The Effect of Supplementation of Gliricidia or Rice Bran on Liveweight Gain, Feed Intake and Digestibility of Kacang Goat Fed Mulato Grass

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ABSTRACT: A low liveweight gain of of Kacang goats when given grass as single feed indicated that additional feed is required to increase their gowth performance. This study was done to examine the effect of addition of Gliricidia or rice bran on liveweight gain, feed intake, and feed digestibility of Kacang goat given Mulato (*Brachiaria mulato*) grass. Twenty four male Kacang goat approximately 13.4±0.6 (SE) kg in initial weight and 10 months of age were housed in individual metabolic pen and allocated to one of three dietary treatments. The experimental design was a completely randomized block design, with 3 treatments and 8 replicates (goats). The treatments were Mulato grass *ad libitum* (M), M plus Gliricidia (1% W/d, dry matter (DM)) (MG), and M plus rice bran (1% W/d, DM) (MRB). The experiment was run for 8 weeks period (2 and 6 weeks for adaptation and measurement period, respectively) Parameters measured were liveweight gain (LWG), dry matter intake (DMI), and dry matter digestibility (DMD). The result showed that dietary treatment significantly affected ($P<0.05$) LWG, DMI and DMD of Kacang goat Goat given M had lowest LWG, DMI and DMD with value 58 g/d, 2.77 % weight (W)/day (d) and 57.61%, respectively. Goat received MG and MRB had the highest LWG (73 and 76 g/d, respectively), DMI (3.25 and 3.65 %W/d, respectively) and DMD (62.28 and 63.19%, respectively). However, no significant difference ($P>0.05$) between goat received MG and MRB. In conclusion, this study demonstrated that protein or energy contents of the diet dictated growth, feed intake and digestibility of Kacang goat.

Keywords: Kacang goat, Mulato grass, Gliricidia, and rice bran

INTRODUCTION

(sources of cash in emergency, as insurance for crop harvest failure) and potentially to reduce poverty. At national level the population of goat increased from time to time. For example in 2009, goat population was 15.82 million head increased to 17.91 million head in 2012. This lead to the contribution of meat from goat up to 65.2 thousand tons or approximately 18% of total meat production (LAHS, 2013). The data suggests that contribution of goat meat production can be increased through increasing goat population and productivity.

However, liveweight gain of Kacang goat given native grass as single feed are generally low. In their previous studies, Garantjang (2004), Liwa (1996) and Marsetyo (2014) reported that daily liveweight gain of Kacang goat given native grass was 45, 30 and 43 g/d, respectively. This poor growth performances are mainly due to insufficient supply of protein or other nutrients for animals, particularly during dry season (Panjaitan *et al.,* 2010; Sodiq *et al.*, 2011). Poppi *et al.* (2009) reported that crude protein (CP) content of native grass in Indonesia is maily low which ranged at 5-8%. Lower of CP content of forages often resulted in the longer retention time of its digesta in the rumen which is caused a lower feed intake (Panjaitan *et al.,* 2010). This suggests that additional feed are required to increase growth performance of Kacang goats. The use of improved grass such as Mulato (*Brachiaria mulato*) grass plus supplement feed is one way to improve

growth performance of Kacang gotas. Many previous studies (Marsetyo, 2004 and Ngongoni *et al.,* 2008) reported that supplementing basal grass diets with legume forage or concentrate has increased feed intake and diet digestibility by ruminant livestock. Feed supplement improves nitrogen (N) retention by the ruminant when grass diets that do not meet ruminant energy and N requirements are fed (Marsetyo, 2004).

There are many types of supplement for the goat that available locally. Gliricidia leaves or rice bran can be used to correct feed deficiency of the goat that potentially to increase their growth. Gliricidia is rich in CP and abundantly available in Palu, while rice bran provide medium carbohydrate that is relatively cheap. This study was therefore directed to examine the effects of addition of gliricidia or rice bran on liveweight gain, feed intake and digestibility of Kacang goats given Mulato grass as a basal diet.

