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EFFECT OF SUPPLEMENTATION AND INTERNAL PARASITES ON GROWTH OF CROSS-BRED GOATS UNDER VILLAGE ENVIRONMENTS IN SOUTHERN THAILAND

By

WINAI PRALOMKARN, SURASAK KOCHAPAKDEE, SOMKIAT SAITHANOO and SURAPOL CHOLDUMRONGKUL

Department of Animal Science, Faculty of Natural Resources, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand

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ABSTRACT :- The effects of supplementation on growth rate of the cross-bred (50 % Anglo-Nubian) as well as the effectiveness of drenching to suppress worm burden were studied. It was found that gastrointestinal nematodes, especially stomach round worms, are common parasites in this region. Drenching and nutrition played important role on growth of goats. Relationship between levels of worm infestation and rainfall was found.

INTRODUCTION

Most goats in Thailand are raised by small farmers in villages of the southern region. Kochapakdee et al. (1991) reported that stomach round worms were the common parasites of goats in the area, which is classified as a humid tropical zone. It was demonstrated that, under village environments, drenching goats over a six month period in the rainy season (7/8/1991 to 23/1/1992) had very little effect on weight gain (Kochapakdee et al. 1993). This result may be due to a limitation of nutrition. Pralomkarn et al. (unpublished data) reported that weight gain of 93 g/d can be obtained from 50 % Anglo -Nubian (AN) male weaners raised under improved management at Prince of Songkla University (PSU) Farm.

Feeding ruminants in Thailand commonly used by small farmers are simple and depended on naturally available feed resources, particulary crop by–products in various seasons. Therefore, liveweight, reproductive performance and working ability is influenced by seasonal feeds and level of feeding (Wanapat 1990). Information on supplementary feeding for goats in villages is very limited. The aim of this study was to investigate the effect of supplementation and internal parasites on growth rate of the Thai native (TN) x AN cross–bred male goats raised under village conditions.

MATERIALS AND METHODS

The study was conducted in a village of Satun province, southern Thailand (5° 37'N and 98° E) involving 4 farmers. The region has a tropical humid climate with a mean annual rainfall of 1,337 mm in which 73 % occurs between June and November. Mean maximum and minimum temperatures are 33.2 and 23.9°C, respectively.

An area of two hectares was used. The pasture comprised largely of Alang alang (*Imperata cylindrica*), weed (*Eupatorium odoratum*) and *Pueraria phaseoloides*. This pasture had been grazed lightly between January and April 1991.

A complete randomised design was used. There were four treatments in this trial. The first treatment was undrenched (control), the other were drenched with fenbendazole (Panacur(R); Hoechst AG, Germany), oxfendazole (Systamex(R); The Wellcome Foundation, England) or albendazole (Farmbazen(R); H.K. Pharmaceutical, Thailand). These anthelmintics were broad–spectrum anthelmintics. Six animals were allocated for each treatment.

Twenty–four weaner bucks (TN x AN cross–bred) were used in this study. These goats were born at the PSU Farm between March and April 1991 and transferred to the village after weaning, on 7 August. At weaning (3 months of age), they were drenched with Panacur (R) approximately 125 mg/kg BW/d to control heominths and with Mansonil M(R) (active ingredient 790 g/kg niclosamide monohydrate; Bayer Australia Ltd., Australia) approximately 100 mg/kg BW/d to control *Monezia* sp. Soon after weaning, they were vaccinated against: (i) caseous lymphadenitis (CLA), pulpy kidney, tetanus, black disease, malignant oedema and blackleg with Glanvac–6 vaccine (Commonwealth Serum Laboratories, Victoria, Australia), (ii) foot and mouth disease (Type O, A and Asia 1, Department of Livestock Development) and (iii) haemorrhagic septicaemia (Veterinary biologies Centre, Pak Chong, Thailand).

In the village, goats grazed on a two hectare paddock with an average stocking rate of 12 animals/ha. They were free to graze at any time during the day and water was available all time. No concentrate supplement was offered for the first six months (first period) and then all goats were offered 1.0–1.5 % BW with a concentrate diet (crude protein = 15.0 %) until the end of the experiment. The diet composed of (%) 25.0 palm kernel cake, 25.0 rubber seed meal, 25.0 maize or broken rice, 8.5 rice bran, 12.0 soybean meal, 2.0 oyster shell, 2.0 salt and 0.5 dicalcium phosphate. During the experimental period, animals were treated for health problems whenever necessary.

