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Original Research Paper

HELMINTHIC AND PROTOZOAN INTERNAL PARASITIC INFECTIONS IN FREE RANGING SMALL RUMINANTS OF BANGLADESH

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Summary: A year-round study was carried out on 136 Bengal sheep and 224 Bengal goats with the aim to compare the species diversity and prevalence of infections with protozoa, flukes, tapeworms and nematodes parasitizing gastrointestinal tract and lungs of the small ruminants from various parts of Bangladesh. The prevalence of internal parasitic infections was higher in goats (74.55%) than in sheep (55.88%). Liver fluke (*F. gigantica*) was more prevalent in goat (14.28 %) than in sheep (8.82%) whereas tapeworm infection was more frequent in sheep (24.26%) in comparison to goat (16.52%). In addition, goats showed higher than sheep prevalence of protozoan (*Eimeria spp.*) and lungworm (*Muellerius spp.*) infections. Goats (33.48%) showed eight times higher prevalence of *Muellerius capillaris* (lungworm) infections than sheep (4.41%) did. Lungworm infection was more likely to occur in female goats where as other species were more prevalent in male. The most prevalent gastrointestinal nematode in both host species was *Trichostrongylus* followed by the occurrence of *Haemonchus*. A total of 10 different types of internal parasites were identified of which 9 were common for both species. The most commonly occurring parasites in both species include *Eimeria, Trichostrongylus, Haemonchus, Monizia* and *Fasciola*.

Key words: helminth; protozoa; parasitic; prevalence; species diversity; sheep; goat

Introduction

There are about 38.1 million small ruminants (goat and sheep) in Bangladesh (1) which plays an important role in the rural economy and earn substantial amount of foreign currency by exporting skins and other by-products (2). Goat production is becoming more and more popular in Bangladesh and nowadays special emphasis is also given to the raising of sheep. Helminthiasis, specially parasitic gastro-enteritis (PGE) constitutes a serious health problem and limitation to the productivity of small ruminants throughout the world due to the associated morbidity, mortality and cost of treatment and control measures (3). In Bangladesh parasitism has been considered as one of the major constraints of livestock production (4). The incidence of parasitic diseases is usually very high and ranges from 30–80% in ruminants and the young crossbred animals are severely affected (5). Losses arise from deaths (10–15%) of young animals, stunted growth, reduced milk and meat production and draft output, delayed maturity and prolonged calving intervals (5). Goats and sheep have numerous gastrointestinal parasites, many of which are shared by both species. The most important include coccidia (protozoa), nematodes (roundworms), cestodes (tapeworms), and trematodes (flukes). Gastrointestinal nematodes of *Trichostrongylidae* family are perhaps the most important parasites of small ruminants world-wide, causing significant morbidity and loss of production.

Owing to the growing demand for high quality animal proteins for human consumption, small ruminants occupy a special place as they are extremely efficient in converting the indigestible cellulose and hemicellulose to animal protein. As goat

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and sheep rearing in Bangladesh being popular with days because these species are valuable for economic, managerial and biological reasons, special emphasis has to be employed regarding proper health & production of them. Among the multitude of problems hindering the livestock development in Bangladesh, disease problems specially related to endoparasitism constitute a serious threat to the successful small ruminants' industry. Despite the special emphasis on the rearing small ruminants, the development of the industry in Bangladesh is seriously threatened.

So, it is essential to know the type of parasites involved in the production of parasitic diseases in goat and sheep industry for its treatment, prevention and control under field condition. Though, some works have been reported on the parasitism of livestock in Bangladesh, no precise report has been found on the prevalence and distribution of helmintic as well as protozoan parasites of goat and sheep together. To the best of our knowledge, this would be the first time report on helminthic and protozoan parasites of goat and sheep. The principal aim of this work was to investigate prevalence of internal parasites of goats and sheep in Bangladesh and to identify species diversity of helminthes in goats and sheep so that proper measure could be taken to help prevent and control the small ruminant industry from the devastating effect of parasitism accordingly.

Materials and methods

Animals and collection of samples

The study was carried out for one year from March 2005 to February 2006 on 136 indigenous Bengal sheep and 224 black Bengal goats from different parts of Bangladesh. The animals were reared under free ranging system where they were allowed for grazing on nearby pasture. Only concentrate was supplied once or twice daily. Faecal samples were collected randomly from the rectum of animals in individual sterile polythene bag and carried on ice to the laboratory and either used promptly or stored at 4°C for a maximum of 24 hours.

