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## Efficacy of fenbendazole and ivermectin against naturally occurring gastrointestinal helminths of Chottanagpuri sheep at Ranchi, Jharkhand

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### Abstract

This study was aimed at evaluation of efficacy of common broad spectrum anthelmintics *viz.* Fenbendazole and Ivermectin, against gastrointestinal helminths in Chottanagpuri sheep of Jharkhand. A total eighteen growing lambs and twelve pregnant ewes were taken for the study, Fenbendazole was administered at the dosage of 10mg/Kg body weight orally and Ivermectin at the dosage of 0.2mg/Kg body weight subcutaneously. The egg per gram estimation were carried out on zero days before treatment and twice weekly upto 14<sup>th</sup> day post treatment and the efficacy was evaluated using fecal egg count reduction test. This experiment concludes that there is no such emergence of anthelmintic resistance in Chottanagpuri sheep pertaining to Fenbendazole and Ivermectin.

**Keywords:** anthelmintic resistance, Chottanagpuri sheep, gastrointestinal nematodes, fecal egg count reduction test, Fenbendazole, Ivermectin, Jharkhand.

### Introduction

Gastrointestinal parasitism is of paramount importance in different agro-climatic zones and a potential threat to the livestock production and its economic growth (Meenakshisundaram *et al.*, 2014 and Kumari *et al.*, 2017) [12, 8]. The losses include anorexia, reduced feed intake and alteration in protein metabolism, along with loss of blood and plasma protein in the gastrointestinal tract. There are great economic losses in terms of decreased growth rate, reduction in wool production, sub-optimal reproduction and sometimes mortality (5-10%) of (adult and new born lambs) animals (Nasreen *et al.*, 2007; Meenakshisundaram *et al.*, 2014 and Kumari *et al.*, 2017) [14, 12, 8]. As a result, diseases caused by helminths remain one of the major global impediments to small ruminant production (Kumsa and Abebe, 2009) [9]. In tropics upto 95% of sheep and goat are reported to be infected with helminths of which *Haemonchus* and *Trichostrongylus* are the two most commonly involved genera (Odoi *et al.*, 2007 and Mbuh *et al.*, 2008) [16, 11]. Free ranching and open grazing in sheep leads to parasitic gastroenteritis both in clinical and subclinical forms. Gastrointestinal parasitism has been commonly treated by using variety of anthelmintics (Lalchandama, 2010 and Hassan *et al.*, 2012) [10, 3]. This has inevitably led to development of anthelmintic resistance rendering helminths infection rampant as ever. So, anthelmintic resistance can be understood by drug efficacy studies of common broad spectrum anthelmintics (Meenakshisundaram *et al.*, 2014) [12].

Perusal of literature indicates that very limited attempts have had been made to study the efficacy of broad spectrum anthelmintics in Chottanagpuri sheep of Jharkhand. Hence, this study was designed to detect the resistance to the most commonly used anthelmintics *viz.* fenbendazole and ivermectin against gastrointestinal helminths of Chottanagpuri sheep by the widely used in vivo fecal egg count reduction test (FECRT).

### Materials and Methods

After getting approval of the Animal Ethical Committee, naturally infected growing lambs of Chottanagpuri sheep and pregnant ewes with gastro-intestinal helminths were selected among the farmers for evaluating the anthelmintic efficacy. A total of 18 number of Chottanagpuri growing lambs naturally infected with common gastro-intestinal helminthic parasites were selected for this trail. They were then, divided into three groups *v.i.z.* T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> each consisting of six lambs being treated with Fenbendazole at the dosage of 10mg/Kg body (Meenakshisundaram *et al.*, 2014 and Kumari *et al.*, 2017) [12, 8].

Similarly, in the 2nd part of this experiment, a total of 12 pregnant ewes were selected having almost similar helminthic infections as observed in the case of growing lambs. These experimental pregnant ewes were divided into two groups comprising of six animals each. *v.i.z.* T<sub>F</sub> and T<sub>U</sub>. The ewes in group T<sub>F</sub> were treated with Fenbendazole at the dosage of 10mg/Kg body weight orally and T<sub>U</sub> were left untreated.

The egg per gram (EPG) estimation were carried out on zero days before treatment and twice weekly upto 14<sup>th</sup> day post treatment as per the method described by Stoll (Zajac and Conboy, 2011).

