

Evaluation of forages for growing goats

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Summary

Thirty two male native goats were randomly allotted to four treatment groups of eight animals in a 2*2 factorial design. The two factors were type of hay and addition of cassava root chips. Gamba grass was fed *ad libitum* in the amount of 120% of the average daily DM intake of grass consumed the previous week. Cassava hay and Stylo 184 hay were fed *ad libitum* in the amount of 60% of expected total daily intake, 3% of body weight. Cassava root chips were fed at 0 or 130g per head per day during the experiment. The experiment lasted for 12 weeks. There was a significant difference in CP intake between cassava hay and Stylo hay. There were no significant differences in DM intake, live weight gain or feed conversion ratio for DM.

Keyword: gamba grass, cassava hay, stylo hay, cassava root, live weight gain, local goats, feed intake.

Introduction

Goat production in Lao PDR is still relatively undeveloped, with a total population of 136 800 goats (MAF, 2003). Almost all goats are of indigenous breed and are well adapted to poor nutrition and management. The level of production from local goats is generally low, and this is primarily due to poor feeding practices and lack of intensification of the production systems (Devendra, 1982). Supplementation of fibrous feeds with forages such as cassava leaves (*Manihot esculenta* Crantz) or Stylo 184 (*Stylosanthes guianensis* cv CIAT 184) are common in many tropical countries. Cultivation of cassava to produce hay is based on a first harvest of the foliage at three months after planting, followed by a harvest every two months thereafter until one year. Potential yield of leaves could reach 4.64 tons/ha (Dung, 2003). The leaves are sun-dried and can be stored for later feeding. Cassava hay contains 20% to 25% crude protein (CP) in the dry matter (DM) and has a low HCN content (Wanapat et al., 2001). According to Phengsavanh (1997) Stylo 184 grows well and can adapt to a wide range of environmental conditions. The objective of this experiment was to compare the potential of using cassava hay and Stylo 184 hay as protein sources in diets based on Gamba grass to improve the present goat production systems.

Materials and methods

The study was conducted at the Livestock Research Centre, near Vientiane, Laos. Thirty two male goats of local breed, 6 to 7 month of age and weighing 13.0 (0.46) kg were used in the experiment. The goats were dewormed by using Ivermectin and were vaccinated against foot and mouth disease before starting the experiment. The goats were adapted to the pens and the experimental feed for 21 days before the start of the experiment. The animals were fed twice per day at 07:00 h and 16:00 h. Drinking water, mineral lick blocks and salt were available all times.

The feeds used in the experiment were Gamba grass, cassava hay, Stylo 184 hay and cassava root chips. Gamba grass was collected from existing pastures of the Livestock Research Centre. The grass was harvested at the age of 40 to 45 days twice per day in the morning (07:00h) and in the afternoon (16:00h). The grass was chopped to a length of 10 to 20 cm before feeding. Cassava was planted and cut twice during the growing period. The foliage was harvested after 90 days, chopped into small pieces and sun-dried 2 to 3 days. Stylo 184 was planted and harvested after 60 to 70 days of growth. Cassava root chip was bought from the market, chopped into small pieces, sun-dried 2-3 days, and stored.

A complete randomized two factor design (CRD) was used in the experiment. The 32 goats were randomly allotted to four treatment groups of 8 animals. The factors were two different protein sources, cassava hay or Stylo 184 hay, and addition or no addition of cassava root chips as an energy source. During the experiment the grass was fed fresh *ad libitum* in the amount of 120% of the average daily DM intake of grass consumed the previous week. The cassava hay and Stylo 184 were fed *ad libitum* in an amount of 60% of expected total daily intake, 3% of BW. Cassava root was fed at 130g per head per day. The experiment lasted for 12 weeks. The amounts of feeds offered and refused were recorded daily for individual animals during the data collection period. The data from the experiment were statistically treated by variance analysis using the General Linear Model (GLM) of Minitab Software version 12.21 (Minitab, 1998).

Results and discussions

The chemical composition of the feed used in the experiment is shown in Table 1. Cassava hay had a CP content of 191 g per kg DM, which is similar to levels reported by Dung (2003) and Kiyothong (2003), and Stylo 184 hay contained 124 g/kg DM which agrees with the result of Kiyothong (2003).

