

EFFECT OF DEWORMING FREQUENCY ON GROWTH PERFORMANCE OF GRAZING SMALL EAST AFRICAN GOATS

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SUMMARY

A study was carried out to evaluate the effect of deworming frequency using the current available anthelmintic (Ivermectin) on performance of grazing Small East African (SEA) goats. Three treatment groups each with 9 males and 9 females of three strains (Dodoma, Kigoma and Mtwara), were randomly formed from fifty four SEA goats. The age of the goats ranged between 8 – 12 months with an average of 10 months old. The goats weighed between 7 – 17 kg with a mean of 13 kg. The three treatments were based on deworming frequency thus treatment I was monthly deworming (T1), treatment II was bi-monthly deworming (TII) and treatment III was tri-monthly deworming (TIII). Growth performance was based on body weights, which was measured fortnightly. At the end of the experimental period (90 days) body condition scorings were carried out to supplement assessment of growth rate.

There were significant ($P < 0.05$) treatment effects on goats' growth rate, TIII showing much lower rates, $12.87 + 9.88$ g/day compared to $44.54 + 7.23$ and $51.54 + 6.05$ g/day for T1 and TII respectively. There were no significant ($P > 0.05$) effects of sex or strain on goats growth rate. Goats in TIII significantly ($P < 0.05$) scored the lowest body condition that of $2.61 + 0.15$ compared to the other two treatments. Kigoma strain had significantly ($P < 0.05$) higher body condition scores than the Dodoma and the Mtwara strains, $3.51 + 0.11$ and $3.03 + 0.13$ respectively. Female goats in all treatments scored higher than the male goats ($P < 0.01$) condition scores than the Dodoma and the Mtwara strains, $3.51 + 0.11$ and $3.03 + 0.13$ respectively. Female goats in all treatments scored higher than the male goats ($P < 0.01$)

INTRODUCTION

In Tanzania, goats' population is estimated to be 9.7 million (FAO 1995). The predominant breed is the Small East African (SEA) goat. They are local breeds and generally named based on the place they are found. Mtenga *et al* (1990) reported 5 goat strains in Tanzania, namely the Masai, Ujiji, Newala, Gogo (dwarf) and Blended (synthetic) types. The wide distribution of goats in the tropics and sub-tropics reflect their ability to adapt to a variety of environmental conditions (Peters, 1987).

There are a number of constraints, which hinder goats' production in Tanzania. These include inadequate nutrition, diseases, unavailability of improved breeds and improper animal management (MALD, 1990). There is limited data about the prevalence or relative occurrence of small ruminant diseases in Tanzania; the lack of data makes it difficult to

accurately rank the diseases according to their economic significance. However, helminthosis, pneumonia and enteric infections are considered to be the most widespread and responsible for most economic losses in the small ruminant industry in Tanzania (Shoo *et al*, 1992). Helminth infestations form a consistent problem in livestock production seriously affecting production (Gipson *et al*, 1996). Helminthosis is the cause of obvious losses to the farmers in terms of deaths of young livestock due to

heavy worm burdens. However, major economic losses are realised through loss in live weight gain, lowered productivity due to helminthiasis which are unfortunately not easily detected by most farmers (Kasuku and Ngomuo, 1997). The control of nematodes especially *Haemonchus species* in sheep and goats is achieved by regular drenching of the animals (Gipson, *et al.*, 1996). The present research work was initiated to compare the three different deworming frequency on body weight gain and body condition score.

MATERIALS AND METHODS

The study was carried out at Magadu Farm, Department of Animal Science and Production, Sokoine University of Agriculture (SUA) Morogoro. Fifty-four kids (27 males and 27 females) from 3 strains of Small East Africa (SEA) goats (Dodoma, Kigoma and Mtwara strains) owned by the ENRECA project were used in the study. The goats were aged between 8-12 months, with mean of 10 months. The goats weighed between 7-17kg, with mean weight of 13kg.

Goats were weighed fortnightly up to the fourth month of the experiment. Goats were weighed for two consecutive days at the beginning and end of the experiment, and the mean weights recorded as the initial and final body weights. Weighing was carried out in the morning around 07.00h to 08.00h. and the bodyweight

changes reflected response in growth performance. Faecal egg counts (epg) were determined using a modified McMaster method (MAFF, 1986).

At the end of the experiment, body condition score was carried out to supplement the data on body weight changes. The five point systems developed by Allen and Kilkenny (1984) was used. The balls of fingers and the thumb were used to feel the amount of soft tissue (meat and fats), the backbone and the rib ends. Goats were examined individually in a standing and relaxed position to avoid tense and crushing by others, in order to get an accurate condition score for each. The exercise was done early in the morning around 07.30h to 08.15h.