Parasitological procedures

Prevalence of gastrointestinal parasites was estimated using flotation in saturated NaCl and sedimentation methods. In order to assess species of gastrointestinal nematodes, infective (L3) larvae were cultured using samples of faeces from individual animals. Faecal samples weighing between 2 and 5 g from each goat or sheep in the study were prepared into a faecal culture for third stage larvae development (6). After 7 days of incubation larvae from faecal cultures were harvested and identified to genera or species using light microscope. The differential counts and identification of each nematode species were performed according to the descriptions of Soulsby (7) and Hansen and Perry (8). Baermann's technique was used for detection of lungworm infection.

Results

As many as 74.55% of examined goats was infected with at least one genus/species of parasite. The prevalence of parasitic infections was higher in goats than in sheep (55.88%) reared in the same conditions (Fig. 1).

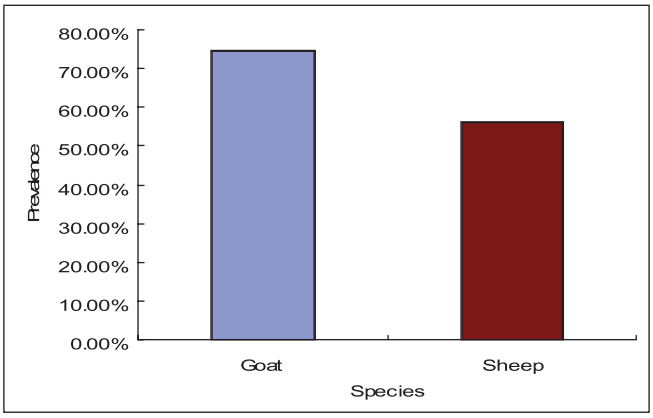

Figure 1: Overall prevalence of parasitic infections in goat and sheep

Liver fluke (*F. gigantica*) was more prevalent in goat (with prevalence 14.28 %) whereas tapeworm infection was more frequent in sheep (24.26%) (Fig.2). In addition, goats showed higher than sheep prevalence of *Eimeria spp.* and *Muellerius spp.* (lungworm) infections (Fig.2). With the later, goats were about 8 times more frequently infected than sheep.

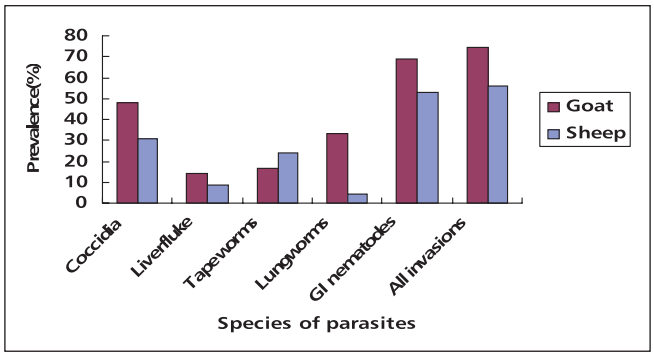

Figure2: Prevalence of protoza, trematode, tapeworms and nematode infection in goats and sheep in Bangladesh

Female goats seem to be more susceptible to infections with lungworms and males with the rest of genus/species but the overall infection was higher in females (Fig-3).

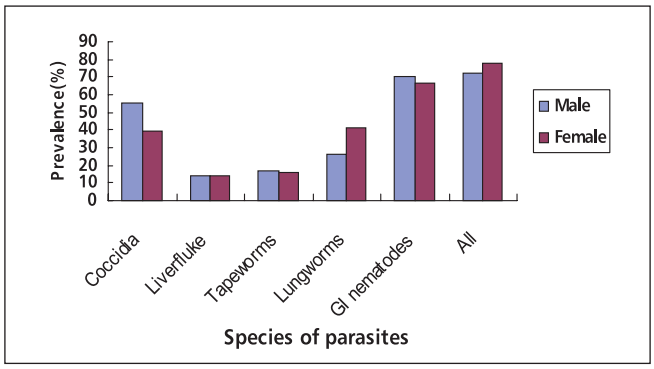

Figure3: Extensiveness of parasitic infections in males and females of goats

On the other hand, male sheep were found to be more often infected than females (Fig.4). However, the sex related incidence was not significant. The most prevalent gastrointestinal nematode in both species of hosts was *Trichostrongylus sp.* (Table-1). The species diversity of various parasites found in goat and sheep is given in table-1 which shows that some species can be considered as common to both species of host.

