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The Prevalence of Gastrointestinal Parasites in Buffalo Calves in Sylhet District of Bangladesh

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Abstract

BACKGROUND: Buffalo is one of the most important animals for the source of milk and meat, and it is also used for draught purposes in Bangladesh. Gastrointestinal parasites in the buffalo calves lead to reduced growth and hinder the development of buffalo industry in Bangladesh.

OBJECTIVES: The study was conducted to identify the gastrointestinal parasitic load in the buffalo calves at Sylhet district, Bangladesh.

METHODS: Fecal samples were collected from one hundred seventy (170) buffalo calves from different areas of Sylhet district and samples were examined using sedimentation, and floatation techniques. A morphological examination of parasitic eggs was performed to identify the parasitic species.

RESULTS: Among the 170 calves examined in the present study, 62 (36.47%) were found positive with different parasites. Two species of gastro-intestinal parasites were identified, among them 26.47% positive with *Neoascarisvitulorum*, 5.88% with *Strongyloides sp*.and 4.12% with Strongyle type. The prevalence of gastro-intestinal (GI) parasites in males (44.12%) was lower than in female (55.88%) calves. A relatively higher worm load was observed in summer (58.82%) than rainy (41.18%) season. The prevalence of Gastrointestinal parasitic infections was significantly higher ($P \leq 0.05$) in calves aged 6 months of age (44.12%) than calves of 6-12 months of age (32.35%) followed by 13-18 months of age (23.53%). EPG (egg per gr of feces) ranged from 50-1950.

CONCLUSIONS: The present study showed that the prevalence of GI parasites in buffalo calves in Sylhet is relatively higher regardless of age, sex, and seasons. Data generated through this study will help to adopt necessary measures to control the GI parasitic infections in buffalo calves in developing countries like Bangladesh.

KEYWORDS: Buffalo calves, Fecal examination, Gastrointestinal parasites, Morphology, Prevalence

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Introduction

Buffalo is one of the most important animals as a source of milk and meat and it is also used for draught purposes in Bangladesh. They are one of the major sources of animal proteins along with providing milk, meat, and good quality hides (Liu *et al*., 2009). Buffalo is the 'Black gold' of Bangladesh next to cattle. They are widely used for plowing and laddering, racking, threshing, and crushing of sugarcane and oil seeds carting and transportation of goods in rural areas of Bangladesh, and due to its excellent draft and pulling capacity, buffaloes are called the living tractor of the East (Rahaman and Islam, 1992; Cockrill, 1968). The working life of buffalo is ranged up to 25 years of age which is higher than cattle (Cockrill, 1974). The livestock sub-sector contributes 1.54% to the GDP and in financial year 2017-2018, the livestock population is 551.39 lakh (ruminant) whereas the buffalo is 14.85 lakh (Islam *et al*., 2017).

It is a well-known fact that parasitism is a far greater threat to the livestock than any other visible outbreaks of the diseases. Gastrointestinal parasitism is a major cause of the reduced buffalo production and economic losses in Bangladesh and is often ignored due to its chronic and deceptive nature (Jabber and Green, 1983; Sanyal, 1998; Chowdhury and Tada 1994). It causes significant losses in different parameters of health and production (Lebbie *et al*., 1994). Moreover, some parasites of buffaloes such as schistosomiasis and fascioliasis can transmit to humans where they cause significant clinical diseases in several countries (Wang *et al*., 2006; Tum *et al*., 2007). Gastrointestinal parasites in buffalo calves lead to reduced growth and constantly hinder the development of buffalo industry in Bangladesh. Epidemiological data regarding the parasites of buffalos are not abundant. No study was conducted regarding parasitic infection of the buffalo calves in the Sylhet district which is a suitable place for buffalo rearing in Bangladesh. Therefore, this study was conducted to identify the parasitic load found in the gastrointestinal tract in buffalo calves at the Sylhet district, Bangladesh.

