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Full Length Research Paper

A prevalence of parasites in black bengal goats in Chittagong, Bangladesh

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An investigation was carried out to measure the prevalence of ecto- and endopatasites in semi-scavenging black bengal goat (*Capra hircus*) at Pahartali Thana under Chittagong district, Bangladesh during the period of February to May/2006. The overall prevalence of gastrointestinal helminths in goat were 63.41% (N=317). In these positive samples, *Strongyloides* spp. (51.74%) was more prevalent and *Moniezia* sp. and *Capillaria* sp. were least prevalent (n=201). The gastrointestinal parasitic load of goats varied from egg per gram (epg) 0 to 1600. Faecal sample evaluation shows, 36.95% and 13.56% goats were loaded epg 0 and 300, respectively. Age was evident as risk factor where older goats (> 24 month) were more infected by endoparasites than younger ones (< 24 month) in this study ($p < 0.05$). Irrespective of factors, the prevalence of ecto- and endoparasites has been quite high. So, the preventive measurement should be adopted for this goat population. As goats are infected with ecto- and endoparasites, broad spectrum anthelmintics might be judicious choice. As older goats are more susceptible than younger ones for endoparasites, the grazing habit should be restricted.

Key words: Black bengal goat, prevalence survey, ecto-and endoparasites.

INTRODUCTION

The total number of goat population in the world is over 767.90 million of which 109.8 millions (FAO, 2003) are distributed in India, Pakistan and Bangladesh. Of the total livestock population of 64.84 millions (DLS, 2001-2002) in Bangladesh, small ruminants constitute 39.2 millions, of which about 20 millions are goats (Hossain, 2003). Out of 20 million of goats in Bangladesh, 10.4 millions are reared in backyard system by rural farmers, especially the poor women or children as an integral part of the poor farmers (Chowdhury et al., 2003). The total contribution of livestock sub-sector to the gross domestic product (GDP) is approximately 6.5% (DLS, 1998). Livestock sub-sector contributed 13% in the earning of total foreign currency in Bangladesh (Alam, 1993).

For rearing goats, a minimum investment of money is often required, even without specific arrangement of housing, grazing on barren and road-side grass land and least home made supplied feed (rice gruel, boiled rice, skins of vegetables etc.). In addition, goats are fed on leaves of jackfruits, which is available in most of the rearing areas. The higher demands for meat and especially for skin in the local as well as foreign markets focused the goat enterprise extremely prominent to the vulnerable group of people and the existing socio-economic condition of the country. They also have important role in generating employment, income, capital storage and improving household nutrition (Devendra, 1992).

High prevalence of different helminth parasites was reported in cattle (Rahman, 1969; Ahmed, 1970; Bhuyan, 1970; Nooruddin et al., 1987; Howlader et al., 1991; Chowdhury et al., 1993), sheep (Bhuyan, 1970; Samad et al., 1979; Mahbub, 1996; Khalid et al., 2004) and goats (Bhuyan, 1970; Samad et al., 1979; Howlader et al., 1991; Mahbub, 1996). Among the problems encountered, parasitism is thought to be the major causes of hindering the goat production (Dewan et al., 1979; Nooruddin et al., 1987).

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The prevalence of parasitic infestation depends on ecology, geographical and climatic condition prevailing in Bangladesh (Hossain et al., 2004). Gastrointestinal nematodes (*Haemonchus, Trichostrogylus* and *Strogylus)* causes impaired digestion and also affect the absorption of minerals particularly the Calcium and Phosphorus (Speedy, 1992). Jugessur et al. (1998) conducted a survey and reported that 35.3% of the infected goats had above 300 epg in faeces. Like other diseases, parasitic infestation or concurrently occurred infections cause economic losses in terms of mortality, stunted growth, loss of bodyweight gain, poor quality of skin due to ectoparasite in particular, decreased milk and meat production (Dewan et al., 1979; Nooruddin et al., 1987; Ahmed et al., 1994). Therefore, although, different studies have been carried out in various part in Bangladesh, but limited attempt have been taken to study the prevalence of parasites in Chittagong district. However, over the last three decades, there are tremendous changes in the climates, life styles of people and husbandry practices of livestock all over the Bangladesh. Considering these facts, present study was undertaken to study the prevalence of parasites of black bengal goats (*Capra hircus*) in Chittagong, Bangladesh.

METHODOLOGY

The area chosen for the survey is a mixture of high, plain and low land at the periphery of Chittagong city under Pahartali Thana. It is under City corporation administrative areas called 'Wards'. The two wards namely: North Kattali and Soripara were selected for the present study. The availability of goat population and easy communication were taken into account for the selection of areas. Farmers of peri-urban also largely depend on the mixed family farming. A mixed family farm consists of 1 to 2 cattle or goats along with a few poultry. In addition, their livelihoods also depend on small business, job and daily labor. They rear goats in semi-scavenging system with the aim of having kids and meat as a source of subsistent family income.

