Upazila, Bangladesh

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Abstract | Bangladesh is an agriculture-based country where the livestock industry is a significant economic factor. Parasitic infestations create a risk that impairs the livestock industry. The objective of this study was to determine the prevalence and factors of parasitic infestation of cattle in the Livestock Office and Veterinary Hospital, Ullapara, Sirajganj, Bangladesh. A total of 121 fecal samples were collected and examined through a direct smear to detect the presence of the egg and oocyst of parasites. The overall prevalence of cattle parasitic infestation (mixed and single) was 80.17% (N=97/121). The overall prevalence of trematode was 49.58%, nematode was 57.86%, and protozoa was 9.1%. The infestation rate of the *Strongylys* group (45.4%) was dominant followed by *Fasciola gigantica* (24.79%), *Paramphistomum spp.* (24.79%), *Neoascaris spp.* (12.4%) and *Eimeria* (9.09 %). The parasitic infestation in cows was higher than in heifer, bull, and calf based on animal categories, and the animals within 2 years of age were more susceptible to parasitic infestation. As there are no previous studies on the parasitic infestation of cattle in Ullapara Upazila, therefore this study will provide a glimpse of present parasitic infestations in Upazila for future studies on this area.

Keywords | Fecal sample, Age, Trematode, Nematode, Protozoa.

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INTRODUCTION

The majority of Bangladesh's population is, directly and indirectly, reliant on agricultural activity. Agriculture is one of the main economic sectors, accounting for 13.31% of GDP. The involvement of agricultural workers in the labor force as a whole is 43% (BBS, 2019). The population of cattle in Bangladesh is now 243.91 lakh in number and the contribution of Livestock to the Gross Domestic Product (GDP) is 1.47% (DLS, 2021). One of the main obstacles to the production of cattle may be gastrointestinal (GI) parasite diseases (Jittapalapong et al., 2011). A condition known as gastrointestinal (GI) parasitic infestation is brought on by a variety of genera of parasites that live in the gastrointestinal tracts of cattle. Due to subclinical or chronic infections that produce economic losses, the infection decreases productivity through decreased feed intake, decreased efficiency, and infeed utilization (Stromberg et al., 2012; Deo et al, 2019). Mainly, helminth, protozoa, cestode, and trematode are what induce GI parasitism in cattle (Pinilla et al., 2019). The protozoan *Eimeria spp.*, which parasitizes ruminants, equines, and rabbits and causes bovine coccidiosis, is a member of the phylum Apicomplexa (Shaikh et al., 2022). Cattle and

sheep can develop parasitic gastroenteritis from helminths. The Strongylidae family of nematodes contains the most significant and prevalent genera, particularly in tropical regions (Charlier et al., 2009; Tachack et al., 2022). The two liver flukes that are frequently implicated in inflicting fascioliasis in ruminants are *Fasciola hepatica* and *Fasciola gigantica*. These trematodes use a snail as an intermediary host in the course of their life cycle (Bekele et al., 2010; Alvarez et al., 2020). *Paramphistomum* spp. is important in veterinary medicine because they cause paramphistomiasis in cattle, buffaloes, camelids, goats, and sheep (Paul et al., 2012). Gastrointestinal parasite infection is one of the main causes of wastage and decreased productivity, especially in developing nations. It affects animals through mortality, morbidity, decreased growth rate, weight loss in young calves that are still growing, late maturity of slaughter stock, reduced milk and meat production, and decreased working capacity (Cheru et al., 2014). However, because mature cattle are held for extended periods for breeding or milk production purposes and frequently receive insufficient feed in comparison to their high demand, they are also badly affected by parasitism (Akanda et al., 2013). Additionally, these infections increase susceptibility to bacterial and viral illnesses, which increases losses from the condemnation of carcasses and organs and increases medication and veterinary care costs (Gunathilaka et al., 2018). Parasitism is one of the main factors limiting livestock productivity in Bangladesh (Hossain et al., 2011; Ali et al., 2020). Even though gastrointestinal parasitism causes large losses, the issues are frequently disregarded because most infected animals exhibit subtle clinical symptoms throughout their productive lives and the impacts are slow and chronic (Nath et al., 2016). According to earlier reports, gastrointestinal parasitism was the cause of death in 50% of calves for up to 1-year-old. An estimated 25 to 30 million sterling pounds were lost annually as a result of intestinal parasites (Chowdhury et al., 2017). One of the major problems in rearing cattle in this area is considered the occurrence of various parasitic infestation although there are no data. Therefore, the objective of this study is to know the prevalence of parasitic infestation and factor associated with parasitic infestation of cattle in this area.