Experimental design, layout and treatments

The study was carried out using a 3x3x2 factorial design, i.e. 3 treatments, 3 strains and 2 sexes.

Treatments were deworming regime as follows:

Treatment I: Goats were dewormed at beginning of the experiment thereafter repeated after every 30 days.

Treatment II: Goats were dewormed at beginning of the experiment thereafter repeated after 60 days.

Treatment III: Goats were dewormed at beginning of the experiment thereafter repeated after 90 days

Goats were randomly allocated to the three treatments; each group consisted of 18 kids, i.e. 6 from each strain of which half (3) were males and the other half (3) were females. The following table shows when the deworming was carried out, (antihelmintic used was ivermectin):

Table 1: Deworming regime (initially all kids were treated with ivermectin and this was termed as day 0).

Treatment	Days from initial treatment			
	0	30	60	90
I	√	√	√	√
II	√		√	
III	√			√

Duration of study

In total the study covered a period of 9 months starting September to June. This was geared at capturing the wet season, as this is the period expected to have high infestation rates due to conducive survival of the worms' eggs and larvae on pasture.

Statistical Analysis

The analysis of variance was carried out in accordance with Snedecor and Cochran, (1989). A computer software General Linear Model (GLM) of the Statistical Analysis System (SAS, 1989) was used to estimate the mean effect of treatments, sex and strain on the goats' performance. The statistical model used was:

$$Y_{ijkl} = \mu + T_i + B_j + S_k + (T*B)_{ij} + (T*S)_{ik} + (B*S)_{jk} + e_{ijkl}$$

Where:-

Y_{ijk} = Observation of the 1th animal in the ith treatment, jth strain and kth sex.

μ = Overall mean

T_i = Effect of ith treatment

B_j = effect of jth strain

S_k = Effect of kth sex

$(T*B)_{ij}$ = Effect of treatment and strain interaction

$(T*S)_{ik}$ = Effect of treatment and sex interaction

$(B*S)_{jk}$ = Effect of treatment, strain and sex interaction

e_{ijkl} = Random error term

Table 2: Least Squares Means (\pm SE) of body weight gain of goats for each treatment

TREATMENTS				Significance
	I	II	III	
Number of goats (n)	18	18	18	
Bodyweight gain (kg)	4.36 \pm 0.71 ^a	5.05 \pm 0.59 ^a	1.26 \pm 0.96 ^b	**
Daily bodyweight gain (g/day)	44.54 \pm 7.23 ^a	51.54 \pm 6.05 ^a	12.87 \pm 9.88 ^b	*
% of initial bodyweight	39.71 \pm 2.65 ^a	37.92 \pm 2.65 ^a	28.67 \pm 2.65 ^b	*

^a_b means with the same row are not significantly different. (P<0.05). * = Significantly different (P<0.05), ** = Significantly different (P<0.01).

RESULTS

Health of the experimental goats

In general, the experimental goats were all healthy at the onset of the experiment, but during the experiment, there were incidences of diarrhoea (5.5%), eye problems (7.4%), Skin conditions (1.8%), lameness (5.5%). Others were Contagious Caprine Pleuropneumonia (CCPP) (14.8%) and fracture (1.8%). Affected goats were treated and recovered.

Effect of treatments, sex and strain on the growth of goats:

Treatment:

Least squares means for live weight gain (LBWG) in (kg), growth rates (g/day) and percentage of initial bodyweights (%IBW) for the three treatments, are shown in Table 2. The treatments (deworming frequency) significantly ($P < 0.01$) affected bodyweight gain, goats that were dewormed only once

(treatment III) gained less weight compared to treatments II and I. Mean growth curves (kg) are presented in Figure 1.

Sex

From the present study it is apparent that sex had no significant ($P < 0.05$) effect on growth rate of the goats. However, male goats gained more weight (38.1%) of their initial body weight compared with females, which gained (32%) of their initial body weight. Mean growth curves (kg) for male and female goats are presented in Figure 2.

Strain

Strains did not affect significantly ($P < 0.05$) the growth rate of the goats. Generally Kigoma and Mtwara strains gained 46.56 ± 5.37 and 32.8 ± 710.72 g/day respectively compared with 29.50 ± 6.54 g/day of Dodoma strain.

