Impact of treatment of gastrointestinal nemathelminths on body weight of sheep and goats

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Abstract Gastrointestinal nemathelminths affect productive as well as reproductive performance of a wide range of ruminants. To assess the impact of anthelmintic treatment on gain in body weight (b. wt.) of sheep and goat, a study was conducted using two different flocks of sheep and goats each maintained in semi intensive system. Infected animals in both the flocks were divided into three groups each. Group I and II in each flock were treated with levamisole (@7.5 mg/kg b. wt. subcutaneously) and fenbendazole (@5 mg/kg b. wt. orally), respectively. Animals of group III were kept as untreated control. Individual b. wt. and faecal egg count were recorded up to 42nd day post treatment. Results showed 100 % reduction in faecal egg count of sheep on day 7 after treatment with levamisole and on day 10 after treatment with fenbendazole. In goats, the reduction in faecal egg count was 82.60 % after treatment with levamisole and 78.87 % after treatment with fenbendazole on day 14 post treatment. The study also revealed mean increase of 29.57 and 22.67 % in b. wt. of sheep treated with levamisole and fenbendazole respectively 42nd day post treatment whereas mean b. wt. of infected untreated control groups decreased by 7.14 %. Similarly, there was an increase of 10.71 and 14.47 % in mean b. wt. of goats 42nd day post treatment with levamisole and fenbendazole, respectively whereas mean b. wt. of untreated control group decreased by 15.38 %. More weight gain was recorded in sheep as compare to goats after treatment as compared to the untreated control group, which may be due to some drug resistance in goat and

required clarification by further studies in these ecological zones of Udham Singh Nagar.

Keywords Body weight · Faecal egg count · Gastrointestinal nemathelminths · Sheep · Goat

Introduction

Helminth parasites are the cause of impaired output in small ruminants all over the world (Tinar et al. 2005) including India (Shende et al. 2007) where the environmental conditions like temperature, humidity and rainfall are favourable for perpetuation of parasites as compared to temperate regions (Singla 1995; Haile et al. 2010). They limit the productivity of animals as some of them are voracious blood suckers like *Haemonchus* spp. while others remove nutrients from the ingesta due to their direct feeding activities like *Oesophagostomum* spp. (Sargison 2011). They also damage the absorptive lining of the gastrointestinal tract and suppress the host's immune response in order to promote their own survival (Helmby 2009). As consequences, there is reduction in weight gain, poor feed utilization and other production losses which ultimately affect the economy of the livestock owner as well as of the nation (Pedreira et al. 2006). The present study was designed to assess the impact of treatment of gastrointestinal nemathelminths on body weight (b. wt.) in sheep and goats.

Materials and methods

Study area and animals

Two different flocks of sheep and goats were selected from Udham Singh Nagar district of tarai region of Uttarakhand.

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Table 1 Effect of anthelmintic treatment on body weight (b. wt.) and faecal egg count (mean $\pm$ SE) in sheep

Days post treatment	Untreated control		Levamisole treatment (group SI)		Fenbendazole treatment (group SII)	
	Mean EPG	Mean b. wt. (kg)	Mean EPG (% decrease)	Mean b. wt. (kg)	Mean EPG (% decrease)	Mean b. wt. (kg)
0th	1,100.00 $\pm$ 173.81	33.60 $\pm$ 1.31	1,195.00 $\pm$ 268.57	25.70 $\pm$ 1.58	1,435.00 $\pm$ 227.83	26.90 $\pm$ 2.14
7th	1,160.00 $\pm$ 159.24	32.90 $\pm$ 1.31	0.00 $\pm$ 0.00 (100)	28.60 $\pm$ 1.65	10.00 $\pm$ 10.00 (99.30)	29.60 $\pm$ 2.08
10th	990.00 $\pm$ 183.88	32.23 $\pm$ 1.35	0.00 $\pm$ 0.00 (100)	29.02 $\pm$ 1.64	0.00 $\pm$ 0.00 (100)	29.95 $\pm$ 1.26
14th	1,120.00 $\pm$ 130.52	31.10 $\pm$ 1.37	30.00 $\pm$ 11.06 (97.48)	30.04 $\pm$ 1.63	0.00 $\pm$ 0.00 (100)	30.40 $\pm$ 1.89
28th	1,135.00 $\pm$ 121.24	31.00 $\pm$ 1.44	70.00 $\pm$ 32.68 (94.14)	32.50 $\pm$ 1.71	10.00 $\pm$ 2.67 (99.30)	31.00 $\pm$ 2.11
42nd	1,180.00 $\pm$ 123.64	31.20 $\pm$ 1.25	280.00 $\pm$ 80.40 (76.56)	33.30 $\pm$ 1.50	185.00 $\pm$ 77.89 (87.10)	33.00 $\pm$ 2.19
Net % increase/decrease in b. wt. on day 42nd post treatment		-7.14 % (-2.40 kg)		+29.57 % (+7.60 kg)		+22.67 % (+6.10 kg)

Table 2 Effect of anthelmintic treatment on body weight (b. wt.) and faecal egg count (mean $\pm$ SE) in goat

