Effect of supplementation with Kapok (*Ceiba pentandra*) tree foliage and Ivermectin injection on growth rate and parasite eggs in faeces of grazing goats in farmer households

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Summary

An on-farm trial was conducted during an 8-month period from February to September 2004, in Lvea Em District, Kandal province. February through May was the end of the dry season, the rains beginning in June and continuing through September with severe flooding in the last two months. Twelve farmers participated in the trial. Their goats were allocated to 4 treatments according to a 2*2 factorial arrangement with three replications. The treatments were: G, grazing natural pasture only; GI, grazing and ivermectin injection; GS, grazing and supplementation with kapok foliage (*Ceiba pentandra*) when confined in the evening; and GSI, grazing, supplementation with kapok foliage and ivermectin injection). Each farmer was given 2 male goats (local breed). Growth rates were twice as high in the dry season (range of 98 to 112 g/day than in the wet season (24 to 50 g/day), when much of the natural grazing area was flooded. Growth rates were increased by supplementation in the wet season but not in the dry season and were not affected by Ivermectin treatment in either season. Nematode egg counts in faeces were in the low to medium category (200 to 800 EPG). They were less in goats treated with Ivermectin compared with untreated controls, but were not affected by supplementation. Supplementation with kapok foliage appears to be a viable option to improve the nutritional status of goats during periods of the year when grazing is restricted.

Key words: Ceiba pentandra, EPG, goats, growth, Ivermectin, kapok

Introduction

The kapok tree (*Ceiba pentandra*) is a multipurpose plant that is traditionally used in goat production in Cambodia (Theng Kouch et al., 2003a). Nguyen Thi Hong Nhan (1998) reported that the DM digestibility in growing goats fed the foliage as the sole diet was 76% and that growth rates (74 g/day) were similar to what was obtained with foliage of Leucaena. According to Theng Kouch et al. (2003b), during the periods of flooding, the farmers often supplemented their goats with foliage from the kapok tree.

Materials and methods

The experiment was conducted with farmers who were living in Pearm Okgna Ong commune, Lvear Em district in Kandal Province, about 25 km from Phnom Penh city. The research took place over an 8 months period, commencing on 1st February 2004 and finishing at the end of August 2004. February through April were the final months of the dry season, with the rains beginning in May and continuing until October.

Twenty-four non-castrated male goats were allocated to 12 farmers according to a combination of 4 treatments arranged as a 2*2 factorial: **G:**Grazing of natural grass only (control); **GS:**Grazing of natural grass and supplemented with kapok tree foliage; **GI:**Grazing of natural grass and Ivermectin injection; **GSI:**Grazing of natural grass and supplemented with kapok tree foliages and Ivermectin injection.

The kapok tree foliage was given fresh after being collected by the farmers. It was offered on an *ad libitum* basis (about 50% above recorded intake) in the evening (about 4 to 5pm) by hanging bunches of the foliage on the pen wall, simulating the way traditionally used by the farmers. The Ivermectin was injected at the beginning of the experiment and repeated every two months. The dose rate was 1 ml/25 kg live weight.

The goats were weighed every two weeks. Feed intake of the kapok foliage was recorded and samples retained for analysis. Dry matter was determined by micro-wave radiation

(Undersander et al 1993). Nitrogen and ash were determined by methods of AOAC (1990). Samples of faeces were taken every month directly from the rectum of the goats, for determination of faecal egg counts (EPG), according to the method of Hansen and Perry (1994). The data were subjected to analysis of variance (ANOVA) using the General Linear Model option (GLM) of the MINITAB software version 13.1 (Minitab 2000). Sources of variation were treatments, blocks and interaction treatments*blocks and error. Growth rate was calculated by regression of live weight (kg) on time (days). The data for faecal egg counts were transformed by the power of $\log_{10}$ prior to analysis.

Results and discussion

Table 1. Chemical composition of kapok tree foliage with and without petioles and stems

	Leaves	Leaves + petiole	Leaves + petiole + stem
DM, % fresh basis	35.3	33.0	23.2
As % of DM			
Crude protein	18.4	15.9	13.2
Ash	11.4	10.6	13.5
OM	88.6	89.4	86.5

The first 4 months of the experiment coincided with the dry season when there was plenty of grazing available. Beginning in June these areas were progressively reduced due to the flooding. Growth rates were twice as high in the dry season than in the wet season (Table 2).

Growth rates were increased by supplementation in the wet season but not in the dry season and were not affected by Ivermectin treatment in either season. Nematode egg counts in faeces were less in goats treated with Ivermectin compared with untreated controls, but were not affected by supplementation. Coccidia infestation was not affected by Ivermectin or supplementation.

Conclusions

- In an on-farm trial with grazing goats under smallholder farming conditions, supplementation with foliage from the kapok tree increased the live weight gain in the wet season but not in the dry season.
- Overall growth rates were twice as high in the dry compared with the wet season.
- Anthelmintic treatment with Ivermectin reduced the EPG but had no effect on growth rate.
- Supplementation with kapok foliage appears to be a viable option to improve the nutritional status of goats during periods of the year when grazing is restricted.

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Table 2. Mean values for effects of Ivermectin and kapok supplementation on changes in live weight of the goats and in parasite egg counts in faeces in the dry and wet seasons

In the dry season												
	Ivomectin		**Supplement**		**SEM[2]**	**Prob.**		**Interaction of treatments**				
	No	**Yes**	**No**	**Yes**		**Ivom**	**Supp**	**G**	**GI**	**GS**	**GSI**	**SEM/P**
Live weight, kg												
Initial	11.5	11.6	11.7	11.4	0.19	0..57	0.29	11.7	11.3	11.5	11.2	0.27 / 0.25
Final	23.1	23.3	22.4	23.8	0.47	0.81	0.13	23.3^{ab}	21.5^{b}	22.9^{b}	24.8^{a}	0.67/0.03*
ADG, g	104	105	97.2	112	7.17	0.90	0.19	106	87.9	103	123	10.1/0.10
Nematode, EPG[1]	709^{a}	105^{b}	418	396	73.5	0.001	0.87	748	88.0	669	122	134 / 0.69
Coccidia, EPG[1]	389	562	429	521		0.31	0.58	413	446	364	677	157 / 0.41
In the wet season												
Live weight, kg												
Initial	23.1	23.1	22.4	23.8	0.0.47	0.81	0.13	23.3^{ab}	21.5^{b}	22.9^{b}	24.8^{a}	0.67/0.03*
Final	27.5	28.5	26.2^{b}	29.9^{a}	0.57	0.25	0.001	26.5	25.8	28.5	31.3	0.81 / 0.08
ADG, g	35.4	43.9	30.9^{b}	48.4^{a}	3.84	0.17	0.02	24.1	37.6	46.6	50.2	5.43 /0.39
Nematode, EPG[1]	784^{a}	305^{b}	605	484	103	0.001	0.20	838	373	732	236	84.0 / 0.86
Coccidia, EPG[1]	294	323	190	427		0.80	0.08	285	95	303	551	112 / 0.10

[1] *Data transformed by log_{10} prior to analysis*

[2] *SEM of main effects*