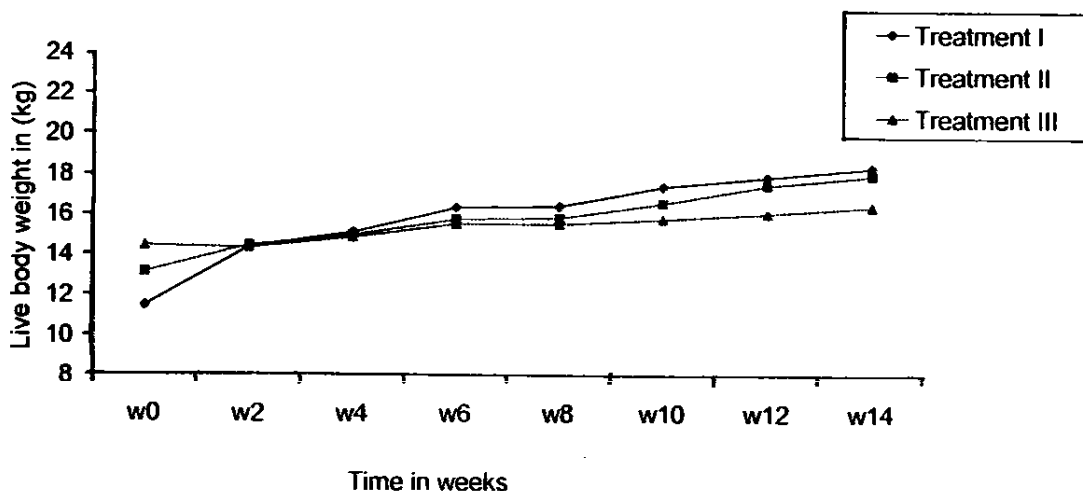


Fig. 1: Mean growth curves for all animals in treatments

Effect of treatment, sex and strain on body condition score of goats

The Least Square means of body condition score on treatment, sex and strain are presented in Table 3. Significant difference ($P < 0.05$) between treatments was observed. Goats dewormed only once within 90 days (i.e. treatment three) scored the lowest (2.61 ± 0.15) compared to goats dewormed thrice and twice (i.e. treatment one and two), respectively. There were significant ($P < 0.01$) sex difference in body condition score with females scoring higher than males. On the effect of strains, the results indicate that Dodoma and Mtwara strains did not differ significantly ($P < 0.05$), although these differed significantly ($P < 0.05$) from Kigoma strains.

DISCUSSION

Effect of treatments, sex and strain on growth performance of goats

Treatments:

The observed growth rate of 44.54 ± 7.23 and 51.54 ± 6.05 g/day for goats in treatment I and II respectively were optimum growth rates, while 12.87 ± 9.88 g/day for treatments III was poor growth rate, which is below the optimum range of 25-40 g/day reported by Mtenga and Kusiluka (1997). Poor growth rate of experimental goats in treatment III could be attributed to pathogenic effect of parasitic helminths in the host.

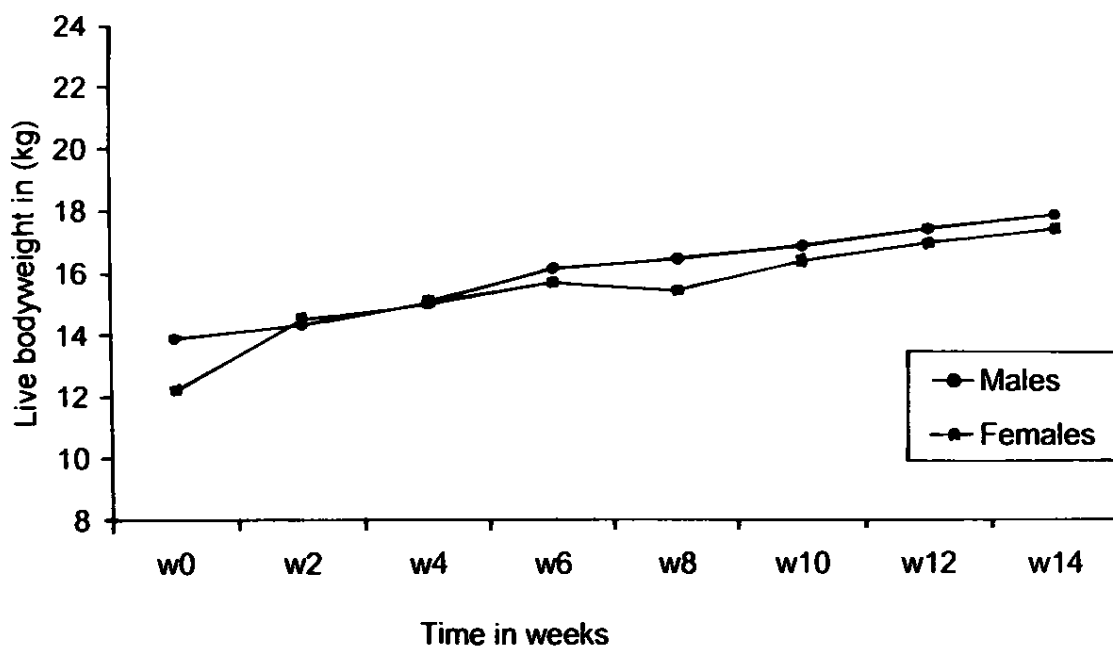


Fig.2: Mean growth curves for males and females in the experiment

Table 3: Least Square Means (\pm SE) of body condition score of goats for the treatments, sex and strains.