Materials and methods

Study area and animals

The study was conducted in Sylhet Sadar, Jaintapur and Zakiganj Upazila of Sylhet district which is located in between 24°36' and 25°11' north latitudes and inbetween 91°38' and 92°30' east longitudes and where the majority of buffalo calves are reared as free – range (Figure 1). One hundred seventy buffalo calves ranging from 1 day old to 18 months of age of either sex were randomly selected from villages of the Sylhet district of Bangladesh for collection of fecal samples (Gunathilaka *et al*., 2018). The study was conducted from January to September in 2018, considering March to June as summer and June to October as rainy season according to the seasonal clarification of Bangladesh.

Collection and preservation of fecal samples

Questionnaires were prepared and interviews with the farmers were conducted during the collection of the sample to obtain specific information regarding buffalo calves (age, sex, type of maintenance, the treatment that has been given, the other reared buffalo calves, type or material of the enclosure, environmental condition, or livestock care). Samples were collected directly from the rectum and brought to the

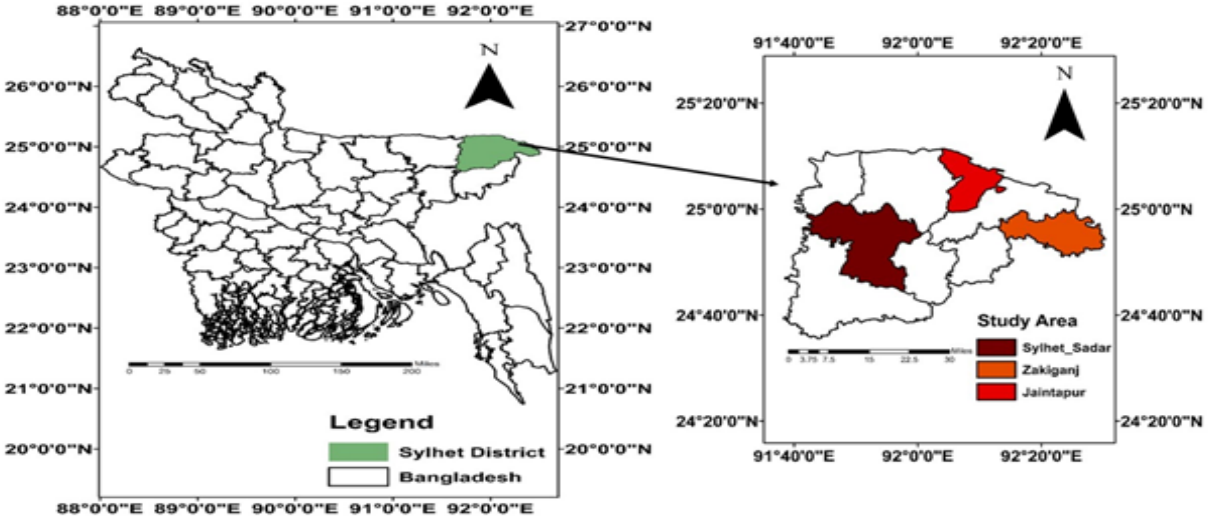

Figure 1. Map of Sylhet district illustrating the study location (Sylhet Sadar, Zakigonj and Jaintapur)

laboratory in mini zip-locked polythene bags. Samples were dispatched in a cool box to prevent the eggs from developing and hatching. Finally, samples were stored in the laboratory in the refrigerator (4 °C) until further processed.

Examination techniques

Fecal samples were examined by fecal floatation using the saturated salt solution, sedimentation techniques for the presence of eggs/oocysts of parasites, and finally, positive cases were counted through the McMaster technique (Storey, 2015; Mohammed *et al*., 2017).

Flotation technique

3 gr of faeces were placed into a container and mixed with 50 ml flotation fluid. The faeces were mixed thoroughly with saturated salt (NaCl) solution using a tongue blade and the resulting faecal suspension was poured through a tea strainer into another container. Taking the faecal suspension from the container the test tube with the suspension was topped off, leaving a convex meniscus at the top of the tube and a coverslip was carefully placed on top of the test tube. After 20 min, the coverslip was carefully lifted off of the tube, together with the drop of fluid adhering to it, and the coverslip was immediately placed on a microscope slide and examined under the microscope (Kandasamy *et al*., 2013).

