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HELMINTH PARASITES OF THE DIGESTIVE SYSTEM OF SHEEP IN MYMENSINGH, BANGLADESH

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ABSTRACT

Helminth parasites of the digestive system of sheep in Mymensingh, Bangladesh were studied during the period January to December, 2004. For this, the digestive system were collected from sheep slaughtered at slaughter houses of Mymensingh town and the Bangladesh Agricultural University Campus and were subjected to routine examination for the collection of helminth parasites. A total of 150 sheep were examined of which 142 (94.67%) were positive for one/more species of helminth parasites, among them six species belonged to trematodes, namely, *Fasciola gigantica, Schistosoma indicum, Paramphistomum cervi, Cotylophoron cotylophorum, Grastrothylax crumenifer* and *Homalogaster paloniae*, two species belonged to cestodes, namely, *Moniezia expansa* and *Moniezia benedeni* and three species belonged to nematodes, namely *Haemonchus contortus*, *Oesophagostomum columbianum* and *Trichuris ovis*. Relatively higher occurrence was recorded in winter season (100%) followed by rainy (96%) and summer (88.57%). In relation to age, the occurrence of helminth parasites in younger (<1 year) and in old (≥2 years) sheep was 100% but in young (≥1-2 years) was 76.09%. In relation to sex, the occurrence of helminth parasites was 100% in female and 78.57% in male sheep.

Key words: Helminth, digestive system, sheep

INTRODUCTION

Sheep are primarily useful for wool and meat production, the relative importance of each varying with the countries over a range of 1:1 to 1:10 for the ratio of fleece to lamb value. In the tropics sheep are essentially valuable only for meat production (Devendra and Coop, 1982). Sheep's meat (mutton) might be an additional source of protein as sheep give 5,000 metric tons meat per year (BBS, 2001). Moreover, sheep rearing may give a financial support to the jobless people. But the sheep rearing is hindered by various problems of which parasitic diseases might be a major problem because the mild winter and the long summer including the rainy season create a favorable environmental condition for the survival of various parasites and sheep are parasitized by various parasites in our country (Islam, 1969; Haq and Shaikh, 1968). But the overall occurrence of helminth parasites of digestive system, their variation in relation to age and sex of sheep and their seasonal dynamics was not studied adequately. From this point of view, the experiment was conducted to study the occurrence of helminth parasites of digestive system of indigenous sheep with their seasonal dynamics and the variation in the occurrence of helminth parasites in relation to the age and sex of sheep. The objective of the present study was to find the occurrence of helminth parasites in the digestive system of sheep and the occurrence in relation to age, sex and season.

MATERIALS AND METHODS

The digestive tract and the associated glands were collected from sheep autopsied at the slaughter houses at Mymensingh town and the BAU campus. The study was carried out at the Department of Parasitology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh where different organs were thoroughly examined for the detection, collection and morphological studies on the helminthes from January to December 2004. Although there are six seasons in Bangladesh but only three seasons are prominent such as summer (March-June), rainy (July-October) and winter (November-February). So, the experimental period was divided into these three seasons for the convenience of the study.

Procedures for examination of visceral organs and collection and identification of parasites

Examination of visceral organs, collection of parasites and their preservation were made by the methods followed by Rahman *et al.* (1996). All worms found were collected and placed separately in physiological saline. Immediately after collection initial studies on the morphological features of these helminths for preliminary identification were made by mounting under the microscope. Nematodes were passed through saline immediately after collection, and then they were removed from saline and placed in hot glycerin alcohol for straightening of the parasites which made morphological studies easier. Large trematodes were cleaned off debris with the help of fine camel hair brushes and then preserved in 10% formalin. All other trematodes and cestodes were cleared off, the debris by passing through saline for several times and preserved in 10% formalin. Large and heavy trematodes and the segments of cestodes were pressed between two glass slides and preserved. Label marking the data, place of collection, specimen, sex and organ of the animals were placed on the collecting bottles.

