

A SURVEY OF ANTHELMINTIC RESISTANCE IN GASTROINTESTINAL NEMATODES IN SHEEP OF HARYANA

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ABSTRACT

Twenty five flocks of sheep (five from each district) from different villages of Fatehabad, Bhiwani, Jind, Rohtak and Sirsa districts of Haryana were surveyed to assess the prevalence of anthelmintic resistance in gastrointestinal nematodes to morantel citrate (10 mg/kg) and ivermectin (0.2 mg/kg) by faecal egg count reduction test. Per cent reduction in faecal egg counts by morantel and ivermectin was 93 and 92 in village Badopal (Fatehabad); 93 and 89 in village Badeha (Bhiwani) and 92 and 94 in village Badsa (Bhiwani), respectively. In these villages, the 95% confidence limit was below 90% indicating slight resistance to morantel citrate and ivermectin. In all cases of anthelmintic resistance, *Haemonchus contortus* was the predominant parasite involved. Reduction in faecal egg counts was 95% in all other 22 village flocks treated with morantel and ivermectin of the above districts indicating no resistance.

Key words: Anthelmintic resistance, *Haemonchus contortus*, ivermectin, morantel, sheep

Gastrointestinal nematode parasitism is one of the major factors limiting sheep production because they cause heavy economic losses in meat and wool production (Gordan, 1974). Farmers mainly use antiparasitic drugs for control of gastrointestinal parasites which led to an increasing dependence on anthelmintics (Taylor and Hunt, 1989). The widespread use, incorrect dosing and increased frequency of treatment have often led to the development of anthelmintic resistance (Coles, 1986; Waller, 1986). Several anthelmintics have been used in Haryana during the last several decades; one of the most common drugs is morantel citrate (Singh, 1995). Resistance against this drug was observed in organized sheep farms (Singh and Yadav, 1997) and in unorganized sector (Chaudhri *et al.*, 2007) in Haryana. Therefore, a need was felt to study the resistance status in unorganized farms i.e. villages. Ivermectin was taken as an alternative as no resistance has been reported against this drug from this state. The present work was designed to determine the resistance against gastrointestinal nematodes in sheep of Haryana reared in villages. Accurate diagnosis and measurement of the extent of anthelmintic resistance in parasitic population are important components in the development of control measures (Donald, 1983).

MATERIALS AND METHODS

During November 2006 to May 2010, a survey was conducted in unorganized sheep farms of villages

of five districts viz. Fatehabad, Bhiwani, Jind, Rohtak and Sirsa of Haryana (India) to assess the prevalence of anthelmintic resistance in gastrointestinal nematodes by faecal egg count reduction test (FECRT) as specified by World Association for the Advancement of Veterinary Parasitology (WAAVP). This study was carried out in sheep flocks of five villages of each district. The animals in villages were being grazed on free range. No regular anthelmintic treatments were done except in a few flocks and the sheep were dourmed as and when they showed symptoms like diarrhoea, anaemia, bottle jaw etc. The treatments depended on availability of anthelmintics and no record was kept.

Forty five to sixty animals with faecal egg count of at least 150 eggs per gram (epg) were identified from each village flock; individually numbered, weighed and allotted to three treatment groups (I-III) of 15 to 20 animals each on the basis of their faecal egg counts. The selected animals had not received any anthelmintic treatment during the previous past two months. Sheep of two groups (I and II) were dosed with morantel citrate @ 10mg/kg orally (Banminth, Pfizer Ltd, Mumbai) and ivermectin @ 0.2 mg/kg subcutaneously (Dosemec, Dosech Animal Health Pvt. Ltd., Mumbai), respectively. Group III served as untreated control. Rectal faecal samples were collected from each animal to estimate the faecal egg counts by modified Mc Master technique before treatment and 10-14 days after treatment. Pooled faecal cultures were made from each group to ascertain the larval composition by a standard technique (Anonymous, 1977). Percent reduction in faecal egg counts was determined following

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the guidelines of WAAVP (Coles *et al.*, 1992) using arithmetic mean egg counts. Resistance was considered to be present, if the egg count reduction following treatment was less than 95% and the 95% confidence limit was less than 90%. Suspected resistance was considered when either of the above mentioned criteria was met.

RESULTS AND DISCUSSION

The results obtained on the basis of FECRT has been summarized in Table I. The emergence of anthelmintic resistance varied with different anthelmintics in different villages but it is clear that slight anthelmintic resistance was present against both these drugs in

village Badopal (Fatehabad) and village Badaha and Badsa (Bhiwani). In all other 22 village flocks studied in Fatehabad, Bhiwani, Jind, Rohtak and Sirsa districts, reduction was 95% indicating no resistance against either of the drugs. The predominant larvae recovered from faecal culture before and after treatment were of *Haemonchus contortus*. Few larvae of *Trichostrongylus* spp., *Oesophagostomum* sp., *Strongyloides papillosus* and *Bunostomum* sp. were also recovered from the faecal cultures before treatment.

