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Pemanfaatan energi pada domba Garut yang mendapat pakan ampas tahu sebagai pengganti konsentrat

Agung Purnomoadi, Yusman, Edy Rianto dan Mitsunori Kurihara*

Universitas Diponegoro, Semarang

* National Institute of Livestock and Grassland Sciences. Japan.

ABSTRAK

Dua belas ekor domba Garut umur satu tahun, dengan bobot badan $33,5 \pm 1,6$ kg (CV= 4,78%) digunakan untuk mengetahui pemanfaatan energi pakan yang disubstitusi dengan ampas tahu. Domba tersebut dibagi menjadi tiga kelompok, masing masing terdiri dari empat domba. Domba kelompok pertama mendapat pakan mengandung 50% konsentrat jadi tanpa ampas tahu (TC0), kelompok kedua mengandung 40% konsentrat dan 10% ampas tahu (TC10) dan kelompok ketiga mengandung 30% konsentrat dan 20% ampas tahu (TC20). Semua perlakuan diberikan rumput gajah *ad libitum*. Pakan perlakuan diperhitungkan memenuhi kebutuhan bahan kering sebesar 4% bobot badan. Kesetimbangan energi diukur dengan melakukan total koleksi selama 7 hari setelah menyelesaikan masa adaptasi pakan selama 2 minggu. Pertambahan bobot badan harian (PBBH) juga diukur setelah domba dipelihara selama 12 minggu. Data yang diperoleh kemudian diuji dengan F-test.

Hasil penelitian menunjukkan bahwa konsumsi energi total (gross energy intake; GEI) dari TC0, TC10 dan TC20 cenderung meningkat dengan peningkatan ampas tahu dalam pakan, yakni masing masing 19,4; 20,8 dan 22,9 MJ/hari. Akan tetapi, keluaran energi melalui feses (fecal energy; FE), urin (urinary energy; UE) dan gas metan (CH₄ energy; CH₄E) cenderung menurun dengan peningkatan ampas tahu. Nilai FE pada TC0, TC10 dan TC20 masing masing adalah 35,9, 30,2, dan 26,6%GEI, nilai UE dari pakan perlakuan tersebut adalah 1,85, 1,16, 1,45%GEI, sedangkan nilai CH₄E masing masing adalah 11,4, 10,2, dan 8,3%GEI. Energi termetabolis (Metabolisable energy; ME) cenderung meningkat dengan peningkatan ampas tahu, yakni 10,0, 12,2, dan 14,6 MJ/hari yang setara dengan 50,9, 58,5, dan 63,6%GEI untuk masing masing TC0, TC10 dan TC20. Tren nilai ME tersebut selaras dengan PBBH yang diperoleh, yakni sebesar 57, 76, dan 110 g/hari, masing masing untuk TC0, TC10 dan TC20. Hasil tersebut diatas, secara statistik tidak berbeda nyata ($P > 0,05$). Dari hasil studi ini dapat disimpulkan bahwa ampas tahu berpotensi dapat meningkatkan pemanfaatan energi dengan menurunkan energi yang hilang, baik melalui feses, urin maupun metan, dan oleh karenanya meningkatkan energi termetabolis dan produktivitas (PBBH).

Kata kunci: *domba Garut, pemanfaatan energi, ampas tahu, kesetimbangan energi*

ABSTRACT

Twelve Garut rams aged one year and weighed 33.5 ± 1.6 kg (CV= 4,78%) were used to study energy utilisation of tofu cake as substitution of concentrate. The sheep were divided into three groups of four sheep. The first group was given a diet consisting of 50% commercial concentrate without tofu cake (TC0 group), the second group was given

a diet consisting 40% commercial concentrate and 10% tofu cake (TC10 group), and the third group was 30% commercial concentrate and 20% tofu cake (TC20). All these treatments were allowed Napier grass *ad libitum*. The diets were arranged to allow the sheep to have dry matter intake at 4.0% LW. The balance trial was conducted by total collections of feces and urine that was carried out in 7 days following a 2-week feed adaptation period. Daily liveweight gain (LWG) was also measured after the sheep being raised for 12 weeks. The data were analysed with F-test. The results showed that gross energy intake (GEI) tended to increase with increasing tofu cake in the diet, being 19.4; 20.8 and 22.9 MJ/d in TC0, TC10 and TC20, respectively. On the other hand, the energy loss through feces (FE), urine (UE) and methane (CH₄E) tended to decrease with increasing tofu cake in the ration. The FE in TC0, TC10 and TC20 were 35.9, 30.3, 26.6%GEI, UE of these treatments were 1.85, 1.16, 1.45%GEI, while CH₄E were 11.4, 10.2, 8.3%GEI, respectively. Metabolisable energy (ME) tended to increase with tofu cake substitution, being 10.0, 12.2, 14.6 MJ/d that equal to 50.9, 58.5, 63.6%GEI for TC0, TC10 and TC20, respectively. The trend of those ME were positively linear with daily LWG, being 57, 76, and 110 g/d, for TC0, TC10 and TC20, respectively; although these data were statistically not significantly different ($P>0.05$). From this study, it can be concluded that tofu cake could increase energy utilisation and reduce the loss of energy from feces, urine and methane, and therefore increased metabolisable energy and productivity (LWG).

