Supplementary Feeding With Concentrated Protein Sources In Ettawa Crossbreed Does

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ABSTRACT
The main constraint of the Ettawa Crossbreed does management at the farmer level is that the forages as the only feed given because farmers are unable to provide another feed, which causes the failure to reach optimum productivity. In this study, the supplementary feed was added as a protein source concentrate to increase productivity. This study used ten does with a bodyweight of about 25 kg, divided into two groups. The first group (n=5) was the control group which the type and the amount of feed given was the usual feed given by farmers, while the second group (n=5) was the treatment group which the control group with supplementation of protein source concentrate. The study was done for eight weeks. In the fifth and sixth weeks, the total collection was carried out. The variables observed in this study were nutrient consumption, nutrient digestibility, and digested nutrients. The results showed that the supplementation of protein sources increased total nutrient ratio consumption (forage + concentrate) compared to the control group. The consumption of Dry Matter (DM) 815.60±94.67 for the Control group and 1349.40±38.89 for the treatment group ($P<0.05$). Meanwhile, for the consumption of Crude Protein (CP) 151.65±11.61 and 271.61±7.00 for the control and treatment group, respectively. For energy, which is represented as Total Digestible Nutrient (TDN), it showed increase significantly ($P<0.05$) to 892.41±21.94 for the treatment group. The dry matter digestibility coefficients gave a significantly lower value ($P<0.05$) for the control, which are 65.18±6.43, and 85.92±3.60 for the Control and Treatment group. The value of crude protein digestibility was 84.28±4.13 for the control group and increased significantly ($P<0.05$) to 94.80±0.29 for the treatment group. The conclusion showed that protein source concentrate supplementation increased consumption and digestibility of nutrient rations.

Keywords: *Forage, Supplementary Feed, Protein Source, Ettawa Crossbreed Does.*

1. INTRODUCTION

Goats or small ruminants are effective livestock to improve the economy in marginal land and landless farmers in some developing countries. The development strategy of proper feeding is necessary to help the growth and increase of goat productivity. However, it is rarely concerned by farmers, especially in rural areas. In general, livestock feeding relies on the harvest season, which means that the basal feed is in the form of peanut straw at the time of harvesting peanuts. When harvesting corn, the basal feed is corn straw, or forage is given in a single feed or a combination. Kustantinah et al [1] observed as many as 37 species of plants were provided by farmers to their goats. This a considerable number was observed during the dry season. However, the plant species would decrease in the rainy season or harvest season for agricultural products.

Feed is a fundamental aspect of livestock management. The genetic potential of livestock can be optimum if supported by good environmental factors, such as feeding management and feed nutrient content before and during mating. Poor quality and quantity of feed will cause low livestock productivity, such as slow growth and low body weight. Young livestock with low body weight will result in prolonged puberty and low fertility. Hence, the formation of the ration components

is essential to obtain the optimum growth rate of livestock and reproduction performance.

The balance of energy and protein is vital because it can affect the dynamics of the microbial fermentation process in the rumen [2], so it is important to determine the proper balance of protein and energy so that the ruminant productivity becomes efficient. The study showed a low feed conversion ratio of Kacang Goats given protected Soybean meal (SBM) supplementation treated with formaldehyde, that the feed efficiency was high [3], while the other study stated that does give concentrate supplementation showed better changes in behaviour during oestrus, ovulation rates, pregnancy rates, and better male responses than those not given concentrate supplementation [4]. Hence, knowing the proper balance of energy and protein is expected to support the livestock's genetic potential to achieve the predicted productivity. This study aimed to determine the proper protein and energy supplementation feeding for Ettawa Crossbreed does to achieve optimum productivity and reproductive performance, also to give information about the proper protein supplementation ratio to produce a good production performance by achieving feed efficiency.

2. MATERIALS AND METHOD

2.1. Animal and Feed

The animal used in this study were ten Ettawa Crossbreed does (age ± 10 months) with an initial weight of ± 25 kg. The feed consisted of usual feed given by farmers as a control group and the control group with supplementation of protein source concentrate as the treatment.

2.2. Preparation, Treatment, And Collection Phase

The preparation phase covered the preparation of the does and pens. Preparation of the pen includes cleaning, and feeder, drinker, and feces collector installation. The ten does use were divided into two groups. The first group (n=5) was the control group, indicating that the type and the amount of feed given is the usual feed given by farmers, while the second group (n=5) was the treatment group, indicating that the feed given is the usual feed given by farmers with supplementation of protein sources feed in the form of concentrate (TDN 77.88%, DM 12.81%, and CP 23.0%), as much as 500 g/head/day.

2.3. Adaptation

Does were adapted to the feed for 14 days to stabilize the livestock body's condition during the study and reduce the influence of the previous feed. In addition, does was also given deworming medicine prior to the study.

Table 1. Feed offered.

