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Anthelmintic resistance in Un-Organized goat farms in Assam

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Abstract

Anthelmintic resistance (AR) against commonly used anthelmintics (Albendazole, Fenbendazole and Closantel) was studied in naturally occurring gastrointestinal (GI) nematodes in adult goat of Halogaon area of Kamrup district of Assam. After qualitative and quantitative screening of faeces of 44 Assam hill goats having egg per gram of faeces (EPG) > 500 were randomly selected and divided into 4 equal groups (Three treated and One infected control group). Albendazole @ 5 mg/kg body weight, Fenbendazole @ 7 mg/kg body weight and Closantel @ 10 mg/kg body weight orally were given to the treated groups. The arithmetic faecal egg count reduction (FECR) for albendazole, fenbendazole and closantel were 96.36%, 89.09% and 100%, respectively. Therefore, the study revealed confirmed resistance to fenbendazole against gastrointestinal nematodes of goat.

Keywords: Anthelmintic resistance, Goat, albendazole, Fenbendazole, Closantel, FECRT, Assam

Introduction

Goat farming is the most common agricultural subsidiary enterprise in rural Assam with a total population of over 44 lakhs in Assam. Frequent and indiscriminate use of anthelmintic is often responsible for the resistance in gastrointestinal nematodes [1]. The faecal egg count reduction test (FECRT) was used to evaluate the anthelmintic efficiency in commercial flocks and herds [2]. As, no information is available on anthelmintic resistance in Assam, so the present study was undertaken to detect emergence of anthelmintic resistance in unorganized goat farm of Halogaon area of Kamrup district of Assam.

Materials and Methods

Selection of study area

The present study was carried out at Halogaon area of Kamrup district of Assam. The goats were maintained under semi-intensive system i.e. in day-time, they were allowed to graze in free-range field and at night time they were kept in confinements. Regular deworming was carried out under a schedule programme viz. once in three months.

Selection and grouping of the animals

A total of 44 animals naturally infected with gastrointestinal nematodes were selected for FECRT. The goats having EPG >500 were selected for FECRT test from Halogaon area of Kamrup district of Assam. The goats having EPG > 500 were selected for this test. Forty four goats were randomly divided into three treatment and one infected control group. Each group consisted of 11 animals. Group I, II, III and IV for evaluating the efficacy of single dose of three selected anthelmintics.

Anthelmintic treatment

Out of the four groups, goats of three groups were treated with three different anthelmintics and the fourth group served as untreated infected control/infected control throughout the study period.

Group I: Treated with albendazole (@ 5 mg/kg body weight, orally)

Group II: Treated with Fenbendazole (@ 7 mg/kg body weight, orally)

Group III: Treated with closantel (@ 10 mg/kg body weight, orally)

Group IV: Infected control

Collection and examination of faecal samples

Freshly voided faecal pallets or per-rectal Faecal samples were collected in 30 ml wide-mouthed plastic sample bottles, brought to the laboratory and preserved by adding sufficient amount of 10% formalin till further examination.

The post-treatment samples were collected 14 days after the treatment from the treated and untreated groups as recommended by³. The anthelmintic resistance was estimated as per the standard guidelines of World Association for the Advancement of Veterinary Parasitology (WAAVP). FECRT calculations involved the calculation of faecal egg count reduction percent (FECR%), variance of counts (S_i^2), variance of reduction (Y^2) and calculation of upper and lower confidence limits¹³.

$$\text{FECR \%} = 1 - \frac{X_t}{X_c} \times 100$$

Where, X is the arithmetic means of the EPG.
 X_t , X_c = treated and control group respectively.
 FECR% = Percentage of faecal egg count reduction.

95% confidence intervals are calculated as below (Coles *et al.*, 1992):

$$\text{Variance of count } S_i^2 = \frac{\sum_j X_{ij}^2 - (\sum_j X_{ij})^2/n_i}{(n_i - 1)}$$

Interpretation of results

FECR% and the lower confidence limit were used to determine the presence or absence of resistance of the particular drug. Resistance was considered present in the

worm population when the faecal egg count reduction percent is found less than 95% and the lower confidence limit is found less than 90% for the same drug. If either of the above situations exists, it indicates suspected resistance. If neither of the two situations exists, it indicates that no resistance exists and the worm population is susceptible.

Results and Discussion

Results of FECRT are presented in Table 1. The WAAVP suggested that reduction of less than 95% with 95% confidence level below 90% is diagnostic of anthelmintic resistance³. A reduction of EPG upto 89.09% and 78.74% lower confidence limit was observed in fenbendazole treated group. It indicated the resistance of the GI nematodes to fenbendazole. This can be comparable with the finding of Jeyathilakan⁴. The reduction of EPG upto 96.36% and 92.91% lower confidence limits was observed in albendazole treated group. The faecal egg count reduction of 96.36% and lower confidence limit above 90% at 14 days i.e. 92.91% of post-treatment using albendazole in the present study that indicates the drug is susceptible against gastrointestinal nematodes in goat. The present study was in agreement with the findings of others¹⁵. For drug closantel the FECR and lower confidence limit found to be 100 per cent at 14 day of post-treatment that indicates the drug is highly effective against gastrointestinal nematodes in goats. The present finding is agreed with the finding of other worker^{16,7}.

Table 1: Anthelmintic resistance in GI nematodes of goats in Halogaon area of Kamrup district of Assam

Anthelmintic	Goat (No.)	Post EPG (Mean±SE) Day 14	FECRT		95% confidence limits		Interpretation
			Variation	%	Lower	Upper	
Albendazole	11	54.55±31.23	0.34	96.36	92.91	98.13	Susceptible
Fenbendazole	11	163.64±50.94	0.11	89.09	78.74	94.40	Resistant
Closantel	11	0.00±0.00	0.00	100.00	100.00	100.00	Susceptible
Infected control	11	1500.00±143.97	-	-	-	-	

In Halogaon area, only fenbendazole was found to be resistant and the drug albendazole and closantel was found to be effective against gastrointestinal nematodes. The drug fenbendazole was most widely used as anthelmintic in this area, the development of resistance to fenbendazole is understandable. As Halogaon area was a completely village area, most of the goat owners were illiterate and possibility of under dosing of fenbendazole cannot be eliminated. Frequent use of fenbendazole might be an important cause for the development of resistance since the drug had been used for years together as per the history of drugs used earlier, whereas albendazole and closantel have been used by the goat owners of this area very rarely as per the history collected during the study period. So very less use of these two drugs against gastrointestinal nematodes in the animals of this area might be the cause of effectiveness of these two drugs against gastrointestinal nematode.

Larval culture studies revealed that *Haemonchus contortus* was found to be the most predominant nematode species in these farms. *Haemonchus contortus*, *Trichostrongylus* spp., *Oesophagostomum* spp., *Bunostomum* spp., *Cooperia* spp., *Mecistocirrus* spp. and *Strongyloides papillosus* were found in pre-treatment larval cultures. In post-treatment culture, *Haemonchus contortus* and *Trichostrongylus* spp. were found indicating that these two genera had developed resistance to fenbendazole in goats.

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