A total of 317 semi-scavenging goats of 30 households were selected randomly from a complete list of households. Each households consisting of ≥5 black bengal goats (*C. hircus*) and individual age of being ≥5 months was included in the sampling frame. The sampling frame was developed at the beginning of the study as there was no existing sampling frame. The survey was carried out during 4 months period (February to May, 2006) at Pahartali thana in Chittagong district, Bangladesh.

We sampled 7 to 10 black bengal goats (*C. hircus*) each day early in the morning. Around 5 g of fresh feacal sample from each individual were drawn directly from the rectum with aseptic condition (using hand gloves). The samples were kept in vials containing 10% formalin. Each vial was marked with the unique identification number and basic demographic information (age, sex and body weight). A record keeping sheet was used to register demographic information of goats, flock size and types of goat house. The samples were immediately transferred to parasitology laboratory, Chittagong veterinary and animal sciences university (CVASU) and kept in refrigerator at 4°C temperature until further examination. Both the direct smear and flotation methods described by Urquhart et al. (1996) were performed to screen out the positive samples. Modified McMaster Counting technique developed by Soulsby (1986) and Tibor (1999) was also carried out to determine the parasitic eggs load (epg). Ecto-parasitic loads were counted by physical examination of two more susceptible areas of affected goats: marked by 4 square inches of neck and loin following Hannan et al. (2001). The age of the goat were determined on the basis of dentition, sex were detected by examining the external genitalia and body weight were measured using automatic balance (MISAKI; Model-CAP. 130 kg, GRAD.0-100;100-130 kg; Made in Japan) .

Statistical analysis

The obtained information was imported, stored and coded accordingly using Microsoft Excel-2000. The data was exported from MS Excel-2000 to STATA (TM) 9.0 (Stata Corporation College Station) for analysis. The results for epg of endo and ectoparasites were described in frequency percentage. For analysis of epg (endo and ecto) of parasites as a categorical variable, chi-square test (descriptive) and logistic regression (univariable and multivariable) were used. We included 3 numerical and two binary variables in univariable Chi-Square and logistic regression. The numerical variables (age, body weight and flock size) were categorized into two based on 50% of the observation. Variables that were screened out as significant ($p < 0.05$) in univariable analysis were moved forward for the multivariable analysis. The confounding and interaction effects were checked for age and body weight following backward elimination to refine the final model and the final model included age and body weight of the goats. The results were expressed in percentage with p-value for Chi-Square test and showed in odd ratio (OR) with standard error, p-value and 95% confidence interval for logistic regression.

RESULTS

Prevalence of parasites

The overall prevalence of gastrointestinal and ecto-parasites were 63 and 57.72% (N= 317), respectively. Of all the endoparasites *Strongyloides* spp. was 51.74%, *Haemonchus* spp. was 41.79%, *Paramphistomum* spp. was 39.30%, *Trichostrongylus* spp. was 36.32%, *Oesophagostomum s*pp., *Bunostomum* spp., *Fasciola* sp. and *Cooperia* spp. remained between 10.95 and 12.94%. The rest of the species (*Capillaria* spp., Moniezia spp. and *Chabertia* spp.) were just in between 1.5 and 2.0%. The percentage of gastrointestinal parasitic load was variable. The level of load at 300 epg picked up the highest percentage (13.56%) while the level at 1100 to 1600 epg got the lowest (0.32%) (Table 1). The frequency percentage of ectoparasites (EPC) load level at 50 was 34.38%, the level at 100 was 18.30%, and the level at 150 was 4.42%. The EPC level at 200 was only 0.63%.

Risk factor analysis for goats affected with endoparasites

The older and heavier goats were more prone to infection (52.24%) than younger and lighter goats (47.76%) ($p < 0.05$) (Table 2). The infestation rate is 1.61 times higher

Table 1. The level of gastro-intestinal parasitic load (epg) and frequency.

Level of epg	Frequency	Percent (%)
0	116	36.59
100	24	7.57
200	32	10.09
300	43	13.56
400	31	9.78
500	10	3.15
600	34	10.73
700	4	1.26
800	14	4.42
1000	6	1.89
1100	1	0.32
1400	1	0.32
1600	1	0.32
Total	317	100

Total number (N) = 317.

Table 2. epg per-goat in relation to the selected variables.

Variable	Category	epg (0) (%)	epg (100-1600) (%)	P-value (x^2)
Age (month)	4-18	69 (59.48)	96 (47.76)	0.044
	18.1-60	47 (40.52)	105 (52.24)	
Sex	Male	49 (42.24)	88 (43.78)	0.79
	Female	67 (57.76)	113 (56.22)	
Body weight (Kg)	4-12.5	69 (59.48)	96 (47.76)	0.044
	12.51-30	47 (40.52)	105 (52.24)	
Flock size	5-13	65 (56.03)	94 (46.77)	0.112
	14-27	51 (43.97)	107 (53.23)	
Housing	Slatted	87 (75)	152 (75.62)	0.901
	Muddy	29 (25)	49 (24.38)	

Analysis of epg as categorical variable (0 = Negative; 1=Positive: 101-1600; N=317).

in older and heavier goats than younger and lighter goats (Table 3). The final model evidenced that age was risk factor where older goats are significantly affected than younger ones (OR-1.61, CI-1.01/2.55 and $p < 0.05$).