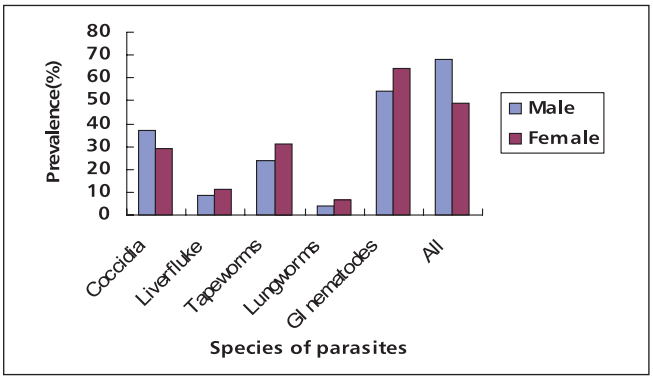

Figure4: Extensiveness of parasitic infections in males and females of sheep

Table 1: Species diversity of internal parasites in goats and sheep in Bangladesh

Parasites	Goat % positive (n=224)	Sheep % positive (n=136)
Eimeria spp.	47.76	30.88
Fasciola gigantica	14.28	8.82
Monizia spp.	16.52	24.26
Muellerius capillaris	33.48	4.41
Trichostrongylus spp.	51.58	34.55
Haemonchus contortus.	25.89	15.44
Cooperia spp.	5.35	2.94
Oesophagostomum spp.	4.01	1.47
Trichuris spp.	8.03	3.67
Nematodirus spp.	0	2.94

Discussion

The results of the present study reveals that goats acquire a lower level of immunity to gastrointestinal parasites than sheep and those parasitic infections are more prevalent in goats than in sheep in Bangladesh. This may be due to the gastrointestinal physiology of sheep. Bengal sheep may be genetically more resistant to GI parasites than goats.

About 48% of goats and 31% of sheep were infected with *Eimeria sp.* (coccidia). *Eimeria* infections can result in serious clinical signs of fluid diarrhea, which may or may not contain mucous or blood, dehydration, emaciation, weakness, loss of appetite, and death. Some goats may instead be constipated and suddenly die without diarrhea (9). The rate of incidence of this pathogenic protozoan species in

small ruminants in Bangladesh is awfully high though they couldn't be compared due to unavailability of available information regarding this. Howsoever, it has been found as one of the most devastating protozoa for sheep and goat farming.

Fasciola gigantica is the only liver fluke found in Bangladesh (10). In this study, the incidence of this species was 14.28% and 8.82% in goat and sheep respectively. Bhuyan (11) reported the incidence of liver fluke in goat as 13%. No available information was found for sheep in this regard. Although goat showed more incidences of almost all parasites, interestingly the incidence of tape worms was higher in sheep (24.26%) than in goat (16.52%). The reason(s) of such high prevalence in sheep is not clear, further study may be of value to conclude it precisely.

One of the most prevalent infections in goats in some part of Bangladesh seems to be *Muellerius capillaries* (Table-1; figure-3), which was found 8 times more infective to goat. Goat may be genetically more vulnerable to lungworm infection. The development of *Muellerius spp.* in the lung of goats is associated with marked tissue damage and pronounced cellular reaction (12). Infections due to *Muellerius capillaris* tend to be cumulative over time, i.e. older goats are more likely to exhibit clinical signs of coughing and ill-thrift due to heavy infestations than are young goats (12). *Muellerius* infection is more likely to be pathogenic in goats than in sheep. Normal treatment with anthelmintics may fail to clear infections, although repeat dosing and/or increasing the dose rate may clear some mild to moderate infections.

Out of Trichostrongylidae family the highest prevalence of infections showed nematodes of genus *Trichostrongylus.* Most of the species of the genus of *Trichostrongylus* actually live in the small intestine. Only one *T. axei* lives in the abomasum. The intestinal species cause more problems than *T. axei* which lives in the abomasums . The presence of the intestinal species cause diarrhea, weight loss and loss of appetite. The worms suck blood from the lining of the intestines which causes irritation and swelling of the intestinal membrane. The damaged mucosa results in malabsorption, impaired digestion and protein loss. Heavy infestations may prove to be fatal to the young animal (13).

The second most prevalent trichostrongylid nematode both in sheep and goats was a blood sucking nematode, *Haemonchus contortus.* Severe infestations can cause death of the animal within a week of heavy infection without showing any clinical signs. Animals with chronic infections show anemia and weight loss. The worms tend to infect mostly young animals, however, older animals can develop heavy infections especially during lactation which may prove fatal. In the late stages of infections, the animal develops a swelling beneath the lower jaw, called bottle jaw (13).

The reason for absence of Nematodirus species in goat in this study is not clear. Although Ostertegia, cooperia and nematodirus were reported as most prevalent genera found from pasture (14), present study findings support previous two genera but not last one for goat.

Conclusion

This study showed high incidences of GI parasites (helminth and protozoan) in goat and sheep in Bangladesh. It was found that sheep and goat share some species of GI parasites even though the incidences vary significantly. It was also noted that sheep acquires more resistance to common GI parasites than goat does. We do believe that this study will help the researchers as well as the epidemiologist to take the necessary steps regarding the control and management of GI parasitic diseases of small ruminants in Bangladesh since there is no/little concise report on this issue. Although this study is not sufficient and further extensive study should be carried out through out the country, this study might serve as a baseline for the followers.

