Performances of Post-weaned Pasundan Calves Fed Extra Diets in an Extensive Grazing System

Kardaya D, Sudrajat D, Wahyuni D

Department of Animal Sciences, Faculty of Agriculture, Universitas Djuanda, Bogor, Indonesia
E-mail: dede.kardaya@unida.ac.id

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ABSTRAK

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Proses perubahan pedet dari periode prasapih ke pascasapih merupakan proses transisi dari pakan cair ke padat yang disertai transformasi dramatis saluran cerna secara alami. Pemberian pakan tambahan berbentuk padat pada pedet pascasapih yang digembalakan diharapkan dapat memperbaiki produktivitasnya. Penelitian bertujuan untuk mengetahui pengaruh diet ekstra terhadap performa pedet Pasundan pascasapih (15 ekor jantan dan 15 ekor betina) yang digembalakan, menggunakan rancangan acak lengkap pola faktorial 2 x 3 (dua faktor jenis kelamin x tiga faktor ransum). Perlakuan adalah pedet Pasundan pascasapih digembalakan: tanpa diberi ransum ekstra (grazing/kontrol), diberi ransum ekstra tanpa suplemen zeolit terimpregnasi urea (diet ekstra-1), dan diberi ransum ekstra berzeolit terimpregnasi urea (diet ekstra-2). Parameter yang diamati terdiri atas konsumsi ransum (hanya untuk diet extra, konsumsi grazing tidak diukur), bobot badan, dan kondisi tubuh. Data hasil penelitian dianalisis dengan GLM Univariate. Hasil penelitian menunjukkan: Interaksi antara perlakuan ransum dan jenis kelamin tidak mempengaruhi semua parameter yang diamati. Konsumsi bahan kering diet ekstra-1 (529,37±3,06 g DM/ekor/hari) lebih tinggi (P<0,05) dibanding konsumsi diet ekstra-2 (525,17±1,96 g DM/ekor/hari), tetapi setelah koreksi atas bobot badan, hasilnya tidak berbeda nyata. Jenis kelamin tidak mempengaruhi semua parameter yang diamati. Pertambahan bobot badan harian pedet pascasapih yang diberi diet ekstra-1 (155,8±27,5 g) atau diet ekstra-2 (124,2±56,3 g) lebih tinggi (P<0,05) dibanding yang grazing (66,67±35.8 g). Diet ekstra-1 menghasilkan perubahan kondisi tubuh lebih tinggi (1,8±0,78, P<0,05) dibanding diet ekstra-2 dan yang digembalakan saja (1,2±0,42). Disimpulkan, pemberian diet ekstra-1 untuk pedet Pasundan pascasapih yang digembalakan meningkatkan pertambahan bobot badan harian sampai 234% dan memperbaiki kondisi tubuh sampai 150% lebih baik dari pedet yang hanya digembalakan.

Kata Kunci: Kondisi Tubuh, Pertambahan Bobot Tubuh, Penggembalaan Ekstensif, Pedet Sapi Pasundan Pascasapih, Zeolite Terimpregnasi Urea

ABSTRACT

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Changing from the pre-weaning to the post-weaning period is a transition from liquid to solid feed accompanied by a dramatic transformation of the GI tract. Supplemental solid feeding of grazing post-weaning calves is expected to improve their productivity. The study aimed to determine the effect of extra diet on the performances of post-weaned Pasundan calves (15 males and 15 females) that were grazed, using a completely randomized design of 2x3 factorials (two sex factors x three diet factors). The diet treatments were that post-weaned Pasundan calves were grazed: without being given extra diets (grazing/control), extra diets without urea-impregnated zeolite (extra diet-1), and extra diets with urea-impregnated zeolite (extra diet-2). The parameters were diet consumption (only for extra diets, unmeasured grazing consumption), body weights, and body condition. The data were analyzed with GLM Univariate. The results showed: The interaction between diet treatment and sex did not affect all the observed parameters. Consumption of extra diet-1 (529.37±3.06 g DM/head/day) was higher (P<0.05) than extra diet-2 consumption (525.17±1.96 g DM/head/day), but after a correction of body weight, the result was no different. Sex factors did not affect all observed parameters. The ADG of post-weaned calves fed extra diet-1 (155.8±27.5 g), or extra-2 diet (124.2±56.3 g) was higher (P<0.05) than the grazing (66.67±35.8 g). The extra diet-1 produced a higher change in body condition (1.8±0.78, P<0.05) than extra diet-2 or grazing (1.2±0.42). In conclusion, feeding extra diet-1 to post-weaned Pasundan calves increased ADG by 234% and improved the body condition by 150% better than calves that were only grazed in an extensive grazing system.

