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EFFECT OF IVERMECTIN ON THE PREVALENCE OF GASTROINTESTINAL PARASITES IN JAMUNA BASIN SHEEP

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ABSTRACT

The effect of ivermectin on the prevalence of gastrointestinal parasites of Jamuna basin sheep was investigated in relation to the areas, flock sizes and rearing systems. A total 420 faecal samples were examined microscopically by using Stoll's ova dilution technique from June to December 2020. The number of eggs per gram of feces was calculated and it ranged from 100-500.The study showed that 100% sheep were found to be infected with one or more species of parasites. Four types of parasites were identified. In grazing animals, stomach worm, *Paramphistomum* worm, *Fasciola* and install feeding, stomach worm and *Trichuris* were found. The prevalence of parasites in grazing on 0 day was stomach worm 20%, *Paramphistomum* worm 10% whereas in stall feeding it was stomach worm 15% and *Trichuris* 10%. In 15 days, in all grazing animals stomach worm was 10% and *Paramphistomum* worm 10% whereas in stall feeding it was stomach worm 5%. On 30th day, in grazing animals, stomach worm 15%, and *Paramphistomum* worm 10% were present, whereas in stall feeding it was stomach worm 10%, and *Paramphistomum* 10%. The highest prevalence of stomach worm was 20%, whereas *Paramphistomum* was the lowest with 10% as seen ingrazing animals. Stomach worm with 15% was the highest and the*Trichuris* with 10% was the lowest in stall feeding animals. Prevalence of parasites increased with the flock size on 0 day and ivermectin injection reduced the prevalence in 15 days and later it increased after 30 days of interval. The prevalence was higher in char area (35%) than the hilly area (15%). The sheep were more affected in grazing (25%) than stall feeding (20%). In conclusion, the use of ivermectin injection reduced the prevalence of gastrointestinal parasites up to one month in sheep.

Keywords: Gastrointestinal parasites, Ivermectin injection, Jamuna basin sheep, Prevalence.

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INTRODUCTION

Livestock is an integral component of food production system in Bangladesh and make multifaceted contributions to the growth and development in the Agricultural sectors (Sarker et al., 2017). The present population of sheep is 3.65 million (DLS, 2021). Jamuna basin sheep is characterized by small body size (male: 18-25 kg, female: 15-22 kg) widely distributed at Tangail, Sirajgonj, Gaibandha, Sherpur, Jamalpur, Mymensingh and Dhaka especially, both sides of Jamuna river in Bangladesh. Wool of Jamuna basin lamb is coarse and modulated (Hashem et al., 2020). Parasitic diseases caused high morbidity and huge economic losses (20-25%) in the form of lower yield of wool, meat and milk, followed by retarded growth (Gupta, 2006). Hossain et al. (2016) reported in their literature that parasites usually suck 10-15% of the host nutrients. Domesticated ruminants in Bangladesh are at continuous risk of infection with one or more harmful helminths and the extent of financial losses is estimated to the tune of 25 to 30 million pounds sterling annually (Rahman, 1999). Helminthiasis, especially parasitic gastroenteritis, poses a serious health threat and great challenge to the productivity of small ruminants due to the associated morbidity, mortality, cost of treatment and control measures (Nwosu et al., 2007).

In addition to these threats, infestations with helminths lower the animal's immunity and render it more susceptible to other pathogenic infections; finally, this may result in heavy economic losses (Garedaghi et al., 2011). Among multiple constraints, gastrointestinal parasites are considered as one of the most serious and under estimated problems, which hinders the productivity of sheep (Perry and Randolph, 1999). In the tropics, the most important nematode species affecting small ruminants are *Haemonchus contortus*, *Trichotrongylus* spp. and *Oesophagostomum* spp. According to the available report, helminth infections in sheep ranged from 81 – 94.67% in Bangladesh (Sangma et al., 2012; Mazid et al., 2006). Ivermectin sheep drench is indicated for the effective treatment of gastrointestinal round worms, lung worm and nasal bots in sheep. When used as recommended doses, it provides effective control of parasites.There is limited information on the effect of ivermectin on the prevalence of GI-helminths in Jamuna basin sheep of Bangladesh. The current study was undertaken to examine the effect of ivermectin on the prevalence of gastrointestinal parasites and to compare the prevalence of gastrointestinal parasites under grazing and stall feeding in sheep.