MATERIALS AND METHODS

Site and Time

The experiment was conducted at the experimental farm, Department of Animal Sciences, Tadulako University, Palu, Central Sulawesi from July to September 2013.

Treatments and Experimental Procedures

Twenty four Kacang goats (purchased from local markets) weighing 13 ± 0.6 kg were used for the experiment. These animals were ranked and blocked on the basis of their un-fasted live weights. Within blocks, the animals were then randomly allocated to individual metabolism crates (0.5 x 1.5 m) pens and assigned to one of the dietary treatments tested: Mulato grass *ad libitum* (M), M plus Gliricidia (MG), and M plus rice bran (MRB). The Gliricidia or rice bran was offered at a rate of 1% body weight on dry matter basis. All goats were treated with Ivomec (1 mL per 10 kg of live weight) to eliminate internal and external parasites at the beginning of preliminary period.

Experimental animals were confined in individual pens. The experiment lasted for 8 weeks, consisted of a 2 week of adaptation period to diets and experimental routines and a 6 weeks of measurement. The experiment employed a completely randomized block design with 3 treatments and 8 replicates (animals) per treatment. The supplements were given once daily at 07:00 h and fed separately to basal diet. Initially, the animals receiving the supplemental treatment were accustomed to the supplement by gradually introducing the supplement over the first 7 days of the preliminary period. Mulato grasses were obtained from the farm, cut fresh daily and offered to the corresponding animals twice a day at 08:00 and 13:00 h. The grasses were cut to 5-10 cm in length before feeding. The amounts of basal feed offered to the goat daily were set at 10% more than that basal feed intake of the previous day. Drinking water was provided in bucket placed to each crate for *ad libitum* intake.

Chemical analyses

Feed offered, feed refusal and faeces collected during digestibility run were sampled and their representative were ground and analysed to determine their DM, organic matter (OM) and ether extract (EE) content (AOAC, 1990). Samples were dried to a constant weight at 60 oC using oven. Feed offers were also sampled for neutral detergent fibre (NDF) (Goering and Van Soest, 1970) and N analysis to determine its CP content, by using the Kjeldahl laboratory method.

Statistical analysis

Data collected (feed intake, digestibility and growth of goat) were analysed as a block randomized design using ANOVA in Genstat Release 11.1 statistical package (GenStat, 2008). The mean differences between treatments were compared by Least significant differences test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

The nutritive value of feed given to goat is presented in Table 1. The main differences between Mulato grass, Gliricidia and rice bran is the CP and DM content. The CP content of Gliricidia is more than double of the CP content of Mulato grass (23.7 vs 11.3% DM). In addition, Glricidia contained the lowest NDF compared with Mulato grass and rice bran. Rice bran showed the highest DM, and EE contents compared with MG and Gliricidia.

Table 1. Nutritive value of feed used in Experiment

Feedstuff	DM[1] (%)	OM[1] (% DM)	CP[1] (% DM)	NDF[1] (% DM)	EE[1] (% DM)
Mulato grass	29.8	92.1	11.3	59.1	1.6
Gliricidia	31.7	90.8	23.7	38.5	3.0
Rice bran	87.3	93.4	10.6	45.4	6.7

[1]**Dry matter (DM), organic matter (OM), crude protein (CP), neutral detergent fibre (NDF), ether extract (EE).**

Table 2. Feed intake, digestibility and growth of Kacang goat given Mulato grass, Mulato grass plus Gliricidia or rice bran

Parameter	Mulato grass (M)	M+Gliricidia (MG)	M+rice bran (MRB)
Forage intake (kg DM/d)	0.42±0.01	0.38±0.01	0.39±0.01
Forage intake (%W/d)	2.77±0.08^{b}	2.52±0.07^{a}	2.67±0.09^{b}
Supplement intake (kg DM/d)	0.00	0.12±0.01	0.14±0.01
Supplement intake (%W/d)	0.00	0.73±0.02	0.98±0.01
Total intake (kg DM/d)	0.42±0.01^{a}	0.50±0.01^{b}	0.53±0.01^{b}
Total intake (%W/d)	2.77±0.07^{a}	3.25±0.05^{b}	3.65±0.08^{b}
Dry matter digestibility (%)	57.61±1.07^{a}	62.28±1.09^{b}	63.19±1.12^{b}
Daily live weight gain (g/h/d)	58.33±2.80^{a}	72.62±2.01^{b}	75.79±0.73^{b}

Means with different superscripts in same raw are significantly different (P<0.05).

