

Nitrogen Balance of Bligon and Kejobong Goat Fed King Grass and Peanut Straw

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ABSTRACT

Five male Kejobong goats, six female Kejobong goats and six male Bligon goats were used in this experiment to compare their nitrogen balance when they received the diet consist of King grass and peanut straw. The animals were put in the metabolism cages, fed *ad libitum* twice a day at 08.00 am and 3.00 pm. The feeding trial was run for one-week collection period, after couple weeks of adaptation period. During collection period, samples of feed, uneaten feed, as well as feces were taken out for dry matter and nitrogen measurements. Daily urine collection was done for nitrogen analysis. The data of N intake and fecal N excretion were used to calculate nitrogen absorbed. Nitrogen balance were calculate from N absorbed subtracted by urinary N excretion. The result showed, that there were no significant differences in dry matter and N intake between male Bligon, male Kejobong as well as female Kejobong. When it was presented in metabolic body weight, the dry matter intake of male Bligon significantly lower compared with female Kejobong (59.99vs.68.99g/W^{0.75}/day) while the N intake of male Bligon significantly lower compared with male and female Kejobong. No differences were found for fecal and urinary N excretion as well as N digested and N balance between the goats. When it was expressed in metabolic body weight, N digested of male Bligon (0.58g/W^{0.75}/day) significantly lower than male Kejobong (0.70 g/W^{0.75}/day) and female Kejobong (0.81 g/W^{0.75}/day. It could be concluded that King grass- peanut straw mixed diet could fulfill N requirement for male Bligon, male Kejobong as well as female Kejobong goat although metabolism response of goat could be different among breeds and sex.

Keywords: Nitrogen Balance, male Bligon, male Kejobong and female Kejobong goats

INTRODUCTION

In Indonesia, generally farmer use agricultural waste such as peanut straw for feedstuff, especially during harvest time. Some farmers give the straw as sole diet and some give the straw mixed with other forages. Peanut straw is potential forage as its high crude protein content 17.62% DM (Yusiati, 2005), therefore as sole diet, it could fulfill nitrogen (N) need for maintenance and growth of Kejobong and Bligon goat which showed by positive N balance value (Yusiati *et al.*, 2016).

It stated by Rodwell (2003), that body protein status can be calculated based on N intake and N excretion. The different between both values is called as *nitrogen balance*. It means that N balance is affected by N metabolism. Accordingly, there is a tendency of N balance difference between breeds as enzymatic activity effects of rumen microbe metabolism as well as host metabolism. Ruminant require protein in the diet to supply N for the activity of rumen microbes (6-8% CP) and for host tissue metabolism (7-20% CP) depending upon species, sex, and physiological status (Huston, and Pinchak, 2016). It is

reported by Yusiati (2005) that CP digestibility of King grass with CP content 10.72% DM, as sole diet were differed among Indonesian local breed cattle. It was also stated that efficiency of N used also affected by the breed, even though sole diet of King grass could fulfill N requirement of all the breed as they gave N balance in positive position. In this present study it will be evaluated the response of N balance when Kejobong and Bligon goat fed by King grass mixed with peanut straw in the same portion.

MATERIALS AND METHODS

Animals, diets and experimental design

Five male Kejobong goats, six female Kejobong goats and six male Bligon goats with an average weight of 18-20 kg (6-8 month olds) were used in this experiment. The animals were housed in individual metabolism cages that allowed separate collection of urine and feces. Each of animal was fed *ad libitum* (as fed basis) King grass and peanut straw (1;1) twice daily, and had free access to water. The experiment consisted of 14 day dietary adaptation and 7 day samples collection.

Refusal feed, feces, urine collection and sampling.

Feed offered, refusal feed, feces and urine excretion were measured and recorded every morning. Daily samples of feedstuff and refusals feed were dried in oven at 55°C and then were prepared for dry matter and N analysis. Feces samples were taken out and stored in a cool room at 5°C for nitrogen determination. Urine samples were preserved with 10% sulphuric acid to adjust the urine pH below 3, and then were stored in a cool room at 5°C for nitrogen determination.

Dry matter, nitrogen intake, and nitrogen balance

Feed, fecal and refusal feed samples were analysed for dry matter content. Those samples as well as daily urine samples were subjected for nitrogen measurement using the Kjeldhal method (AOAC, 2005). Dry matter and nitrogen content of feed and refusal samples were used to measure dry matter and nitrogen intake. Nitrogen balance was calculated using the formula:

Nitrogen Balance = Nitrogen Intake - (Fecal nitrogen + Urinary Nitrogen).

The efficiency of N retention was expressed as N retained (g) per 100 gram N apparently digested in digestion tract or N retained (g) per 100 gram N intake as well as DM intake.

Statistical analysis

Data were analyzed using the analysis of variance with one way design and followed by Duncan's New Multiple Range Test which was used to compare treatment mean values (Rosner, 1990).

