The Pharma Innovation Journal 2019; 8(12): 434-436

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2019; 8(12): 434-436

www.thepharmajournal.com
Received: 07-10-2019
Accepted: 09-11-2019

Hardeep Kalkal
Ph.D. Scholar, Department of Veterinary Parasitology, College of Veterinary Sciences Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Sukhdeep Vohra
Senior Scientist, Department of Veterinary Parasitology, College of Veterinary Sciences Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Satyavir Singh
Professor, Department of Veterinary Parasitology, College of Veterinary Sciences Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Snehil Gupta
Assistant Professor, Department of Veterinary Parasitology, College of Veterinary Sciences Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Ankit Magotra
Assistant Professor, Department of Animal Genetics and Breeding, College of Veterinary Sciences Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

YC Bangar
Scientist (Statistics), Department of Animal Genetics and Breeding, College of Veterinary Sciences Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Corresponding Author:
Hardeep Kalkal
Ph.D. Scholar, Department of Veterinary Parasitology, College of Veterinary Sciences Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Detection of moderate to severe anthelmintic resistance against fenbendazole in sheep and goat breeding farms, Hisar

Hardeep Kalkal, Sukhdeep Vohra, Satyavir Singh, Snehil Gupta, Ankit Magotra and YC Bangar

Abstract
In the present study, 20 sheep and 20 goats from University Sheep and Goat Breeding Farm which were naturally infected with gastro-intestinal (GI) nematodes and having at least 150 eggs per gram (EPG) counts were selected and grouped into four groups i.e. T1, T2, T3 and T4 of 10 animals each. Group T1 of sheep and T2 of goats were treated with fenbendazole @ 5 mg/kg b.wt and 10 mg/kg b.wt orally, respectively while, Group T3 of sheep and T4 of goats served as untreated control. To assess the prevalence of anthelmintic resistance Faecal Egg Count Reduction Test was used (FECRT). The percentage reduction in faecal egg counts by fenbendazole on University Sheep and goat Breeding Farms were 62.17 and 48.17%, respectively. This indicated moderate to severe fenbendazole resistance in sheep and goats of these farms. Coprocultures from post-treatment faecal cultures revealed the predominance of *Haemonchus contortus* larvae.

Keywords: Anthelmintic resistance, fenbendazole, goat, *Haemonchus contortus* and sheep

1. Introduction
Gastrointestinal nematode parasitism is one of the major factors limiting sheep and goat production because they cause heavy economic losses in meat and wool production. Farmers mainly use antiparasitic drugs for control of GI parasites which has led to an increasing dependence on anthelmintics (Taylor and Hunt, 1989) [13]. The widespread use, incorrect dosing and increased frequency of treatment often leads to the development of resistance (Coles, 1986; Waller, 1986) [3, 15] against anthelmintics in nematodes of sheep and goat in organised farms (Kumar and Yadav, 1994) [10]. The grazing habit of these animals predisposes them to various types of diseases especially parasitic gastroenteritis caused predominantly by GI nematodes like *Haemonchus contortus*, *Trichostrongylus axei*, *Nematodirus* spp. and *Strongyloides papillosus*. Among these GI nematodes, *H. contortus*, is most pathogenic, widely prevalent and important worm in India responsible for high mortality and morbidity (Yadav, 1997) [17]. The present study was envisaged to detect the status of anthelmintic resistance to the most commonly used anthelmintic viz. Fenbendazole, against GI nematodes of University Sheep and Goats Breeding Farms by FECRT.

2. Materials and Methods
2.1 Study area
Between January-July, 2019 study was conducted to assess the status of anthelmintic resistance of fenbendazole GI nematodes in University Sheep and Goats Breeding Farms by FECRT from Lala Lajpat Rai University of Veterinary and Animal Sciences (LUVAS), Hisar. The selected animals had not been administered any anthelmintic during the previous two months.

2.2 Collection and processing of faecal samples
Freshly voided faecal pellets or per-rectal faecal samples were collected from naturally infected adult animals in 30 ml wide mouthed plastic sample bottles. Twenty sheep and 20 goats naturally infected with GI nematodes with faecal eggs per gram (EPG) counts of > 150 prior to treatment were selected for performing FECRT. These animals were divided into four groups i.e. T1, T2, T3 and T4 of 10, 10, 10 and 10 animals, respectively. Group T1 of sheep and T2 of goats were treated with fenbendazole @ 5 mg/kg b.wt and 10 mg/kg b.wt orally,

respectively while Group T3 of sheep and T4 of goats served as untreated control. Rectal faecal samples were collected from each animal to estimate the faecal egg counts by the modified McMaster technique before and 14 days after treatment. Pooled faecal cultures were made from each group to ascertain the larval composition by a standard technique (Anonymous, 1977) [1].