MATERIALS AND METHODS

Study area and period

The study took place at Ullapara, Sirajganj, Bangladesh. The weather in this area is the tropical wet and dry climate with maximum temperatures of 35°C and minimum temperatures of 21°C. The study period was about 8 months starting from February to September 2022.

Animal selection and fecal sample collection

In total 121 cattle were enrolled in the study to collect data during the study period. The information was gathered from cattle that went to the hospital for routine inspections, vaccinations, deworming, and other medical procedures. Face-to-face interviews with the owner were used to collect the data. Throughout the study period, data based on quantitative factors (animal categories and age) were gathered. Fecal samples weighing 5 to 10 grams were taken immediately from the rectum, though sometimes cattle owners brought the samples for inspection.

Examination of fecal samples

The direct smear technique was used for the gross examination of collected feces. Three smears were prepared from each sample to identify the morphological characteristics of eggs, cysts, and oocysts, as described by Hendrix (2006). Direct smear was done by a little number of feces spread out on a grease-free, clean slide to create a thin smear, which was then inspected with the 10X low power objectives as stated by Ashford & Crewe (2003).

Data Analysis

The data was imported, saved, and appropriately coded. STATA version 16 and Microsoft Excel were used to analyze the data. The 95% confidence interval and Chi square test were used to convey descriptive statistics as a proportion and at $p<0.05$, associations were considered significant.

RESULT AND DISCUSSION

One of the primary health issues influencing the productivity of cattle globally is parasitic infestation (Urdaneta et al., 2011; Ali et al., 2020). Bangladesh is inhabited by a diverse range of parasites, and the country's climate is ideal for the growth and spread of all parasite species (Ilyas et al., 2016). In this study, the overall prevalence of parasitic infestation (both single and mixed) was 80.17% whereas the prevalence of single parasitic infestation was 49.59% and the mixed parasitic infestation was 30.58% (Table 1) but the result was not significant. This result is inclined with the report of Ahmed et al. (2015) where the overall prevalence (single and mixed) was 72% but the study's result differed from Alim et al. (2012) whereas the finding was 39.75% lower than this study's result. The probable cause of difference between results may be different parasitic sp., sample size, duration of the study, different study locations, management system, and grazing system. In his study, They also showed the prevalence of gastrointestinal parasitic infestation in different seasons and it is proved the infestation rate varies from season to season (Aktaruzzaman et al., 2013; Moussouni et al., 2018). That's why the prevalence rate differed in both studies. In this study, the sample was collected from animals who came to the hospital, and mainly animals with illnesses mostly come to the hospital

Table 1: Prevalence of parasitic infestation of cattle based on animal categories (N=121).

