

ENERGY METABOLISM IN RELATION TO GRAZING ACTIVITY IN GROWING PRIANGAN SHEEP AS AFFECTED BY RATIONS

D.A. Astuti* & D. Sastradipradja

ABSTRACT

Animal activities can cause variation in energy utilization. The effect of concentrate supplementation on grazing activity compare with housing condition was studied, in relation to energy metabolism. Sixteen growing Priangan Sheep (15 kg) were allotted into four groups, two groups were fed with mix native grass plus 500 g.d⁻¹ of concentrate (C+N) and *ad libitum* of mix native grass only (N), in the house using individual pens, whereas other two groups were fed as same as mention above but they spent for a half of day in a grazing area. Concentrate ration contained 17.40 MJ.kg⁻¹ of gross energy (GE) and 18.00% of crude protein (CP), while the mix native grass contained 14.00 MJ.kg⁻¹ GE and 12.60% of CP. Sheep were fed at approximately two times a day, morning and afternoon, while water were given *ad libitum*. Grazing time was started from 08:00 a.m. to 17.00 p.m., after and before fed by concentrate. Energy balance were measured during a 7-d experimental period, which was preceded by a month adaptation period. Average daily gain (ADG), heat production (HP), metabolizable energy (ME) and retained energy (RE) were measured using balance trial, heart rate (HR) was monitored using Polar Spot Tester and urea space for body composition. Results showed that dry matter intake (DMI) were 3.5% from the body weight (BW) in all groups. The values of ME on sheep fed by concentrate were 5.02 and 6.70 MJ.d⁻¹ for housing and grazing groups, respectively, which were significance difference (P<0.05) with sheep fed native grass only, 4.73 and 4.86 MJ.d⁻¹ for housing and grazing group, respectively. Heat production for grazing groups tended to be higher than for those housing (P=0.08), and the data showed that percentage of HP/GE start from 31 till 43%. Values of ADG and RE of sheep fed concentrate were higher than for those without concentrate, whereas the values were 109, 50, 114 and 48 g.d⁻¹ and 1.22, 0.56, 1.28 and 0.54 MJ.d⁻¹ for housing and grazing, with and without concentrate, respectively. Percentage of fat and protein were around 20.99 and 19.31%. There was a good correlation between HP and HR following the equation $Y = -2.36 + 0.059 X$, with $r = 0.88$, where $Y = HP$ and $X = HR$. There were significance differences for percentage of body compositions among the groups.

Keywords : Priangan sheep, native grass, grazing, heat production, heart rate

Utilization of feeds by animals is important information. Comparing nutrient requirement with nutrient concentration in tropical forages, suggested that both energy and protein in the diets were insufficient for optimal growth when young animals graze on tropical pasture only (Huston *et al.*, 1995). Energy requirements for physical activity can result in differences in maintenance requirement (McCracken and Caldwell 1980). There is a relationship between heart rate and heat

production (Purwanto *et al.*, 1990), and activity on swamp buffalo which is worked in field (Mahardika *et al.*, 1998). Increasing heat production and oxygen consumption by tissues require an increased oxygen arteriovenous difference or increased blood flow. Increased blood flow to the tissues, in turn, requires an increased stroke volume of the heart or an increased heart rate.

Grazing and working animals are very common in Indonesia, but there is still limited information about energy utilization by indigenous animals according to that kind of activities. Therefore, the effect of concentrate supplementation on grazing Priangan sheep in relation to energy utilization was assessed in this study.

MATERIALS AND METHODS

Animal and Housing

Sixteen male growing Priangan sheep (av. 15 kg BW) was used for the two months experiment. The animals were randomly allotted into four groups are presented in Table 1. The experiment consisted of one month for adaptation period (housing and grazing) and a two-weeks preliminary period followed by a 1-week balance period. The adaptation period was applied to allow the sheep to adjust the experimental diets and grazing condition, whereas preliminary period was directed to maintain the animals in the metabolic cages using heart rate detector (Polar Sport Tester). At d-8 of the preliminary period, animals on the grazing group were trained to wear metabolic bag during grazing. The bag is designed to separate feces and urine. Animals were housed in metabolic pens during night balance trial.

In this study, housing animals were kept in individual pens during adaptation period and moved to metabolic cages for balance trial. Grazing area was prepared in a 400 m² pasture for eight sheep. Before the animals plotted on the pasture, mix native grass was cut and in a 4 m² corner grass was sampled in order to know the grass production and composition during grazing period. That pasture is grown with many kind of grasses which contained difference of amount of nutrient values. All grasses in the pasture was estimated completely fed. Grazing time started from 08.00 a.m. to 5.00 p.m. everyday, after that animals were kept in individual pens during night. The data of relative humidity, environmental temperature and body temperature of this study were measured and shown in Table 2.

* Department of Physiology and Pharmacology, Faculty of Veterinary Medicine, Bogor Agriculture University, Indonesia