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PREVALENCE OF GASTROINTESTINAL PARASITISM IN CATTLE OF CHITTAGONG DIVISION, BANGLADESH.

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A one year (2009-10) prevalence study on gastrointestinal parasitism was conducted in crossbred and local cattle, Chittagong, Bangladesh. Fecal samples were collected randomly from 216 crossbred and 432 local cattle of four representative areas in three consecutive seasons. Samples were examined by routine coproscopical methods. The effects of topography, season, age and gender were tested in both crossbred and local cattle. The overall prevalence of gastrointestinal parasitic infections was 39.75% and 46.25% in crossbred and local cattle, respectively. Frequency of trematodes and nematodes infections was persistent in all the study areas. The highest prevalence of trematodes infections was found in Boalkhali (32.41%) compared to Noakhali (23.14%), Rangunia (18.53%) and Khagrachori sadar Upazila (17.60%). Prevalence of nematodes infection was the highest (25.93%) in Noakhali sadar Upazila in local cattle. Occurrence of gastrointestinal parasitic infections was more common in rainy season followed by summer and winter. Significantly higher prevalence of *Paramphistomum* spp (20.13%) was found in rainy season whereas *Haemonchus* spp (5.56%) and *Moniezia* spp (4.16%) were higher in summer (P<0.05). *Paramphistomum* spp infections were more frequent in adult while *Toxocara* spp were predominant in calf (P<0.05). Prevalence of *Haemonchus* spp (4.86%) infections was significantly higher in local adult cattle whereas *Trichostrongylus* spp (4.86%) infections were predominant in local young cattle (P<0.05). It could be stated that season, age were the important predictor of gastrointestinal parasitism. We recommended further studies for molecular detection of such diseases which will assist to take necessary preventive measures.

Key words: Crossbred Cattle, Gastrointestinal, indigenous, Parasitism, Prevalence

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Gastrointestinal parasitism is a world-wide problem (Regassa *et al.,* 2006). It is thought to be one of the major constraints that hinder the development of livestock population (Kakar *et al*., 2008) and also adversely affects the health and productivity of animals (Radostits *et al.,* 1994). The losses caused by parasitic infections are in the form of lowered general health condition, retarded growth rate, diminishing the working efficiency, decrease milk and meat production, abortion, cost associated with preventive measures and reduces the disease resistance capability, which may ultimately lead to higher mortality (Silvestre *et al.,* 2000; and Radostits *et al.,*

1994). Infections caused by gastrointestinal parasites especially nematodes are one of the major causes of calf mortality and act as a big threat for dairy industry of the country. Research revealed that 50% calves up to 1 year of age died due to gastrointestinal parasitism (Debnath *et al*., 1995). On the other hand, the adult cattle are also severely affected by parasitism as they are kept for a longer period of time in breeding or milk production purposes and often supply insufficient feed against their high demand (Sardar *et al.*, 2006) resulting enormous economic losses. Despite significant losses by gastrointestinal parasitism, the problems are often neglected and overlooked as majority of the infected animals show a number of little obvious clinical signs during their productive life and their effects are gradual and chronic (Raza *et al.*, 2010).

However, the topography of Chittagong division was much diversified. The region comprises plane, plane and hilly, costal and hilly areas. Besides, Chittagong is one of the most important dairy belts in Bangladesh where dairy sector is expending in a noticeable way. But, investigations for gastrointestinal parasitism in Chittagong region especially in hilly areas or in a combination of plane and hilly areas were less focused by the previous researchers. Hence, the present study was undertaken to investigate the prevalence of gastrointestinal parasitism of cattle considering breed, age, sex, seasons at four different areas of Chittagong division. The current investigation will give an overall idea about the distribution of gastrointestinal parasitic infection in the region which will ultimately assist the clinicians regarding epidemiological forecasting and aware the farmers to take appropriate control measures against them.

MATERIALS AND METHODS

Study Design

The research was conducted in four topographically different areas, namely Noakhali sadar (plane, costal), Boalkhali (plane, costal) Rangunia (Semi- hilly), and Khagrachori sadar (hill tract) of Chittagong division. Holstein Friesian (HF) crossbred (*Bos taurus* X *Bos indicus*) and indigenous/non descriptive/Red Chittagong cattle (*Bos indicus*) were selected for this study as target animals. Selected animals were categorized into three age groups: calves (≤1 year), young (>1–2.5 years) and adult (≥2.5years) for HF crossbred and for indigenous cattle age limit differed for young (>1-3.5 years) and adult (≥3.5 years) cattle only (Sastrt *et al.*, 2005). In each season, 72 HF crossbred cattle were considered where 30 adult, 14 young and 28 calves were taken from different dairy farms of Noakhali sadar area. On the other hand, 144 indigenous cattle were taken in each season from household cattle where 36 animals from each mentioned area including 12 from each age group. Samples were collected randomly in three consecutive seasons; summer (March to May), rainy (June to August) and winter (October to December).

