Anthelmintic resistance of nematodes in communally grazed goats in a semi-arid area of South Africa

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ABSTRACT

A survey was conducted on the occurrence of anthelmintic resistance of nematodes in communally grazed goats in a semi-arid area in South Africa. In herds belonging to 10 smallholder goat farmers, the efficacies of fenbendazole, levamisole and rafoxanide were tested by faecal egg count reduction (FECR) tests. Efficacies of 80 % were considered a threshold for anthelmintic resistance. The FECR tests showed that all drugs tested more than 80 % effective in most instances, but there were notable exceptions. In 1 case, rafoxanide was only 31 % effective and in another case fenbendazole was only 47 % effective. The occurrence of anthelmintic resistance in this farming sector is of concern. Steps should be taken to prevent its further spread and to avoid the development of a situation as on numerous commercial sheep farms in South Africa where resistance is very common.

Key words: communal grazing, drug resistance, fenbendazole, goats, levamisole, nematodes, rafoxanide, South Africa.

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Anthelmintic resistance of nematodes in small stock has been reported widely and it has become an important consideration in the prevention of trichostrongylosis in the tropics[2,6–9]. In France 85 % of goat dairy farms harbour benzimidazole-resistant nematodes[3]. In South Africa, anthelmintic resistance has become a major problem in commercial sheep farming. One study reporting on 3 surveys indicated that more than 90 % of the farms harboured *Haemonchus* strains that were resistant to at least 1 of the 4 anthelmintics tested and that between 60 and 78 % of these strains were resistant to 3 anthelmintic groups[11]. Similar resistance has recently been reported on commercial sheep farms in Zimbabwe[2]. Little information is available on the degree of resistance to commonly used anthelmintics in communally grazed small ruminants in South Africa, apart from reports on a resource-limited communal grazing area in Lebowa[11] and a farm at Rust de Winter[14]. The present survey was therefore undertaken to ascertain the occurrence of anthelmintic resistance in communally grazed goats against 3 commonly used groups of anthelmintics. The study was conducted within a radius of approximately 50 km of Mafikeng, North West Province, South Africa, from January to March 2001. Ten smallholder goat farmers, each rearing 40–60 goats of mixed breed ('village goats') on communally managed range land, were included in this study. The predominant traits displayed by the goats were those of the Boer goat. These goats also grazed freely with sheep and cattle. During the 1st visit to the farmers, 4 groups of 10 goats each, of different age and sex, were selected at random. All animals were ear-tagged, weighed and faecal samples were taken from each goat rectally, transported in an ice-cooled box and stored in the laboratory at 4 °C. One group of goats was treated with rafoxanide (Ranide, Logos Agvet) as an oral drench at a dose of 7.5 mg/kg live mass. The 2nd group was treated with levamisole (Tramisol, Intervet) as an oral drench at a dose of 7.5 mg/kg live mass. The 3rd group was treated with fenbendazole (Panacur, Intervet) as an oral drench at a dose of 5 mg/kg live mass. The 4th group was not treated and served as a control. Fourteen days after the 1st visit, each farmer was visited again and faecal samples were taken from the same forty marked goats. Individual faecal samples collected during both visits were examined for nematode eggs on the day of collection using a modification of the McMaster technique[10]. The arithmetic mean of the individual counts before and after treatment was calculated for each group. The faecal egg count reduction (FECR) percentage was calculated according to the equation[2]:

$$\text{FECR } \% = (1 - T_2/T_1 \times C_1/C_2) \times 100,$$

where T and C are the arithmetic means of the egg counts of the treated and control groups, respectively. The subscripts 1 and 2 designate the counts before and after treatment, respectively. In this study, the threshold for efficacy was considered to be 80 %, following Kettle *et al*.[5]. The threshold at which an anthelmintic was considered effective by Boersema and Pandey[2] was not stated.

Reduced efficacy of anthelmintics in goats has been ascribed to faster metabolism of drugs in this species than in sheep[4].

Pooled faecal samples using the same amount of faeces from the 40 treated animals after the 1st visit were incubated at 25 °C in a Labotec incubator for 5 days and the 3rd-stage nematode larvae (L3) were harvested and identified using a key developed by Onderstepoort Veterinary Institute, Pretoria[1]. Table 1 shows the anthelmintic efficacy, based on faecal egg count reduction (FECR), of rafoxanide, levamisole and fenbendazole. The efficacy of rafoxanide varied from 31 % to 100 %. Levamisole had an efficacy between 76 % and 100 % while fenbenda-

Table 1: **Anthelmintic efficacy** (%) **in goats on 10 farms.**

	Farm									
Anthelmintic	1	2	3	4	5	6	7	8	9	10
Rafoxanide	100	91	100	95	91	92	31	89	85	78
Levamisole	87	100	85	93	97	82	93	88	76	78
Fenbendazole	100	81	98	96	100	88	82	85	83	47

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zole varied from 47 % to 100 % in efficacy. The most prevalent genus was *Haemonchus*, followed by *Trichostrongylus* and *Oesophagostomum* spp. *Haemonchus* has been reported from commercial sheep farms in summer rainfall areas[12].

The efficacy of the drugs used in the present study were generally above 80 %, suggesting that the level of anthelmintic resistance may not be as high as on commercial sheep farms in southern Africa[2,11,13]. The reason for low resistance in communal grazed goats is probably due to infrequent dosing by resource-poor farmers. There may therefore still be the prospect of slowing down the development of severe anthelmintic resistance against the commonly used groups of anthelmintics in communally grazed goats in this region. However, on farm no. 7 the efficacy of rafoxanide was only 31 %, and on farm no. 10, fenbendazole had an efficacy of only 47 %, indicative of highly resistance nematode populations. On the latter farm fenbendazole had been used very often over a long period. Some resistance to levamisole was evident on farms 9 and 10, with respectively 76 and 78 % efficacy having been recorded. The anthelmintic resistance observed in goats in this study may be due to underdosing as a result of limited financial resources. In addition, emerging farmers often buy small stock at auctions supplied by commercial farms on which anthelmintic resistance is common, and in this way resistant worm strains may be disseminated. The occurrence of anthelmintic resistance in the smallholder farming sector is cause for concern. Steps should be taken to prevent its further spread and to avoid the development of a situation as on numerous commercial sheep farms in South Africa where resistance is very common.

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