Efficacy of fenbendazole, levamisole and ivermectin against gastrointestinal nematodes in Jamunapari goats

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Abstract Efficacy of fenbendazole, levamisole and ivermectin was checked in comparison to untreated controls in twenty Jamunapari goats, naturally infected with gastrointestinal nematode parasites. Faecal examination at day 0 revealed an egg per gram of 930 ± 175.1 , 1350 ± 421.1 , 1060 ± 224.9 and 800 ± 279.7 in group A, B, C and D, respectively having five animals each. The results of larval culture examination revealed the presence of *Haemonchus*, *Trichostrongylus*, *Oesophagostomum*, *Bunostomum* and *Strongyloides* spp. in these animals. Faecal egg counts of the animals treated with fenbendazole (group A), levamisole (group B) and ivermectin (group C) were reduced by 23.66, 63.70 and 98.11%, respectively on day 14 post-treatment.

Keywords Anthelmintic efficacy · Fenbendazole · Goats · Ivermectin · Levamisole

Introduction

Jamunapari goats are maintained for dual purpose (milk and meat) and have been extensively utilized to upgrade

indigenous goat breeds. They can thrive well on naturally growing biomass (shrubs, bushes, dry tree leaves, etc.) available for browsing in arid to semi arid regions of India (Acharya 1992). Helminthic infections have been a persistent and major constraint on the growth and development of the goats. These infections are rarely fatal but instead are chronic and debilitating in their effect upon the hosts causing huge economic losses in terms of monetary gains to their nomadic owners. The farmers are mainly rely on anthelmintics for the control of these helminthic infections. However, reports of the poor efficacy and/or failure of these drugs against gastrointestinal nematodes of goats have been documented by several workers (Yadav and Uppal 1992; Laha et al. 1999; Ram et al. 2007). Therefore, the present study was carried out to evaluate the comparative efficacy of fenbendazole, levamisole and ivermectin against naturally acquired nematode infections in Jamunapari goats at Jaipur.

Materials and methods

The animals

The study was carried out on a goat farm of the Apollo College of Veterinary Medicine, Jaipur, located in the eastern semi arid Thar Desert, Rajasthan. The Jamunapari goats, selected for the experiment were maintained in the temporarily erected tin sheds having non-concrete floors and were allowed to browsing biomass naturally growing in open land around the college premises in addition to being fed with standard concentrate, dehydrated groundnut agro-waste and greens as per their age and body weight, and water was provided ad libitum.

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Table 1 Faecal egg counts (Mean $\pm$ S.E) in the respective groups

	Animal group (%)	Drug	EPG	Mean EPG $\pm$ S.E	FECR
Data with different superscripts were significantly different at 5% level EPG denotes eggs per gram (minimum–maximum)	A	Fenbendazole	Day 0 (400–1350)	930 $\pm$ 175.1	23.66
			Day 14 (0–1050)	710 $\pm$ 199.6 ^{bc}	
	B	Levamisole	Day 0 (100–2600)	1350 $\pm$ 421.1	63.70
			Day 14 (0–1250)	490 $\pm$ 209.4 ^{bc}	
	C	Ivermectin	Day 0 (450–1650)	1060 $\pm$ 224.9	98.11
			Day 14 (0–50)	20 $\pm$ 12.3 ^a	
	D	Untreated control	Day 0 (250–1700)	800 $\pm$ 279.7	–
			Day 14 (350–1750)	860 $\pm$ 274.9 ^c	

Experimental design

Twenty Jamunapari goats were assigned to four groups (A, B, C and D) of five animals each, irrespective of age, sex and weight. The first three groups (A to C) were selected for the treatment and the animals of group D were kept as untreated controls. All the animals of group A, B and C were treated with fenbendazole (Fenbezol, Ranbaxy) at 7.5 mg/kg body weight (bw) orally, levamisole (Almizol, Alembic) at 7.5 mg/kg bw orally and ivermectin (Ivomec, Glaxo Pharma) at 0.2 mg/kg bw subcutaneously, respectively.

Faecal egg counts and faecal culture: Per rectum copro samples were collected in individually labeled polybags on day 0 and 14 post-treatment (PT) for the screening of gastrointestinal (GI) nematodes using standard techniques (Taylor et al. 2007). Pooled faecal culture and larval separation were carried out for each animal group on day 0 and 14 PT using Baermann apparatus. Collected larvae were identified according to the description given by Taylor et al. (2007).

The percent efficacy of anthelmintics was calculated on the basis of reduction in mean egg per gram (EPG) PT using the following formula described by Wirtherle et al. (2004). $FECR(\%) = [(FEC_{bt} - FEC_{at}) / FEC_{bt}] \times 100$

where FECR (%) denotes percentage faecal egg count reduction, FEC_{bt} and FEC_{at} represent the mean egg count before and after treatment, respectively.

The data so generated were analyzed using “SPSS-12.0” software and the differences between means were tested by “Duncan’s Multiple Range Test”.

Results and discussion

The results of the present study are summarized in Table 1. All 20 animals were found positive for GI nematode parasites on day 0 of the experiment. Fenbendazole, levamisole and ivermectin reduced the faecal egg counts by 23.66, 63.70 and 98.11%, respectively on day 14 PT. Pre-treatment faecal cultures of each group identified *Haemonchus* spp. as

the predominant parasite (88%) followed by *Trichostrongylus* (5%), *Oesophagostomum* (4%), *Bunostomum* (2%) and *Strongyloides* spp. (1%). However, *Haemonchus* spp. larvae were also recovered from fenbendazole and levamisole treated animals on day 14 PT, while larvae of *Trichostrongylus*, *Oesophagostomum*, *Bunostomum* and *Strongyloides* spp. were eliminated from fenbendazole and levamisole treated animals on day 14 PT.

The study indicated that fenbendazole and levamisole at the recommended dosage were not effective against GI nematodes in goats on this farm. Reduced efficacies of the fenbendazole and levamisole drugs against GI nematode parasites in goats have been documented earlier by several workers (Yadav and Uppal 1992; Singh et al. 2002; Waruiri et al. 2003; Ram et al. 2007). Ivermectin showed 98.11% potency against the GI nematode parasites in goats which is in line with earlier reports (Gill 1996; Ram et al. 2007). The between group differences in ivermectin (Gr-C) treated animals were significant ($p < 0.05$) in comparison with fenbendazole (Gr-A), levamisole (Gr-B) and untreated controls (Gr-D). However, there was no significant difference between fenbendazole (Gr-A) and levamisole (Gr-B) treated animals vis-à-vis in comparison to untreated controls. Considering the comparative efficacy of drugs, injectable ivermectin could safely be recommended for the treatment of GI nematode parasites of goats on this farm.

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