MATERIALS AND METHODS

Experimental site

This experiment was conducted in two Upazila (Sherpur Sadar and Nalitabari) of Sherpur district and Sheep and Goat farm, Bangladesh Agricultural University (BAU), Mymensingh. It lies between 24°18′ and 25°18′ north latitudes and between 89°53′ and 90°91′ east longitudes.

Rearing systems of sheep

In grazing, all sheep were kept inside the house at night and subjected to grazing for 6-7 h/ day. In stall feeding, sheep were kept inside the shed all the time. The house was cleaned every morning. Sheep were supplied green grass and pure drinking water *ad-libitum*. The 150-180g supplements were fed in the morning and evening containing 12 MJME/kgDM and 18% protein.

Flock Size

The farmers are categorized into groups according to the flock size i.e., initial number of sheep of the farm. The farmer who started sheep farming with 5 sheep (4 ewes and a ram) termed as a flock of 5 sheep. Similarly, sheep farming with 10 sheep (9 ewes and a ram) termed as flock of 10 sheep and sheep farming with 15 sheep (14 ewes and a ram) termed as flock of 15 sheep and BAU, flock size was 10 sheep.

Flock management

All the farmers reared sheep in semi-intensive system. The sheep were generally allowed to graze in naturally available pasture land around the village during day time. At night, they were kept confinement in the shed or other places suitable for the farmers. In some occasion, sheep were tethered by rope and allowed to graze by road side or suitable pasture land convenient to the farmers. Leaves of tree *viz.*, mango, jackfruit, banana leaves or cutting grass from the cultivated land was fed during the rainy season. Some farmers cultivated Napier, Oat and Maize for their sheep. Farmers someone used to concentrate (crushed maize, wheat bran, rice bran) in the morning and again in the afternoon at the rate of 150-180 g/sheep/day.The sheep flocks were de-wormed against internal parasites three times a year (at the end of rainy season, at mid-dry season, and at the onset of rainy season) and external parasites by ivermectin injection @ 0.3 ml/sheep (Brand name: Parakil vet., concentration: BP 10 mg and clorsulon USP 100 mg per ml injection). The recommended dose level is 1ml of IVOMEC injection per 50 kg of body weight. Animals were also vaccinated against PPR. The bio-security was not strictly maintained by all farms to reduce the incidence of diseases.

Sample collection

At first, on 0^{th} day, randomly 20 rectal samples were collected from each group of Sherpur Sadar, Nalitabari upazila and Sheep & goat farm of BAU. A total 140 samples were collected from 7 groups. After collecting sample, ivermectin injection @0.3 ml/sheep (Brand name: Parakil vet. concentration: BP 10mg and clorsulon USP 100 mg per ml injection) was used for every sheep. On 15^{th} day again, 20 rectal samples were randomly collected from each group (total 140) of Sherpur sadar, Nalitabari upazilla and 'Sheep and goat' farm of BAU. On 30^{th} day, 20 rectal samples were randomly collected from each group (total 140) of Sherpur sadar, Nalitabari Upazilla and 'Sheep and goat' farm of BAU. Faecal samples were placed in plastic vials containing 10% formalin and quickly transported them at 4°C to the Veterinary Teaching Hospital, BAU, Mymensingh for analyses.

Feaces egg counts of sheep

Faecal samples were processed and subjected to counting of eggs using microscope through Stoll's ova dilution technique.

Identification of egg of parasites

Eggs of different parasites were identified under compound microscope (10×) by their characteristics morphological features (Soulsby, 1982).

