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The 16th AAAP Congress

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Sustainable Livestock Production in the Perspective of
Food Security, Policy, Genetic Resources, and Climate Change

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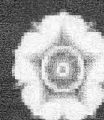
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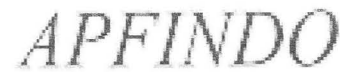
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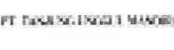
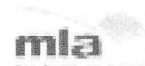
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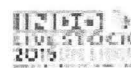
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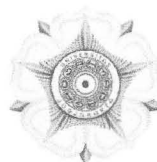
SUSTAINABLE LIVESTOCK PRODUCTION IN THE PRESPECTIVE OF FOOD SECURITY, POLICY, GENETIC RESOURCES, AND CLIMATE CHANGE

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Energy Balance and Blood Metabolites Status of Local Sheep Based on *Indigofera* sp and Sproutbean Ration

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ABSTRACT

This research was undertaken to evaluate energy utilization and blood metabolites status of male Indonesian local sheep involving nutrient balances and urea techniques. Factorial randomized completely design was used in this study using 16 growing male local sheep. Factor A was breed which consisted of 8 garut sheep (av.BW 14.90 kg) and 8 jongsol sheep (av.BW 13.60 kg). Factor B was ration which received *Indigofera* sp. and sproutbean ration of ad libitum fed. The ration offered were pellets containing CP around 16% and energy 15,6 MJ GE/kg. Energy balance and blood metabolites studies were conducted during three-months trial. Intake, digestibility, urinary and metabolism parameters were measured based on total collection method. Methane energy was measured by rusitec technique and methane gas production multiplied by calory equivalent value of methane. Energy retention (RE) was measured by urea space technique. Heat production was calculated from ME-RE. Plasma glucose, cholesterol and urea-N were measured by using spectrophotometry. Result showed that there were significant different of energy intakes, digestibilities and metabolism among the rations. Animals fed with sproutbean ration has higher energy utilization compared to *Indigofera* sp ration. There were no significant different for all blood metabolite parameters among breed and its interaction between combination treatments. It was concluded that both rations were good for local sheep.

Key Words: *Indigofera* sp., Local sheep, Rusitec technique, Sproutbean, Urea space

INTRODUCTION

Sheep production plays an important role within farming systems in the humid tropics of the developing countries as an incoming-generating activity and producing of animal protein. Problem with sheep production in developing tropic countries is limited of feed quality and unbalance of energy utilization caused by low quality of forages due to high temperature and humidity of environment. Lack of nutrient intake on ewes reared under the tropical rain forest caused high deadly birth rate and pregnant ewes (Astuti, et al., 2009). High fiber ration for growing sheep under the traditional feeding system with high temperature environment will produce high energy expenditure. One of tropical legume which have 27% CP content and leaves production around 4 tons DM/ha is *Indigofera* sp. (Abdullah, 2010). On the other hand, traditional market waste such sproutbean is one of feedstuff which have 13.65% CP and 65% TDN (Rahayu et al., 2011). Garut and Jongsol sheep are indigenous crossbred of Indonesian thin tail sheep which are small in body size but well known for their prolificacy. Garut sheep is come from local area at district of southernpart of West Java while jongsol sheep is come from local area at district of nothernpart of West Java, Indonesia. They have potential to produce carcass until 40% - 45% with low fat quality through good management feeding practices (Herman, 2002; Wiryawan et al., 2009).

There is a paucity of information on energy utilization of sheep in the humid tropics feeding management system, especially on global warming situation. Hence *in vivo* studies that address the evaluation of energy utilization and blood metabolites status on growing Indonesian local sheep based on local resources feedstuff would be best done to support animal's survival and production performance. The objective of the study was to measure

energy balance of two kinds local breed (Garut and Jonggol sheep) fed with two kinds of rations (*Indigofera* sp. and sproutbean waste) involving total collection, RUSITEC and urea space technique.

MATERIAL AND METHODS

Sixteen male Indonesian local sheep (Garut and Jonggol) with av.BW 14 ± 0.6 kg were used for up to three months. The animal randomly allotted into two rations with contained 30% of *Indigofera* sp and 30% of sproutbean waste. The rations offered were pellets containing CP 16% and gross energy 15.6 MJ GE/kg. A one-month feed adaptation period for the growing sheep was allowed and followed by daily intakes and DMD evaluation, before energy balance were measured at the end of this experiment using metabolic cages. Blood samples were drawn from the jugular vein to directly measure of blood metabolites concentrations such as glucose, cholesterol and urea-N by using general procedure of KIT diagnosis, a week before total collection. Urea space measurement with modification (Rule et al., 1986) were used to calculate percentage of total body protein and fat. Animal were weighing once a month and the ADG was used to calculate total body protein and fat. Total energy retention (RE) was calculated from total body protein and fat using the heat of combustion values 23.85 and 38.50 kJ/g of body protein and fat, respectively. Methane production (ml/h/d) from the RUSITEC technique was used to calculate energy loss from ruminal methane production. Urinary energy loss (UE) as urinary-N times 34 kJ/g N. Energy expenditure or heat production was calculated as the difference between ME and RE.

