Intake and digestibility of feed in lamb of Sumatera composite breed when the commercial concentrate diet were substituted by gliricidia (*Gliricidia maculata*) and rice bran

Dwi Yulistiani and Wisri Puastuti

Balai Penelitian Ternak, P.O. Box 221, 16151. Bogor, Indonesia

ABSTRACT: The study was conducted to evaluate the effect of feeding under village condition for Sumatera composite breed. Sumatera composite breed is sheep breed created in Balai Penelitian Ternak Bogor, a crossed bred between Sumatera local sheep and St croix and cross bred between local Sumatera breed with Barbados Blackbelly sheep. The feeding evaluated consist of control diet (K) and treatment diet under village condition (T). In treatment diet K lambs were fed on with King grass adlibitum suplemented with 400 g/head/day concentrate comercial with protein content 16%, while treatment diet T the lambs were fed on King grass and gliricidia mixture in equal amount and offered adlibitum and suplemented with rice bran. This study used 20 head composite sheep breed male lamb and 10 head Barbados crossed male lamb as control. Parameters recorded were feed consumption and feed digestibility. Data obtained was analysed using GLM method from SAS. Result from this study showed that dry matter intake between treatments was not significantly different. Digestibility of organic matter (OM) and crude protein (CP) was similar between treatment K and T (average 65.79% and 64.45% respectively for DM and CP digestibility). DM (dry matter), NDF (neutral detergent fibre) and ADF (acid detergent fibre) digestibility was higher in treatment K than T. Total DMI was higher in breed BC than in Composite breed, however there was no significant different between breed in nutrient digestibility. It can be concluded that substitution of commercial concentrate with gliricidia and rice bran reduced the digestibility DM, NDF and ADF.

Key word: nutrient, gliricidia, digestibility, sheep

INTRODUCTION

One of the attempts to improve local breed sheep productivity is through improving genetic quality which done by crossing the local sheep with different breed followed by selection. Sumatera composite sheep is crossed bred between local Sumatera and St Croix breed and Sumatera and Barbados Blackbelly. Improving productivity usually followed by the increasing quality of feed requirement. However in the tropical countries feed availability is fluctuated either in quality and quantity as a result level production could not achieved its potential genetic. As a ruminant animal sheep obtained protein source from feed consumed and from microbial protein synthesized in the rumen. Protein source can be obtained from agro-industrial by-product (such soy bean meal, coconut meal, etc) or from forage legume, however, quality of these feed protein sources is affected by its degradability and its potency to be digested post ruminally. For small scale sheep farmer, providing protein feed from concentrate is expensive and unaffordable. On the hand Improving feed quality can be done using cheaper feeds materials and can be found easily such as forage legume and agriculture by products. *Gliricidia sepium* is one of the legume trees which can grows well throughout the year in the tropical countries with high forage yield and has high protein content (23.5%; Smith and Houtert, 1987) . This forage is expected can be used to overcome the problem of need high quality feed especially in dry season for small scale farmers. Gliricidia has been commonly used for ruminants feed in the village as a supplement in native grass basal diet. Previous study showed that gliricidia supplementation in sheep ration increased its growth rate (MATHIUS et al, 1981; Rangkuti and Martawidjaja, 1989). Rice bran is agriculture by products which is abundantly available in the rice field area and commonly used as an energy source. Sumatera Composite sheep breed in the research station fed on grass basal diet and supplemented with commercial concentrate had higher productivity than local breed sheep (YULISTIANI et al, 2001). However, to be developed in the village sheep productivity should be evaluated as in village condition. Therefore the objective of this study was

evaluate the effect of substitution of commercial concentrate with gliricidia and rice bran (as source of protein and energy which is commonly available in the village) on feed consumption and nutrient digestibility.

MATERIALS AND METHODS

Study was conducted in Balai Penelitian Ternak Research station for 12 weeks using 10 head male lambs of Sumatera composite breed and 10 head male lambs of Barbados Crossed breed as control breed. The average body weight of experimental animals was 13.6 kg. The lambs were placed in individual pen. The sheep were grouped into 5 groups based on body weight, one of the sheep was offered one of the diet treatments. The diet treatment consist of 1). Standard diet in the station which is sheep fed on grass adlibitum as basal diet and supplemented with commercial concentrate (KK); 2). Modification of feeding in village condition, where forage diet was a mixture of grass and gliricidia at ratio 1:1 as basal diet and supplemented with rice bran (GRb). Commercial concentrate and rice bran was offered at 400 g/head/day. Forage and concentrate (commercial concentrate or rice bran) was offered separately and given in the same time at 9 am. Parameters observed were feed consumption, and nutrient (DM. OM, CP, NDF and ADF) digestibility. Crude protein (CP) analysis was done usig macro-Kjeldahl. Dry matter (DM), oranic matter (OM) and CP analysis were carried out according to the method from AOAC (1990), while neutral detergent fibre (NDF) and acid detergent fibre (ADF) were analysed according to the method of Van Soest et al (1991).

The study was conducted in 2x2 factorial experiemnt in a randomized complete block design. The first factor was 2 types of breed and the second fator was 2 types of diet treatments. Data obtained were analyzed using general linier model from SAS (1988).

RESULTS AND DICUSSION

Table 1 shows that there was no significant interaction effect of diet and breed on total dry matter consumption. Similarly there was no significant effect of diet treatment on total DM consumption, the average DM consumption was 629.35 g/head/day or 3.75% BW. However there was significant effect of different breed on DMI. DMI of BC breed lamb was significantly higher this higher consumption was caused by the increase intake in grass, since commercial concentrate, rice bran and gliricidia was offered in fixed amount. Similar condition was also occurred in protein consumption. The higher DMI in BC breed lamb resulted in the higher intake of protein. On the other hand protein consumption in the diet KK and GRb was not significantly different this can be considered that diet in commercial concentrate can be replaced by gliricidia and grass at ratio 1:1 and supplemented with rice bran.