Key Words: Body Condition, Body Weight Gain, Extensive Grazing, Post-Weaned Pandan Calves, Urea-Impregnated Zeolite

INTRODUCTION

The productivity of local beef cattle in Indonesia was still exceptionally low. The average growth rate of local beef cattle (Bali and Ongole) was 0.16 kg/d if only fed grass (Rusdy et al. 2019; Mayberry et al. 2021) and could be increased to 0.39 kg/d if fed 55% grass and 45% Gamal (Gliricidia sepium) leaves (Rusdy et al. 2019), or 0.46 kg/day if the grass supplemented with cassava tuber and Gliricidia sepium up to 1.6% LW/day (Sulendre et al. 2021). Concentrate supplementation increased the daily body weight gain of Brahman crossbred cattle by 0.792 kg compared to the cattle that only fed grass, which only achieved a daily body weight gain of 0.092 kg (Quang et al. 2015).

Extensive cattle production systems are characterized by low input use and reliance on low-quality forage (Dahlanuddin et al. 2017). The extra feed with conventional concentrate or high-concentrate diets could increase beef cattle productivity (Koch et al. 2019). The best performance of beef cattle calves was achieved when the calves consumed 750 g/day of concentrates (Wang et al. 2020). However, concentrate supplementation is applied on intensively managed farms because livestock is managed in pens. In smallholder farms, farmers can only raise livestock 1-6 heads because, in addition to their business not being the primary business, the purchasing power of farmers still needs to be improved on concentrate feed, which is quite expensive (Kardaya et al. 2020).

Pasundan cattle have been designed as a wealth of genetic resources for local Indonesian livestock that must be protected and preserved. Pasundan cattle have a strategic value because the cattle are raised for generations and have been integrated with the lives of the farming community for hundreds of years and used as a source of capital. The cattle are the result of the adaptation of more than 10 generations between Bos sundaicus / banteng / Bali cattle, with Javanese cattle, Madura cattle, and Sumba Ongole cattle forming Pasundan cattle (Ministry of Agriculture of the Republic of Indonesia 2014).

Adult Pasundan cows have shoulder height: males 115.74±8.40 cm and females 109.74±6.30 cm, body length: males 120.09 ± 9.80 cm and females 110.09±9.68 cm, chest circumference: males 150.22±11.76 cm and females 138.22±11.85 cm; body weight: male: 240.40±34.00 kg and female: 220.30±22.00 kg (Ministry of Agriculture of the Republic of Indonesia 2014) Pasundan post-weaning cows aged 11-12 months have an average body length of 83.60±1.14 cm, a chest circumference of 117.20±5.50 cm, a shoulder height of 97.50±2.67 cm, a chest depth of 44.30±2.39 cm, and body weight of 111.80 kg (Tanjung et al. 2019).

Based on the production characteristics that are still low, but with its strategic value and supported by government policies that ensure its sustainability, Pasundan cattle have the potential to be further developed. However, because most farmers, especially in the southern coastal areas of West Java, graze their Pasundan cattle on grazing fields rather than keeping them in pens intensively, the productivity of Pasundan cattle is highly dependent on the availability and quality of forage grown on pastures and plantations. Therefore, to overcome this nutritional problem, these grazing Pasundan cattle must be given extra diets, especially during transitional moments such as the change from the pre-weaning to the post-weaning period.

Feeding extra diets was expected to increase growth and improve the body condition of post-weaning calves in extensive grazing. The study aimed to increase the productivity of post-weaned Pasundan calves, which were reared extensively by adding extra diets.

MATERIALS AND METHODS

Location, animals, and diets

The study was conducted in the southern coastal area of the Pameungpeuk sub-district of Garut Regency, West Java, Indonesia, in March – December 2020. The study used post-weaned Pasundan calves grazed during the day and gathered in a place surrounded by living fences that could be considered a roofless enclosure or a kind of roofless shelter in the afternoon. Each calf was tied with a rope to retrieve extra diet consumption data so that when given an extra diet in a bucket, one calf could not reach the bucket where the other calf ate.

Thirty post-weaned Pasundan calves aged 6-7 months, consisting of 15 male and 15 female calves, were used in this study. The average initial body weight of the male was 75.97±3.24 kg, and the female was 77.53±3.24 kg. The experimental diets used were those composed of non-conventional materials sourced from agricultural and industrial by-products, as recommended by (Agus & Widi 2018; Singh 2018).