## Results

**Table 1:** Efficacy of Fenbendazole and Ivermectin against Natural G.I. Helminths in Growing Lamb

Groups (No. of animals)	Drugs used	Dosage & route	Avg. Pre-treatment EPG (0 day)	Avg. post-treatment EPG & Drug Efficacy (%)			
				3 <sup>rd</sup> day	7 <sup>th</sup> day	10 <sup>th</sup> day	14 <sup>th</sup> day
T <sub>1</sub> (6)	Fenbendazole	10mg/ Kg B.Wt. (Orally)	850.00 ±76.36	200.00 ±51.63 (76.47%)	33.33 ±21.08 (96.08%)	29.97 ±11.03 (97.02%)	27.27 ±10.07 (97.19%)
T <sub>2</sub> (6)	Ivermectin	0.2mg/Kg B.Wt. (S/C)	900.00 ±57.72	116.67 ±16.66 (87.04%)	22.11 ±10.04 (98.67%)	0.00 ±0.00 (100%)	0.00 ±0.00 (100%)
T <sub>3</sub> (6)	—	—	666.67 ±49.43	866.67 ±42.15	916.67 ±40.13	966.67 ±49.43	1000.00 ±44.71

Group T<sub>1</sub> – Fenbendazole treated; Group T<sub>2</sub>–Ivermectin treated; Group T<sub>3</sub> – Infected Untreated control.

The anthelmintic efficacy of Fenbendazole and Ivermectin against natural gastro-intestinal helminths is presented in Table 1. The growing lambs (Group T<sub>1</sub>) naturally infected with G.I. helminths were treated with Fenbendazole at the dose rate of 10 mg /Kg body weight orally and pre treatment EPG observations and per cent efficacy of drugs were taken before treatment (0 day) and post treatment EPG were recorded on day 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 14<sup>th</sup> day. The EPG counts done on 3<sup>rd</sup> day post treatment indicated 76.47% efficacy of the drug whereas 96.08% efficacy was observed on 7<sup>th</sup> day with 97.02% efficacy on 10<sup>th</sup> day post treatment, lastly on 14<sup>th</sup>

day, 97.19% anthelmintic efficacy was observed. All the six lambs (Group T<sub>2</sub>) naturally infected with G.I. helminths were treated with Ivermectin at the dose rate of 0.2mg/Kg body weight by subcutaneous route on 0 day showing the EPG count as 900 ± 57.72. But when the EPG count was done on 3<sup>rd</sup> day post treatment, the drug was found to be 87.04% efficacious. The EPG counts from 7<sup>th</sup> day recorded an anthelmintic efficacy of 98.67%, thereon 100% efficacy was observed upto 14<sup>th</sup> day post treatment. The G.I. Helminth infected untreated control lambs (Group T<sub>3</sub>) continued to discharge the eggs during the entire treatment period.

**Table 2:** Efficacy of Fenbendazole against Natural G.I. Helminths in Pregnant Ewes.

Groups (No. of animals)	Drugs used	Dosage & route	Avg. Pre-treatment EPG (0 day)	Avg. post-treatment EPG & Drug Efficacy (%)			
				3 <sup>rd</sup> day	7 <sup>th</sup> day	10 <sup>th</sup> day	14 <sup>th</sup> day
T <sub>F</sub> (6)	Fenbendazole	10mg/ Kg B.Wt. (Orally)	700.00 ±57.74	83.33 ±40.14 (88.10%)	33.33 ±21.08 (95.24%)	28.88 ±12.09 (96.55%)	27.69 ±11.01 (96.99%)
T <sub>U</sub> (6)	—	—	633.33 ±42.16	733.33 ±55.78	816.67 ±40.14	916.67 ±40.14	1016.67 ±47.23

Group T<sub>F</sub> – Fenbendazole treated; Group T<sub>U</sub> – Infected Untreated control.

The drug Fenbendazole was used to control the common G.I. helminths infection in pregnant ewes and EPG observations recorded on different days have been shown and illustrated in Table 2. The infected pregnant ewes were treated with Fenbendazole @ 10 mg/Kg body weight orally and post treatment EPG observations and per cent efficacy of drugs were taken on zero and post treatment on 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 14<sup>th</sup> days, respectively. The average EPG counts of the treated and control group of ewes on zero day before treatment were 700 ± 57.74 and 633.33 ± 42.16, respectively. From here on, EPG counts went on decreasing at 88.10% on 3<sup>rd</sup> day, 95.24% on 7<sup>th</sup> day, 96.55% on 10<sup>th</sup> day and 96.99% on 14<sup>th</sup> day during the subsequent period of post treatment observations. The infected untreated control group (Group T<sub>U</sub>) continued to discharge increasing amounts of eggs during the whole period of treatment.