Sample collection and microscopic examination

Faces samples (approximately 5-10gm from each animal) were collected directly from rectum and stored in plastic containers. The container was then filled with 10% formalin after leveling with specific identification number. The collected samples were carried to the Parasitology Laboratory of Chittagong Veterinary and Animal Sciences University (CVASU) where the samples were preserved in refrigerator at 4^0C temperature. Three different types of qualitative tests, namely direct smear, flotation and sedimentation techniques were used to examine the fecal samples (Hendrix, 2006). Sugar salt solution was used as flotation fluid. At least, two smears were prepared from each sample for each test to identify the morphological characteristics of eggs, cyst, Oocysts (Kassai, 1999 and Soulsby, 1982). During sampling collection, a prototype questionnaire was used to record the information like owner's name and address, animal Identification (ID), farm size, breed, age, sex and deworming history.

Statistical Analysis

Obtained data were analyzed by using statistical software 'STATA/IC-11.0'. Chi-Square Test were performed and the result were expressed in percentage with P-value and significance was determined when P<0.05.

RESULTS

Table 1: Seasonal prevalence of gastrointestinal parasitism

Traits	Crossbred cattle				Local cattle			
Gastrointestinal parasitic infections	**Summer (n=72)**	**Rainy (n=72)**	**Winter (n=72)**	**P value**	**Summer (n=144)**	**Rainy (n=144)**	**Winter (n=144)**	**P value**
Paramphistomum	**15.28**	**13.80**	**15.28**	**0.96**	**10.41**	**20.13**	**8.34**	**0064***
Schistosoma spp	2.78	6.94	6.94	0.45	4.16	11.11	6.94	0.077
Fasciola spp	0	2.78	0	0.13	2.08	3.48	2.08	0.68
Trichuris spp	2.78	2.78	4.17	0.68	6.94	4.86	2.78	0.25
Toxocara spp	5.56	6.94	4.17	0.67	6.94	8.34	6.25	0.78
Oesophagostomum	1.39	4.17	1.39	0.44	2.08	1.39	1.39	0.86
***Haemonchus* spp**	**2.78**	**0**	**1.39**	**0.36**	**5.56**	**1.39**	**0**	**0.005**
Trichostrongylus	4.17	2.78	1.39	0.59	2.78	3.48	0.69	0.26
Strongyloides spp	1.39	2.78	0	0.36	3.48	0.69	1.39	0.19
Bunostomum spp	0	1.39	0	0.36	0.69	3.48	0.69	0.98
***Moniezia* spp**	**1.39**	**1.39**	**0**	**0.60**	**4.16**	**0.69**	**0**	**0.011**

Table 2: Age specific prevalence of gastrointestinal parasitism

Traits	Crossbred cattle				Local cattle			
	Age Group				Age Group			
Gastrointestinal parasitic infections	**Calf (n=84) %**	**Young (n=42) %**	**Adult (n=90) %**	**P Value**	**Calf (n=144) %**	**Young (n=144) %**	**Adult (n=144) %**	**P value**
***Paramphistomum* spp**	**4.76**	**19.07**	**22.22**	**0.004**	**6.94**	**14.58**	**17.36**	**0.024***
Schistosoma spp	2.39	7.14	7.78	0.26	5.56	6.94	9.72	0.38
Fasciola spp	0	0	2.22	0.24	0.69	2.78	4.17	0.17
Trichuris spp	3.57	2.38	3.33	0.82	4.17	4.17	6.25	0.63
***Toxocara* spp**	**13.09**	**0**	**1.11**	**0.001**	**19.44**	**0**	**2.08**	**0.000***
Oesophagostomum spp	1.19	4.76	2.22	0.45	0	2.08	2.78	0.15
***Haemonchus* spp**	**0**	**0**	**3.33**	**0.11**	**0**	**2.08**	**4.86**	**0.023***
***Trichostrongylus* spp**	**1.19**	**2.38**	**4.44**	**0.42**	**0.69**	**4.86**	**1.39**	**0.04***
Strongyloides spp	0	2.38	2.22	0.37	0	3.47	2.08	0.08
Bunostomum spp	0	0	1.11	0.49	0	1.39	3.47	0.06
Moniezia spp	0	2.38	1.11	0.40	0.69	0.69	3.47	0.098