Table 1. Chemical composition of dietary components (Mean and Standard deviation)

	Gamba grass	Cassava hay	Stylo hay	Cassava root
No of samples	6	6	6	6
DM (g/kg feed)	277 (1.4)	838 (0.9)	848 (0.8)	852 (0.9)
<i>Composition of DM g/kg</i>				
Ash	36 (2.3)	66 (2.5)	56 (2.5)	26 (2.9)
CP	98 (5.2)	191 (5.5)	124 (7.5)	18 (1.2)
NDF	779 (11.9)	519 (40.8)	595 (23.3)	124 (6.8)
ADF	421 (13.4)	442 (39.2)	506 (48.1)	46 (1.9)

Total feed intake increased significantly when cassava root was added when both hays were analyzed together (Table 2). However, addition of cassava root decreased intake of both hays and Gamba grass to some degree. There was a significant difference in CP intake, which was higher in cassava hay, in g/day, g/kg LW and g/W^{0.75} between the two hays. This was a result of the fact that protein content and consumption of cassava hay was higher than that of Stylo 184 hay. The CP intake was, however, lower than the 50 g/day recommended for goats in the tropics (Devandra and McLeroy, 1982). There were no interactions between hays and root for any of the variables.

Table 3 shows that there were no significant differences in live weight gain and feed conversion ratio for DM due to hays or to addition of cassava root chips. There was, however, a significant difference in feed conversion ratio for CP between the two hays (P<0.05) Stylo 184 having lower FCR-CP than cassava hay.

Conclusions

Addition of 130 g cassava root increased total feed intake by around 60 g/day but decreased intake of Stylo 184, cassava hay and Gamba grass to a similar extent degree. There was no difference between cassava hay and Stylo 184 hay concerning live weight gain or FCR-DM but FCR-CP was lower for Stylo 184 hay.

Table 2. Feed offered (means) and feed intake (Least squares means (LS-means) and standard error (SE)).

Parameters	Cassava hay		Stylo hay		SE	Sign. Level		
	NR	R	NR	R		H	R	H*R
<i>Feed offered, g DM/day</i>								
Cassava root	0	110	0	110				
Cassava hay	261	247	0	0				
Stylo hay	0	0	274	242				
Gamba grass	621	583	180	155				
Total offer	882	941	455	508				
<i>Feed intake, g DM/day</i>								
Cassava root	0	110	0	110				
Cassava hay	219	114	0	0				
Stylo hay	0	0	107	89				
Gamba grass	123.7	93.8	129.9	96.8	12.1	NS	*	NS
Total intake	253.1	318.7	237.8	296.1	29.8	NS	*	NS
CP intake, g/day	40.8	36.5	27.1	24.6	3.2	**	NS	NS
DM intake, g/day LW	15.2 ^b	20.8 ^a	14.2 ^b	19.9 ^a	0.7	NS	***	NS
DM intake, g/day W ^{0.75}	30.7 ^b	41.1 ^a	28.7 ^b	38.8 ^a	1.5	NS	***	NS
CP intake, g/kg LW	2.4	2.3	1.6	1.6	0.1	***	NS	NS
CP intake, g/kg W ^{0.75}	4.9	4.6	3.2	3.1	0.2	***	NS	NS
NDF intake, g/day	162.0	125.9	146.5	109.0	14.5	NS	*	NS
ADF intake, g/day	96.3	73.6	81.8	58.9	9.5	NS	*	NS

H= hay ; R= root ; NR= no root; *= P < 0.05 ; **=P<0.01;***= P < 0.001

^{a, b} Means within row and hay with different superscripts are significantly different P < 0.05

Table 3. Initial weight, live weight gain and feed conversion ratio (FCR).

Parameters	Cassava hay		Stylo hay		SE	Sig.lev	Sig. Level		
	NR	R	NR	R			H	R	H*R
Initial weight, kg	13.91	13.14	13.00	13.95	NS	NS			
Final weight, kg	17.7	17.5	17.8	16.6	1.14	NS	NS	NS	
Live weight gain, g/d	45.4	51.6	38.7	42.8	47.40	NS	NS	NS	
FCR-DM, kg DM/kg LWG	5.6	6.9	6.4	6.9	0.66	NS	NS	NS	
FCR-CP, kg CP/kg LWG	0.9	0.8	0.7	0.5	0.07	*	NS	NS	

H= hay ; R= cassava root ; NR= no cassava root; *= P < 0.05

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