Sedimentation technique

Three gr of faeces was weighed or measured in a container and mixed with 45 ml tap water with a tongue blade. The faecal suspension was filtered through a tea strainer into another container and poured into another test tube. The mixture was allowed to sediment for 5 min and (pipette, decant) the supernatant was removed very carefully. The sediment was resuspended in 5 ml of water and allowed to sediment for 5 min. The supernatant(pipette, decant) was discarded and the sediment stained by adding one drop of methylene blue and transferring the sediment to a micro-slide covered with a coverslip (Marco *et al*., 2019).

McMaster egg count

Two gr of faeces was weighed,and added to 60 ml of ZnSO4 flotation solution (Sp. Gr. 1.18-1.20*) in a flask or beaker. The

contents were swirled vigorously to break down and homogenize the faecal sample. The contents were poured through a sieve or a cheesecloth-lined funnel into a second container. A tongue depressor or spatula was used to squeeze as much fluid as possible from the material left in the sieve or funnel. While swirling vigorously to keep the material in suspension, a sample of the mixture was aspirated with a pipette and carefully transferred to one of the chambers of the McMaster slide. The procedure was repeated to fill the adjacent chamber. for a period of 1-3 minutes was given to allow eggs to float to the top and debris to fall to the bottom of the chamber. Eggs that fell within the gridded area of both sides of the chamber were counted under the microscope. The total number of eggs in the 2 chambers were multiplied by 100; this is the eggs per gr of faeces (EPG) (Mohammed *et al*., 2017).

Statistical analysis

Data were analyzed by Statistical Package for Social Science (SPSS version 20, USA.) using the F test. For comparative analysis, data were analyzed by using paired sample t-test (Mostafa, 1989). $P \leq 0.05$ was considered as significant.

Results

During this study one hundred seventy (170) buffalo calves were examined through fecal sample examination, of which 62 (36.47%), were found infected with gastro-intestinal (GI) parasites (Table 1). Two species of GI parasites were identified as 26.47% positive with *Neoascaris vitulorum*, 5.88% with *Strongyloides sp*. and 4.12% Strongyle type. EPG (Egg per gram of feces) was also determined in the study and the range of EPG varied among the parasites. The highest EPG count was detected in *N. vitulorum* (50-1950) followed by *Strongyloides sp.* (50-150) and Strongyle type (50-150). Mean EPG count was also higher in *N.vitulorum* (252.22±60.86) followed by Strongyloides sp. (80±13.33) and Strongyle type (64.29±14.29).

Table 1. Overall prevalence of gastro-intestinal parasites in buffalo calves in Sylhet district

Name of parasite	No. of animal affected N=170	Prevalence (%)	EPG (Egg per gram of Feces)	
			Range	Mean±SE
N. vitulorum	45	26.47	50-1950	252.22±60.86
Strongyle type	7	4.12	50-150	64.29±14.29
Strongyloides sp.	10	5.88	50-150	80.00±13.33
Total	62	36.47	50-1950	132.17±29.49

The prevalence of GI parasites in males and females was not significant ($P \leq 0.05$). Females (55.88%) were more vulnerable to parasitic GI infection than males (44.12%). In both the sexes, the prevalence was the highest in the case of *N.vitulorum*. In the male highest prevalence was observed in *N.vitulorum* (22.67%) followed by *Strongyloides sp*. (5.33%) and *Trichostrongylus sp*. (2.67%), whereas in the female the prevalence was 29.47% in *N.vitulorum* followed by 6.32% in *Strongyloide sp*. and 5.26% in Strongyle type (Table 2).