Table 3: Sex-specific prevalence of gastrointestinal parasitism

Criteria		Popul-ation (N)	Parasitic infections (%)										
			Paramph-istomum	Schito-soma	Fasc-iola	Tric-hur is	Toxo-cara	Oesophag-ostomum	Haem-onchus	Trichos-trongylus	Stron-gylus	Bunos-tomum	Mon-iezia
Crossbred	Male	60	8.33	1.67	0	5.0	5.0	0	0	1.67	0	0	0
	Femal	156	17.30	7.05	1.2	3.2	5.77	3.20	1.92	3.20	1.92	0.64	1.20
	P value	-	0.09	0.12	0.37	0.55	0.82	0.16	0.27	0.53	0.27	0.53	0.37
Indigenous	Male	126	11.90	7.14	2.3	3.9	10.3	1.59	3.17	1.59	1.59	0.79	0.79
	Femal	306	13.40	7.51	2.6	5.2	5.89	1.63	1.96	2.61	1.96	1.96	1.96
	P value	-	0.67	0.89	0.88	0.58	0.10	0.97	0.44	0.51	0.79	0.38	0.38

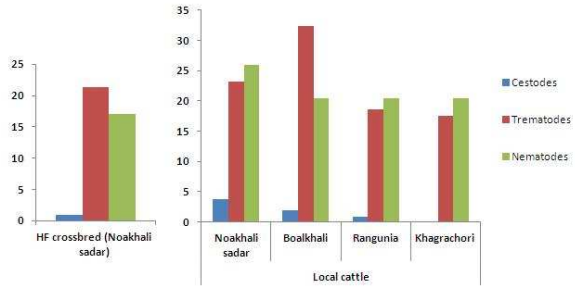

Fig1: Area-wise prevalence of gastrointestinal parasitism in cattle

DISCUSSION

Overall prevalence of gastrointestinal parasitism

The documented prevalence of gastrointestinal parasitic infections of HF crossbred cattle (39.75%; data not shown) of this study showed consistency with the observation of Zahid *et al.* (2005) who found almost similar prevalence in Holstein-Friesian and Jersey cattle in Pakistan. The same findings was partially consistence with the reports of Khan *et al.* (2010) and Saravanana *et al.* (2009) who documented slightly lower prevalence in Pakistan and India, respectively. The reports of Hirani *et al.* (2006) supported the prevalence of indigenous cattle (46.25%, data not shown) of the present study. The earlier findings of indigenous cattle was also partially similar with the findings of Raza *et al.* (2007) and Regassa *et al.* (2006) who documented somewhat higher prevalence in Pakistan and Ethiopia, respectively. Prevalence of gastrointestinal parasitic infections in study population indicated a continuous trend of such infections in the study areas. Variation in the occurrence of gastrointestinal parasitic infections might be due to geo-climatic conditions, breed, age, sex, plane of nutrition, stress, availability of intermediate host (Hansen and Perry, 1993).

Seasonal prevalence of gastrointestinal parasitism

It was evident that climate play an important role in the transmission of parasitic infections (Moyo *et al.*, 1996). In this study, prevalence of gastrointestinal parasitic infections were more in rainy season (Table 1) which was in agreement with the reports of Jeyathilakan *et al.* (2008) and Chavhan *et al.* (2008). It might be due to adequate moisture and optimum temperature which favuored the growth and survival of infective stages in the pasture (Shirale *et al.*, 2008 and Regassa *et al.*, 2006). On the other hand, subsequent occurrence of gastrointestinal parasitic infections were observed in winter followed by summer season which showed consistency with the observation of Shirale *et al.* (2008) and Chavhan *et al.* (2008). It might be due to hot humid climate in summer and low temperature in winter season provides unfavourable environment for the survival and development of parasitic larvae (Pfukenyi *et al.*, 2007) which decreased the availability of infective larvae in the pasture (Moyo *et al.*, 1996). In all three seasons of this study, gastrointestinal parasitic infections were

more prevalent in local than crossbred cattle which might be due to communal grazing by local cattle and never use of anthelmintics. On the other hand, improved husbandry measures along with irregular anthelmintic or sometimes strategic anthelmintic therapy contributed less parasitic infection in crossbred cattle. *Paramphistomum* spp infection showed significant ($P<0.05$) seasonal variation in rainy season which was supported by the reports of Jeyathilakan *et al.* (2008) and Chavhan *et al.* (2008). On the other hand, higher prevalence of *Schistosoma* spp, *Fasciola* spp and *Toxocara* spp infections in rainy season in both local and crossbred cattle might be due to the rainfall and temperature which favours the growth and development of infective stages leading to more contamination of the pasture or feed (Radostits *et al*., 1994) In the study population, significantly ($P<0.05$) higher prevalence of *Haemonchus* spp infection in summer in local cattle were found in line with the reports of Pfukeny *et al.* (2007) and Urquhart *et al.* (1996) who reported that relatively high temperature and humidity in the microclimate required for the larval development and survival. Comparatively higher prevalence of such parasitic infection in summer might be due to over activity of oribatid mites for a longer period of time which are abundant especially on shady parts of any grassland (Kassai, 1999).