Morphological studies of the nematodes were made after clearing them in suitable clearing agents such as Lacto-phenol. Trematodes and cestodes required staining for detailed morphological studies. Semichon's carmine was used as a staining agent and 10% formalin used for fixation, of the trematodes and cestodes was removed through washing in running water for several hours to get rid of the fixatives. Then the specimens were dehydrated by passing through graded alcohol such as 30%, 50% and 70% for half to one hour in each case. This was done by changing the liquids by decanting and keeping the specimens in the dish. Then the specimens were passed through 80%, 90% and absolute alcohol retaining in each for fifteen minutes to half an hour. They were then cleared in neutral, turpinal for half an hour. Then mounting with Canada balsam was done after momentary washing in xylol. In all cases, parasites were identified following the keys given by Khalil *et al.* (1994) and Rahman *et al.* (1996).

RESULTS AND DISCUSSION

In this study, six species of trematodes; two species of cestodes and three species of nematodes were identified. Helminths recorded are *Fasciola gigantica, Schistosoma indicum, Paramphistomum cervi, Cotylophoron cotylophorum, Gastrothylax crumenifer, Homalogaster paloniae, Moniezia expansa, Moniezia benedeni, Haemonchus contortus, Oesophagostomum columbianum* and *Trichuris ovis*.

During this study, a total of 150 digestive system of sheep were examined where 142 (94.67%) were positive for one/more species of helminth parasites and the detail results are given in the following Tables 1 and 2. Mean density of individual parasites in different seasons are shown in the Table 3. From the result it is revealed that almost every sheep has infection with helminth parasites and 94.67% of sheep were found parasitized, but Haq (1967) recorded 87% of sheep and goats were infected in Mymensingh. This variation among the present and previous study might be due to the differences in geographical niches, climatic conditions, rearing and management of sheep, breeds of sheep and the variation in the sampling collection procedures. Higher occurrence was recorded in winter season (100%) followed by rainy (96%) and summer (88.57%) (Table 1) but Haq (1967) reported that the highest occurrence was in rainy season (95%) followed by winter (90%) and summer (85%). The possible cause of this difference in the percentage of infection could be due to different sampling procedure and gradual change in the climatic condition.

In relation to age, the occurrence of helminth parasites in younger (<1 year) and older animal (≥2 year) was 100% but in young (≥1- 2 years) was 76.09% (Table 2). In relation to sex, the occurrence of helminth parasites was 100% in female and 78.57% (Table 2) in male sheep which is closely related to the report of Uddin (1999). The higher percentage of infection in the females may be due to stress of pregnancy and lactation which make the more susceptible to infection. This investigation revealed that 81.39% of the sheep was infected with *F. gigantica* in Mymensingh (Table 2) which is similar to the earlier reports of Bhatia *et al.* (1989) in Uttar Pradesh, India who recorded 81.4% infection with *F. gigantica* in sheep. It can be hypothesized that, tropical climatic condition is highly favourable for the survival and maintenance of *F. gigantica.* Relatively higher rate of infection with *F. gigantica* in winter (93.33%) followed by rainy (68%), summer (82.86%) seasons is similar to previous report by Aydenizoz Yildiz (2002) in Turkey. This could be explained by the fact that during rainy season, due to availability of favorable breeding places, snail population is increased in great numbers that made it easier for a miracidium to find a suitable intermediate host for further development.

Table 1. Occurrence and mean density of helminth parasites in the digestive system of sheep in winter, summer and rainy season

Name of parasites	Winter season		Summer season		Rainy season		Overall occurrence (%)
	No. infected (n = 30)	% infected	No. infected (n = 70)	% infected	No. infected (n = 50)	% infected	
F. gigantica	28	93.33	58	82.86	34	68	81.39
S. indicum	04	13.33	06	08.57	12	24	15.30
P. cervi	24	80.00	36	51.42	26	52	61.14
C. cotylophorum	20	66.67	20	28.57	26	52	49.08
G. crumenifer	10	33.33	26	37.14	06	12	27.49
H. paloniae	00	00.00	10	14.29	00	00	04.76
Trematodes	**30**	**100**	**60**	**86.72**	**48**	**96**	
Mean ± SD	**29.21 ±3.02**		**13.84 ±3.23**		**17.24±4.02**		
M. expansa	14	46.67	08	11.42	14	28	28.69
M. benedeni	06	20.00	04	05.71	00	00	08.57
Cestodes	**20**	**66.67**	**08**	**44.43**	**14**	**28**	
Mean ± SD	**12.81 ±4.01**		**10.25 ±2.32**		**4.14±3.12**		
H. contortus	18	60	48	68.57	44	88	72.19
O. columbianum	26	86.67	54	77.10	46	92	89.89
T. ovis	18	60	30	42.86	36	72	58.29
Nematodes	**26**	**86.67**	**62**	**88.57**	**46**	**92**	
Mean ± SD	**8.44±2.14**		**7.59±3.02**		**0.03±4.17**		

