

The Effect of Different Energy Level on The Ration to The Mating Acceleration of Local Sheep

L Khotijah¹, A Maulidina¹, KB Satoto¹, KG Wiryawan¹

Corresponding email:

lilis.khotijah@gmail.com

¹Department of Animal Nutrition and Feed Technology, Faculty of Animal Science, Bogor Agricultural University

Pengajuan: 20 Des 2018

Diterima: 30 Des 2018

ABSTRACT

The aim of this research was to find the appropriate ration energy levels to determine the puberty time of ewes. The study used 12 offspring female sheep obtained from crossing Jonggol ewes of Animal Science Teaching and Research Unit (JASTRU) Faculty of Animal Science IPB with Garut male sheep. The animal age was approximately 2-3 months with the average body weight 9.79 ± 1.97 kg. The treatments were consisted of 3 rations which have different TDN level, namely: T1= 65% TDN, T2=70% TDN and T3= 75% TDN. The experimental design used was a completely randomized design with three treatments and four replications. The measured variables were feed intake, average daily gain, and the first matting age and body weight. The data were analyzed using Analysis of Variance. The results indicated that the ration energy levels did not significantly affected on the feed intake, average daily gain, as well as the first mating age and body weight. The age of first mating was 180-203 days with body weight at 18-22 kg. It is concluded that the TDN level between 65% -75% has similar response to accelerate the mating of local sheep.

Keywords: energy, local sheep, mating acceleration

ABSTRAK

Tujuan penelitian ini adalah untuk mencari tingkat energi ransum yang sesuai untuk menentukan masa pubertas domba betina. Penelitian menggunakan 12 ekor anak domba betina hasil persilangan domba Jonggol dengan domba Garut, berumur sekitar 2-3 bulan dengan rata-rata bobot badan $9,79 \pm 1,97$ kg. Perlakuan yang diberikan terdiri dari 3 ransum dengan level TDN berbeda, yaitu: T1= 65% TDN, T2=70% TDN dan T3= 75% TDN. Rancangan acak lengkap dengan 3 perlakuan dan 4 ulangan digunakan dalam penelitian. Peubah yang diukur meliputi konsumsi ransum dan nutrisi, rata-rata pertambahan bobot badan harian, umur dan bobot badan saat kawin pertama. Data yang diperoleh dianalisis menggunakan Analisis of Varian. Hasil yang diperoleh menunjukkan bahwa tingkat energi ransum yang berbeda tidak memberikan pengaruh yang berbeda nyata terhadap konsumsi ransum dan nutrisi, rataan pertambahan bobot badan harian, demikian juga pada umur dan bobot badan kawin pertama. Umur kawin pertama terjadi pada hari 180-203 dengan bobot badan 18-22 kg. Kesimpulan hasil bahwa Level TDN ransum 65%-75% memberikan respon yang sama terhadap percepatan kawin domba lokal

Kata kunci: domba lokal, energi, percepatan kawin

INTRODUCTION

Estrus is one of the important things that will be affected on the success rate of mating sheep. It will indirectly impact on the reproductive efficiency and development of local sheep. The improvement of parent reproduction aspects are not only improve the efficiency of biological livestock, but also increase the production efficiency of livestock business (Dickerson 1996). Smith and Akinbamijo (2000) stated that there are four main factors that determine reproductive performance of ruminants in the tropics, there are genetic, physical environment, nutrition and management. The levels of energy and protein in the ration will affect the success rate of reproduction O'Callaghan *et al.* (2000) suggested that the level of energy consumption will influence to the systemic of hormonal concentrations and follicular fluid. Kusina *et al.* (2001) examined the provision of ration with three different energy levels, namely: low, medium and high on Mashona goats, it

showed the reducing expression of estrus, conception, fecundity and twinning rates in goats that consume ration with low energy. Koyuncu and Canbolat (2009) stated that the level of dietary energy supplement at pre-mating period can have a beneficial effect and can be practiced to improve the reproductive performance of ewes. The information of optimal energy content in ration for local sheep and its influence to the speed of estrus and first mating have not been widely available. The aim of this research was to find the appropriate ration energy levels to determine the puberty time of local ewes.

