The effects of two strategic anthelmintic treatments on goat performance under extensive management in a semi-arid area of South Africa.

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Abstract: A study was carried out in a semi-arid area of the North West province of South Africa from September 2004 to September 2005 to determine the effects anthelmintic treatment before or during the rains on the performance of 60 indigenous female goats. The performance parameters studied were body weight, packed cell volume and faecal nematode egg output. Anthelmintic treatment of goats before and during the rains significantly reduced faecal egg output, and improved body weight and packed cell volume. Overall, anthelmintic treatment before the rains was equal to or better for all the three performance parameters when compared to treatment during the rains. Both treatments yielded better performance in comparison to the control.
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1. Introduction

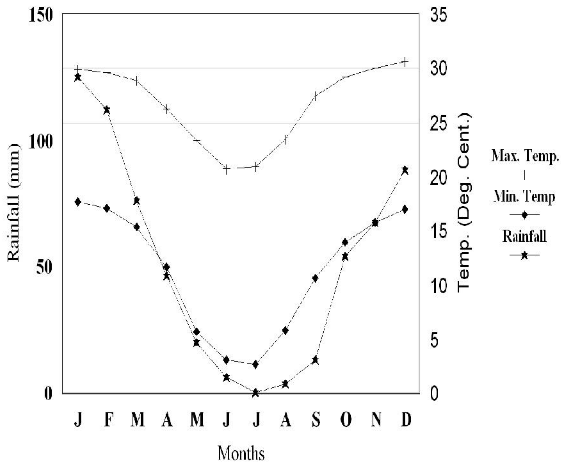
Small ruminants constitute a major source of protein for human nutrition in tropical and subtropical regions. However, production levels are usually low because of a number of factors which include poor nutrition, diseases, parasitism and poor management. While poor nutrition is considered the most critical factor, disease and parasitism are a major source of economic loss (Ng'ang'a et al. 2009). Complete eradication of gastrointestinal parasites of small ruminants is impractical. The main objective of control programs should therefore be to minimize associated economic losses by containing parasite populations at levels that do not significantly affect production of their hosts (Vlassoff et al. 2001). In control programs, nematode populations can be maintained at low levels by strategic use of anthelmintics which may also in the end lessen the development of anthelmintic resistance in small ruminants (Vlassoff et al. 2001; Van Wyk et al. 2006; Ng'ang'a et al. 2009). In summer rainfall areas of South Africa, sheep and goat farmers traditionally treat their animals against helminths during the rains when clinical disease is already evident. Such treatment may not control the infection effectively since hypobiotic larvae are suspected to be a source of clinical infection in the aftermath of a dry season (Gatongi et al. 1997; 1998). The objective of this study was therefore to compare flock performance in goats treated before and during the rains, on the assumption that treatment before the rains would remove hypobiotic larvae.

2. Material and Methods

This study was conducted at the North West University farm, 7km from Mafikeng (25º 49′ S, 25º 36′ E, altitude 1278m) city in the North West province of South Africa. Mafikeng has a semi-arid environment with Savanna type vegetation and annual summer rainfall of 540 mm year $^{-1}$. The region has one dry season that extends from May to September, and a wet season that extends from October to February. The mean monthly meteorological data for Mafikeng for the last 18 years is presented in figure 1. Sixty indigenous female goats of about 1 year of age as determined by dental eruption were purchased from local communal farmers. They were ear-tagged and randomly allocated into three groups of 20 animals each. Group 1 was treated with an oral dose of albendazole (Prodose Green, Virbac Animal Health) at the rate of 7.5mg/kg live mass at the end of September when the mean monthly meteorological data revealed zero mm of rainfall, and 8.1 and 25.7^{o}C minimum and maximum temperatures respectively. Group 2 was similarly treated at the end of October when the mean monthly meteorological data revealed 13.6mm of rainfall, and 14.3 and 29.7^{o}C minimum and maximum temperatures respectively.

Group 3 served as a control, with no treatment being administered. All the groups were housed together at night in a camp (30m x 30m) which was partially roofed and had a dirty floor. All the animals were let out to graze at 10 00hr and kraaled at 17 00hr. They grazed freely together with Bosmara cattle in a 70 ha pasture. The study was conducted between September 2004 to September 2005.

Fig 1. Average rainfall (mm) and temperature (°C) data for Mafikeng over the last 18 years.



The effects of group treatments were compared by evaluating parasitological, health and production parameters in each group. Monthly faecal and blood samples were collected from all animals. Egg counts per gram of faeces (epg) were analyzed by using a modification of the McMaster technique (Reinecke 1983), while packed cell volume (PCV) was determined using standard protocols. Live weights of all animals were recorded monthly using a manual scale.

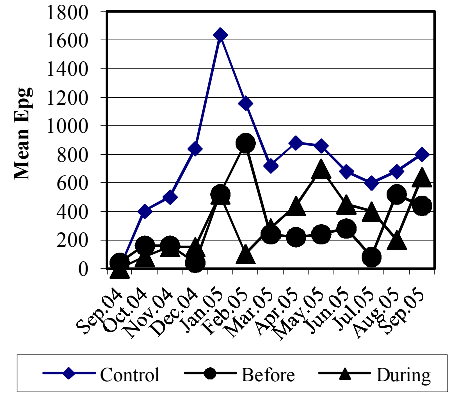
Separation of the means was performed using the least significant differences calculated following the GLM procedure of the SPSS program (Version 10.0). The probability used to determine significance was at $P < 0.05$ (5% level). All other statistical analyses were performed using the Data Analysis tool pack of Microsoft Excel 2000.