In each drenched group, animals were drenched every two months (on 2 October 1991, 28 November 1991 and 22 January 1992, respectively). In the first period, they were drenched with 5 mg fenbendazole/kg body weight (BW), 5 mg oxfendazole/kg BW (Systamex) or 5.6 mg albendazole/kg BW (Farmbazen). However, in the last six months (second period), magnitude of drenching were depended on parasite burden. If one of drenched groups had an average egg per gram (EPG) > 1,000, all drenched animals would be additionally drenched with particular anthelmintics.

Rainfall data were obtained from the Satun Animal Nutrition Research Station, Department of Livestock Development, which is located about 14 km from the experimental site. The total monthly rainfall (mm) between August 1991 and June 1992 were 357, 361, 99, 200, 77, 55, 5, 19, 117, 155 and 255, respectively.

Animals were weighed every two weeks. Faecal samples were also collected fortnightly from rectum of each animal and stored at 4 °C until examination. The Universal Flotation Technique (Whitlock 1948) was used for quantitative analysis of coccidian oocysts and helminth eggs. Faecal samples (2 g) were thoroughly mixed in 30 ml of saturated sugar solution. This suspension was sieved through strainer and during steady stirring, a suspension (0.3 ml) was removed and placed into two McMaster counting chamber. Number of oocytes or helminth egg counts within the etched area of these two counting chambers were multiplied by 25 to yield oocytes or eggs per gram (EPG) of faeces. The eggs of the different parasite species were classified by reference to illustrations in Sloss (1970).

Data were analysed using the Statistical Analysis Systems Package (SAS 1987). Growth rate and faecal egg counts after transformation (log10 (n+1)) of goats among treatments were compared using analysis of variance.

RESULTS

Figure 1 shows the changes in liveweight for goats in each treatment and rainfall during the experimental period. During the first period (no supplementation). All animals lost weight in the first four months except those drenched with albendazole in the second month which gained little weight. During the second period (supplementation) all groups, especially for drenched animals markedly gained weight throughout the experiment.