METHODS

Animals and Diets

Twelve female local sheep used in the experiment with an initial age of 2-3 months old and bodyweight 9.79 ± 1.97 kg. Animals were housed on individual cages. The female lambs were fed diets containing the different level of TDN, namely T1=65% TDN, T2=70% TDN and T3=75% TDN. The Ingredient composition of the experimental diets are presented on Table 1 and nutrient compositions of the diets shown in Table 2. Sheep were freely allowed to feed and water. The feed was given twice at around 06.00 pm and 14.00 pm. Concentrates and forage were given separately. Body weight gain was obtained by weighing scale every two weeks.

Puberty Detection and Mating in Female Lambs

The Estrus detection was carried out after the lamb brood stock achieve 60% of mature body weight (13-18 kg), or the age of 5-6 months. Estrus detection was done by using a ram teaser. The teaser was released in the cage after feeding in the morning and afternoon. Based on the teaser detection, the female sheep were removed from individual cages to make sure whether female sheep were estrus. The female sheep was already considered estrus in case it was silent when it was ridden by teaser during mating. The onset of first estrus was used as an indicator

Tabel 1 The ingredient composition of experimental diets (% dry matter)

Ingredients	Treatments		
	T1	T2	T3
	-----%		
Native grass	40	40	30
Yellow corn	11	7.4	32
Cassava meal	14.1	15	12
Coconut meal	31.1	31	21
Urea	0.4	1.0	1.1
Crude palm oil	0.0	2.0	2.2
Mollases	0.0	2.0	1.0
CaCo3	2.9	2.0	1.0
Dicalcium Phosphate	0.0	0.2	0.3
NaCl	0.3	0.2	0.1
Premix	0.2	0.2	0.1

for the onset of puberty. Date of onset at the first estrus was recorded for each female lamb and considered as an indicator for pubertal age. After the mating date has recorded, the sheep were immediately weighed to determine the body weight at the time of mating.

Experimental Design

Completely randomized design (CRD) with 3 treatments and 4 replications was used on this experiment. The treatments were: T1 = ration with TDN 65%, T2 = ration with TDN 70% and T3 = ration with TDN 75%. The variables were feed intake, nutrient intakes, average daily gain, feed efficiency, proportion of weight change, as well as the age and body weight of first mating.

Statistical Analysis

Data were analyzed using Analysis of Variance. If the analysis results showed the significant differences, it will be tested using Orthogonal Contrast (Steel and Torrie 2003).

RESULTS AND DISCUSSION

The consumption of grass, concentrate, dry matter and nutrients on local sheep with different level energy diets are showed in Table 3.

The energy levels of ration had not significant different affected on the consumption of grass, concentrate and total dry matter. The amount of DM intake ration was ranged from 450.29 to $517.21 \text{ g}^{-1} \text{ h}^{-1} \text{ day}^{-1}$, or 3.20% - 3.49% of body weight. This is due to the way of sheep to obtain the feed was based on the physical nature and composition of the feed nutrients which are similar. Parakkasi (1999) stated that the factors affecting feed intake of dry material in ruminants included physical nature and chemical composition of feed. Result is still in line with the recommendation of NRC (1985), that the sheep weighing 10-20 kg requires dry matter on 3-5% of body weight. The ration with 65%, 70% and 75% of TDN content could provide the sufficient dry matter to growth ewes.

