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Supplementation of Sakura Block Plus in Palm Frond-Based Rations on Production Efficiency of Kaur Cattle

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ABSTRACT

This study evaluated the effectiveness of fattening Kaur cattle-fed sakura block plus supplements and ammoniated palm frond-based rations. The production efficiency of Kaur cattle fed with Sakura block plus supplements and ammoniated palm-frond-based ration. The study design uses Latin Square Design (LSD) with treatments P0 (10% sakura block plus), P1(12% sakura block plus), P2 (13% sakura block plus), and P3 (14% sakura block plus). This study employed four 12-month-old male Kaur cattle for four 10-day treatment periods. Ration Efficiency (RE), Feed Cost per Gain (FC/G), Income Over Feed Cost (IOFC), and Revenue per Cost Ratio (R/C) were not substantially different between treatments (P>0.05).

Keywords: fattening, Kaur cattle, sakura block plus, ammoniated palm frond

INTRODUCTION

Kaur cattle are native breeds in Kaur Regency, Bengkulu Province, which can fulfill a portion of the national beef shortage. Raising Kaur cattle is more appealing to rural people than raising other beef cattle because Kaur cattle adapt to the environment, are resistant to parasites, and can eat low-quality grass. However, the quick rise of the oil palm business in the Kaur District had a significant impact on reducing Kaur cattle productivity, as grass as the primary feed source for Kaur cattle declined drastically in the frond palm area (Daru et al., 2014; Purwantari et al., 2015; Ramdani et al., 2015; Ramdani et al., 2017). On the other hand, oil palm plants have the potential to produce waste in the form of palm fronds which are quite large and available throughout the year, with production reaching 6,500-7,500 fronds per hectare per year (Subagyono, 2004; Rahutomo et al., 2012: Ebrahimi et al.. 2015). Palm fronds have a low nutritional value, particularly protein content ranging from 1.32 to 4.18%, and a high lignin content of 30.18 (Febrina et al., 2014). As a result, palm fronds used in ruminant rations must be treated with ammoniation (Nurhaita et al., 2014; Rusli et al., 2019) and the inclusion of concentrate or supplementary feed (Ebrahimi et al., 2018; Warly et al., 2015; Warly et al., 2018; Febrina et al., 2018).

Sakura block is a modified Urea Molasses Block (UMB) feed additive that provides a balance of energy, nitrogen, and other easily soluble nutrients required by rumen microbial development as the primary source of protein for ruminant animal growth and output. Sakura blocks have been used as feed to boost beef cattle growth (Jarmuji et al., 2017; Santoso et al., 2017). Increasing milk production and quality for dairy cows (Jarmuji et al., 2021) and dairy goat milk production (Jarmuji et al., 2018; Soetrisno et al., 2019). As a supplemental feed, the nutritional quality of sakura block, particularly its protein level, has to be enhanced. Using 6% earthworm flour in the sakura block plus raised the protein content of the sakura block from 17.83% to 25.28% and improved the overall digestible nutrient value from 78.87% to 87.10%. (Jarmuji et al., 2021b). Jarmuji et al. (2022) discovered that adding 10-14% sakura block plus to ammoniated palm frond-based meals increased the digestibility of dry matter, organic matter, and crude protein in vitro. Based on the initial study's findings, the researcher wishes to undertake additional research to determine the economic value of employing ammoniated palm frond-based meals supplemented with sakura block plus.

Materials and methods

For three months, researchers worked in the Commercial Animal Zone (ZCAL) of the Department of Animal Husbandry, Faculty of Agriculture, University of Bengkulu. Livestock enclosures with feed and drinking containers, livestock scales, digital scales, ammoniated palm fronds, cassava flour, palm kernel cake, tofu dregs, worm meal, and sakura blocks were used.

Cage preparation

The cage is a permanent cage with an open system composed of tin roof concrete. The cage was cleaned and disinfectant sprayed before it was used for research. Individual cages with a width of 1.5 m and a length of 3 m fitted with feeding and drinking areas for cattle.