RESULT AND DISCUSSION

The result showed, that there were no significant differences in dry matter and N intake between male Bligon, male Kejobong as well as female Kejobong. When it was presented in metabolic body weight, the dry matter intake of male Bligon significantly lower compared with female Kejobong (59.99vs.68.99g/W^{0.75}/day) while the N intake of male Bligon significantly lower compared with male and female Kejobong (P≤0.05).

Table 1. Daily dry matter intake and nitrogen balance in bligon and kejobong goat fed by King grass and peanut straw (mean \pm SE¹).

	Goat		
	Male Bligon	Male Kejobong	Female Kejobong
Dry matter intake (g/W ^{0.75} /d) ^{ns}	60.00 \pm 1.61 ^a	65.89 \pm 2.92 ^{ab}	69.00 \pm 2.56 ^b
Nitrogen intake (g/W0.75/d)	0.96 \pm 0.04 ^a	1.11 \pm 0.05 ^b	1.16 \pm 0.04 ^b
Fecal N excretion (g/W0.75/d) ^{ns}	0.39 \pm 0.04	0.40 \pm 0.06	0.35 \pm 0.04
Digested N (g/W0.75/d)	0.58 \pm 0.03 ^a	0.70 \pm 0.08 ^{ab}	0.81 \pm 0.06 ^b
Urinary N excretion (g/W0.75/d) ^{ns}	0.32 \pm 0.03	0.46 \pm 0.03	0.38 \pm 0.06
N Balance (g/W0.75/d) ^{ns}	0.26 \pm 0.06	0.25 \pm 0.04	0.44 \pm 0.10

¹ Standard Error of the Mean.

^{a,b,c} The means with different superscripts at the same row differ significantly (P<0,05).

Male Bligon goats compared to male Kejobong goats showed no differences in digested N but had a lower digested N compared with female Kejobong (P \leq 0.05). Male Bligon had lower nitrogen intake compare with the female and male Kejobong, therefore the digested N in male Bligon showed to be lower compared with that of female Kejobong and had tendency to be lower than that of male Kejobong. (0.58 vs.0.81 and 0.70 g/W0.75/d). Nitrogen compound digestibility in male Bligon, male Kejobong and female Kejobong were 60.41, 63.06 and 69.83% respectively. The superior of female Kejobong goat as well as male Kejobong in digesting N compound over Male Bligon goat were supported by the finding that estimated microbial nitrogen supply (EMNS) in male and female Kejobong were higher compare with in Bligon 985 and 561 Vs. 384 mg/d when the goat fed by peanut straw mixed with King grass in 1:1 ratio (Yusiati and Hanim, 2013). Nitrogen retained in female Kejobong (3.50g/d) tended to be higher than in male Kejobong (2.07 g/d) and male Bligon (2.41 g/d). These N retained was lower compared with result reported by Yusiati *et al.* (2013) which were found N retained 11.33 in male Bligon and 10.08 g/d in male Kejobong fed by peanut straw as sole diet. Nitrogen retained value of female Kejobong on the same position with N retained of sheep fed by wheat straw (3.2 g/d). The value increased with increasing of peanut straw substitution to wheat straw due to the high nutritional value of peanut straw (Khan *et al.*, 2012).

Table 2. Ratio of N retained to N intake and N retained to N digested of Bligon and Kejobong goat fed by King grass and peanut straw (mean \pm SE¹).

	Goat		
	Male Bligon	Male Kejobong	Female Kejobong
Dry matter intake (kg/d) ^{ns}	0.57 \pm 0.01	0.57 \pm 0.01	0.56 \pm 0.01
N retained/DM intake (%) ^{ns}	42.32 \pm 9.16	35.76 \pm 13.18	61.52 \pm 12.91
N retained/ N intake ^{ns} (%) ^{ns}	25.96 \pm 5.45	21.37 \pm 8.25	36.99 \pm 8.03
N retained / N digested ^{ns} (%) ^{ns}	42.42 \pm 8.06	29.54 \pm 13.01	51.37 \pm 9.73

¹ Standard Error of the Mean.

^{ns}: not significant

Female Kejobong had higher N intake and N digested compared with male Bligon when fed by King grass-peanut straw mixed diet, therefore they showed tendency to retain N higher than male Bligon did. It seemed that digestion and metabolism response to diet was different among breeds and sex. This finding was in line with the result reported by Yusiati (2005) that crude protein digestibility of King grass as sole diet in Bali and Ongole crossed

bred cattle (Peranakan Ongole/PO) was higher than that in Fresian Crossed bred cattle (Peranakan Fresian Holstain/PFH). It was also stated the superior of Bali and PO over PFH cattle in efficiency N used. Study of N requirement for indigenus Indonesian ruminants really needed.

CONCLUSSIONS

It could be concluded that King grass- peanut straw mixed diet could fulfill N requirement for male Bligon, male Kejobong as well as female Kejobong goat although metabolism response of goat could be different among breeds and sex.

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