Key words: *Garut sheep, energy utilisation, tofu cake, balance*

I. INTRODUCTION

Good quality of feed is needed to improve animal production. However, the use of concentrate for this purpose will lift the production cost that may not suit for smallholder farmer. An alternative for such problem is by exploration of local feedstuff that is cheap and available abundantly. There have been many studies on the use of by-products of agricultural industry for composing of animal diet, such as palm oil (Hasnudi, 2004), white radish root (Ginting et al., 2004), 'tempeh' cake (Adiwinarti et al., 2001), etc.

Tofu cake, the by-product of tofu industry, has been used widely for animal diet component in farm level, due to its high content of protein and carbohydrate. Wahyuni (2003) reported that drying process on tofu cake was found to significantly increase nitrogen retention in sheep without any disadvantageous effects on digestibility. However, these are only very few studies on energy utilization. Therefore, this study was aimed to investigate the energy utilization of tofu cake as substitution of concentrate feed.

II. MATERIALS AND METHODS

Twelve Garut rams age one-year and weighed 33.5 ± 1.6 kg (CV= 4.78%) were used to study the energy utilisation of tofu cake as substitution of concentrate in a Completely Randomized Design. The sheep were kept in individual pens and given Napier grass as basal diet.

These sheep were divided into three groups; each group consists of four sheep. First group was given a diet containing of 50% commercial concentrate without tofu cake (TC0 group), second group was given a diet containing 40% commercial concentrate and 10% tofu cake (TC10 group), while the third group was given a diet containing 30% commercial concentrate and 20% tofu cake (TC20). All these treatments were allowed Napier grass *ad libitum*. The diets were arranged to allow the sheep to have dry matter intake at 4.0% BW. Table 1 showed the composition of feedstuff used in this study.

Table 1. Chemical composition of feeds used in this study (%DM)

	OM	CP	EE	CF	NFE	GE, kJ/g
Napier grass	57.6	10.6	1.9	16.7	28.4	16.6
Tofu cake	95.3	22.8	10.1	19.6	42.8	20.0
Comm. Concentrate	81.2	7.6	1.8	18.2	53.6	15.6

The energy balance trials were measured by total collections carried out during a 7-day total collection period following a 2-week feed adaptation period. Methane production was measured by the facemask method equipped with methane analyser (Horiba, Japan) for 10 minutes at 3-hour intervals for 2 days immediately after the 7-day period ended. This methane production was then converted to daily total production. Daily liveweight gain (LWG) was also measured after the sheep being raised for 12 weeks. The data were analysed with F-test.

III. RESULTS AND DISCUSSION

Dry matter intake (DMI) and digestibility among the treatments were similar, as shown in Table 2. The DMI tended to increase in the diet containing tofu cake, being 1203, 1260 and 1343 g/d in TC0, TC10 and TC20, respectively. These DMI were in the

level of 3.5-4.0% of body weight. Similar tendency was observed on body weight gain and digestibility that increased as tofu cake increasing.

Table 2. Daily intake, fecal excretion, urinary excretion and methane production from Garut sheep fed on diet containing various level of tofu cake

	TC0	TC10	TC20	Signif.
Body weight, kg	33.6	33.2	33.6	
Body weight gain, g/d	57	76	110	Ns
DMI, g/d	1208	1260	1343	Ns
DM digestibility, %	62.1	68.3	71.3	Ns
Energy intake, MJ per day				
Gross energy (GE)	19.4	20.8	22.9	Ns
Digestible energy (DE)	12.5	14.5	16.8	Ns
Metabolizable energy (ME)	10.0	12.2	14.6	Ns
Energy loss through, MJ/d				
Feces	6.87	6.27	6.12	Ns
Urine	0.35	0.24	0.34	Ns
Methane	2.19	2.13	1.92	Ns

All the parameters for energy utilisation among the treatments were not significantly different ($P>0.05$). Energy loss through feces, urine and methane tended to decrease as the level of tofu cake in the diet increased. Fecal energy loss in TC0 (37.1%) was higher than that of TC10 (34.9%) and TC20 (30.8%GEI; gross energy intake). Urinary energy in TC0 (1.92%) tended to be higher than in TC10 (1.35%) and TC20 (1.70%GEI). Similarly, energy loss from methane also tended to decrease with increasing tofu cake level, being 11.89; 11.60 and 9.63% GEI in TC0, TC10 and TC20, respectively

These values of energy losses were all better than that reported in other studies. The loss energy from feces in all treatments, ranging 29.1-39.7% of GEI, was better than 45-50%GEI as stated by Bondi (1987). Similarly, the loss energy from urine in all treatments that ranged in 1.35-1.70% of GEI was better than 3-5%GEI as stated by Van Soest (1994), while the loss energy from methane that ranged in 9.63-11.89%GEI was better than 12-15%GEI as stated by Bondi (1987). This results was considered as an effect of the high contents of protein and carbohydrate that also available in appropriate balance.

Metabolisable energy in all treatments of this study was found positive, being 10.0, 12.2, 14.6 MJ/d that equal to 50.9, 58.5, 63.6%GEI in TC0, TC10 and TC20, respectively. The trend of those ME were positively linear with daily LWG, being 57, 76, and 110 g/d, in TC0, TC10 and TC20, respectively. Although these data were statistically not significantly different ($P>0.05$), it can be concluded that tofu cake could increase energy utilization and reduce the energy loss from feces, urine and methane, and therefore increased metabolisable energy and productivity (gain).

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