Class	Category	LSMeans(\pm)SE
Sex	Male	2.83 \pm 0.11 ^b
	Female	3.61 \pm 0.11 ^a
	Significance	**
Treatments	Treatment I	3.79 \pm 0.15 ^a
	Treatment II	3.25 \pm 0.11 ^b
	Treatment III	2.61 \pm 0.51 ^c
	Significance	*
Strains	Dodoma	3.03 \pm 0.13 ^{b^a}
	Kigoma	3.51 \pm 0.11 ^b
	Mtwara	3.13 \pm 0.13 ^a
	Significance	*

^{a,b,c} means with the same superscripts along the same column are not significantly different. * Significant different at ($P < 0.05$), ** Significant different at ($P < 0.01$).

It has been reported that *Trichostrongylus* and *Cooperia* feeding on plasma fluids may damage the epithelial mucosa of the intestine resulting in leakage of plasma proteins into intestinal lumen and out of the host (Radostits *et al.*, 1994), affecting the absorption and the utilization of these proteins in the animal's body thereby affecting the growth performance of the host. The growth rates observed in the present study indicate that the animals were above the inflection point during the commencement of the experiment. This is in agreement with Kifaro *et al.*, (1996) who reported a decline of growth rate with age. The lowest

growth rate was recorded in treatment III where goats were dewormed only once in the 90 days. Delayed deworming could have led to accumulation of worm infestation as well as re-infestation.

Sex

The growth performance for males and females were not statistically different. Males gained slightly higher compared to females. Male were gaining at a rate of 38% of their initial body weight, while females were gaining at the rate of 32.9%, which are essentially the same rates of gain. The results are in agreement with Mourad (1993); Djemal *et al.*, (1994) and

Mchau (1979) who reported that males are superior to females. The differences between sexes on growth performance have been explained on the basis of muscle cell number possessed by the male animals. Males have higher number of muscle cells than female animals (Dass and Charya, 1970).

Strain

The poor growth performance for Dodoma strain 29.50 ± 6.54 g/day is within the range of poor growth rate suggested by Mtenga and Kusiluka (1997). For small ruminants poor growth rates have been reported at the range of 25 – 40 g/day (Mtenga and Kusiluka 1997). Kitalyi, (1982) reported growth rates of 45 – 63 g/day and 43.4 g/day respectively as normal and good growth rates. However, the gain for Kigoma and Mtwara of 46.56 ± 5.36 g/day and 32.87 ± 9.10 g/day respectively, were not statistically different from the Dodoma strain.

Effect of treatment, sex and strain on body condition score

Treatment:

In comparison, the growth performance of the goats and the body condition score were observed to be related. Live weight changes and body condition scoring can measure the condition and nutritional status of goats. It is assumed that live weight changes

using live weight scale are the accurate way of measuring the condition of livestock except during late pregnancy. When live weight scale is not available, condition scoring is the best alternative.

Sex

The fact that females scored significantly higher than males in the present study is in agreement with Assenga (1997) who observed higher scores for female sheep and goats than in males in Mkuyuni and Mlali division in Morogoro region.

Strain

Strains differed significantly on body condition score despite that they were in the same species. Strain differences in body condition score observed in the present study were probably brought about by their originality as earlier suggested by Madubi (1997) and Chalya (1998). Kigoma strain was from Western Zone, Mtwara strain was from the Southern Zone and Dodoma strain was from the Central Zone of the country (ENRECA, 1998; Madubi, 1997). These three locations may be responsible for strain differences as they differ ecologically and climatically.

CONCLUSION

Deworming regime has an influence on the growth performance of goats as the interval of deworming become longer spaced the chances

of increasing the worm burden increases, which led to low growth rate. It is recommended that deworming at an interval of two months could perform better for the three strains studied i.e. Dodoma, Kigoma and Mtwara strains. But this should only be practiced during the season in which there is a high risk of infection due to high larvae contamination on pasture. The longer spaced interval (90 days) would only be applicable during dry season when infestation rate is low.

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