Extra diets and drinking water were provided in the shelter before and after the calves were grazed. Extra diets 1 and 2, containing the same protein content (17.71 and 17.69%, respectively), were fed to calves in coarse granular form. The calves were allowed to adapt to the extra diets for 14 days before entering the feeding trial period for the next 60 days. Extra diets were given to the calves twice a day, in the morning at 06.00 – 08.00 before the calves were driven to the pasture and in the afternoon at 17.00 – 19.00 after the calves were driven back to the shelter. Drinking water for the calves was available in ponds or puddles around the grazing area during grazing.

The grassland or pasture where all cattle of various age strata are grazed stretches along the southern coastline in the Pameungpeuk subdistrict area planted by natural grasses covering an area of more than 15 hectares.

Table 1. Nutrient composition of experimental diets

Compositions	Diets (DM basis, %)		
	Grazing	Flushing-1	Flushing-2
Ingredients, % DM basis			
Rice bran		36	33
Cassava meal		-	12
Palm kernel meal		23	28
Coconut meal		30	23
Soybean meal		8	-
Urea-impregnated zeolite		-	1
Mineral mix†		3	3
Total		100	100
Nutrient composition, % DM basis			
DM	33.02	89.84	89.41
Crude protein	9.74	17.71	17.69
Ether extract	1.43	5	3.15
Crude fiber	21.76	13.33	12.48
Nitrogen free extract	56.46	53.2	56.16
Ash	10.61	10.76	10.52
NDF	64.96	66.49	66.16
ADF	49.69	35.06	37.42
Cellulose	24.13	20.55	21.32
Hemicellulose	15.27	31.43	28.74
Lignin	10.98	10.82	11.48

Composition (per kg): Vitamin A 3,300 IU, Vitamin D 360 IU, Vitamin E 100 IU, Mg 100 mg, Co 100 mg, P 340 mg, Ca 720 mg, K 650 mg, Na 90 mg, S 120 mg, Fe 7 mg, Mn 5 mg, Zn 4 mg, Cu 1 mg, I 60 mcg, Se 40 mcg, organic chromium 0.3 mg. DM: Dry Matter; NDF: Neutral Detergent Fiber; ADF: Acid Detergent Fiber.

This condition is almost impossible to measure grass consumption, even with the indicator method, because it still has to measure the total fecal output to predict the level of consumption. The grasslands, which the Pacific Ocean flanks to the south and rivers to the north, are the main places for farmers to graze beef cattle. The existence of rivers and water pools formed from the relics of iron sand excavation is a natural drinking place for all cows grazed in the pasture. In the dry season, when the availability of such natural grasses begins to decrease, farmers herd their livestock to rubber plantations located north, crossing the river, away from the grasslands on the coast. In the morning, the cattle are herded to the pasture, and in the afternoon, the cattle return to the roofless shelters, which are also located in the pasture. At the time of the study, the cows grazed in this pasture were all Pasundan cattle.

Experimental design and laboratory analysis

The study used a factorial, completely randomized design consisting of two factors (gender and diet) and five replicates. Each five male and female calves were given the following treatments: 1) the calves were allowed to graze without extra diets, 2) the calves were allowed to graze and fed 1 kg extra diets without urea-impregnated zeolite supplement (extra diet-1), and 3) the calves were allowed to graze and fed 1 kg extra diets with urea-impregnated zeolite supplement (extra diet-2). Extra diets and urea-impregnated zeolite were prepared according to (Kardaya et al. 2021).

Extra diet refusals were weighed after every feeding time, put in a polyethylene bag, and air-dried in the sun the next day. A total of 100 g of grass samples were taken randomly at each of the 30 points determined based

on the recommendations of (Cayley and Bird 1996) on pastures where post-weaned calves were grazed. Every 100 grams of air-dried samples from offer and refusal of extra diets and natural grass were oven-dried at 55^0 C for 96 hours. Then, each sample was ground using a Willey grinding machine to pass a 1 mm sieve, put in a plastic bag, and stored in a refrigerator at -4^0 C for further analysis (proximate and Van Soest analysis).