Table 2. Sex related prevalence of gastro-intestinal parasites in buffalo calves in Sylhet district

Categories (Sex)	Name of parasite	No. of animal affected	Prevalence (%)	EPG (Egg per gram of feces)	
				Range	Mean±SE
Male N=75	*N. vitulorum*	17	22.67	50-550	176.47±40.02
	Strongyle type	2	2.67	50-150	100.00±50.00
	Strongyloides sp.	4	5.33	50-150	87.50±23,94
Sub total		23	30.67	50-550	182.41±56.67
Female N=95	*N. vitulorum*	28	29.47	50-1950	298.21±94.44
	Strongyle type	5	5.26	50-50	50.00±0.00
	Strongyloides sp.	6	6.32	50-150	75.00±17.08
Sub total		39	41.05	50-1950	141.07±37.17
Level of significance					0.078**

** $P \leq 0.05$, N = Total number of samples collected

In the present study, Table 3 showed that the seasonal effect of gastro intestinal parasitism in buffalo calves was not significant ($P \leq 0.05$). The prevalence of GI parasites was relatively higher in the summer season (58.82%) than in the rainy season (41.18%). Our study revealed that buffalo calves were more susceptible to GI parasitic infection in the summer season than the rainy season. In the summer season, prevalence was somewhat higher in the case of *N.vitulorum* (27%) followed by *Strongyloides sp.* (4%) and strongyle type (2%) and in the rainy season, the prevalence was relatively higher in the case of *N.vitulorum* (25.71%), followed by *Strongyloides sp.*(8.57%) and strongyle type (7.14%).

Table 3. Seasonal prevalence of gastro-intestinal parasites in buffalo calves in Sylhet district

Categories (Season)	Name of parasite	No. of animal affected	Prevalence (%)	EPG (Egg per gram of feces)	
				Range	Mean±SE
Summer N=100	*N. vitulorum*	27	27.00	50-1950	176.47±40.02
	Strongyle type	2	2.00	50-150	100.00±50.00
	Strongyloides sp.	4	4.00	50-150	100.00±28.87
Sub total		33	33	50-550	178.40±58.62
Rainy N=70	*N.vitulorum*	18	25.71	50-550	127.78±29.49
	Strongyle type	5	7.14	50-50	50.00±0.00
	Strongyloides sp.	6	8.57	50-100	66.67±10.54
Sub total		29	41.42	50-550	81.48±13.34
Level of significance					0.056**

** $P \leq 0.05$, N = Total number of samples collected

Table 4 showed that the prevalence of GI parasites was significantly ($P \leq 0.05$) higher in calves aged > 1-day to 6 months than in calves of aged > 7-12 months. In calves (1-day to 6 months), the prevalence was relatively higher in the case of *N.vitulorum* (36%) followed by *Strongyloides sp.* (2.67%) and strongyle type (2.67%). In calves of 7 to 12 months age, *N.vitulorum* was the main gastrointestinal parasite recorded (23.64%) followed by *Strongyloides sp.* (5.45%) and strongyle type (3.64%). In calves of 13 to 18 months of age, the higher prevalence was also recorded in the case of *N.vitulorum* (12.50%), followed by *Strongyloides sp.*(12.50%) and strongyle type (7.50%).

Table 4. Age related prevalence of gastro-intestinal parasites in buffalo calves in Sylhet district

Categories (Age)	Name of parasite	No. of animal affected	Prevalence (%)	EPG (Egg per gram of feces)	
				Range	Mean±SE
1Day-6 months N=75	*N. vitulorum*	27	36.00	50-1950	372.22±95.00
	Strongyle type	2	2.67	50-150	100±50
	Strongyloides sp.	2	2.67	50-100	75±25
Sub total		31	41.34	50-1950	182.41±56.67
7 -12 months N=55	*N.vitulorum*	13	23.64	50-200	73.08±12.16
	Strongyle type	2	3.64	50-50	50.00±0.00
	Strongyloides sp.	3	5.45	50-150	83.33±33.33
Sub total		18	32.73	50-200	68.80±15.16
13-18 months N=40	*N.vitulorum*	5	12.50	50-100	70.00±12.25
	Strongyle type	3	7.50	50-50	50.00±0.00
	Strongyloides sp.	5	12.50	50-150	80.00±20.00
Sub total		13	32.50	50-150	66.67±10.75
Level of significance				0.023**	