Statistical analysis

Data were edited using Excel 2013. Tabular technique was applied for the analysis of data using descriptive statistical tools such as average, percentages, range, mean and standard error.

RESULTS AND DISCUSSION

Prevalence of gastro-intestinal parasites in sheep of char areas of Sherpur

In small group, mean of stomach worm was 150, whereas it was 196 and 227 in sheep of large group (Table 1). According to Gadahi et al. (2009) and Emiru et al. (2013), about 84.3, 59.1, 58.7 and 53.3%, respectively sheep were infested with single or multiple helminths. The present finding is lower than the prior findings of Mazid et al. (2006) in Mymensingh (94.7%) and Sangma et al. (2012) in Tangail (81.1%), Bangladesh. Strongyle had the highest prevalence of 92 (28.75%) *Trichuris* had the lowest prevalence of 16 (5%) in single infection of indigenous sheep breeds (Muhamed et al. 2017), which did not agree to the present study. This variation might be due to the distinction in geographical locations, climatic condition, rearing and management practices of sheep and the variation in the sampling methods. The prevalence of infection with different gastrointestinal parasites was identified namely, stomach worm, *Paramphistomum* and *Fasciola*. On 0^{th} day, the most prevalent eggs of gastrointestinal helminths were stomach worm (20%), whereas, *Paramphistomum* (13.13%) was the lowest. The egg per gram (EPG) count was the highest in stomach worm (100-500) and lowest in *Paramphistomum* (100-200). A low parasitic load of 150 was detected for *Paramphistomum*. Overall prevalence of small, medium and large flock was 20, 25 and 35%, respectively. It was observed that parasitic load was low in small flock (5 sheep) than medium and large flock, respectively (10 and 15 sheep). After using ivermectin injection on the 15^{th} day parasitic egg count was very low in three types of flocks as overall prevalence of small flock was 10% and large flock was 30%. But on 30^{th} day slightly highest parasitic load was detected in three types of flocks as 20 % in small flock, 25% in medium flock and 35% in large flock respectively. The cause of this variation may occur from difference in pasture land, fodder, geographical location and environmental factors. The percentage of sheep infected with different gastrointestinal parasites species including *Haemonchus* spp. (57.63%), *Trichuris* spp. (40.07%), *Fasciola* spp. (9.48%), *Paramphistomum* spp. (24.96) and *Eimeria*

spp. (31.93%) reported by Molla and Bandyopadhyay (2016), which were higher infected rate than the present study. It was detected that flock size had significant effect on gastrointestinal parasitic infestation. The prevalence of parasitic infection was higher (35%) in large group, which contain 15 numbers of sheep than small group (20%) which contain 5 numbers of sheep. Asif et al. (2007) reported similar findings in sheep from Vhola and Sirajgong district of Bangladesh. Poddar et al. (2017) also reported that higher infection was found in Sherpur district as compared to other areas in Mymensingh of Bangladesh.

Prevalence of gastro-intestinal parasites in sheep of hilly area

The stomach worm and *Paramphistomum* worm was found 100-200, 100-300, and 100-400 on 0^{th} day among 5, 10 and 15 groups, respectively (Table 2). The result of the present study had significant effect on the prevalence of gastrointestinal parasites. Prevalence of gastrointestinal parasites in sheep was lower in hilly area than that of char area. Feces egg count was lower in hilly area. A few numbers of eggs was found in large flock at 15^{th} day due to the effect of ivermectin injection. Though in 30^{th} day egg count increase slightly higher than last count, whereas 10, 15 and 25% prevalence were found in small, medium and large flock sizes. Similarly, Yeasmin et al. (2015) reported that sheep in char area were more infected with parasites as compared to hilly area in Bangladesh. In Kashmir-Pakistan, lower prevalence of gastrointestinal parasites was found in mountainous areas (Wani et al., 2011).