Proximate analysis was accomplished according to (AOAC 2016) procedure. Each sample was analyzed for dry matter content, ash content, crude protein (as determined based on total nitrogen using the micro-Kjeldahl technique and calculated as N x 6.25), and ether extract was determined gravimetrically after extraction using petroleum ether in a Soxhlet apparatus (AOAC 2016). The nitrogen-free extract was calculated using the following formula: % NFE = 100 % – (% EE + % CP + % Ash + % CF). Neutral detergent fiber (NDF), acid detergent fiber (ADF), cellulose, and lignin contents were determined according to the procedure of (van Soest et al. 1991). Hemicellulose was calculated by subtracting ADF from NDF. Table 1 presents the results of the feed analysis.

Measurements

The observed variables included feed intake, feed conversion, weight gain, and body condition score. Feed intake measurements were only carried out for extra diets, while feed intake measurements for natural grasses in grazing fields were not carried out due to technical constraints. Feed intake was calculated by subtracting feed refusal from the offered feed. Body weight (BW) was measured using a digital weight scale. Weighing for post-weaning Pasundan calves was carried out in the morning before the calves were given extra diets during morning feeding. The calves were weighed at the beginning of the study, after 30 days, and 60 days of the study period. Average daily weight gain (ADG) was calculated by subtracting the initial body weight from the final body weight divided by the length of time between the two weighing times. Body condition score (BCS) was defined based on a nine scale (Nicholson and Butterworth 1986).

Statistical analysis

The data that had been collected were analyzed by GLM Univariate using IBM SPSS Statistic version 26.0 (IBM 2019). Experimental diets and calves' gender were considered fixed factors. The covariate analysis employed for BCS changes and ADG parameters used each corresponding initial measurement as the covariate variable. However, covariate analysis would be eliminated from the model if the statistical analysis results were insignificant. Experimental diets and gender's main effects were subject to the least significant difference (LSD) test option. The significance test was calculated at $P \leq 0.05$.

The statistical model employed for analysis was:

$$Yijk = \mu + \alpha i + \beta j + (\alpha\beta)ij + \beta(Xi - \bar{X}) + \varepsilon ijk$$

where Yijk is the dependent variable; μ is the overall mean; αi is the effect of gender; βj is the effect of dietary treatment; (αβ)ij is the effect of the interaction between gender and dietary treatment; β(Xi-$\bar{X}$) is the covariate variable; εijk is the overall error term.

RESULTS AND DISCUSSION

Dry matter intake of extra diets

Feed intake measurements were only carried out for extra diets, while feed intake measurements for natural grasses in grazing fields were not carried out due to technical constraints. The average dry matter intake (DMI) of extra diets in post-weaned Pasundan calves during the 60 days of the study ranged from 29.383±0.110 – 29.768±0.138 kg, with the average DMI per head per day ranging from 524.70±1.23 – 531.58±2.47 g (Table 2).

The interaction between diet factor and sex factor had no significant effect on the DMI of extra diet. Sex factors also had no significant effect on the DMI of extra diets. Only diet factor affects the DMI of extra diet ($P<0.05$). Both total DMI and daily DMI showed that the extra diet-1 was consumed more than the extra diet-2 ($P<0.05$). However, if the DMI was corrected for body weight, the results showed the same DMI ($P>0.05$).

The average DMI per head/day of this study was below the DMI of solid diets consisting of starter diets and hay (3,292 g DMI/head/day) of Holstein's calves with the ADG of 1.2 kg/day at the post-weaned period (Engelking et al. 2020). Unfortunately, (Engelking et al. 2020) did not report either the initial or post-weaned calves' body weight. The higher range of the average DMI of 550 – 618.4 g/ head/day in post-weaning calves fed concentrates with the average body weight ranging from 87.6±1.64 - 95.6±1.75 kg also reported by (Wang et al. 2020), but still below the DMI (1.4 – 1.65 kg/head/day) of post-weaning calves fed starter diets supplemented with *Candida tropicalis* and mulberry leaves with the average daily gain range from 0.69 – 0.79 kg/head/day (Kong et al. 2019). The high DMI of the extra diet-1 compared to the extra diet-2 reflected that the extra diet-1 was more palatable than the extra diet-2; this was presumably due to the influence of urea content in the urea-impregnated zeolite in extra diet-2, which were less favored by calves, so the DMI level was lower than extra diet-1 did not contain urea. Previous researchers also reported that the level of DMI in diets supplemented with urea was lower than the rate of DMI without urea supplements (Costa et al. 2017).