Tabel 2 The nutrient composition of experimental diets based on dry matter

Nutrients	Treatments		
	T1	T2	T3
	-----%		
Dry matter	89.37	88.62	88.37
Ash	9.15	10.38	7.01
Ether extract	8.42	10.43	7.36
Crude protein	14.60	17.90	16.32
Crude fiber	13.44	13.86	11.35
Calcium	1.29	0.85	0.65
Phosphorus	0.11	0.06	0.12
TDN	65	70	75

Analysis by Laboratory of Science and Feed Technology, IPB (2011)

Table 3 The grass, concentrate, total dry matter and nutrients intakes on local sheep with different level of energy ration

Parameters	Treatments		
	T1	T2	T3
	-----($\text{g}^{-1}\text{h}^{-1}\text{day}^{-1}$)-----		
Grass	149.85	151.50	122.27
Concentrate	300.4	312.37	394.94
Total dry matter	450.29±100.76	463.87±70.30	517.21±115.13
Dry matter intake (%BW)	3.20	3.26	3.49
Ratio of roughage: concentrate	33:67	32:68	24:76
Crude fat	39.43	51.27	36.41
Crude protein	67.08	86.84	86.55
Crude fiber	55.63	59.00	53.16
Calcium	6.32	4.24	3.55
Phosphorus	0.55	0.29	0.63
TDN	306.53	33.32	390.51

Consumption of crude protein (CP) and TDN of treatment T1 is lower than T2 and T3 of treatment, although not statistically significant. T2 and T3 of treatment have the CP consumption value almost equal, but the value of TDN consumption is lower than T3. Total consumption of digestible nutrients is similar to the research conducted by Rianto *et al.* (2006) and lower than the NRC recommendations (1985) the sheep weighing 10-20 kg live crude protein should consume approximately $127\text{-}167 \text{ g}^{-1}\text{h}^{-1}\text{day}^{-1}$ and TDN of about $400\text{-}800 \text{ g}^{-1}\text{h}^{-1}\text{day}^{-1}$. The consumption of crude protein and TDN on this research is lower than the recommendation standard requirements of NRC.

The data showed (Table 4) that T1 and T2 and T3 have not significantly different on average body weight at puberty. However, average body weight at puberty tended to be slightly increased with the increasing of energy level on ration. Chelikani *et al.* (2003) stated that both of average daily gain and body weight are contributed to 96% of the variation in attaining puberty. Shirley *et al.* (2001) found that the heavier ewes tended to produce more growth hormone (GH) attained puberty earlier than lighter weight ewes. Wells *et al.* (2003) suggested that thyroxin (T4) may be an indicator of onset of puberty because T4 rises gradually from the low concentrations just before the onset of breeding season to the peak concentrations just before the transition to the estrus. El-Saidy *et al.* (2008) suggested that female lambs growing at the faster rates exhibited their first estrus and most likely conceive at a younger age than ewe lambs growing at slower rate. Furthermore, Ionel *et al.* (2012) claimed that in general, the onset of puberty takes place in most of the ewes not only at the age of 6-9 months, but also at 3-4 months in breeds that mature earlier (much later than 18-20 months). The difference of energy content in the ration did not give a different effect on the age of first mating. This suggests that the levels of energy ration at 65% TDN is sufficient to accelerate the puberty of local sheep.

Table 4 Mean (\pm SE) of initial body weight and final body weight at first mating

Parameters	Treatments		
	T1	T2	T3
	-----($\text{g}^{-1}\text{h}^{-1}\text{day}^{-1}$)-----		
Number of lamb	4	4	4
Initial body weight (kg)	9.75±2.90	9.87±1.70	9.75±1.71
Average body weight gain ($\text{g}^{-1}\text{h}^{-1}\text{day}^{-1}$)	82.74±10.85	90.33±21.99	104.87±13.04
Feed efficiency	0.18±0.17	0.19±0.11	0.20±0.10
Proportion of weight change (%)	88	101	126
Body weight at first mating (kg)	18.37±3.27	19.87±1.93	22±2.94
The age of first mating (month)	6.2±0.39	6.6±0.55	6.8±0.12

CONCLUSIONS

The difference of energy content in the ration TDN, between 65% -75% has similar response to accelerated the mating of local sheep.

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