SHORT COMMUNICATION

Failure of Fenbedazole and Ivermectin to Control Gastrointestinal Nematodes in Goats in Rewa, Madhya Pradesh

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Abstract

Anthelmintic resistance has been reported in most goat-raising areas in India, yet little is known about the anthelmintic resistance status in gastrointestinal nematodes in goats in Rewa, Madhya Pradesh. The aim of this study was to determine the occurrence of anthelmintic resistance in goats in field conditions using Faecal Egg Count Reduction test (FECRT). 40 goats having egg per gram above 600 were divided into a control (G1) and three treatment groups (G2, G3 and G4) consisting of 10 goats in each group. Goats which were not given any treatment were kept as control group. Group G2, G3 and G4 goats were treated with fenbendazole @ 7.5 mg/kg BW orally, closantel @ 10 mg/kg BW orally and ivermectin @ 0.2 mg/kg BW subcutaneously, respectively. Percent reduction in faecal egg counts were monitored 14 days after treatment. The FECRT indicated percent reductions of 83, 94 and 94 for G2, G3 and G4, respectively. When analysed statistically using standard WAAVP protocol, anthelmintic resistance against fenbendazole and ivermectin was detected. These findings strongly suggest that anthelmintic resistance is a serious problem in strongyles in goats in Rewa and marked changes in gastrointestinal nematode management need to be instituted immediately to mitigate a worsening situation.

Key words: Anthelmintic resistance, Fenbendazole, Gastrointestinal nematodes, Goats, Ivermectin

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Introduction

Gastrointestinal nematodes can cause major production losses in small ruminants and represent an animal welfare problem worldwide. For decades, anthelmintics have been used as the primary control measure against these harmful parasites. Broad-spectrum anthelmintics are more commonly used in ruminants because these can eliminate a large variety of parasites. The prevalent gastrointestinal parasites in goats maintained under semi-intensive and field management systems of the locality are *Haemonchus contortus*, *Bunostomum trigonocephalum*, *Oesophagostomum columbianum*, *O. aspersum* and *Trichuris* spp. etc. (Maravi *et al.*, 2020) and commonly employed anthelmintics against these parasites are fenbendazole and ivermectin (IVM). It has been demonstrated that under-dosing of anthelmintics might be an important contributory factor for the development of anthelmintic resistance [AR] (Conder and Campbell, 1995). As goats show a different metabolic and pharmacokinetic profile compared to sheep with lower bioavailability in goats especially after oral administration (Escudero *et al*., 1999), which could result into AR due to underdosing (Singh and Swarnkar, 2008). Several cases of benzimidazole group drug resistance have been reported in goats from various parts of the country (Jaiswal *et al*. 2013, Das *et al*. 2015; Dixit *et al*. 2017). Suspicions of IVM resistance, however, are less commonly documented in India and world (Paraud *et al*. 2010; Jaiswal *et al*. 2013).

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Materials and Methods

Experimental Design

A total of 504 goats were screened, out of which 282 goats were found positive for gastrointestinal nematodes. Forty goats suffering from gastrointestinal nematodosis (EPG higher than 600) were randomly selected and were divided into four groups (G1, G2, G3 and G4), comprising 10 animals in each group. Goats which were not given any treatment were kept as control group (G1). Group G2, G3, and G4 goats were treated with fenbendazole @ 7.5 mg/kg BW orally, closantel @ 10 mg/kg BW orally and ivermectin @ 0.2 mg/kg BW subcutaneously, respectively. The study was done in monsoon season (June – Sept). At the end of the experiment, goats of G1 group were also treated with anthelmintic.

Faecal Egg Count Reduction Test (FECRT)

Per rectally faecal samples were collected from the goats before treatment (day 0) and 14 days post treatment and eggs per gram (EPG) was determined by modified McMaster technique. As per guidelines of World Association for the Advancement of Veterinary Parasitology (WAAVP) the EPG data was analysed for presence of anthelmintic resistance (Coles *et al*., 1992) using RESO (version, 2.0) computer programme (Martin & Wursthorn, 1991). As per WAAVP guidelines if the FECR was <95% and the lower 95% confidence limit was <90%, confirmed anthelmintic resistance was present but If only one of these two criteria was met, suspected resistance was considered.

Results and Discussion

Results of FECR percentage are shown in Table 1. The FECRT indicated percent reductions of 83, 94 and 94 for G2, G3 and G4, respectively. When analysed statistically using standard WAAVP protocol, anthelmintic resistance to fenbendazole and ivermectin was detected. For closentel, although the FECR was found 94% i.e. below 95% and the lower confidence interval was 79% i.e. also below 90%. Resistance against closantel can be confirmed only after larval culture studies.

Table 1: Mean faecal egg count and faecal egg count reduction (%) in goats treated with three common anthelmintics

Parameter	G1	G2	G3	G4
No of animals	10	10	10	10
Mean EPG on 0 day	1745	5625	3850	3505
Mean EPG on 14th day	2105	355	135	120
FECR%		83	94	94
95% upper confidence interval		97	98	98
95% lower confidence interval		-1	79	82
Resistance status		Resistant	-	Resistant

Reduced efficacies of fenbendazole against GI nematode parasites in goats have been documented earlier by several workers (Singh *et al*., 2002; Das *et al*. 2015; Dixit *et al*., 2017). In our earlier studies at Jabalpur, FECR test result confirmed benzimidazole resistance at Amanala goat farm, Jabalpur (M.P.), while nematodes at that farm were found fully susceptible to doramectin (Dixit *et al*., 2017). Resistance against IVM in nematodes of goats was detected from southern and north central India by Deepa and Devada (2011) and Jaiswal *et al*. (2013) respectively.

Closantel, a salicylanilide, is mainly effective against blood sucking strongyle nematodes like *Haemonchus, Bunostomum* etc but in study area, non blood sucking nematodes like *Oesophagostomum* spp. were also prevalent (Maravi *et al*., 2020). Therefore only on the basis of FECR %, resistance to closantel can not be confirmed. Further studies involving larval culture before and after treatment are required to confirm resistance against closantel. However, periodically, reports have suggested developing resistance to closantel as well (Chandrawathani *et al*., 2013; Premaalatha *et al*., 2014).

The present finding determines the presence of anthelmintic resistance against fenbedazole and ivermectin in gastrointestinal nematodes of goats while there is need of larval culture studies to determine the presence of resistance against closantel.

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