Body weight gain of post-weaned Pasundan calves

The average initial body weight of post-weaning Pasundan calves grazed and fed with extra diets ranged from 66.1±16.1 - 84.8±12.9 kg (Table 3). The interaction between diet and sex factors did not significantly affect all body weight parameters. Sex factors also had no significant effect on all body weight parameters. The diets affected final body weight and body weight gain ($P<0.05$). After two months of the experimental feeding period, the body weight of calves fed extra diet-1 increased by 9.35±1.65 kg per head, and extra diet-2 increased by 7.45±3.4 kg compared to the control calves (4.0±2.14 kg/head**)** ($P<0.05$). The average daily body weight gain of post-weaned Pasundan calves receiving extra diet-1 reached 155.83±27.5 g, and extra diet-2 rations reached 124.2±56.3 g and were higher than the control calves (66.7±35.8 g) ($P<0.05$).

This study's average final body weight of post-weaned Pasundan calves was comparable to the average final body weight of several previous researchers, ranging from 75.89 – 96.6 for Holstein Friesian calves (Maktabi et al. 2016; Gasiorek et al. 2020). The average final body weight of Pasundan calves in this study is also within the body weight range of Pasundan calves aged 9 – 12 months (69.3 – 111.8 kg) reared in extensive grazing (Tanjung et al. 2019) and Pasundan calves aged 9-10 months (70.23±9.15 – 136.59±7.10 kg) used in the study of (Herni et al. 2022).

The average daily body weight gain (ADG) of post-weaned Pasundan calves in this study was lower than all ADG of Holstein Friesian calves reported by Raeth et al. (2016) with substitute milk and various protein sources (0.68 – 0.78 kg/day), Kong et al. (2019) using mulberry leaf supplements (0.69 – 0.79 kg/day), and McDonnell et al. (2019) with unsaturated fatty acid and glucan supplements (0.68 – 0.78 kg/day). Pasundan calves aged 9 – 10 months given conventional rations (rice bran, rice straw, and elephant grass) supplemented with *Leucaena* leaf wafers also resulted in higher ADG (0.34±0.14 – 0.97±0.42 kg) in an intensive rearing system (Herni et al. 2022).

The increase in ADG due to the provision of an extra diet was as expected because extra diets supply a percent of crude protein that was almost twice as much crude protein as supplied by natural grasses growing in pastures. The same ADG achievement between post-weaned Pasundan calves who consumed extra diet-1 and extra diet-2 was thought to be because both extra diets supplied the same percent of crude protein. Thus, providing 1 kg of extra diet-1 or extra diet-2 daily for 2 months in extensively grazed post-weaning Pasundan calves aged 6 – 7 months increased ADG by 234% – 186% greater than ADG of calves that were only grazed on pasture.

Body condition scores of post-weaned Pasundan calves

The average initial body condition score (BCS) of post-weaning Pasundan calves in this study was classified as thin, which was 3.6±0.89 – 4.2±0.83 based on 9 scales of body condition scores (Table 4). The average initial body condition score of post-weaning Pasundan calves grazed and fed with extra diets ranged from 3.6±0.89 to 4.2±0.83.

The interaction between diet and sex factors did not significantly affect all body condition score parameters. Sex factors also had no significant effect on all body condition score parameters. The diet treatments had a significant effect ($P<0.05$) on body condition scores and

Table 2. Extra feed dry matter intake (mean±s.d.) of post-weaned Pasundan calves fed extra diets under extensive grazing

Parameters	Sex	Extra feed-1	Extra feed-2	Average
Dry matter intake, kg DM/head/60 days	Male	29.768±0.138	29.431±0.144	29.599+0.222
	Female	29.521±0.094	29.383±0.069	29.451±0.106
	Average	29.645±0.172^{b}	29.407±0.110^{a}	
Dry matter intake, g DM/head/day	Male	531.58±2.47	525.56±2.58	525.57±3.96
	Female	527.16±1.68	524.70±1.23	525.92±1.90
	Average	529,37±3.06^{b}	525.17±1.96^{a}	
Dry matter intake (kg DM/kg BW)	Male	0.34±0.03	0.32±0,04	0.33±0.04
	Female	0.37±0.43	0.33±0,02	0.35±0.04
	Average	0.36±0.04	0.32±0.34	

Different superscripts within similar rows or columns for each parameter show significantly different ($P<0.05$), BW= body weight, DM= dry matter. s.d.= standard of deviation

Table 3. Effect of extra diet and sex on body weight gain of post-weaned calves under extensive grazing