2.3 Interpretation of results

The percentage reduction in faecal egg counts was determined following the guidelines of World Association for the Advancement of Veterinary Parasitology (Coles *et al*., 1992) [4] using arithmetic mean egg counts. Resistance is considered to be present; if the egg count reduction following treatment is less than 95% and confidence interval is less than 90%.

3. Results and Discussion

The faecal egg counts (Mean±S.E.) on 0 and 14th day, percent reduction in faecal egg counts (FECR%), variance, upper and lower confidence limits (95%) of sheep and goat naturally infected with GI nematodes and treated with fenbendazole anthelmintics at University Sheep and Goats Breeding Farms, LUVAS, Hisar, Haryana are given in Table 1 and 2.

Table 1: Pre- and post-anthelmintic treatment faecal egg counts in sheep naturally infected with gastro-intestinal nematodes at University Sheep Breeding Farm, LUVAS, Hisar

Group	Anthelmintic	Dose (mg/kg)	No. of sheep treated	Route of administration	FEC on days (mean± SE)		FECRT on 14 day PT		Confidence limits at 95%	
					0	14	%	Variance (Y2)	Upper	Lower
T1	Fenbendazole	5	10	Oral	822.22±146.98	311.11±48.43	62.17	222.111	77.77	50

Table 2: Pre- and post-anthelmintic treatment faecal egg counts in Goats naturally infected with gastro-intestinal nematodes at University Goat Breeding Farm, LUVAS, Hisar

Group	Anthelmintic	Dose (mg/kg)	No. of goat treated	Route of administration	FEC on days (mean±SE)		FECRT on 14 day PT		Confidence limits at 95%	
					0	14	%	Variance (Y2)	Upper	Lower
T2	Fenbendazole	10	10	Oral	870.34±175.28	470.11±56.23	48.17	401.11	62.23	27

The results revealed that fenbendazole given to sheep reduced the faecal egg counts by 62.17% on 14th day post-treatment with 95% upper and lower confidence levels as 77.7 and 50, respectively. Fenbendazole given to goats reduced the faecal egg counts by 48.17% on 14th day post-treatment with 95% upper and lower confidence levels as 62.23 and 27, respectively. Thus, moderate to severe fenbendazole resistance was detected in University Sheep and Goat Breeding Farm, LUVAS, Hisar. Anthelmintic resistance to fenbendazole was previously reported on University Sheep and Goat Breeding Farms, LUVAS, Hisar by (Das and Singh, 2005) [6]. The selection pressure exerted by regular use of anthelmintic is responsible for the development of anthelmintic resistance. The occurrence of anthelmintic resistance against the commonly used anthelmintics due to their frequent use has also been reported previously in sheep (Green *et al*., 1981; Yadav *et al*., 1995; Singh and Yadav, 1997) [8, 18, 17] and in goats (Uppal *et al*., 1992; Singh and Yadav, 1997; Waruiru *et al*., 2003) [14, 17, 16].

Another factor which may have contributed to the high worldwide prevalence of anthelmintic resistance in small ruminant trichostrongyles is the common use of the sheep dosage of these products in both sheep and goats (Conder and Campbell, 1995) [5]. In this situation, resistant nematodes may have been transmitted from goats to sheep, if they were grazed together or sequentially on the same pasture during the same year or in the following years. Coles (1997) [2] recommended that goats require higher dosage of anthelmintics than sheep to achieve similar efficacy against trichostrongyles. In the present study, sheep and goats of organised farms were grazed together or sequentially on the same pasture and received similar dosages of anthelmintics. Hence, constant monitoring for anthelmintic resistance is essential on organised farms to determine the effectiveness of anthelmintics before their use, where resistance has not already emerged. This in turn is expected to help in taking timely measures to be taken to prevent or to delay the occurrence of anthelmintic resistance based on minimum anthelmintic usage.

The coproculture of pooled faecal cultures of infective third stage larvae from sheep and goat inculding control group on day 0 and 14 were performed. The predominant larvae which were recovered from faecal culture before and after treatment were of *Haemonchus contortus* and few larvae of *Trichostrongylus* spp. and *Strongyloides papillosus*. The infective larvae were identified as per criteria of Keith (1953) [9]. The result showed different genera of GI nematodes of sheep and goat with the predominance of *H. contortus* (95%) (Fig.1) followed by Trichostrongylus spp. (4%) and only 1% of *S. papillosus* larvae in all the treatment and control groups on day 0. On day 14 PT, *H. contortus* was the only species found to survive in all treatment groups. The strain of *H. contortus* resistant to various anthelmintics in small ruminants i.e. sheep and goat have already been reported by Swarnkar *et al*. (1999), Fleming *et al*. (2006) [7] and (Das and Singh, 2005) [6].