** $P \leq 0.05$, N = Total number of samples collected

Discussion

In the present study, 34.47% buffalo calves were found to be infected with GI parasites. Other studies reported that 47%, 75% and 73.58% buffalo calves were positive for GI parasites in Sindh of Pakistan, Toba Tek Singh in Pakistan and Punjab state of India respectively (Bachal *et al*., 2002; Bilal *et al*., 2011; Singh *et al*., 2012). Jyoti *et al*. (2011) reported that *N. vitulorumin* buffaloes were 8.47% which is lower than the present finding (26.47%), but the present finding is lower than the other study where it was recorded that *N. vitulorum* in buffaloes was 33% (Bachal *et al*., 2002). Azam *et al*. (2002) observed that the overall prevalence of strongyle type was 21.19% in Khadagzai. This finding is also higher than the current findings (4.12%). Jyoti *et al*. (2012) observed that the prev-

alence of *Strongyloides sp*. was 28.45%, which was much higher than the present study (5.88%). In the present study, infection of *Strongyloides sp.* (5.88%) is higher than strongyle type (4.12%). There was no significant ($P \leq 0.05$) difference in the rate of infection between the male and female buffalo calves. It was observed that, the prevalence of GI parasite was slightly lower in male (44.12%) than in female (55.88%) animals which agrees with the previous report of higher prevalence (48.30%) of helminths in female than in male (45.12%) in buffalo calves (Bachal *et al*., 2002). However, the findings of the present study disagree with other studies Jyoti *et al*. (2012) and Bilal *et al*. (2002) that recorded the prevalence of helminths in the male (74.49% and 88.38%) which was higher than the prevalence of the female (72.95% and 59.46%) respectively. There was no sex variation in GI parasitic infection reported by Azhar *et al*. (2002). He observed that buffaloes of either sex were equally affected. This difference between the findings cannot be explained precisely. The alteration in the physiological condition of the female animals during pregnancy and lactation (production activity) may be the cause of the higher percentage of infection in the females. The individuals (female) are more susceptible to any infection due to the secretion of the higher levels of prolactin and progesterone hormones (Lioyd, 1983). Seasonal variation of the year had no significant ($P \leq 0.05$) effect on the prevalence of GI parasitic infection in buffalo calves. There was significant difference in the prevalence of GI parasites in buffalo calves in different seasons of the year. In this study, relatively higher infection with GI parasites was observed in the summer season (58.82%) than the rainy season (41.18%) but Jyoti *et al*. (2012) reported that in the rainy season, the prevalence was (74.67%) that was slightly higher than the summer season (73.59%). The present findings showed that the highest prevalence *N. vitulorum* was27% in summer and 25.71% in winter season respectively. The present findings are higher than Singh *et al*. (2012), who reported that the highest prevalence of *N.vitulorum* was (12.85%) in the rainy season. The contrast between the earlier and present findings may be due to the methods used in the study and also variation in the geographical locations of the studies. Moreover, in the present study, the study period was divided into two seasons for which different seasons had made some overlapping seasons of months that might have formed some contradictions. The age of the buffalo calves had no significant ($P \leq 0.05$) effect on GI parasitic infection in our study. The prevalence of GI parasitic infections was significantly higher ($P \leq 0.05$) in calves of 1-6 months (41.18%) than calves of 7-12 months (32.35%) and calves of 13-18 months of age (23.53%), respectively. The present findings were consistent with the earlier report of Bilal *et al*. (2011), who reported that the higher prevalence of helminths infection was found in calves of 1-6 months of age (86.67%) compared to 7-12 months of age (60%). On the other hand, the present findings disagreed with Jyoti *et al*. (2012), who reported that calves of > 3 months of age were more susceptible to parasitic infection than calves of < 3 months of age. They recorded that parasitic infection in >3 months of age was 68.62%, and< 3 months of age was 79.12%. The higher infection rate was recorded in older buffaloes than the young buffaloes (Azhar *et al*., 2002), which is not in agreement with the

present findings. Age-wise variation might be due to an exhausted immune system.

Conclusions

Our study revealed that the prevalence of GI parasites in buffalo calves is widespread in the study area regardless of age, sex, and seasons of the year. Data generated through this study will help to adopt necessary measures to control these GI parasitic infections in buffalo calves in Sylhet, Bangladesh. Farmer's training is necessary for the construction of proper feeding strategy to reduce the parasitic load.

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Conflicts of interest

The authors declared that there are no conflicts of interest.

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