There was no interaction effect between diet treatment and breed of lambs on nutrient digestibility (Table 2). Nutrient digestibility of the diets in Table 2 shows that the digestibility of DM, NDF and ADF was higher in the KK than GRb. But the digestibility of OM and CP was not significantly different. The digestibility of NDF and ADF of diet GRb were respectively 51,07 and 43,04% which were lower than KK diet 62,81 and 53,41%. NDF and ADF are cell wall component of plant which is digested by enzyme (cellulolase and hemicellulolase) produced by microorganism in the rumen. The capability of rumen microorganism to digest fibrous materials is influenced by the rumen condition. Gliricidia is a protein source from forage which has high solubility in the rumen as reported by Abdulrazak et. al., (1996). In the rumen protein with high degradability is degraded into ammonia (NH_3-N). Moreover Ondiek et. al., (2000) reported that rumen ammonia of diet supplemented with gliricidia was higher than supplemented by leucaena.

Previous study reported by Yulistiani et al. (2000) showed that rumen ammonia of female lamb fed on grass and gliricidia mixture as basal diet and supplemented with rice bran (similar diet reported in this study) was higher than grass basal diet supplemented with commercial concentrate (19.9 vs 15 mg/100 ml). The higher NH_3-N of GRb diet was also caused by the high crude protein degradability rice bran as reported by Yulistiani et al (2009). One of the factors that affects fiber digestibility in the rumen was concentration of rumen ammonia. From the previous report the concentration of rumen NH_3-N was adequate to sustain the activity of rumen microorganism, even the GRb diet has higher

rumen NH_3-N. However, the fiber digestibility of GRb diet was lower than KK diet. It seem that the utilization rumen NH_3-N by rumen microorganism to synthesize microbial protein in GRb diet was not as efficient as in KK diet. Protein is degraded in the rumen into rumen NH3-N (ammonia), however to utilize rumen NH_3-N for synthesizing microbial protein, readily available carbohydrate is needed, when it is not available the utilization of nitrogen is not efficient. Castillo et al.,(2001) stated that one factors that determine synthesize microbial protein is the availability of substrate that produce energy, concentrate that rich in energy content with different levels and rate of degradation in the rumen is more efficient in utilizing N in the rumen. The less efficient in utilizing N in the rumen in diet GRb might cause the lower microbial growth which in turn resulted in the lower fiber digestibility in GRb (Table 2). Moreover, the lower fiber digestibility in diet T may also caused by the lower energy content in diet GRb as shown in Table 2 that diet GRb tends to had low OM digestibility than diet KK. Cell wall component is digested in the rumen producing volatile fatty acid (VFA) and microbial protein that used by host for production. The higher cell wall digestibility will provide more energy for synthesize rumen microbial protein and for host (Allan and Oba, 1996). Beside resulted in lower NDF and ADF digestibility, diet GRb also resulted in lower average daily gain (ADG). Yulistiani et al (2002) reported that the ADG of lambs fed on diet GRb was lower than KK diet (66.6 vs 83.5 g/h/d).

Table 1. Dry matter consumption (g/h/d) of lamb fed different diet

Treatment		Dry matter consumption				
Diet	Breed	Grass	Gliricidia	Concentrate	Rice bran	Total
KK	BC	324		352		676
	M	260.12		352		612.12
GRb	BC	159.5	139.4		348	646.9
	M	136.1	134.3		348	618.43
Main factor effect of diet:						
KK						631.43a
GRb						627.27a
Main factor effect of breed:						
BC						662.65a
M						615.64b
Treatment						
Diet	Breed			Crude protein consumption		
KK	BC	31.73		56.32		88.05
	M	25.41		56.32		81.73
GRb	BC	15.58	31.82		40.0	87.41
	M	13.30	30.66		40.0	83.96
Main factor effect of diet:						
KK						84.85[a]
GRb						85.68[a]
Main factor effect of breed:						
BC						87.70a
M						82.84b

Different superscript in the same column shows different (P<0.05).

Table 2. Digestibility of DM, OM, CP, NDF and ADF of lamb fed on different diet.

Treatment		Digestibility, %				
Diet	Breed	DM	OM	CP	NDF	ADF
KK	BC	69.11	66.06	66.43	61.22	53.58
	M	69.92	69.32	60.83	64.40	53.23
GRb	BC	62.58	63.48	66.43	51.03	42.60
	M	63.67	64.30	64.14	51.11	43.49
Average of diet	KK	69.52[a]	67.69[a]	63.63[a]	62.81[a]	53.41[a]
	GRb	63.13[b]	63.89[a]	65.28[a]	51.07[b]	43.04[b]
Average of breed	BC	65.85	64.77	66.43	56.12	48.09
	M	66.79	66.81	62.49	57.75	48.36

Different superscript in the same column shows different (P<0.05).

There was no interaction between breed and diet treatment (Table 2) and the nutrient digestibility was not significantly different between Sumatera composite and BC lamb breed. Previously reported by Yulistiani et al (2002) that the ADG of these two lamb breed was similar. The non significant difference in growth rate and nutrient digestibility between Sumatera composite and BC breed as standard breed indicated that the Sumatera composite breed has been stable as it is expected this new breed has similar performance with its dam and sire. Subandriyo et al (2006) also reported that productivity of Sumatera composite breed is comparable to its tetuanya (BC).

CONCLUSIONS

The dry matter and fibre digestibility was lower when grass and commercial concentrate diet was replaced by mixture of grass and gliricida and rice bran diet. The performance of Sumatera composite breed and Barbados Cross breed was comparable.

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