## Discussion

The maximum pathogenic effects of gastro-intestinal parasitic infections in sheep are observed between two and half to three month's age because the growing lambs after weaning are allowed to graze and house after weaning along with other animals of different age groups (Meenakshisundaram *et al.*, 2014 and Kumari *et al.*, 2017)<sup>[12, 8]</sup>. This situation necessitates the control of G.I. helminths infection in growing lambs. Therefore, the control of G.I. helminths like,

*Paramphistomum*, *Fasciola*, *Moniezia expansa*, *Moniezia benedeni*, *Strongyloides*, *Trichostrongylus*, *Haemonchus*, *Trichuris*, *Oesophagostomum*, *Ostertagia* and *Cooperia* infecting growing lambs were carried out by application of different broad spectrum anthelmintics. The anthelmintics, Fenbendazole and Ivermectin were chosen and administered in prescribed doses to the naturally infected animals in different groups. Both the drugs, Fenbendazole and Ivermectin showed higher anthelmintic efficacies from 7<sup>th</sup> day onwards as recorded by the post treatment EPG observations. Similar, results have also been observed by Hovorka *et al.* (1975)<sup>[4]</sup>; Islam *et al.* (2003)<sup>[5]</sup>; Nasreen *et al.* (2007)<sup>[14]</sup> and Mekala *et al.* (2012)<sup>[13]</sup> in Fenbendazole and by Islam *et al.* (2003)<sup>[5]</sup>; Nasreen *et al.* (2007)<sup>[14]</sup>; Nasreen *et al.* (2008)<sup>[15]</sup> and Desie and Amenu (2010)<sup>[2]</sup> in Ivermectin. Altogether it was found that Ivermectin was better and more effective than Fenbendazole. Long term effective control of G.I. helminths infection in Chottanagpuri sheep could be achieved by using the package of anthelmintic control both in organized as well as unorganized farming conditions. The use of supportive drugs was included keeping in mind to restore the normal functioning of different vital organs and also, to neutralize the undesirable effects on health and growth status caused by parasites (Nasreen *et al.*, 2008 and Desie and Amenu, 2010)<sup>[15, 2]</sup>. For optimizing the production from sheep farming it is highly essential to keep the animals as far as possible parasite

free from the time of birth itself. There are several parasites which affect lambs during the gestation period ( $145 \pm 5$  days) or just after parturition affecting the health conditions and growth rate in early stages of the growing lambs (Mekala *et al.*, 2012) [13]. Thus, it becomes essential to apply the parasite control measures during the stage of pregnancy. The present study was thus conducted to control the natural common G.I. parasitic infection in pregnant ewes/sheep, so that the difference in growth rate and health condition of lambs during early period of life could be compared with that of the lambs born to parasite infected pregnant ewes. The anthelmintic Fenbendazole being economical and safe to be used during pregnancy was used to control G.I. parasites in pregnant ewes (Mekala *et al.*, 2012; Meenakshisundaram *et al.*, 2014 and Kumari *et al.*, 2017) [13, 12, 8]. The result obtained during the present investigation revealed that the G.I. parasitic infection in pregnant ewes could be successfully controlled by Fenbendazole. However, the findings of the present study could be more authentic if such package of controlling parasitic infections during pregnancy be applied on larger no of naturally infected animals in both extensive and semi-intensive farming conditions. Similar, results have also been observed by Kelly *et al.* (1977) [7]; Janssen, D. L. (1985) [6]; Barutzki *et al.* (1989) [1]; Raman *et al.* (2000) [17] and Mekala *et al.* (2012) [13] in Fenbendazole.

### Conclusion

Anthelmintic treatment has been serving as the most effective mean for the control and amelioration of helminth infections in livestock including sheep. The prolonged and indiscriminate use of anthelmintics has led to emergence of anthelmintic resistance, which is a major constraint for nematode control throughout the world including India (Singh *et al.*, 2002 and Meenakshisundaram *et al.*, 2014) [18, 19, 12]. But this experiment concludes that there is no such emergence of anthelmintic resistance in Chottanagpuri sheep pertaining to Fenbendazole and Ivermectin.