4. Conclusion

Based on the results of the present study, it may be concluded that the choice of anthelmintic in a flock should be based on the previous history of use of drug, frequency of use of drug and status of anthelmintic resistance. It should always be considered primarily to use an anthelmintic judiciously and the anthelmintic efficacy must be estimated at least once in two years. The drugs which show moderate resistance should be changed immediately and discontinued for some years so that the larval population resistant to the drug is diluted and the portion of susceptible larval population is increased in the sheep and goat farms. Due to frequent use of fenbendazole, resistance against these anthelmintic has developed in these farms.

Fig 1: Kinked tail of Infective third stage larvae of *Haemonchus contortus* (10X)

5. References

1. Anonymous. Manual of Veterinary Parasitological Laboratory Techniques. Bulletin No. 18, Ministry of Agriculture, Fisheries and Food. London, 1977, 5-50.
2. Coles GC. Nematode control practices and anthelmintic resistance on British sheep farms. Veterinary Record. 1997; 141:91–93.
3. Coles GC. Anthelmintic resistance in sheep: Veterinary Clinics of North America. Food Animal Practice. 1986; 2:423-432.
4. Coles GC, Bauer C, Borgsteede FHM, Geerts S, Klei TR, Taylor MA, *et al*. World Association for Advancement of Veterinary Parasitology (WAAVP) methods for the detection of anthelmintic resistance in nematodes of veterinary importance. Veterinary Parasitology. 1992; 44:35-44.
5. Conder GA, Campbell WC. Chemotherapy of nematode infections of veterinary importance, with special reference to drug resistance. Advances in Parasitology. 1995; 35:1-84.
6. Das M, Singh S. Anthelmintic resistance to nematodes in sheep and goat farms in Hisar. Journal of Veterinary Parasitology. 2005; 19:103-106.
7. Fleming SA, Craig T, Kaplan RM, Miller JE, Navarrem C, Rings M. Anthelmintic resistance of gastrointestinal parasites in small ruminants. Journal of Veterinary Internal Medicine. 2006; 20(2):435-444.
8. Green PE, Forsyth BA, Rowan KJ, Payne G. The isolation of a field strain of *Haemonchus contortus* in Queensland showing multiple anthelmintic resistance. Australian Journal of Zoology. 1981; 57(2):79-84.
9. Keith RK. The differentiation of infective larvae of some nematode parasites of cattle. Australian Journal of Zoology. 1953; 1:223-235.
10. Kumar R, Yadav CL. Prevalence of fenbendazole resistance in ovine nematodes in North West India. Tropical Animal Health and Production. 1994; 26(4):230-234.
11. Singh S, Yadav CL. A survey of anthelmintic resistance by nematodes of three sheep and two goat farms in Hisar (India). Veterinary Research Communications. 1997; 21:447-451.
12. Swarnkar CP, Singh D, Khan FA, Bhagwan PSK. Multiple anthelmintic resistance in *Haemonchus contortus* of sheep. Indian Journal of Animal Sciences. 1997; 69:547-549.
13. Taylor MA, Hunt KR. Anthelmintic drug resistance in the U.K. Veterinary Record. 1989; 125:143-147.
14. Uppal RP, Yadav CL, Godara P, Rana ZS. Multiple anthelmintic resistance in a strain of *Haemonchus contortus* in goats. Veterinary Research Communications. 1989; 16:195–198.
15. Waller PJ. Anthelmintic resistance in sheep nematodes. Agriculture Zoology Review. 1986; 1:333-375.
16. Waruiru RM, Ngotho JW, Mutune MN, Munyua WK. Comparative efficacy of ivermectin, albendazole, levamisole and rafoxanide against rastrointestinal nematode infections in goats. Indian Journal of Animal Sciences. 2003; 4:34-35.
17. Yadav CL. Premature ovine births caused by *Haemonchus contortus*. Indian Veterinary Journal. 1997; 74:983-984.
18. Yadav CL, Kumar R, Uppal RP, Verma SP. Multiple anthelmintic resistance in *Haemonchus contortus* on a sheep farm in India. Veterinary Parasitolology. 1995; 60:335-360.