Days post treatment	Untreated control		Levamisole treatment (group GI)		Fenbendazole treatment (group GII)	
	Mean EPG	Mean b. wt. (kg)	Mean EPG (% decrease)	Mean b. wt. (kg)	Mean EPG (% decrease)	Mean b. wt. (kg)
0th	300.00 $\pm$ 100.00	29.25 $\pm$ 5.10	862.50 $\pm$ 424.93	28.00 $\pm$ 3.41	887.50 $\pm$ 189.70	19.00 $\pm$ 1.68
7th	516.66 $\pm$ 280.38	26.00 $\pm$ 2.27	216.60 $\pm$ 47.32 (74.88)	29.50 $\pm$ 4.09	275.00 $\pm$ 136.16 (69.01)	20.75 $\pm$ 1.89
10th	535.35 $\pm$ 150.25	25.80 $\pm$ 2.28	175.00 $\pm$ 43.30 (79.71)	30.36 $\pm$ 4.07	237.50 $\pm$ 75.00 (73.23)	20.50 $\pm$ 1.93
14th	566.67 $\pm$ 148.14	25.50 $\pm$ 2.06	150.00 $\pm$ 20.41 (82.60)	30.49 $\pm$ 3.72	187.50 $\pm$ 23.93 (78.87)	21.15 $\pm$ 2.06
28th	578.00 $\pm$ 179.13	25.25 $\pm$ 2.59	350.00 $\pm$ 88.97 (58.26)	30.76 $\pm$ 3.86	387.50 $\pm$ 94.37 (56.33)	21.55 $\pm$ 1.75
42nd	583.33 $\pm$ 204.84	24.75 $\pm$ 2.72	450.00 $\pm$ 97.89 (47.82)	31.00 $\pm$ 4.24	562.50 $\pm$ 85.08 (36.61)	21.75 $\pm$ 1.11
Net % increase/decrease in b. wt. on day 42nd post treatment		-15.38 % (-4.50 kg)		+10.71 % (+3.00 kg)		+14.47 % (+2.75 kg)

These flocks were situated at a distance of 50 km apart and were maintained under semi intensive condition. Out of total population size, 30 sheep and 15 goats of 1–2 years of age and naturally infected with mixed infection of gastrointestinal nemathelminths were randomly selected for study.

Experimental design

Infected sheep were divided into three different sub-groups SI, SII and SIII having 10 animals in each group. Infected goats were also divided into three sub groups GI, GII and GIII each comprising of 5 numbers of animals. Groups SI and GI were treated with levamisole (Lemasol-75 @ 7.5 mg/kg b. wt. subcutaneously) while Groups SII and GII were treated with fenbendazole (Fentas @ 5 mg/kg b. wt. orally). Animals of group III were maintained as untreated control. During the entire study period, b. wt. of all the animals of treated as well as untreated groups of sheep and goats were recorded individually up to 42 days post treatment (i.e. on 0th, 7th, 10th, 14th, 28th and 42nd day) in order to assess the effect of helminth control on growth parameter.

Collection and examination of faecal samples

Faecal samples were collected per rectally on 0, 7th, 10th, 14th, 28th and 42nd day of anthelmintic treatment from each animal. Faecal egg count of each sample was recorded using Modified McMaster's technique MAFF (1986). Coproculture of pooled faecal samples was done and the larval composition was also recorded pre and post treatment.

Results and discussion

In the present study, the percent reduction in faecal egg count, in case of sheep, was observed to be 100 % following treatment with both levamisole and fenbendazole on 7th and 10th days post treatment, respectively while in case of goats, it was 82.60 and 78.87 % respectively after treatment with levamisole and fenbendazole on day 14 post treatment. Examination of the coproculture findings at pre-treatment revealed presence of mixed infection in the sheep flock including *Haemonchus contortus* (*H. contortus*), *Trichostrongylus* spp., *Oesophagostomum* spp. with percent composition of 74, 8 and 18 % but after the treatment there was no larvae seen in levamisole and fenbendazole treated sheep. While in group of goats pre-treatment coproculture comprised of larvae of *H. contortus*, *Trichostrongylus* spp. and *Oesophagostomum* spp. with percent composition of 55, 22 and 23 % but post-treatment, there was presence of only *H. contortus* larvae in both treated

groups of goats. Percent increase in mean b. wt. of sheep was observed to be 29.57 and 22.67 % in following treatment with levamisole and fenbendazole, whereas mean b. wt. of untreated control group decreased by 7.14 % (decrease of 2.40 kg) on 42nd day of post treatment (Table 1). Pandit et al. (2009) also observed gain in b. wt. of sheep treated with different anthelmintics as compared to untreated control after 10 days of treatment. In goats on day 42nd post treatment, there was an increase of 10.71 and 14.47 % in mean b. wt. of levamisole and fenbendazole treated groups whereas in untreated control group it was decreased by 15.38 % (Table 2). Since these flocks were maintained under semi intensive system, there will be an increase in the faecal egg count after post treatment. Reduced b. wt. gain due to gastrointestinal nematode infections in goats was also reported earlier by Faye et al. (2003). The difference in b. wt. gain of treated and untreated control might be due to difference in intensity of eggs per gram (EPG) counts. This in turn indicates the extent of damage caused by worms and hence low weight gain. The total worm load in fenbendazole and levamisole treated group of goats was reduced by 82.60 and 78.87 % respectively and hence there will be increase in their b. wt. but not upto such extend when these drugs are 100 % effective. Prince et al. (2010) reported that there is a direct effect of faecal egg count on growth characteristics i.e. whenever faecal egg count is high, average daily weight gain declines. Jas et al. (2007) also concluded that feed conversion efficiency may be another factor for reducing the b. wt. by 20–25 g/day in goats. Thus it can be concluded that there is a direct effect of reduction in faecal egg count on average daily b. wt. gain of animals and further studies need to be done to clarify the state of efficacy of the commonly used anthelmintics covering different agro ecological zones and species of animals in tarai region of Udham Singh Nagar.

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