Resistance to morantel and ivermectin was detected in three flocks indicating the need to be vigilant while using these anthelmintics. It may be associated with the type and frequency of anthelmintic used by the local farmers. History revealed that sheep were being

Table 1

Per cent reduction in faecal egg counts on treatment with morantel and ivermectin in sheep flocks

District (village)	Morantel				Ivermectin			
	% FECR	95% CL		Result	% FECR	95% CL		Result
		U	L			U	L	
Bhiwani								
Khanak	97.8	99.1	84.5	L, R	99.7	98.9	98.0	S
Ratera	96.7	98.3	93.6	S	99.7	99.9	99.0	S
Jamalpur	99.1	99.7	96.2	S	100	100	100	S
Badaha	93.0	99.0	86.0	R	88	98	79	R
Badsa	92.0	98.0	78.0	R	94.0	99	83	R
Fatehabad								
Samain	97.9	99.3	93.0	S	100	100	100	S
Dhangar	98.1	99.0	96.1	S	99.5	99.9	96.8	S
Kanheri	98.9	99.6	96.7	S	100	100	100	S
Badopal	93.0	99.0	86.0	R	92	98	76	R
Bhuna	97.0	99.5	94.0	L, R	100	100	100	S
Jind								
Jajanwala	99.4	99.9	98.1	S	99.5	99.9	98.1	S
Dinoda	99.6	99.9	97.4	S	100	100	100	S
Ramrai	99.3	99.8	97.4	S	99.3	99.8	97.4	S
Rajpura	97.6	98.9	94.7	S	100	100	100	S
Gulkani	97.6	99.2	91.8	S	100	100	100	S
Rohtak								
Kheri	98.0	99.8	94.7	S	99.6	99.9	99.0	S
Bhaini	95.2	99.7	90.3	S	100	100	100	S
Maharajpur								
Bhaini Mirpur	100	100	100	S	99.7	99.9	99.5	S
Madina	99.1	99.8	98.1	S	99.8	99.7	98.4	S
Meham	99.3	99.9	95.4	S	100	100	100	S
Sirsa								
Moriwala	100	100	100	S	100	100	100	S
Kotli	99.6	99.8	98.4	S	100	100	100	S
Patli Dabur	100	100	100	S	100	100	100	S
Bajekan	98.9	99.8	92.8	S	100	100	100	S
Sikandarpur	98.9	99.7	95.7	S	100	100	100	S

% FECR = % Faecal egg count reduction, CL = Confidence limit at 95% level, U = Upper confidence limit, L = Lower confidence limit, R = Resistant, LR = Likely to become resistant, S = Susceptible

treated with morantel citrate and ivermectin by farmers since long. The treatments depended on the availability of anthelmintics and no record was maintained by the farmers. The role of frequent use of anthelmintics in the development of resistance has been reported previously (Barton, 1980; Martin *et al.*, 1982). The selection pressure exerted by regular use of anthelmintic is responsible for the development of anthelmintic resistance. The occurrence of anthelmintic resistance against these commonly used anthelmintics due to their frequent use has also been reported previously in sheep (Yadav *et al.*, 1995; Singh and Yadav, 1997; Das and Singh, 2005; Chaudhri *et al.*, 2007). In all other 22 flocks, no anthelmintic resistance was detected. It may be because of very less use of anthelmintics. In addition, no regular deworming schedule is followed in villages and the individual sheep and not the whole flock are treated as and when they show symptoms of the parasitic disease. This practice in villages by illiterate farmers is in agreement with the latest recommendation i.e. FAMACHA system (Malan and van Wyk, 1992; Bath *et al.*, 1996; van Wyk *et al.*, 1997). Moreover, in villages of Haryana, there are no organized pastures and sheep are grazed on free ranging system based on availability of post-harvested fields, barren lands, uncultivated lands during rain fed season, road and river side lands etc. However, constant monitoring for anthelmintic resistance is essential for unorganized sector 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 prevent or to delay the occurrence of anthelmintic resistance by minimum anthelmintic usage.

It can be concluded from the study that both the anthelmintics were effective against *H. contortus* in sheep flocks of villages of all the five districts surveyed except one flock in Fatehabad and two flocks in Bhiwani district where resistance against both the drugs was observed. It indicated need to be more vigilant while using anthelmintics.

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