Age specific prevalence of gastrointestinal parasitism

Age specific prevalence (Table 2) of gastrointestinal parasitic infections especially, *Paramphistomum* spp, *Schistosoma* spp, *Haemonchus* spp and *Fasciola* spp were found more in adult cattle which supported the observation of Sardar *et al.* (2006) who reported that *Fasciola, Paramphistomum, Trichuris* and *Schistosoma* were highest in the age group greater than 36 months and lowest in age group less than 12 months. Findings of Fritsche *et al.* (1993) also supported the findings of this study. The earlier findings of this investigation showed disagreement with Raza *et al.* (2007) and Regassa *et al.* (2006) who recorded significantly higher worm burden in younger animals than adult. Higher prevalence of parasitic infection in adult cattle might be due to keeping them for a longer period of time in breeding and milk production purposes or supply inadequate feed against their high demand (Sardar *et al.*, 2006). Moreover, stress like lactation, pregnancy, nutritional deficiency which might be accounted for higher prevalence in adult cattle (Radostits, 1994). On the other hand, the highest prevalence of *Toxocara* spp infection in calf was supported by the reports of Sarder *et al.* (2006) and Bachal *et al.* (2002) who recorded such infection in early months of life. *Toxocara* spp infection in local calf of this study partially supported the findings of Avcioglu and Balkaya (2011) who recorded higher prevalence at 0-12 month of age. Higher prevalence of such infection might be due to prenatal infection through transfer of 3rd larval stage (L_3) and post-natal infection by poor hygienic condition (Urquhart *et al.*, 1996 and Soulsby, 1982).

Sex-specific prevalence of gastrointestinal parasitism

Sex-specific prevalence (Table 3) of gastrointestinal parasitic infections showed that infection caused by *Paramphistomum* spp, *Schistosoma* spp, *Oesophagostomum* spp, *Trichostrongylus* spp, *Strongyloides* spp, *Bunostomum* spp, *Fasciola* spp, *Moniezia* spp except *Trichuris* spp were found predominant in female than male cattle. Findings of this study was found in accordance with the reports of Raza *et al.* (2007, 2010) who also reported higher worm burden in female cattle compared to male cattle. On other hand, *Toxocara* spp infection in indigenous male cattle was found in harmony with the reports of Rekwot and Ogunsusi (1985) and Soulsby (1982). In crossbred cattle, *Toxocara* spp infections were also in line with the observation of Avcioglu and Balkaya, (2011) and Raza *et al.* (2010). Variation in occurrence of such helminth infections in male and female animals might be due to the variation in sample size (Bachal *et al.*, 2002), lowered resistance of female animals or temporary loss of acquired immunity near parturition (Garcia *et al.*,

2007), stress, genetic resistance of host and insufficient feed supply against their higher needs (Raza *et al.,* 2010 and Hansen and Perry, 1993).

Area-wise prevalence of gastrointestinal parasitic infections

Comparative analysis (Fig.1) revealed that coastal areas (Noakhali and Boalkhali) were more vulnerable for gastrointestinal parasitism compared to hilly (Khagrachori) or semi-hilly (Rangunia) areas which might be due to favourable temperature and humidity which have the influence on the survival and dissemination of eggs, larvae as well as intermediate hosts of the parasites. Higher prevalence of gastrointestinal parasitism was noticed in indigenous cattle due to communal grazing, insufficient diet and higher stocking density in those areas. Lower susceptibly of such infections in crossbred cattle might be due to use of irregular or strategic use of anthelmintics and improved hygienic measures at farm level.

CONCLUSION

The study was performed to determine the prevalence of gastrointestinal parasitic infections in crossbred and indigenous cattle considering age, sex and season in areas. The explored information of this study will give an overall idea about the distribution of gastrointestinal parasitic infections among the study areas. It will also provide some epidemiological ideas in the occurrence of such diseases in cattle. However, this study will make the way to take further extensive study related to these infections which will help to take necessary preventive and control measures against them.

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