	Result	Animal categories				Overall		
		Cow N (%)	Bull N (%)	Heifer N (%)	Calf N (%)	N (%)	95% Conf. Interval	*P* value
Total	Negative	13 (10.74)	5 (4.13)	2 (1.65)	4 (3.31)	24 (19.83)	13.61-27.99	0.223
	Positive	47 (38.84)	37 (30.58)	7 (5.79)	6 (4.96)	97 (80.17)	72.01-86.39	
Fasciola gigantica	Negative	44 (36.36)	30 (24.79)	7 (5.79)	10 (8.26)	91 (75.21)	66.66-82.14	0.288
	Positive	16 (13.22)	12 (9.92)	2 (1.65)	0 (0.00)	30 (24.79)	17.85-33.34	
Paramphistomum spp.	Negative	45 (37.19)	33 (27.27)	4 (3.31)	9 (7.44)	91 (75.21)	66.66- 82.14	0.112
	Positive	15 (12.40)	9 (7.44)	5 (4.13)	1 (0.83)	30 (24.79)	17.85-33.34	
Strongylus group	Negative	36 (29.75)	17 (14.05)	4 (3.31)	9 (7.44)	66 (54.55)	45.53-63.27	0.023
	Positive	24 (19.83)	25 (20.66)	5 (4.13)	1 (0.83)	55 (45.4)	36.73-54.46	
Neoascaris spp.	Negative	52 (42.98)	36 (29.75)	9 (7.44)	9 (7.44)	106 (87.6)	80.37-92.42	0.679
	Positive	8 (6.61)	6 (4.96)	0 (0.00)	1(0.83)	15 (12.4)	7.58-19.63	
Oocyst of *Eimeria*	Negative	55 (45.45)	39 (32.23)	9 (7.44)	7 (5.79)	110 (90.91)	84.24-94.92	0.093
	Positive	5 (4.13)	3 (2.48)	0 (0.00)	3 (2.48)	11 (9.09)	5.07-15.76	
Infestation type	Single	30 (24.79)	22 (18.18)	2 (1.65)	6 (4.96)	60 (49.59)	40.70-58.50	0.105
	Mixed	17 (14.05)	15 (12.40)	5 (4.13)	0 (0.00)	37 (30.58)	22.96-39.43	

Table 2: Prevalence of parasitic infestation of cattle based on age (N=121).

		Age				
		≤1 year N (%)	>1-2 year N (%)	>2-3 year N (%)	≥3 year N (%)	*P* value
Total	Negative	3 (2.48)	8 (6.61)	7 (5.79)	6 (4.96)	0.977
	Positive	15 (12.40)	32 (26.45)	25 (20.66)	25 (20.66)	
Fasciola gigantica	Negative	15 (12.40)	30 (24.79)	25 (20.66)	21 (17.36)	0.643
	Positive	3 (2.48)	10 (8.26)	7 (5.79)	10 (8.26)	
Paramphistomum spp.	Negative	14 (11.57)	30 (24.79)	24 (19.83)	23 (19.01)	0.994
	Positive	4 (3.31)	10 (8.26)	8 (6.61)	8 (6.61)	
Strongylus group	Negative	11 (9.09)	20 (16.53)	16 (13.22)	19 (15.70)	0.686
	Positive	7 (5.79)	20 (16.53)	16 (13.22)	12 (9.92)	
Neoascaris spp.	Negative	17 (14.05)	35 (28.93)	29 (23.97)	25 (20.66)	0.489
	Positive	1 (0.83)	5 (4.13)	3 (2.48)	6 (4.96)	
Oocyst of *Eimeria*	Negative	15 (12.40)	37 (30.58)	31 (25.62)	27 (22.31)	0.348
	Positive	3 (2.48)	3 (2.48)	1 (0.83)	4 (3.31)	
Infestation type	Single	12 (9.92)	19 (15.70)	16 (13.22)	13 (10.74)	0.738
	Mixed	3 (2.48)	13 (10.74)	9 (7.44)	12 (9.92)	

because of this the overall prevalence rate is higher.