Prevalence of gastrointestinal parasites of sheep under stall feeding

The overall prevalence of gastrointestinal parasites was found 25%, 5% and 20% at 0, 15 and 30 days of interval, respectively (Table 3). Similarly, parasites infection range was 100-300, 100 and 100-200 in 0, 15 and 30 days of intervals, respectively. Significant effects of parasites were observed in grazing systems of sheep. Higher prevalence was observed in semi-intensive rearing as compared to stall feeding system. These findings were consistent with the findings of Sangma et al. (2012) in Bangladesh, who reported prevalence is higher in free ranged system (79.12%). From the present study, it was observed that fluke infection was higher in free ranged sheep rearing system. The cause of this variation might be occurring from difference in pasture land, fodder types and environmental factor. The overall prevalence of *H. contortus* infection in sheep (83.4%, n=314) was higher than in goats (71.8%, n=635) (Mushonga, et al., 2018), which was not in accordance with the present study.

Table 1. Effect of ivermectin on the prevalence of gastro-intestinal parasites of sheep among different flock sizes and days of interval at char areas of Sherpur

Days	Parasites	5 group (n=20)			10 group (n=20)			15 group (n=20)		
		Prevalence (%)	Range	Mean±SE	Prevalence (%)	Range	Mean±SE	Prevalence (%)	Range	Mean±SE
0	Stomach worm	2(10)	100-200	150±49.49	4 (20)	100-400	192.5±69.92	6 (30)	100-500	233.35±60.31
	Paramphisto-mum	2 (10)	100-200	150±49.49	2(10)	100-300	200±88.20	4 (20)	100-300	220±42.62
Overall		4 (20)	100-200	150±49.49	6 (30)	100-400	196.25±79.06	10 (50)	100-500	226.67±51.46
15	Stomach worm	2 (10)	100-200	150±49.49	2 (10)	100-200	150±49.49	2 (10)	100-300	200±88.20
	Paramphisto-mum	-	-	-	2 (10)	100-200	150±49.49	2 (10)	100-200	150±49.49
	Fasciola	-	-	-	-	-	-	2 (10)	100-200	150±49.49
Overall		2 (10)	-	-	4 (20)	100-200	150±49.49	6 (30)	100-300	166.66±62.20
30	Stomach worm	2 (10)	100-200	150±49.49	3 (15)	100-200	163.33±25.95	3 (15)	100-300	223.33±50.84
	Paramphisto-mum	2 (10)	100-200	150±49.49	2 (10)	100-200	150±49.49	2 (10)	100-200	150±49.49
	Fasciola	-	-	-	-	-	-	2 (10)	100-200	150±49.49
Overall		4 (20)	100-200	150±49.49	5 (25)	100-200	156.66±37.72	7 (35)	100-300	174.44±49.94

Table 2. Effect of ivermectin on the prevalence of gastrointestinal parasites of sheep at grazing and stall feeding and days of interval at hilly area

Days	Parasites	5 group (n=20)			10 group (n=20)			15 group (n=20)		
		Prevalence (%)	Range	Mean±SE	Prevalence (%)	Range	Mean±SE	Prevalence (%)	Range	Mean±SE
0	Stomach worm	2 (10)	100-200	150±49.49	2 (10)	100-300	200±84.2	5 (25)	100-400	196±53.66
	Paramphistomum	-	-	-	2 (10)	100-200	150±49.49	3 (15)	100-300	183.33±48.49
Overall Prevalence		2 (10)	100-200	150±49.49	4 (20)	100-300	157±37.72	8 (40)	100-400	189.5±51.05
15	Stomach worm	-	-	-	2 (10)	100-200	150±49.49	2 (10)	100-200	150±49.49
	Paramphistomum	-	-	-	-	-	-	2 (10)	100-200	150±49.49
	Fasciola	-	-	-	-	-	-	-	-	-
Overall Prevalence		-	-	-	2 (10)	100-200	150±49.49	4 (40)	100-200	150±49.49
30	Stomach worm	2 (10)	100-200	150±49.49	2 (10)	100-200	150±49.49	3 (15)	100-200	163.33±25.95
	Paramphistomum	-	-	-	1 (5)	100	100±0	1 (5)	100	100±0
	Fasciola	-	-	-	-	-	-	1 (5)	100	100±0
Overall Prevalence		2 (10)	100-200	150±49.49	3 (15)	100-200	84±24.24	5 (25)	100-200	121.1±8.65