Item	Control	Treatment
Basal feed: Forage (as farmer usually given to animals)	Ad libitum	Ad libitum
Feed Supplement	-	Concentrate Protein source

Table 2. The number of Leaves and Branches of peanut plants with different organic fertilizer.

Feedstuffs	DM (%)	Composition (%)					
		OM	CP	CF	EE	NFE	TDN*
Wheat pollard[1]	88.39	94.61	13.76	10.23	4.08	66.54	76.89
Soybean Meal[1]	85.74	94.78	45.59	2.63	1.12	45.44	84.14
Soybean husk (Kleci)[1]	89.16	92.32	6.42	35.26	1.09	51.80	66.34
Dry cassava[1]	87.16	97.13	2.59	4.81	2.11	87.62	85.24
Mollases[1]	39.65	85.17	5.00	0.99	1.09	78.09	78.53

Description: [1] Analyse at Feed Science Laboratory, Faculty of Animal Science, Universitas Gadjah Mada.
*Obtained by the regression formula [5].

The observation and treatment were carried out for two months. During the study, the does were kept in individual pens. Feed was given two times a day, at 8.00 am and 4.00 pm. Drinking water and forage were provided ad libitum, while the concentrate was given according to the bodyweight of the does, as much as 2% of body weight or ± 500 g/ head/day (Table 1).

Total collection was carried out during the last 14 days of the treatment period by weighing the amount of forage and concentrate given, the remaining feed, and the feces every day. The remaining feed was separated by type, and as much as 10 % of the feces were taken. Samples were dried under the heat of the sun for two days. Then it was dried at 55 ºC and then ground for analysis. Sample analysis of dry matter (DM), organic matter (OM), crude protein (CP), extract ether (EE), and crude fiber (CF), nitrogen-free extract (NFE) was done using the AOAC method [6].

2.4. Feed Consumption

Feed consumption measured included consumed DM, OM, CP, CF, EE, and TDN. Dry matter of feed consumption was calculated by calculating the difference between the amount of feed given and the amount of remaining feed, then multiplied by the DM content of the feed.

$$Nutrient\ intake\ (g/day)\ = nutrient\ feed\ given\ (g) - \ feed\ residue\ nutrient\ (g)$$

The consumption of CP, CF, and OM was calculated by multiplying the consumption of DM by the nutrient content (%) of each nutrient in the feed [5]. The equation calculates TDN consumption was:

TDN (%) = CP_{dd} (%) + CP_{dd} (%) + 2,25 x EE_{dd} (%) + NFE_{dd} (%)

2.5. Digestibility

Digestibility of feed nutrients was calculated by the difference between feed nutrient consumption (DM, OM, CP, and CF) with fecal nutrient content (DM, OM, CP, and CF). The equation was:

$$\text{DM digestibility (\%)} = \frac{digested\ DM\ (g)}{DM\ consumption\ (g)} \text{ x } 100\%$$

2.6. Data Analysis

Data on nutrient consumption and nutrient digestibility were analyzed using a Completely Randomized Design with a one-way ANOVA with one treatment with an addition concentrate of protein source, followed by Duncan's test if the results showed significant differences.

3. RESULTS AND DISCUSSIONS

3.1. Nutrient Consumption

Observations on nutrient consumption showed that for all observed nutrients DM, OM, CP, CF NFE, and TDN (Table 3) showed that the addition of protein source concentrate resulted in a significant increase in nutrient consumption (P<0.05) when compared with the control group, where the feed only forage, this showed an improvement in the balance of protein and energy in the treatment group. Protein supplementation provided a reasonably high nutrient consumption (P<0.05).

The effect of dry matter consumption due to the addition of protein supplements was also observed on goats included low protein supplements (18% DM) and high protein supplements (31.6% DM). It was stated that DM consumption showed a value of 1.28 kg/day (18% protein supplement), and DM consumption increased to 1.33 kg/day (31.6% CP supplement), there was a significant increase (P<0.05) for the increase in protein content in the supplementary feed [7].

Table 3. Nutrient consumption (g/head/day).

Nutrient	Consumption (g/head/day)	
	Control	Treatment
DM	815.60±94.67[b]	1349.40±38.89[a]
OM	763.14±90.34[b]	1268.00±34.67[a]
CP	151.65±11.61[b]	271.61±7.00[a]
EE	5.45±0.65[b]	16.69±0.58[a]
CF	193.21±28.04[b]	265.35±10.88[a]
NFE	412.82±50.89[b]	715.90±18.17[a]
TDN	491.96±53.25[b]	892.41±21.94[a]

Description: [a, b] Different superscripts on the same line show differences (P<0.05) (a>b).

Table 4. Consumption of forage nutrients (without concentrate).

Nutrient	Control	Treatment
DM[ns]	825.33±96.44	928.60±38.89
OM[ns]	771.58±91.70	871.35±34.67
CP[ns]	153.03±11.66	175.95±7.00
EE	5.50±0.65[a]	7.09±0.58[b]
CF[ns]	195.88±28.73	218.68±10.88
NFE[ns]	417.16±51.48	469.60±18.17
TDN[ns]	497.16±53.94	562.50±21.94

Description: [a, b] Different superscripts on the same line show differences (P<0.05) (a>b).