After examination of the fecal sample (Figure 1) revealed a total of six species of parasitic infestation belonging to three genera- nematodes, trematodes, and protozoa (Table 1 and 2). Where, nematodes showed the most diverse class followed by trematode which contained two species, and protozoa which had only one species. This study also showed mixed parasitic infestation in cattle based on age (Table 3). The overall prevalence was higher in nematodes (57.86%) followed by trematodes (49.58%) and coccidian (9.1%) (Figure 2) and this is supported by Squire et al. (2013) in where the infestation rate of nematode was 63.1%, trematode was 51.1% and coccidian was 29.4%. Table 1 revealed the parasitic infestation in different animal categories. The infestation of trematodes such as *Fasciola gigantica* and *Paramphistomum spp.* were found at 13.22% & 12.4% in cows, 9.92% & 7.44% in bull, 1.65% & 4.13% in heifer, nil & 0.83% in the calves. The infestation of nematodes such as *Strongylus* group and *Neoascaris spp.* were found at 19.83% & 6.61% in cows, 20.66% & 4.96% in bulls, 4.13% & nil in heifer, and 0.83% & 0.83% in calves.

Table 3: Prevalence of mixed parasitic infestation based on age (N=121).

	Age				Overall	
	≤1 year N (%)	>1-2 year N (%)	>2-3 year N (%)	≥ 3-year N (%)	N (%)	95% Conf. Interval
Fasciola gigantica+ *Paramphistomum spp.*	2 (1.65)	2 (1.65)	1 (0.83)	1 (0.83)	6 (4.96)	2.22-10.68
Fasciola gigantica+ *Paramphistomum spp.*+ Strongylus group	0 (0.00)	1 (0.83)	0 (0.00)	0 (0.00)	1 (0.83)	0.11-5.73
Fasciola gigantica+ Strongylus group	0 (0.00)	0 (0.00)	2 (1.65)	1 (0.83)	3 (2.48)	0.79-7.49
Paramphistomum spp. +*Neoascaris spp.*	0 (0.00)	0 (0.00)	1 (0.83)	0 (0.00)	1 (0.83)	0.11-5.73
Paramphistomum spp. +Oocyst of *Eimeria*	0 (0.00)	0 (0.00)	0 (0.00)	2 (1.65)	2 (1.65)	0.40-6.45
Paramphistomum spp. +Strongylus group	1 (0.83)	6 (4.96)	5 (4.13)	2 (1.65)	14 (11.57)	6.93-18.68
Paramphistomum spp. +Strongylus group +Oocyst of *Eimeria*	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.83)	1 (0.83)	0.11-5.73
Strongylus group +*Neoascaris spp.*	0 (0.00)	3 (2.48)	0 (0.00)	5 (4.13)	8 (6.61)	3.31-12.74
Strongylus group +Oocyst of *Eimeria*	0 (0.00)	1 (0.83)	0 (0.00)	0 (0.00)	1 (0.83)	0.11-5.73