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ZAJEDAVSKE INVAZIJE S PLOSKIMI ČRVI IN PRAŽIVALMI PRI NOMADSKI DROBNICI V BANGLADEŠU

K. B. M. S. Islam in M. J. F. A. Taimur

Povzetek: Da bi primerjali raznolikost vrst in ugotavljali prevalenco zajedavskih invazij, smo v enem letu proučili 136 ovc in 224 koz iz Bangladeša. V prebavilih in dihalih smo iskali praživali, metljaje, trakulje in valjaste črve. Pogostnost invadiranosti z notranjimi zajedavci je bila pri kozah večja (74,55 %) kot pri ovcah (55,88 %). Veliki metljaj (F. gigantica) je bil pogosteje najden pri kozah (14,28 %) kot pri ovcah (8,82 %), trakulje pa nasprotno bolj pogosto pri ovcah (24,26 %) kot pri kozah (16,52 %). Koze so imele tudi več praživali (Eimeria spp.) in pljučnih zajedavcev (*Muellerius* spp.). Pri kozah se je Muellerius capillaris pojavil kar v 33,48 % primerov, pri ovcah pa samo v 4,41 %. Pljučni zajedavci so bili pogostejši pri samicah, ostali zajedavci pa pri samcih. Pri obeh vrstah drobnice je bil najpogosteje ugotovljen želodčno-črevesni zajedavec Trichostrongylus spp., takoj za njim pa Haemonchus. Ugotovili smo 10 različnih vrst notranjih zajedavcev in sicer se jih je 9 pojavljalo pri obeh vrstah gostiteljev. Najpogosteje smo našli vrste Eimeria, Trichostrongylus, Haemonchus, Monizia in Fasciola.

Ključne besede: helminti; praživali; zajedavci; prevalenca; drobnica

Helminthic and Protozoan internal parasitic infections in free ranging small ruminants of Bangladesh. Slovenian Veterinay Research. 45 (2): 67-72.Â Outbreak of Haemonchus contortus infection in sheep of Himachal Pradesh. Indian Veterinay Journal. 76: 932-933. Khajuria, J.K. andKapoor, P.R. (2003). Prevalence of parasites in sheep and goats at Kathua-Jammu. Veterinay Parasitology. 17: 121-126. Helminthic and protozoan internal parasitic infections in free ranging small ruminants of Bangladesh. Slov. Vet. Res. 45(2): 67-72. Jean-Richard V, Crump L, Abicho AA, NarÃ© NB, Greter H, Hattendorf J, Schelling E, Zinsstag J (2014). Prevalence of Fasciola gigantica infection in slaughtered animals in south-eastern Lake Chad area in relation to husbandry practices and seasonal water levels.Â Small ruminant research and Development in Africa. Proceedings of the Second Biennial Conference of the African Small Ruminant Research Network. ILCA. Pp. 1-5. Luna LG (1968). Manual of Histopathological Staining Methods of the Armed Forces Institute of Animals. 3rd edn. McGraw-Hill Book Company, London. Taimur, "Helminthic and protozoan internal parasitic infections in free ranging small ruminants of Bangladesh," Slovenian Vet. PREDOMINANCE OF GASTROINTESTINAL HELMINTHIASIS IN OVIS ARIES (SHEEP) AT THE VICINITY OF JATOI, PAKISTAN Muhammad Asif Raza*, Saeed Murtaza1, Hafiz Allah Bachaya2, Hafiz Muhammad Arshad1.Â Because some Barawan Somali refugees were infected with both helminthic and protozoan pathogens, the interim recommendation for mass pre-embarkation therapy with 3-day mebendazole was changed to single-dose albendazole (400 mg per kg of body weight) for all persons except pregnant women.([dagger]) This approach was considered preferable because of the high prevalence of mixed intestinal parasites Helminthic and protozoan internal parasitic infections in free ranging small ruminants of Bangladesh. Slovenian Veterinary Researcher. 2008; 45:67â€“72.Â 40. Talukdar SK. Prevalence of Helminthic infection in goats in Assam. Journal of Veterinary Parasitology. 1996; 10: 83â€“86. Laboratory detection methods for Intestinal Parasitic Infections. Macroscopic examination. Stool sample is first examined macroscopically for its consistency (formed, semi-formed, or liquid), colour, odour and presence of blood or mucus.Â In the case of helminthic infestations eggs (ova), larvae or segments of helminths can be seen. Direct wet mount (saline or iodine) of stool specimen is routinely done in diagnostic laboratories for the detection and identification of agents of intestinal parasitic infections.Â Culture methods are available for some of the protozoan parasites (Entamoeba histolytica, Balantidium coli), and Helminths e.g. Harada-Mori culture for recovering larvae of nematodes such as Hookworms, Strongyloides stercoralis. Serology.