Contents

Growth performance and parasite infestation of goats given cassava leaf silage (or sun-dried cassava leaves) as supplement to grazing in lowland and upland regions of Cambodia

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Summary

The study was conducted during a period of 3 months in two rural communities in Cambodia. The objective was to measure the growth performance and parasite infestation of goats managed by small householders in the traditional system of free grazing with supplementation of conserved cassava foliage in ensiled and sun-dried forms and natural grass. The growth rates were higher in the upland area compared to the lowland area and were higher for ensiled cassava leaf compared to sun-dried cassava leaf or native grasses. The better growth response and the lower rate of nematode infection in the upland region appeared to be the result of higher intakes of protein from the supplement. In the upland region, the goat production was effectively managed during the wet season.

Introduction

Feed shortage, especially in the dry season in upland areas, and in the wet season in lowland areas because of flooding, is becoming a major problem for goat production in Cambodia. Many researchers showed that, during these difficult periods, the farmers often supplement their goats with tree foliage (Nguyen Thi Mui et al., 2000; Seng Sokerya et al., 2003; Theng Kouch et al., 2003). Cassava (*Manihot esculanta*) is one of these foliages, which has been recognized as a locally available feed resource for both non ruminant and ruminant production for small-holders farmers (Preston, 2001; Doan Thi Khang and Cu Xuan Dan, 2001; Wanapat, 2001; Chhay Ty et al., 2003).

Material and methods

The experiment was conducted in two communities: in the lowland area (Ogna Ong village) along the Mekong river bank, and in the upland area of Pursat province, Southwest part of Cambodia. The study took place over a 3 month period during the wet season, starting on August 1, 2004. 24 farmers (including 8 women householders) were selected, 12 farmers in each of the lowland and upland areas. Each farmer received 2 goats of about 4 months of age (males in lowland area and females in upland area). The treatments were arranged as a 3*2 factorial with 4 replications. The main effects were: Supplementation (EC: Ensiled cassava foliage, DC: Dried cassava foliage; NG: Natural grass); Region (L: Lowland, U: Upland). The goats were managed in the traditional system of free grazing (from 8.00am to 4.00 pm), with nighttime confinement in a shed with raised floors where they were offered the forage supplements *ad libitum*. They were vaccinated against Foot and Mouth Disease and injected with Ivermec (1ml/25kg live weight (LW). Every farmer planted cassava in a plot of $100m^2$. Cassava leaves were purchased from neighboring farmers and either ensiled or sun-dried in quantities sufficient to supply half the needs of the experiment. After 2 months the farmers prepared the supplements from their own cassava plots. Farmers assigned the NG treatment harvested fresh grass from the area around the household.

LW was measured every two weeks, in the morning before grazing. Intake of supplements was recorded every day and samples retained for analysis. Dry matter (DM) was determined by micro-wave radiation (Undersander et al., 1993) and N and ash 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 (FEC), 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 13.2. Sources of variation were supplement, region and error. Growth rate was calculated by regression of live weight (g) on time (days). The data for faecal egg counts were transformed by the power of $\log_{10}$ prior to analysis.

Results and discussion

There was more crude protein (CP) in the DM in ensiled cassava leaves than in sun-dried leaves with the grass having intermediate values (Table 1).

Table 1. Composition of the supplements

Chemical composition	% DM	% CP in DM
Ensiled cassava foliage	32.44	24.5
Dried cassava foliage	87.82	18.4
Natural grass at lowland	16.80	22.6
Natural grass at upland	21.27	21.7

Growth rates were higher in the upland compared with lowland area and higher for ensiled cassava leaves compared to sun-dried cassava leaves or natural grasses (Table 2). DM intakes from the supplements were higher in upland than in lowland areas and higher for cassava leaf supplements than for natural grass. CP intake showed a similar pattern but was higher for the ensiled compared to the sun-dried cassava leaves. There was a positive relationship (R^2=0.53) between CP intake from the supplement and the growth rate.

Table 2. Mean values for growth rate and supplement intake of goats in upland or lowland area, given sun-dried (DC) or ensiled (EC) cassava leaves or natural grass (NG)

	Lowland	Upland	SEM/P	DC	EC	NG	SEM/P
Daily gain, g	34.7	55.2	5.2/0.008	34.4	63.1	37.4	6.4/0.005
Intake of supplementary forages, g/day							
DM	125	258	25.4/0.002	201	249	126	31.1/0.038
CP	27.41	56.08	5.6/0.002	36.83	60.92	27.49	6.8/0.008

FEC were low in all treatments at one month after Ivermectin injection (Table 3). They remained low (FEC<500) in the goats in the upland area with no differences among supplements. However, in the lowland area the FEC increased to 2250 after 3 months in goats fed natural grass, with much lower values (FEC=700) for the goats given ensiled cassava leaves. Goats fed sun-dried cassava leaves had intermediate values (FEC=1500).

The better growth response and the lower rate of nematode infection in the upland region appeared to be the result of higher intakes of protein from the supplement. Similarly, growth responses and the FEC within regions also appeared to reflect the amount of supplementary protein consumed.

Table 3. Mean values for monthly FEC of goats in upland or lowland area, given sun-dried (DC) or ensiled (EC) cassava leaves or natural grass (NG)(Original data were transformed by log_{10} prior to statistical analysis)

	7/8/2004_2	5/9/2004_2	3/10/200	31/10/21
Lowland				
Ensiled cassava	24.4	11.3	351	696
Cassava hay	20.6	39.4	692	1502
Grass	48.8	141	1063	2246
Prob.	0.192	0.001	0.01	0.004
Upland				
Ensiled cassava	677	435	324	338
Cassava hay	897	756	360	471
Grass	478	621	444	467
Prob.	0.149	0.863	0.986	0.79

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