Parameters	Sex	Grazing	Extra feed-1	Extra feed-2	Average
Metabolic body weight (kg $BW^{0.75}$)	Male	23.1±4.3	25.9±2.5	27.9±3.2	25.6±3.7
	Female	26.7±4.4	24.2±2.1	27.2±1.4	26.0±3.0
	Average	24.9±4.5	25.1±2.4	27.5±2.3	
Initial body weight, kg/head	Male	66.1±16.1	77.0±10.1	84.8±12.9	75.9±14.6
	Female	80.2±17.6	70.3±8.3	82.1±5.9	77.5±12.1
	Average	73.15±17.5	73.7±9.4	83.4±9.6	
30 days body weight, kg/head	Male	68.0±15.7	84.1±7.4	88.3±12.0	80.1±14.4
	Female	82.3±17.5	75.7±8.3	86.1±5.4	81.3±11.6
	Average	75.1±17.4[a]	79.9±8.6[ab]	87.2±8.8[b]	
60 days body weight, kg/head	Male	69.3±16.09	86.7±9.44	92.8±12.5	82.9±15.8
	Female	85.0±17.42	79.3±8.55	89.0±5.4	84.4±11.5
	Average	77.1±17.8[a]	83.0±9.3[ab]	90.9±9.3[b]	
60 days of body weight gain, kg/head	Male	3.2±1.78	9.7±0.83	8.0±1.58	7.0±3.15
	Female	4.8±2.36	9±2.26	6.9±4.73	6.9±3.55
	Average	4.0±2.14[a]	9.35±1.65[b]	7.5±3.4[b]	
Average daily gain, g	Male	53.3±29.8	161.7±13.9	133.3±26.4	116.1±52.5
	Female	80.0±39.3	150.0±37.7	115.0±78.9	115.0±59.2
	Average	66.7±35.8[a]	155.8±27.5[b]	124.2±56.3[b]	

Different superscripts within similar rows show significantly different (P<0.05), BW= body weight

Table 4. Body condition scores of post-weaned calves under extensive grazing

Parameters	Sex	Grazing	Extra feed-1	Extra feed-2	Average
Initial BCS	Male	3.8±0.83	4±0.70	4.2±0.83	4.0±0.75
	Female	3.6±0.89	4±0.70	4.2±0.83	3.9±0.79
	Average	3.7±0.82	4±0.66	4.2±0.78	
30 days BCS	Male	4.6±0.89	4.8±0.45	4.6±0.54	4.7±0.61
	Female	4.0±1.00	4.8±0.45	4.6±54	4.4±0.74
	Average	4.3±0.94	4.8±0.42	4.6±0.52	
60 days BCS	Male	5.0±1.00	5.8±0.44	5.4±0.54	5.4±0.73
	Female	4.8±1.09	5.8±0.44	5.4±0.54	5.3±0.81
	Average	4.9±0.99[a]	5.8±0.42[b]	5.4±0.51[ab]	
BCS changes	Male	1.2±0.44	1.8±0.83	1.2±0.44	1.4±0.63
	Female	1.2±0.44	1.8±0.83	1.2±0.44	1.4±0.63
	Average	1.2±0.42[a]	1.8±0.78[b]	1.2±0.42[a]	

Different superscripts within similar rows show significantly different (P<0.05); BCS= body condition score

changes in body condition scores after two months of the study. The body condition score of post-weaned Pasundan calves consuming the extra diet-1 was higher ($P<0.05$) than the control-feeding calves (only grazing) but the same as the body condition score of the calves consuming the extra diet-2 ($P>0.05$). Calves consuming the extra diet-1 also produced a higher change in body condition score ($P<0.05$) than the calves consuming the control diet or the extra diet-2.

This study's final body condition score of post-weaning Pasundan calves was within the range of body condition scores (4.9 – 6.2) of calves consuming starter rations (Llewellyn et al., 2013). A previous researcher also reported the significant effect of diet treatment on the final body condition score in this study (Qamar et al., 2020). A more significant BCS change in post-weaned Pasundan calves consuming extra diet-1 compared to BCS of calves consuming extra diet-2 was thought to be due to differences in nitrogen sources in the two extra diets. Although both extra diets contain similar levels of crude protein, the crude protein in the extra diet-1 comes entirely from the crude protein diets, while the crude protein in the extra diet-2 comes partly from NPN. Thus, calves who consume extra diet-1 are thought to be more efficient in utilizing diets to improve their body condition.

CONCLUSION

Feeding extra diets to post-weaned Pasundan calves in an extensive grazing system increased average daily weight gain by 186% if using extra diet-2 and up to 234% when using extra diet-1. Feeding Extra diet-1 improved the body condition of the calves by 150% better than calves that were only grazed in grazing fields.

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