A Completely Randomized Design with factorial 2x2 and four replications was adopted. Factor A was two breeds (garut and jonggol sheep) while factor B was two rations (30% of *Indigofera* sp. and 30% of bean sprout waste, in the ration). The significance of difference between means was compared using Duncan Multiple Range Test (Steel and Torrie, 1986).

RESULTS AND DISCUSSION

Results of the study showed that sproutbean ration improved DM, CP, CF and fat consumption ($p < 0.05$) which were 914, 173, 255 and 38 g/h/d, respectively, and there were no significant different due to kinds of local sheep and its interaction between treatments. Pellet containing 30% sproutbean waste resulted in a significantly higher nutrient consumption. The total DM consumption was around 4% of BW. The palatability of sproutbean waste ration was better than indigofera sp. ration. Overall the nutrient consumption of local sheep has been in a good match with their requirement for growing sheep. Tomaszewska *et al.* (1993) reported that DM requirement for growing sheep is around 4% to 5% of BW with protein requirement is 52.50 g/h/d. This data was equal with reported before that jonggol sheep reared under the tropical forages could consume 4% DM of BWn (Astuti *et al.*, 2011). There were no significant different in consumption due to the different kind of local sheep.

Energy balance of local sheep fed with different ration were shown at Tabel 1. Data of energy intakes, digestibility, methane production, metabolizable, expenditure and retained in sproutbean ration showed significantly higher than in indigofera sp. ($p < 0.05$), and there were no interaction between treatments. Average DE and ME were around 70% and 60%, respectively. The fact all RE values were in positive balance, it means that those animals have grown well without any negative energy balance in all treatments. The highest RE value was found in sheep fed with sproutbean waste ration. This data was comparable with RE value (1.1 MJ/d) in growing local goat fed ad libitum of concentrate as reported by Astuti *et al.* (2000).

Table 1. Energy balance of local sheep fed with different rations

Parameters		<i>Indigofera</i> sp		Sproutbean waste	Mean
EI(MJ/d)	Jonggol	11.31	14.24	12.77	
	Garut	10.55	16.94		13.28
	Mean	10.93^b	15.13^a		
DE(MJ/d)	Jonggol	7.58	10.21	8.89	
	Garut	7.79	11.77		9.78
	Mean	7.69^b	10.99^a		
E-CH4(MJ/d)	Jonggol	1.13	1.42	1.28	
	Garut	1.05	1.60		1.33
	Mean	1.09^b	1.51^a		
EU(MJ/d)	Jonggol	0.03	0.02	0.025	
	Garut	0.02	0.02		0.02
	Mean	0.025	0.02		
ME(MJ/d)	Jonggol	6.43	8.76	7.59	
	Garut	6.72	10.15		8.43
	Mean	6.57^b	9.45^a		
EE(MJ/d)	Jonggol	5.62	7.98	6.80	
	Garut	6.15	9.02		7.58
	Mean	5.88^b	8.50^a		
RE(MJ/d)	Jonggol	0.81	0.78	0.79	
	Garut	0.57	1.13		0.85
	Mean	0.69^b	0.95^a		

EI= energy intake ;DE= digestibility of energy; ME= metabolizable of energy ;EE= energy expenditure ; RE= retained energy. Values in a row differing letter superscripts, differ significantly at $p<0.05$

There were no significant different of body composition and its interaction between different local sheep fed with different of rations (Table 2). Therefore, the ADG of sheep fed with sproutbean waste was the highest compared to other treatments. As a consequence, the percentage of body fat in sproutbean ration was also higher (6.45%) compared to Indigofera ration (3.90%). It was reported by Astuti et al (1999) that percentage of fat in growing local sheep was range from 9% to 20%, depend on age, physiological status and diet.

Table 2. Body composition and blood metabolites of local sheep fed with different rations

Parameters		<i>Indigofera</i> sp.		sproutbean waste	Mean
ADG(g/d)	Jonggol	136	127	131	
	Garut	99	153		126
	Mean	117^b	140^a		
Glucose(mg/dL)	Jonggol	77.95	88.06	83.01	
	Garut	85.89	71.78	78.84	
	Mean	81.92	79.92		
Cholesterol (mg/dL)	Jonggol	77.18	68.46	72.82	
	Garut	58.97	81.28		70.13
	Mean	68.08	74.87		
BUN(mg/dL)	Jonggol	73.31	56.63	64.97	
	Garut	71.78	55.67		55.83
	Mean	64.65	56.15		

ADG = average daily gain;BUN = blood urea-N. Values in a row differing letter superscripts, differ significantly at $p<0.05$

IMPLICATIONS

It was concluded that both rations, indigofera sp. and sproutbean waste were good for local sheep (jonggol and garut) with positive energy retention and normal blood status during growing periode.

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