The effect of supplement intake on feed intake is shown in Table 2. Forage DM intake was lowest (P<0.05) for goats receiving MG compared goat receiving M and MRB respectively, but no significant difference (P>0.05) between the last two groups. All goats receiving Gliricidia or rice bran did not consume 100% of their total allowance. Supplement intake expressed as percentage of liveweight was higher for goats received rice bran (98%) than Gliricidia (73%). Although the supplementation increased total DM intake, in fact, supplement resulted in the decline of forage intake that often called as a substitution. In this study, the substitution rates with addition of Gliricidia and rice bran (1%W/d) were 9 and 4%, respectively. This is only small substitution rate. The reason of this substitution is not clear but probably because of limited gut fill and increasing intake of metabolisable energy (ME) due to supplemental feed. Goats received Gliricidia had higher basal feed intake depression compared goats received rice bran . Both Gliricidia and Mulato

grass were bulky materials which could limit capacity in reticulorumen. This is in agreement with Marsetyo (2004) who suggests that physical condition of supplement can potentially result in the decrease in forage intake due to physical limitation.

The effect of supplement intake on DMD, and daily liveweight gain are shown in Table 2. In both parameters, the greatest values were achieved by goat received MG and MRB and no significant differences (P>0.05) between two treatments (Table 2). The values of DMD for MG an MRG treated goats were 4,67 and 5,58% higher respectively than M treated goats. This study demonstrated that addition extra N to goat given MG could stimulate feed intake and digestibility. The stimulation of total intake and digestibility of goats supplemented with Gliricidia or RB could be due to increased N intake and supported by earlier studies (Bowen *et al.,* 1998). Assuming that N is one of the major limiting nutrients (along with minerals, particularly sulphur, and soluble carbohydrate) in forage, a significant increase in intake and digestibility could have been expected when supplementary nitrogen was provided. Carbohydrate supplementation in addition, supplies substrates for microbial activity in the rumen. The reason for the highest responses in total intake, digestibility for calves received rice bran could be due to addition of extra N and carbohydrate from feed component such as rice bran. These results suggest that addition of energy and protein to the basal diet dictated feed intake and digestibility of Kacang goat.

M had the lowest daily liveweight gain. The main constraints leading to these lower goat performances given M only are probably from lower supply of CP or other nutrients for animal, which resulted in the low rate of productivity. Many previous studies (Damry *et al.,* 2008; Panjaitan *et al.*, 2010; Marsetyo, *et al.,* 2012) indicated that CP content of feed influence significantly feed intake and digestibility, and retention time of digesta in the rumen. The total feed intake and digestibility of goats received M were significantly lower (P<0.05) than goats received MG and MRB. This finding is supported by Panjaitan *et al.* (2010) who suggested that the lower of CP content of feed the longer retention time its digesta in the rumen. The current study demonstrated that the addition of simple supplements, such as Gliricidia orrice bran to M can result in higher daily liveweight gain than goats given M only. The current data of liveweight gain of goat offered M as single feed is relatively closed to the finding of Marsetyo (2014). In the previous study this author reported that daily liveweight gain of Kacang goats given M as single feed was 53.50 g/d, which is much higher than goat given native grass (28.11 g/d). Both studies used similar materials with similar chemical contents so it is no surprising for the close growth rate data.

CONCLUSIONS

It is concluded that addition protein from supplement feed can stimulate feed intake, feed digestibility and growth rates of young Kacang goat given Mulato grass.

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