Meanwhile, the other study showed that supplementation of low protein (16.8% DM) in goats did not show any difference in DM consumption when compared to the addition of high protein supplementation (20.8% DM) [8], and the effect of protein source supplementation on goats, showed that the supplementation of molasses block and Hay Lablay, molasses block and sweet potato, molasses block and cassava leaf flour did not show any effect in dry matter consumption. However, protein source supplementation of Molasses block + sunflower seed meal would significantly increase dry matter consumption (P<0.05) [9].

Observation of forage consumption from the two groups turned out to provide values that were not significantly different (Table 4) for DM, CP, and other nutrients. There was no significant effect of adding protein source supplements to forage consumption as basal feed.

3.2. Digestibility Coefficient

The digestibility coefficient of the does a group that received protein supplementation gave considerably good results. It was seen that there was a significant increase ($P<0.05$) in the digestibility coefficient of all nutrients in the control group. In the digestibility coefficient of DM, there was an increase of about 20 points, CP an increase of 10 points and TDN as an energy estimate, an increase of 20 points was obtained (Table 5).

Table 5. Nutrient digestibility coefficient of control and treatment rations.

Nutrient	Control	Treatment
DM	65.18±6.43^{b}	85.92±3.60^{a}
OM	66.63±6.11^{b}	86.88±3.29^{a}
CP	84.28±4.13^{b}	94.80±0.29^{a}
EE	55.45±6.90^{b}	80.99±3.63^{a}
CF	66.91±6.70^{b}	86.24±4.16^{a}
NFE	61.87±6.30^{b}	82.99±3.13^{a}
TDN	65.18±6.43^{b}	85.92±3.60^{a}

Description: $^{a, b}$ Different superscripts on the same line show differences ($P<0.05$) (a>b).

If the nutrient digestibility coefficient of forage was observed, without concentrate, the forage nutrient digestibility (Table 6) showed a significant increase ($P<0.05$) in the group of goats supplemented with protein sources concentrate. The supplementation of protein source concentrate of 500 g/head/day will cause an increase in forage nutrient digestibility. The increase reached 9 points (% digestibility of DM and CP), while in the digestibility of CF, the increase was relatively high significantly ($P<0.05$), which was almost 40 points (Table 6).

Observations on the use of protein source supplementation in goats were also observed the digestibility of nutrients in the supplementation of soybean meal (SBM) protein sources and a mixture of SBM and leaf flour, which was a mixture of *Leucaena leucocephala*, *Morus alba*, and *Azadirachta indica* leaves that had been dried under the sun, both diets were iso protein (approximately 23%). Observations showed that both protein source supplements did not affect dry matter digestibility, namely 55.11% (SBM supplementation) and 52.25% (SBM + Leaf meal supplementation). Similarly, there was no difference in protein digestibility, namely 51,97% (SBM supplementation) and 51.89% (SBM+Leaf meal supplementation) [10].

Table 6. Forage nutrient digestibility coefficient (without concentrate) (%) in both groups.

Nutrient	Control	Treatment
DM	68.57±6.57^{a}	79.53±8.21^{c}
OM	66.98±6.21^{a}	80.89±4.79^{c}
CP	84.42±4.15^{a}	91.98±1.41^{c}
EE	55.99±7.20^{a}	91.98±4.47^{c}
CF	67.25±6.72^{a}	79.03±6.25^{ac}
NFE	62.15±6.37^{a}	76.42±4.53^{c}
TDN	68.57±6.57^{a}	79.53±8.21^{c}

Description: $^{a, b, c}$ Different superscripts on the same line show differences ($P<0.05$) (a>b).

The other study used Gliricidia (PK 23.7% BK) as a protein source supplement in Kacang Goats. Giving 1% (bodyweight) of Gliricidia increased dry matter digestibility by 5 points compared to Gliricidia. This showed that the addition of 1% of the bodyweight of Gliricidia increased the digestibility and weight (14 points) [11].

Observations of forage nutrient digestibility (Without concentrate, Table 6) gave positive outcomes, namely an increase in the digestibility of forage nutrients in the goat group given a protein source concentrate. The giving of concentrated energy sources gave a more favourable balance of protein and energy in the rumen for the proliferation of rumen microorganisms, resulting in increased digestibility (Table 6).

4. CONCLUSIONS

The conclusion was that adding a protein source concentrate of 500 g/head/day positively impacts the consumption of all nutrients (CP, CF, NFE, and TDN) than groups that did not get supplementation feed. As an implication, the digestibility of these nutrients also increased. Observations on the consumption and digestibility of forage nutrients without considering concentrates showed that the Goat group that received

supplementation of protein sources increased nutrient consumption and digestibility.

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