

Effect of supplementation of protein feeds to various roughages as a basal feed on the performance of Bligon goats

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Summary

The research aimed at increasing the performance of Bligon goats kids by feeding protein supplements. Bligon goat kids weaned at an age of 3 to 5 months were used in the experiment which was conducted in farm conditions. The animals were divided into three groups of 8 females in each and three groups with 5 males in each. The treatments were three different diets: a control, where the feedstuffs given were similar to what is given by farmers and two diets with a basal feed usually used by farmers supplemented with a concentrate containing old milk powder (CP 18.5% and TDN 78.0%) (T₁) or Leucaena leaf meal (CP 17.8% and TDN 76.0 %) (T₂).

The farmers used 15 to 20 forage species and 3 to 5 species of leaves were always mixed. DM intake (DMI) for females and males did not differ significantly, when the goats were given basal feed as roughage supplemented with old milk powder or Leucaena leaf meal. DMI ranged from 28.2 g/kg live weight (LW)/day (T₁) and 31.4 g/kg LW/day (T₂) in the groups of females. These results are slightly higher than for the kids given a roughage without supplementation (27.3 g/kg LW/day), while for the male group, the DMI ranged from 31.0 g/kg LW/day (T₁) to 37.5 g/kg LW/day (T₂). Body parameters generally had a positive correlation with LW. Coefficient of correlation of LW vs. chest circumference for the females was 0.91 (n=144) and for the males 0.89 (n=90). Feeding old milk powder to weaned goats resulted in good growth rates, not significantly different from feeding Leucaena leaf meal. Chest circumference had a high correlation with live weight, and can be used to estimate live weight.

Keywords: Bligon goats, Indonesia, supplement, performance

Introduction

In Indonesia, goats are one of the favourite small ruminants raised by farmers. This is due to the fact that goats are easy to manage, the reproductive performance is quite high and the price of animals is low (Kustantinah et al., 2003). Farmers are able to buy kids and to keep them to be fattened or bred. Feed offered usually consists of grasses, leaves and also agricultural by products, which vary depending on the harvest time. Usually farmers do not have any problems in feeding the animals in the rainy season (November – May) because the basal feed is abundant, but during the dry season, generally roughage quality and quantity are very low (Kustantinah et al, 2002; Rahmawati, 2004). The waste of milk powder in the milk industry in Indonesia is quite high, around 1000 kg /month. Old milk powder can not be used for human consumption but can still be used as a protein supplement (crude protein (CP) content 28%) for animals, but until now the utilisation of old milk powder is still low.

Considering the problems of low quality of feedstuffs occurring during the dry season, protein supplementation for kids weaned at 3 months of age is of interest. The objective of this study was to determine the effect of feeding old milk powder or Leucaena leaf meal to growing kids.

Material and methods

Bligon goat kids weaned at an age of 3 to 5 months were used in the experiment, which was conducted in farm conditions. The animals were divided into two groups consisting of 24 females and 15 males. Each group was further divided into three sub-groups, each with 8 female kids and 5 male kids.

The treatments were three different diets, a control, where the feedstuffs given were similar to what is given by farmers, and two diets with a basal feed usually used by farmers supplemented with a concentrate containing old milk powder (CP 18.5% and TDN 78.0%) (T₁) or *Leucaena* leaf meal (CP 17.8% and TDN 76.0 %) (T₂).

Supplementation was given for 10 weeks, starting with an adaptation period of two weeks. Roughage (the basal feed) was fed twice per day, at 07.00 h and 16.00 h. Data collected were: type of feeds and species given by farmers, chemical composition (proximate analysis), feed intake and performance of the kids (average daily gain, hump height, body length and chest circumference), which was measured every two weeks.

Result and discussion

From the observations, in general, farmers in the village fed roughages without concentrate, and the forage species used consisted of 15 to 20 different species (Table 1). This study was conducted in the end of the dry season (August to October), and in this season farmers never use a single feed, and always mixed 3 to 5 species of leaves.

The roughage used can be divided into four groups: legumes (*Sesbania sesban*, *Leucaena* and Kancu leaf); grass (king grass and native grasses); leaves (jack fruit, banana and mahogany) and agricultural waste products (corn stover, dry cassava tuber skin). In the period of data collection the utilisation of agricultural by-products was not common since it was after the time of harvest. The crude fiber (CF) content of the feeds varied between 3.5% (dry cassava tuber) to 41.4% (Kancu leaf), while the protein content ranged between 2.0% (dry cassava tuber) to 27.0% (*Sesbania*) (Table 1).

Feed intake

DM intake (DMI) for the two groups (females and males) did not differ significantly for diets T₁ and T₂ (Table 2). For the females the DMI ranged from 28.2 g/kg LW/day (T₁) to 31.4 g/kg LW/day (T₂). These results are slightly higher than for the kids given roughages without supplementation (27.3 g/kg LW/day). For the males the DMI ranged from 31g/kg LW/day (T₁) to 37.5 g/kg LW/ day (T₂). Intake was high compared to results of Insung et al. (2004), who used Ruzi grass (*Brachiaria ruziziensis*) and *Streblus* leaves (*Streblus asper* Lour), with DMI of 1.2% and 1.7% of LW, respectively.

The CP intake of the females was not significantly different between diets. The males fed diet T₂ had significantly higher CP intake ($P < 0.05$) compared to animals fed diet T₁ or control, 5.3 g/kg LW/day. This may be due to the type of basal feed offered to males, which in diet T₂ often consisted of legumes.