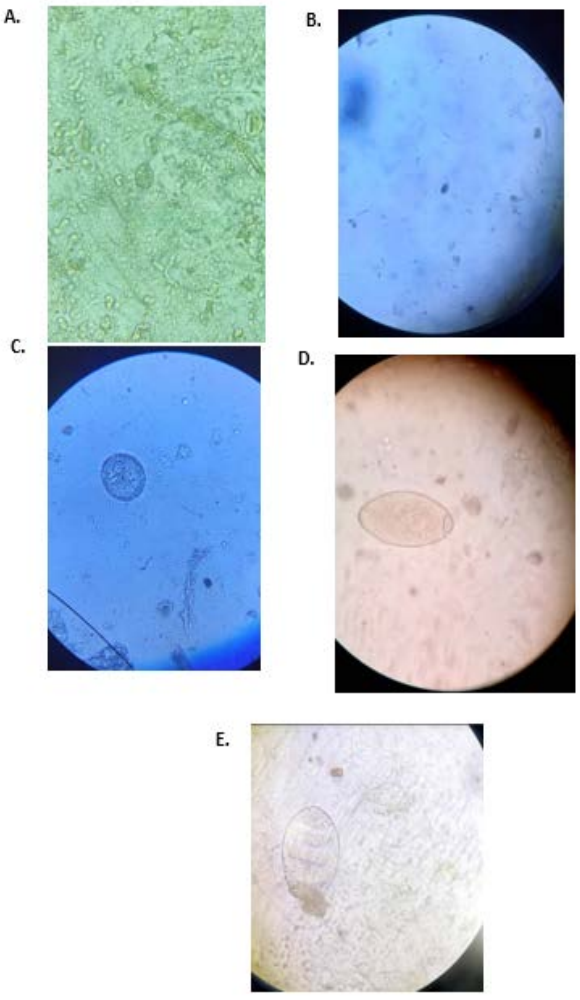

Figure 1: A. Oocyst of *Eimeria spp.* (x40), B. Egg of *Strongylus* group (x10), C. Egg of *Neoascaris spp.* (x40), D. Egg of *Fasciola spp.* (x40), E. Egg of *Paramphistoma spp.* (x40).

The infestation of protozoa such as *Eimeria* sp. was found at 4.13% in cows, and 2.48% in bulls and calves. The result based on animal categories was insignificant (P>0.05) in all kinds of parasitic infestation except infestation of *Strongylus* group (P=0.023) and it is supported by Moussouni et al. (2018). The findings of the study showed that the parasitic infestation in the cow is more dominant than in bulls, heifers, and calves. The infestation rate based on animal categories in this study agree with the other study reported by Sarker et al. (2021), Gunathilaka et al. (2018), Khatun et al. (2021), and Kabir et al. (2018) indicated that cow is more susceptible to parasitic infestation than other animal categories. As cow has to face more stress than others animal categories during their pregnancy condition, lactation, and also in parturition and that is the high time to entry of parasites (Akter et al., 2015; Mustafa et al., 2022). Reduced resistance in cows or transient loss of acquired immunity close to parturition, as well as inadequate nutrition availability compared to their greater requirements are the key factors for their susceptibility to parasitic infestation (Arece et al., 2007; Khan et al., 2023). The genetics, physiological condition, grazing system, ration, and also management system of cows differ from bulls, heifers, and calves and that also act as risk factors for parasitism (Khatun et al., 2021).

In different age groups, there were variable proportions of infections brought on by various parasite species. By age, the gastrointestinal parasite invasion was reported in Table 2. The infestation rate of *Fasciola gigantica* (P>0.05) was found at 2.48% (≤ 1 year), 8.26% (>1-2 years and ≥3 years), and 5.79 % (>2-3years), and the infestation rate of *Paramphistomum spp.* (P>0.05) was 3.31% (≤1 year), 8.26% (>1-2 year), 6.61% (>2-3 years and ≥ 3 years). So the prevalence of trematodes was higher in (>1-2) years of age which agreed with Chowdhury et al. (2017), and Paul et al. (2012) but differs from Pinilla et al. (2019) where the study showed that more than 2 years aged cattle more susceptible to trematode infection. The overall prevalence of *Fasciola gigantica* and *Paramphistomum spp.* based on age in

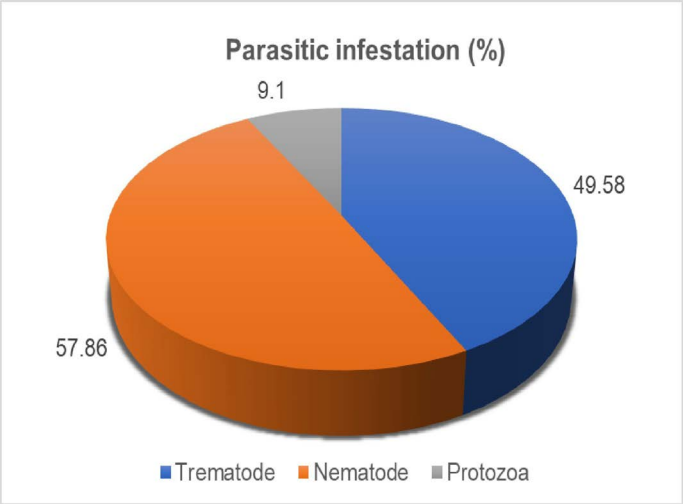

Figure 2: Prevalence of parasitic infestation of cattle in the northern part of Bangladesh (N=121).