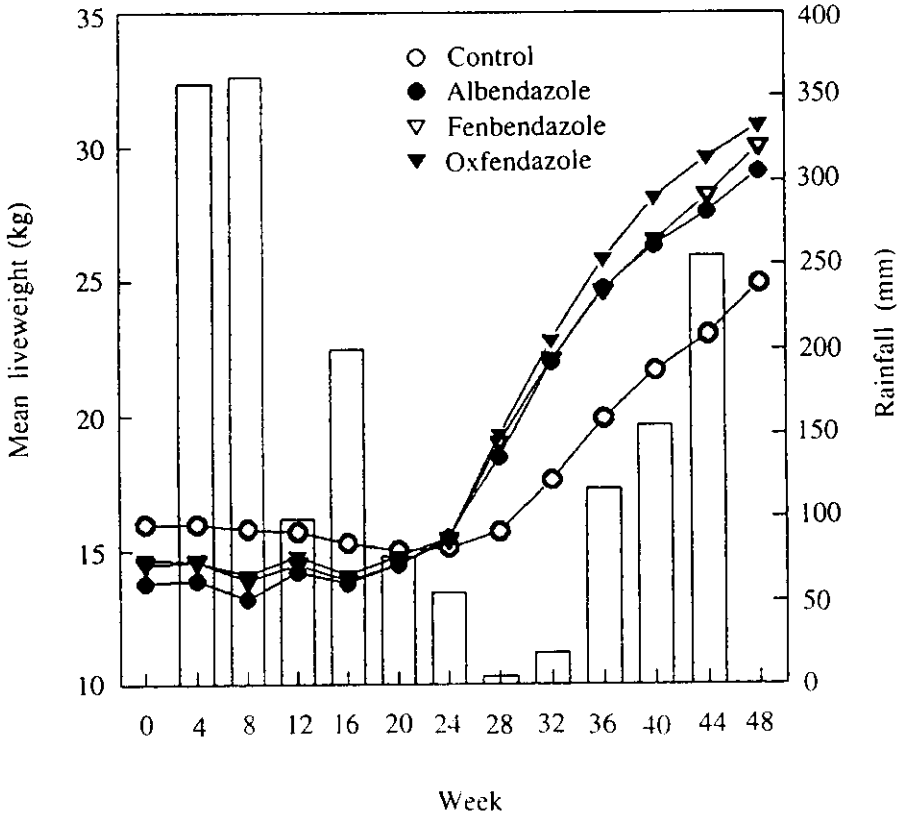

Figure 1. The change of mean liveweight of goats and mean rainfall during the experiment.

Table 1 shows growth rate with standard error for goats in each treatment during the first period, during the second period and during all periods. The results show that animals in drenched groups gained significantly ($P<0.05$) more weights than the controlled one. Drenched goats gained little weight (5.3–10.3 g/d) during the first period whilst controlled ones lost their weight (–5.9 g/d). However, all animals gained more weight during the supplementary feeding period.

Table 1. Growth rate (g/d) and standard error of goats during experimental period.

Treatment	7/8/91–23/1/92	23/1/92–8/7/92	7/8/91-8/7/92
Control	–5.9±2.9a	62.7±6.3a	28.6±3.7a
Albendazole	10.3±2.6b	80.6±5.7b	45.5±3.5b
Fenbendazole	5.3±2.6b	86.8±5.7b	46.0±3.5b
Oxfendazol	4.9±2.6b	91.1±5.7b	48.0±3.5b

a, b Mean within columns with different superscripts differ significantly ($P<0.05$).

Table 2 shows mean EPG of stomach round worms for each treatment in every four weeks. At drenching time (2/10/1991, 28/11/1991, 23/1/1992, 16/4/1992 and 8/7/1992), there was no significant ($P>0.05$) difference between EPG for controlled and drenched animals. During the first period (7/8/1991-23/1/1992), drenched animals had significantly ($P<0.05$) lower EPG than controlled animals only at one month after drenching. Six weeks after drenching, drenched animals had the same level of EPG as controlled ones. During the last period, drenched goats were drenched every 3 months due to a low EPG.

DISCUSSION

It was observed that during the first period EPG in animals was built up within the first two months. In subsequent periods, EPG for controlled animals had never fallen below 1,600 although rainfall during the last four months decreased.

Table 2. Mean of egg counts per gram of gastrointestinal nematodes for goats in different treatments.

Date	Control	Albendazole	Fenbendazole	Oxfendazole
23/1/92*	2,710	2,900	2,370	2,710
20/2/92	1,163a	25b	17b	0b
18/3/92	1,467	892	375	817
16/4/92*	1,175	1,542	800	1,160
13/5/92	1,110a	317b	100b	83b
9/6/92	1,633a	0b	0b	0b
8/7/92*	1,430	1,267	1,092	1,092

* Drenching time

a, b Mean within columns with different superscripts differ significantly ($P<0.05$).

During the second period (January–July 1992), EPG for controlled animals had fallen below 1,250 from January to May. This may be due to a markedly decreased of rainfall. After that EPG increased again in June (Table 2).

Rhaman (1991) reported that in Penang Island, western Malaysia, goats raised in village environments had EPG of trichostrongylid nematodes exceeded 1,000 during monsoon months (September–December). He also found that faecal egg counts associated with total rainfall. The results in the present study suggest that high egg count occurred when the availability of moisture was optimal. However, in the present study there was not severe infestation and/or reinfestation. This may be due to a better health during supplementation. Milton et al. (1987) reported that PSU situated in the east coastal zone has an annual rainfall of 1,120–2,800 mm with a dry period extending from mid January to March/May with markedly increases in rainfall in May/June and October/November. It is quite different from the rainfall data at the region (present study) situated in the west coastal zone showing markedly increase in rainfall in April to November. Therefore, the parasite burden should be also investigated in the east coastal zone.

Stomach round worms are the most common parasite found in village goats in southern Thailand with an average EPG in young goats grazing grass pasture in Malaysia, Daud–Ahmad et al. (1991) reported that EPG of this

worm were 800–2,000. Baldock (1984) has suggested that an EPG level of 500–2,000 may predict severe infestation in goats if these eggs are from *Haemonchus* spp. Baxendell (1987) stated that severe haemonchosis in goats occurred when EPG exceeded 2,000.