Table 2. Age and sex-wise occurrence of helminth parasites in sheep

Variable	Occurrence of helminth parasites (%)										
	F_g	S_i	P_c	C_c	G_c	H_p	M_e	M_b	H_c	O_c	T_o
Age											
Younger (<1 year) (n = 14)	85.71	0.00	100	100	42.86	0.00	100	71.43	100	85.71	85.71
Young (≥1- 2 years) (n = 92)	69.57	2.17	30.43	13.04	28.26	0.00	23.91	0.00	67.39	76.09	52.17
Old (≥2 years) (n = 44)	100	45.56	100	90.91	22.73	22.73	0.00	0.00	77.27	100	54.55
Sex											
Male (n = 112)	73.21	7.14	42.86	25	14.29	0.00	26.79	8.23	73.21	92.86	51.79
Female (n = 38)	100	36.84	100	100	68.42	26.32	15.79	0.00	73.68	100	68.42

F_g = *F. gigantita,* S_i = *S. indicum,* P_c = *P. cervi,* C_c = *C. cotylophorum,* G_c = *G. crumenifer,* H_p = *H. paloniae,* M_e = *M. expanda,* M_b = *M. benedeni,* H_c = *H. contortus,* O_c = *O. columbianum,* T_o = *T. ovis*

Table 3. Comparison of Mean density of individual parasites in sheep among rainy, winter and summer seasons

Name of parasites	Average density of parasites					
	Rainy season		Winter season		Summer season	
	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD
F. gigantica	3-16	10.00 ± 4.03	2-23	11.86 ± 4.32	4-18	12.24 ± 3.22
S. indicum	9-30	15.50 ± 3.03	8-23	15.50 ± 4.24	6-12	9.67 ± 3.42
P. cervi	2-93	32.92 ± 2.25	18-193	78.08 ± 3.21	9-155	33.89 ± 34.22
C. cotylophorum	2-39	13.46 ± 4.32	2-49	23.80 ± 3.23	3-39	13.40 ± 4.23
G. crumenifer	7-25	14.33 ± 3.25	2-23	16.80 ± 3.12	2-25	10.62 ± 3.44
H. paloniae	00	00	00	00	2-5	3.20 ± 3.12
M. expansa	7-19	14.14 ± 4.42	11-49	22.29 ± 3.22	9-27	16.00 ± 3.22
M. benedeni	00	004.54 ± 3.33	1-5	3.33 ± 3.33	4-5	4.50 ± 3.22
H. contortus	2-23	17.32 ± 2.35	5-21	11.55 ± 2.12	3-21	10.46 ± 3.33
O. columbianum	4-21	11.23 ± 2.45	4-19	10.08 ± 2.22	3-19	9.22 ± 4.22
T. ovis	3-36	7.83 ± 3.44	2-17	7.56 ± 2.23	3-17	7.27 ± 4.24

The higher rate of infection with *F. gigantica* was observed in older animals which was similar to the reports of Rahman and Mondal (1983) in Bangladesh. It might be due to reduction of body resistance in older animals from debility as stated by Chowdhury (1993). The significant difference in the rate of infection between male and female animals as observed in this study apparently indicated that the female sheep were more susceptible to *F. gigantica* than male sheep. In this investigation *S. indicum* was found in 15.30% of the sheep whereas Islam (1969) recorded 10% *S. indicum* infection in sheep. During this investigations the highest occurrence (24.00%) was recorded during rainy season (July-October) while the lowest (8.57%) during summer season (March to June) but there was no available data to compare with it. The aged sheep from two years or above showed highest (45.56%) occurrence while the young animals aged less than two years showed lowest (2.17%) occurrence. This observation is closely related to the findings of Islam (1969) who reported that intestinal schistosomiasis was found 11.4% in 2 years aged sheep and 100% in 5 years aged sheep. The female sheep showed highest (36.89%) occurrence and the male showed the lowest (7.14%) occurrence.