3. Results

In this study, the effects of 2 treatment strategies on goat performance were compared. Figure 2 shows the mean faecal egg output of the three groups of animals.

Treatment before and during the rains kept the faecal egg output lower than that of the control group throughout the study period. With regards to faecal egg output and PCV, both treatment groups showed similar results with a lower ($P<0.05$) overall mean faecal egg output and significantly higher ($P < 0.05$) overall mean PCV than the control group (table 1). Body weights of the does were used as an indicator of performance of the animals. Mean weights of both treatment groups were significantly higher ($P<0.05$) than those of the control group. Further, the mean weight of animals treated before the rains were significantly higher ($P<0.05$) than those of animals treated after the onset of rains (table 1), showing superiority of the treatment strategy. Treatment of animals before the rains has also been found to be more beneficial in improving birth weights (Gatongi et al. 1997; Osaer et al. 2000).

Fig 2. Mean fecal egg counts (epg) of animals in group one (before), group 2 (during) and group 3 (control)



On the contrary, treatment during the summer rains is the commonly practiced strategy among the communal farmers, suggesting a possible compromise on the effectiveness of treatment. The compromise in effectiveness could be related to the risks of an immediate re-infection from an already contaminated pasture (Nginyi et al. 2001). The treatment of animals before the rains may lead to a reduction of the adult worm population, as well as that of the hypobiotic larvae, thereby possibly preventing clinical disease (Gatongi et al., 1997). This was evident in this study as shown by a reduction in the level of pasture contamination as indicated by a low mean faecal egg out put (table 1). In conclusion, the superiority of treatment before the rains on weight gain of the study animals calls for a possible shift in anthelmintic control strategies among communal farmers. This may lead to an enhancement of flock performance when compared to treatment applied during the rains when pastures are already contaminated with infective larvae. Such a nematode control program would be beneficial especially in semi-arid communal areas where goats are reared extensively. This may also slow down the development of anthelmintic resistance that is rampant on commercial small stock farms as a result of frequent drug use (Van Wyk et al. 2006; Tembely et al. 2009).

TABLE 1. Mean monthly mean live weight, faecal egg count and packed cell volume among the treatment groups

Group	**n**	**Mean± S.E.M**
Liveweight (kg)		
1	20	31.1 ± 0.9[c]
2	20	28.5 ± 0.5[b]
3	20	25.8 ± 1.0[a]
Faecal egg counts (epg)		
1	20	294 ± 46[a]
2	20	317 ± 46[a]
3	20	470 ± 46[b]
Packed cell volume (%)		
1	20	35.6 ± 1.2[a]
2	20	34.4 ± 1.4[a]
3	20	27.9 ± 1.2[b]

[a,b,c] Means with different superscripts in a column are significantly different among the groups at P<0.05

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References

1. Gatongi, P.M., Scott, M.E., Gathuma, J.M., Munyua, W.K., Chrruiyot, H.T. and Prichard, R.K., 1997. Effects of three nematode anthelmintic treatment regimes on flock performance of sheep and goats under extensive management in semi-arid Kenya. *Veterinary Parasitology*, 68: 323-336.
2. Gatongi, P.M., Prichard, R.K., Ranjan, S., Gathuma, J.M., Munyua, W.K., Cheruiyot, H. and Scott, M.E., 1998. *Veterinary Parasitology,* 77: 49-61.
3. Ng'ang'a, C.J., Maingi, N., Kanyari, P.W.N. and Munyua, W.K., 2009. The effects of anthelmintic treatments against gastrointestinal nematodes on the performance of breeding ewes and lambs on pasture in semi-arid Kenya. *Tropical Animal Health Production*, 41(6): 921-926.
4. Nginyi, J.M., Duncan, D.J., Mellor, M.J., Stear, M.J., Wanyangu, S. W., Bain, R.K. and Gatongi, P.M., 2001. Epidermiology of parasitic gastrointestinal nematode infections of ruminants on smallholder farms in central Kenya. *Research in Veterinary Science*, 70: 33-39.
5. Osaer, S., Goossens, B., Eysker, M. and Geerts, S., 2000. The effects of prophylactic anthelmintic treatment on the productivity of traditionally managed Djallonke sheep and West African Dwarf goats kept under high trypanosomosis risk . *Acta Tropica*, 74: 13–24.
6. Reinecke, R.J., 1983.Veterinary Helminthology. Butterworth Publishers, Durban/Pretoria. pp 321-323.
7. Tembely, S., Lahlou-Kassi, A., Sovani, S., Rege, J.E.O., Baker, R.L. and Mukasa-Mugerwa, E., 2009. Small ruminant practices and control of helminthosis under traditional production systems in the cool Ethiopian highlands. Small Ruminant Research and Development in Africa.
8. Van Wyk, J.A., Hoste, H., Kaplan, R.M. and Besier, R.B., 2006. Targeted selective treatment for worm management– How do we sell rational programs to farmers? *Veterinary Parasitology*, 139: 336-346.
9. Vlassoff, A., Leathwick, D.M. and Heath, A.C.G., 2001. The epidemiology of nematode infections of sheep. *New Zealand Veterinary Journal,* **49(6):** 213–221.

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