At the start of experiment, all animals had low worm burden but faecal egg count rose to the level exceeding 1,000 within 6 weeks. EPG of the animals in an undrenched group remained at this level throughout the experimental period.

Drenching with fenbendazole, oxfendazole or albendazole were highly effective in this experiment. However, reinfestation to pre–treatment level occurred within 4 to 6 weeks. This result agrees with the study on sheep grazed under rubber plantation in North Sumatra, Indonesia, which high EPG occurred 4–6 weeks after drenching (Carmichael 1991). The results suggest that in the humid tropical environments, 4 to 6 weeks drenching would be suitable to suppress worm burden from April to November and 8 to 10 weeks drenching from December to May. In northern New South Wales, Australia, it was common practice to drench lambs at least every four weeks and ewes at least every eight weeks during the spring, summer and autumn months (Newman 1984).

In the first period, undrenched animals in this study lost weights while treated goats gained weight slightly. However, it can be generally said that all animals only maintain their weights. This may be due to nutrition and/or internal parasites. Pralomkarn et al. (unpublished data) reported that weight gain of 93 g/d can be obtained from 50 % AN male weaners raised under improved management at the PSU Farm. A high level of EPG (>1,000) associated with low quality of pasture may result in weight loss in controlled animals in the present study. In drenched animals, besides pasture quality, low level of weight gain may be due to failure of 2 months drenching to suppress worm burden.

Poor nutrition in the village goats resulted in low growth rate and low weight at birth, at weaning and at maturity. In the present study, the stocking rate was low (12 animals/ha), but the growth rate of all kids was very low during the first period. This may be due to insufficient in energy and/or protein intake as all kids grazed in the same paddock with low quantity and quality forages during the experiment. However, in the second period growth rate of the kids, especially drenched animals markedly increased due to a compensatory growth during the supplementary feeding period. This result suggests that 50 % cross–bred kids raised under poor nutrition (drenched or undrenched) in village could not increase their weight. Nevertheless it was

suggested that drenching alone would not result in increased weight gain unless a nutritional level has also been improved. Feeds can be supplied as grains or browse tree legumes. Among browse plants the tree legume *Leucaena leucocephala* is used as a feed for ruminants in the tropics (Jones 1979). A certain level of concentrate supplement needs to be investigated if high level of production is being aimed at. Furthermore, it is suggested that more research on goat nutrition both basic and applied need to be done. The study should focus on utilisation of locally available roughages (grasses, shrubs ad browse), agro-industrial products and other by–products. Technologies associated with treatment/processing need to be developed so that farmers can be used in the villages.

The results in this study indicate that the humid tropical environment of this part of Thailand is favourable for the development of trichostrongylid nematodes. Four to six weeks drenching is necessary to suppress parasite burden under un–rotated pasture conditions. Raising cross–bred goats in this environment needs to consider both nutrition and parasite control and the interaction of these two factors.

Saithanoo (1990) reported that farmers in southern Thailand have not relied on treatment with anthelmintics to control parasites of goats. In the present study, it was shown that cost of production (concentrate plus drench cost) for drenched goats was lower than did controlled ones. This result could be due to a higher growth rate. However, in the first period all goats gained little weight this cost of drenched was higher than did controlled ones due to the drench cost.

In general, male goats (15–20 kg) were sold at 45-50 baht/kg live-weight in southern Thailand. It seems that raising cross–bred goats under these conditions has benefits. Drenching goats should be advised so that the farmers can benefit from these generated research findings. However, careful evaluation is needed before promoting large scale enterprises.

CONCLUSIONS

1. Gastrointestinal nematodes, expecially stomach round worms were common parasites in the region.

2. Drenched goats had supplementary feeding periods hence they reached the target weights earlier than did controlled animals.

3. Relationship between levels of worm infestation and rainfall was found.

4. Nutrition played an important role for growth of the cross–bred goats.

5. Four to six weeks in the region was recommended to suppress parasite burden during rainy season (April to November) and 8 to 10 weeks drenching from December to May under un–rotated pasture conditions.

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