The percentage of infection with amphistomes in sheep in Mymensingh was 61.14%. These findings is similar to that of Haq and Shaikh (1968) who reported that about 50-60% sheep and goats were infected with amphistomes as a mixed infection with other gastro-intestinal helminth parasites. Faecal examinations of cattle and buffaloes from some limited areas of Bangladesh have also suggested that the occurrence of amphistomes is much common in Bangladesh (Rahman and Mondal, 1983). Here also the female animals are relatively more susceptible to amphistome fluke infections than the males which are closely related to the report of Uddin (1999). The higher percentage of infection in the females may be due to the alteration in the physiological condition of the animals during pregnancy and lactation (production state) and also the lack of feed supplement in females for production, which may lead to the lowering of body resistance of the females. Amphistomes in sheep was higher in the monsoon and lower in the winter and summer season which is closely related to the reports of Uddin (1999).

M. expansa and *M. benedeni* occurred in 28.69% and 9.90% of the digestive system of sheep respectively examined during this survey experiment. The rate of infection by *M. expansa* as observed in this study is similar to the earlier reports of Haq (1967) in Bangladesh who recorded 31% in sheep and goats. Findings also conforms to the records by Vurusaner (1999) in Turkey who recorded 25% *M. expansa* infection in sheep. Higher rate of

infection with *M. expansa* and *M. benedeni* was in winter (46.67% and 20%) compared with a lower infection rate in summer (11.42% and 5.71%) (Table 1) is similar to previous report by Haq (1967) in Bangladesh who recorded 50% in winter and 12% in summer. This might be due to consumption of more infected mites during winter when sheep scavenged on the roots of grasses due to shortage of grass or foods. The higher rate of infection with *M. expansa* and *M. benedeni* was observed in young animals than old which are similar to the reports of Rahman *et al.* (1996). In this study, the infection with *Moniezia* spp. was higher in male than female sheep but there was no available data to compare with it.

H. contortus was recorded in 72.19% of the examined sheep. This finding was similar to that of Shahadat *et al.* (2003), Qadir (1967) and Haq and Shaikh (1968) who recorded 63.75%, 72% and 62.5%, respectively in Bangladesh. From the above findings it is observed that the tropical climatic condition and poor husbandry practices highly favours the survival and dissemination of *H. contortus* in Mymensingh. This investigation revealed that the occurrence of infection with *H. contortus* in sheep was the highest (88%) in the rainy season and the lowest (60%) in the winter season (Table 1). This is similar to the findings by, Shahadat *et al.* (2003) reported that the highest infection (75.53%) with in the rainy season and the lowest (57.69%) in the summer in Bangladesh. In this investigation, infection with *H. contortus* in sheep was higher in young than the adult. This conforms to the findings by Oka *et al.* (1999) in Cote d'Ivoire in sheep.

O. columbianum was recorded in 89.89% of the examined sheep. This is closely related to the findings by Qadir (1967) and Haq & Shaikh (1968) who recorded 88.90%, 61%, 87% and 92.70% respectively in goats of Bangladesh. The highest occurrence of *O. columbianum* was recorded during winter (92%) while the lowest during summer (77.14%). This observation is closely related to the findings of Qadir (1967) who reported 72% and 57% occurrence in winter and summer, respectively. Above seasonal differences might be due to probable difference in collection techniques, geographical variation, differences in the ecological niches. From this study, it is apparent that the occurrence of *O. columbianum* increased with the advancement of age of the animals. The occurrence of *O. columbianum* was relatively higher in male sheep than the female. This might be due to farmers allowing the castrated male sheep to have random feeding in the pasture for fattening purpose, and that is why, the change of frequent and multiple infections is higher in male.

The occurrence of *T. ovis* recorded in this study was 58.29%. But Islam (1989) reported that the occurrence of *Trichuris* spp. (*T. ovis* and *T. globulosa*) was 42.23%. The highest occurrence (58.33%) *Trichuris* spp. was recorded in the month of January and the lowest (25.00%) in November. In this study, a peak occurrence of *T. ovis* was in rainy season and winter season, respectively, which is similar to findings by Islam (1989) who reported that a peak occurrence of recorded in winter. A high occurrence of *T. ovis* was observed in younger sheep (<1year) than the young and older sheep but Islam (1989) reported that a high occurrence of *Trichuris* spp. was observed in the middle aged animals (above 8 months to 18 months of age). This investigation also revealed that the occurrence was little higher in female sheep than male, which is closely related to the report of Islam (1989) who reported that the occurrence was little bit higher in female goats than male.

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