The highest average daily gain (ADG) was obtained for T₁ for both sexes, 50.5 g/day for females, and was significantly different for males, 57.6 g/day. The ADG for T₂ and control were quite similar for the females ranging from 26.6 to 31.4 g/day, while for the males the ADG of animals fed diet T₂ was significantly higher than for the diets control and T₁.

Table 1. Chemical composition of feeds used by farmers for the goats

	OM	CP	EE	CF	ETN	TDN*
<i>Legumes</i>						
Sesbania sesban leaf (%)	89.9	27.0	4.7	16.6	42.0	74.0
Leucaena leucocephala leaf (%)	91.6	26.0	4.1	20.9	40.5	71.0
Kancu leaf (%)	92.2	18.0	0.4	41.4	20.3	53.3
<i>Grass</i>						
King grass (%)	89.7	12.0	3.8	31.4	42.5	59.1
Native grass (%)	90.3	6.7	1.8	34.2	47.6	55.8
<i>Other foliages</i>						
Jackfruit leaf (%)	75.0	13.0	4.4	20.0	38.1	56.0
Banana leaf (%)	88.1	14.0	3.8	23.1	46.9	64.0
Mahogany leaf (%)	92.45	14.0	0.7	28.2	38.2	56.4
<i>Agriculture waste products</i>						
Dry cassava tuber skin (%)	82.3	11.0	4.3	6.5	60.3	68.0
Corn Stover (%)	89.8	8.8	1.9	29.5	49.5	59
Rice brand (%)	88.3	14.0	14.1	11.6	48.7	74
Dry cassava (%)	98.6	2.0	1.0	3.6	78.4	82.7

Table. 2 Nutrient intake (g/kg LW/day) and ADG (g/day) of goat kids.

Items	Treatment		
	Control	T ₁	T ₂
<i>Females</i>	27.3	28.2	31.4
Dry Matter (DM) ^{ns}	23.8	24.9	26.8
Organic Matter (OM) ^{ns}	3.8	4.0	4.7
Crude Protein (CP) ^{ns}	8.3	5.5	6.9
Crude Fiber (CF) ^{ns}	16.2	18.7	20.7
Total Digestible Nutrient (TDN) ^{ns}			
Average Daily Gain (ADG) (g/Day) ^{ns}	31.4	50.5	26.6
<i>Males</i>			
Dry Matter (DM) ns	29.8	31.0	37.5
Organic Matter (OM) ns	28.2	22.4	33.2
Crude Protein (CP) ns	4.1	3.9	5.3
Crude Fiber (CF)	-	-	-
Total Digestible Nutrient (TDN)	19.4	19.0	27.6
Average Daily Gain (ADG) (g/day)	14.7 ^a	57.6 ^b	38.0 ^{ab}

Significantly different (P<0.05)

Body parameters

The body parameters measured were LW, humpback height, body length and chest circumference. The objective was to find the highest correlation coefficient (r) between LW and body parameters to be used by farmers to estimate LW in an easy and cheap way. The body parameters generally had a positive correlation with LW. For both sexes coefficients of correlation (r) were higher for LW vs. chest circumference (r = 0.91, n=144) for females, and 0.89 (n=90) for males.

When combining sexes and parameters (Table 3) the best prediction of LW was obtained with chest circumference and humpback height but chest circumference alone could also predict LW accurately (r=0.90).

Conclusions

Feeding old milk powder, a waste product of the milk industry, to weaned goats resulted in good growth rates, comparable to feeding Leucaena leaf meal. Chest circumference had a high correlation with live weight, and can be used to estimate live weight.

Table 3. Regression equations of LW (Y) vs different body parameters (female and males).

Variable	Regression equation	R	R ²	n
Chest circumference (X ₁)	$Y = -16.4 + 0.5X_1$	0.90	0.81	246
Body length (X ₂)	$Y = -11.8 + 0.6 X_2$	0.79	0.62	246
Humpback height (X ₃)	$Y = -19.9 + 0.7X_3$	0.84	0.71	246
Chest circumference (X ₁) and humpback height (X ₂)	$Y = -21.1 + 0.4X_1 + 0.28X_2$	0.93	0.86	246
Chest circumference (X ₁) and body length (X ₂)	$Y = -17.9 + 0.4X_1 + 0.2X_3$	0.91	0.83	246

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References

- Insung O., T. Vearasilp, U. ter Meulen and S. Chakeredza, 2004. Influences of Plants Species and Conservation Methods on Voluntary Intake and Digestibility of Dry Matter and Organic Matter of Ruzi grass (*Brachiaria ruziziensis*) and Streblus Leaves (*Streblus asper* Lour) in Goats under the Humid Tropical Climate in Southern Part of Thailand.
<http://www.tropentag.de/2004/abstract/full/145.pdf>
- Kustantinah, M.A., B. Lomax, B. Suhartanto, A. Agus, E.R.Orskov, H. Hartadi, R. Utomo and L.M. Yusiati, 2002. A livestock development approach contributes to poverty alleviation: A special case at Kwarasan, Nglipar, Gunungkidul as an example. *Proceedings of the 3 rd International seminar on Tropical Animal Production*, Faculty of Animal Science, Gadjah Mada University, Yogyakarta, Indonesia.
- Kustantinah, M.A., B. Lomax, B. Suhartanto, P.W. Soemitro, H. Hartadi and S.Zubaidah, 2003. Effects drying process of cassava leaves on its degradability, *Proceeding AAAP*, UPM, Malaysia.
- Rahmawati. N. 2004. The influence of feeding frequency and concentrate supplementation on energy intake of Bligon goat. M.Sc. Thesis. Fakultas pasca Sarjana, Gadjah Mada University, Yogyakarta, Indonesia.