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### References

- Barutzki D, von Hegel G, Schmid K. The use of Fenbendazole for controlling helminths in small zoo ruminants. *Tierarztl Prax.* 1989; 17(2):137-143.
- Desie S, Amenu A. Efficacy of selected anthelmintics against gastrointestinal nematodes of sheep owned by smallholder farmers in Wolaita, Southern Ethiopia. *Ethiopian Veterinary Journal.* 2010; 14(2):31-38.
- Hassan MM, Hoque MA, Islam SKMA, Khan SA, Hossain MB, Banu Q. Efficacy of anthelmintics against parasitic infections and their treatment effect on the production and blood indices in Black Bengal goats in Bangladesh. *Turk. J. Vet. Anim. Sci.* 2012; 36(4):400-408.
- Hovorka J, Mitterpák J, Corba J, Spaldonová R, Pacenovský. Effect of Fenbendazole (Panacur) in sheep naturally invaded by gastrointestinal and lung nematodes. *Vet Med (Praha).* 1975; 20(7):391-397.
- Islam MS, Begum F, Alam MS. Comparative Efficacy of Aldazole, Fenvet and Ivomec Injection against Natural Infection of Gastrointestinal Nematodes in Goats. *Journal of Animal and Veterinary Advances.* 2003; 2(7):382-384.
- Janssen DL. Efficacy of fenbendazole for endoparasite control in large herds of nondomestic ruminants. *J. Am. Vet. Med. Assoc.* 1985; 187(11):1189-1190.
- Kelly JD, Hall CA, Whitlock HV, Thompson HG, Campbell NJ, Martin IC. The effect of route of administration on the anthelmintic efficacy of benzimidazole anthelmintics in sheep infected with strains of *Haemonchus contortus* and *Trichostrongylus colubriformis* resistant or susceptible to Thiabendazole. *Res. Vet. Sci.* 1977; 22(2):161-168.
- Kumari A, Sharma H, Vohra S, Malhotra AK. Comparative Efficacy of Moxidectin, Ivermectin, Doramectin, and Fenbendazole Against Natural Infection of Gastrointestinal Nematodes in Sheep at Hisar. *Journal of Animal Research.* 2017; 7(3):483-487.
- Kumsa B, Abebe G. Multiple anthelmintic resistance on a goat farm in Hawassa (Southern Ethiopia). *Trop. Anim. Health Prod.* 2009; 41:655-662.
- Lalchandama K. Anthelmintic resistance: the song remains the same. *Sci. Vis.* 2010; 10(4):111-122.
- Mbuh JV, Ndamukong KJN, Ntonifor N, Nforlem GF. Parasites of sheep and goats and their prevalence in Bokova, a rural area of Buea Sub Division, Cameroon. *Vet. Parasitol.* 2008; 156:350-352.
- Meenakshisundaram A, Anna T, Harikrishnan J. Prevalence of drug resistant gastrointestinal nematodes in an organized sheep farm, *Veterinary World* 2014; 7(12):1113-1116.
- Mekala P, Mathialagan P, Manivannan A. Efficacy of Fenbendazole Incorporated Urea Molasses Block in Sheep and Goat in Namakkal District of Tamil Nadu. *Noto-are 12706117: Agriculture*, 2012.
- Nasreen S, Jeelani G, Sheikh FD. Efficacy of Different Anthelmintics Against Gastro-Intestinal Nematodes of Sheep in Kashmir Valley. *Vet Scan* 2007; 2(1): Article 13.
- Nasreen S, Khan MR, Peerzada S, Andrabi SA. Efficacy of different Anthelmintic formulations against Helminth Infestation in Sheep. *Vet Scan* 2008; 3(2): Article 29.
- Odoi A, Gathuma JM, Gachuri CK and Omore A. Risk factors of gastrointestinal nematode parasite infections in small ruminants kept in smallholder mixed farms in Kenya. *BMC Vet. Res.* 2007; 3(6):1186-1746.
- Raman M, Jayatharaj MG, Rajavelu G, John MC. Strongylosis in Captive Elephants - A Report. *Indian Journal of Animal Health* 2000; 39(2):85-86.
- Singh D, Swarnkar CP, Khan FA. Anthelmintic resistance in gastrointestinal nematodes of livestock in India. *Journal of Veterinary Parasitology.* 2002; 16: 115-130.
- Singh D, Swarnkar CP, Khan FA. Anthelmintic resistance in gastrointestinal nematodes of livestock in India. *J. Vet. Parasitol.* 2002; 16:115-130.
- Zajac AM, Conboy GA. *Veterinary Clinical Parasitology.* 8<sup>th</sup> Ed. Wiley-Blackwell Publication 2011; Chichester, West Sussex, UK.