Risk factor analysis for goats affected with ectoparasites

Flock size appeared to be a risk factor at border line significant level (p=0.103) where the larger flock size was more commonly affected than the lower flock size (Table 4).

DISCUSSION

The agro-ecological and geo-climatic conditions of Bangladesh are highly favorable for growth and multiplication of helminths. Ectoparasites and gastrointestinal nematodal parasitism are claimed to be one of the main hindrances for profitable local black bengal goat (*C. hircus*) rearing in Bangladesh (Sobhan et al., 1976). The overall prevalence of endoparasites in the present studied goats was 63.4% which is dissimilar to the previous studies of Jugessur et al. (1998) in which the prevalence of endoparasites in goats was 55.40%. This dissimilarity might be due to unhygienic condition of goat

Table 3. Univariable analysis.

Variable	Category	OR±SE	P-value	95% CI
Age (month)	4-18 18.1-60	1.0 1.61 ± .38	0.045	1.01/2.55
Sex	Male Female	1.0 0.94 ± .22	0.790	0.59/1.49
Body weight (Kg)	4-12.5 12.51-30	1.0 1.61 ± .32	0.045	1.01/2.55
Flock size	5-13 14-27	1.0 1.45 ± .34	0.113	0.92/2.30
Housing	Slatted Muddy	1.0 0.97 ± .26	0.901	0.57/1.64

Table 4. Ecto parasitic count (EPC) per goat in relation to the selected variables.

Variable	Category	EPC (0) (%)	EPC (50-200) (%)	P-value (x^2)
Age (month)	4-18 18.1-60	89 (53.29) 78 (46.71)	76 (50.67) 74 (49.33)	0.640
Sex	Male Female	71 (42.51) 96 (57.49)	66 (44) 84 (56)	0.790
Body weight (Kg)	4-12.5 12.51-30	82(52.90) 73 (47.10)	77 (51.33) 73 (45.33)	0.784
Flock size	5-13 14-27	91 (54.51) 76 (45.51)	68 (45.33) 82 (54.67)	0.103
Housing	Slatted Muddy	126 (75.45) 41 (24.55)	133 (75.33) 37 (24.67)	0.981

Analysis of ecto-parasites as categorical variable (0=Negative; 1=Positive: 50-200; N=317).

house, illiteracy of goat keepers and avoidance tendency of preventive measure in the present study. Most of the goats were found to be infected with more than one species of parasites in the present study. Mixed parasitic infections of *Strongyloides* spp., *Oesophagostomum* spp., *Bunostomum* spp., *Haemonchus* spp., *Paramphistomum* spp., *Trichostrongylus* spp., *Moniezia* spp., *Fasciola* sp. and *Trichuris* spp. were reported earlier in the semi-scavenging goats on Chittagong Hill Tract (Uddin et al., 1994). The parasites affecting the goats were mostly common in both the cases. Rahman (1969), Nooruddin et al. (1987) and Chowdhury et al. (1993) reported the prevalence of similar types of gastro-intestinal parasites in goats in Bangladesh. Yadav and Tandan (1989) reported a bit different prevalence of parasites; 52.7% *Haemonchus* spp., 41.7% *Bunostomum* spp., 38.4% *Oesophagostomum* spp. and 3.5% *Trichuris* spp. infection in goats in a sub-tropical and humid zone in India. *Fasciola hepatica* is an important parasitic infestation in the goats of present study area and Bhuyan (1970) reported 12.9% infections in goats in Bangladesh in his study.

The survey conducted prior to the drug trial, revealed that in 45.7% of the infected goats, there had a high infestation of above 300 epg in the present study. Jugessur et al. (1998) reported that 35.3% of the infected goats had above 300 epg infestations. In addition to gastrointestinal parasites, the ectoparasites (tick and lice) also cause low productivity by damaging hides, sucking blood and playing role as a vector of diseases.

Ectoparasites (ticks and lice) infestation in goats was moderate in the present study which is in agreement with Jugessur et al. (1998). Older goats (> 24 month) were more infected by parasites than younger ones (< 24 month) in this study and this might be due to older ones grazing habits in low land, and grass of low land contain eggs of endoparasites more. Grass of low land might have contained more eggs of parasites.

Large flock size was more infected to parasitic infestation (both by ecto- and endoparasites) than the smaller ones and this is due to direct contact, overcrowding and unhygienic condition of goat farm. Goat maintained on muddy floor was infected more with parasitic infestation than slatted floor and this may be explained as due to low level of hygiene and favored re-infestation. Jugessur et al. (1998) gave similar report on village goats in India.

Conclusion

The prevalence of endo- and ectoparasites has been quite high. It can be concluded that prevalence of parasitic infestation is higher in aged, heavier body weight and large flock sized black bengal goats. Based on the results obtained from the present study, regular deworming and improvement of husbandry practices is suggested.

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