Table 3. Effect of ivermectin on the prevalence of gastrointestinal parasites of sheep at stall feeding and days of interval at BAU

Days	Parasites	Stall (n=20)		
		Prevalence	Range	Mean±SE
0	Stomach worm	3 (15%)	100-300	176.66±62.26
	Trichuris	2 (10%)	100-200	150±49.49
	Overall	5 (25%)	100-300	163.33±55.87
15	Stomach worm	1 (5%)	100	100±0
	Overall	1 (5%)	100	100±0
30	Stomach worm	2 (10%)	100-200	150±49.49
	Paramphistomum	2 (10%)	100-200	150±49.49
	Overall	4 (20%)	100-200	150±49.49

Overall prevalence of gastrointestinal parasites of sheep

The overall prevalence of gastrointestinal parasites of sheep at grazing and stall feeding and days of interval is shown in Table 4. On 0^{th} day for stall feeding the prevalence was 25% but 2 weeks later the prevalence rate was decreased (5%). Although in 30^{th} day, prevalence rate increased (20%). The study revealed that stall feeding could be one of the good options in the future for decreasing parasitic infestation. Similarly, for grazing sheep the prevalence was 30, 20 and 25% at 0, 15 and 30 days of interval, respectively. The present observation indicated that the sheep reared under natural grazing was more affected by gastrointestinal parasites as compared to stall feeding. Intensive feeding system had found better than extensive system regarding the growth, production, and health and sustainability perspective. Practically, this system seemed to be more expensive for farmers in the initial stage, but more return per unit of input in the long run could be counter this problem.This variation might be due to change in management practices of different flocks and opportunity of grazing land in the infected field. Singh et al. (2013) reported that the overall gastrointestinal prevalence was 68.75% with *Haemonchus* spp., *Moniezia* and *Coccidia.* From the study, it was found that rearing system had significance effect on the prevalence of gastrointestinal parasites. Prevalence of parasites in sheep was higher in grazing system. The variation of the study might be due to difference in geographical distribution, climatic condition, availability of vector, rearing and management, breeds and the variation of sampling collection procedure. Infestation rate of *Fasciola* was significantly ($p<0.05$) higher in the grazing group (Moniruzzaman et al., 2002). It was found that parasites egg count was very high in 0^{th} day. After 15^{th} day again collected of feces from every group and parasites egg count reduced than prevosiously collected samples.The final samples counted in 30^{th} day and parasites egg count was found slightly higher than last count. Stall feeding,

small flock size and regular control measures should be practiced to reduce the parasitic burdens in the affected studied areas.

Table 4. Overall prevalence of gastro-intestinal parasites of sheepat grazing and stall feeding and days of interval

Days	Parasites	Grazing	Stall feeding
		Prevalence	
0	Stomach worm	20%	15%
	Paramphistomum	10%	-
	Trichuris	-	10%
Overall prevalence		30%	25%
15	Stomach worm	10%	5%
	Paramphistomum	10%	-
	Fasciola	-	-
Overall prevalence		20%	5%
30	Stomach worm	15%	10%
	Paramphistomum	10%	10%
	Fasciola	-	-
Overall Prevalence		25%	20%

CONCLUSIONS

The important source of variation for parasitic infestation of Jamuna basin sheep were flock sizes, areas and rearing system. The current study revealed that the ivermectin reduced parasites infection and capable to control gastrointestinal parasites up to one month. Further study is needed with increasing the days of interval on the effect of ivermectin for addressing the prevalence of gastrointestinal parasites in sheep.

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