this study was 24.79% inclined to Islam et al. (2016). The prevalence of infestation of *Strongylus* group (P>0.05)) was higher in (>1-2) years of aged cattle (16.53%) followed by (>2-3) years of age (13.22%), ≥ 3 years of age (9.92%), and ≤ 1 year of age (5.79%). The prevalence of *Neoascaris spp.* was dominant in (>3) years of age cattle. *Strongyle* eggs (45.46%) were found in abundance more than *Neoascaris spp.* (12.4%), which was consistent with Marskole et al. (2016) where the prevalence of the *Strongylus* group was 51.32% and *Neoascaris spp.* was 2.62%. The overall occurrence of *Eimeria* in cattle was 9.1% and it is similar to T. Nath et al. (2013) (17.33%) but not comparable with Dong et al. (2012) (53.6%). Meanwhile, the prevalence of trematode (8.26%) and *Strongylus* (16.53%) was higher between more than 1 to 2 years of aged cattle. The reason behind it may be anthelmintic resistance, the type and amount of the anthelmintic medication, or reinfection (Squire et al., 2013). The prevalence of *Neoascaris spp.* (4.96%) and *Eimeria* (3.31%) was higher in more than 3 years old cattle. The higher prevalence of *Neoascaris spp.* mainly noticed under 1 year of state be due to transmission of a third larval stage that causes prenatal infection (Khatun et al., 2021). Cattle under one year of age were most frequently affected by coccidiosis, and as they aged, their susceptibility to infection decreased significantly due to prior exposure to the disease and the resulting development of immunity (Sudhakara et al., 2015). But in this study, different situations were noticed, and the probable cause of this result may be poor hygiene, underdose of anthelmintic, or improper deworming schedule. Although there was no statistically significant variation in the prevalence of GI parasites across the different ages of cattle but younger age is a risk factor for GI parasites infection (Das et al., 2018).

In Table 3, the mixed infestation of different parasitic species was expressed. The combination of *Paramphistomum spp.* with *Fasciola gigantica* (4.96%) and *Strongylus* group (11.57%) was presiding over other groups. The infestation rate of these parasitic species was high between 1-3 years aged cattle. The result agreed with Hambal et al. (2020) but disagreed with Cheru et al. (2014) in which the combination of *Fasciola* with the *Strongylus* group was higher than other combinations. The difference between the current studies and prior studies comparing age-based infestations (both single and mixed infestation) may be brought on by differences in geographic location, climatic conditions Kabir et al. (2018), disease resistance, and grazing behavior Paul et al. (2012).

CONCLUSION

It is concluded that the prevalence of parasitic infestation is a major issue in Ullapara Upazila. This study revealed that the occurrence of *Fasciola gigantica*, *Paramphistomum spp.*, *Strongylus*group, *Neoascaris spp.*, and *Eimeria* is predominant in this Upazila. As younger aged cattle are more susceptible to parasitic infestation, so the management of younger animals needs to be considered.

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CONFLICT OF INTEREST

There are no conflicts of interest.

NOVELTY STATEMENT

This research has highlighted the most common Gastrointestinal parasite and its associated risk factors of the study location.

AUTHORS CONTRIBUTION

Akter S: collected the information, wrote and corrected the manuscript. Prank MR: contributed to data analysis. Islam S: contributed to data analysis, figures and table orientation. Hasnine I and Akter S: helped in collecting information. Ahmed MU: assisted in Microscopical examination of samples. Faruk MSA: contributed in overall inspection, supervision and assistance to do prepare the final

manuscript.

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