Ration preparation

The ration consisted of ammoniated palm fronds as basal feed, concentrate (cassava flour, dried tofu dregs, and palm oil cake), commercial block sakura, and block sakura plus as supplementary feed. Palm fronds are acquired as a byproduct of oil palm harvesting in oil palm fields near the study site. Cassava flour is manufactured from cassava with its outer skin peeled, dried in the sun to a 10% water content, and crushed into flour. Dried tofu dregs are made by pressing fresh tofu dregs and then sun-drying them till the water content is 10%. Palm cake is a byproduct of the manufacturing of palm kernel oil. Sakura block plus was created using the procedure described by Jarmuji *et al.* (2017). Sakura block plus comprises rejected brown sugar, rice bran, refined palm kernel meal, earthworm flour, sago flour, urea, crushed salt, crushed TSP, mineral mix, and topmix.

The design used in the third phase of the study was the Latin Square Design (LSD) with treatments P0 (10% sakura block plus), P1(12% sakura block plus), and P3 (14% sakura block plus). The composition of the treatment rations is presented in table 1, while the composition of the rations based on the price of the ingredients used is presented in table 2.

Ration efficiency

The quality of the ration ingested by livestock is determined by measuring ration efficiency. The formula is as follows:

$$\text{Rations Efficiency (RE)} = \frac{\text{Body Weight Gain (kg)}}{\text{Ration consumption (Kg)}}$$

Feed cost per gain

Feed cost per gain is determined by dividing the average body weight gain obtained by the breeder's daily feed price at the time of the study. The following formula is used:

$$\text{Feed Cost per Gain (FC/G)} = \frac{\text{Consumption (kg) x price}}{\text{Weight gain (kg)}}$$

Table 1. Composition of Sakura block

Material (%)	P0	P1	P2	P3
Palm fronds oil	40	40	40	40
Cassava flour	25	25	25	25
Dregs tofu	10	10	8	6
Palm oil cake	15	15	15	15
SB	10	0	0	0
SB plus	0	10	12	14
Total	100	100	100	100

Table 2. The composition of the ingredients and the price of feedstuff ingredients in Sakura block

Ingredients	Unit price (IDR/kg)	P0		P1		P2		P3	
		Qty (%)	Price (IDR)	Qty (%)	Price (IDR)	Qty (%)	Price (IDR)	Qty (%)	Price (IDR)
Palm fronds	250	0.40	100	0.4	100	0.4	100	0.4	100
Cassava	6000	0.25	1500	0.25	1500	0.25	1500	0.25	1500
Dregs tofu	2000	0.1	200	0.1	200	0.08	160	0.06	120
Palm oil cake	1800	0.15	270	0.15	270	0.15	270	0.15	270
SB	6415	0.1	641.5	0	0	0	0	0	0
SB plus	8740	0	0	0.1	874	0.12	1048.8	0.14	1223.6
Total			2,711.5		2,944		3,078.8		3,213.6

Note: SB: Sakura block, the price of feedstuff ingredients is determined based on the price of ingredients in Bengkulu Province in 2022

Income over feed cost (IOFC)

The Income Over Feed Cost (IOFC) calculation estimates the economic value of feed on the income of beef cattle producers. The average body weight gain is multiplied by the selling price of cattle per kg live weight to compute IOFC. Selling fertilizer made from cow feces collected by breeders generates income from feces. The following calculation formula is used:

IOFC= Income (IDR) – Ration costs (IDR)

Revenue per cost ratio (R/C)

Revenue per cost determines whether the fattening cattle business is profitable. If the R/C value > 1 means the business is profitable and vice versa. The greater the R/C value, the higher the profit of the business. The calculation formula used is as follows:

$$\text{R/C ratio} = \frac{income\ (IDR)}{Ration\ costs\ (IDR)}$$

Statistic analysis

All data obtained were processed and analyzed for diversity using the SPSS version 21.00 program using ANOVA and continued with the Duncan test (Duncan's Multiple Range Tests = DMRT) (SPSS, 2012).

RESULTS AND DISCUSSION

Ration Efficiency (RE), Feed Cost per Gain (FC/G), Income Over Feed Cost (IOFC), and Revenue per Cost Ratio (R/C) figures can be calculated using data on livestock feed intake and daily body weight gain. Although the difference is not statistically significant, there is a trend for lower costs to create weight growth (FC/G) in treating cattle given palm frond-based rations with sakura block plus supplements. At the same time, income earned based on feed costs (IOFC) will likely increase (Table 3).

Rations efficiency

Cattle-fed rations supplemented with commercial sakura block (P0) had an average Ration Efficiency (ER) of 0.13, while cows-fed block + sakura rations had an ER of 0.14 (P1) and 0.15 (P2 and P3) (Table 3). It was shown that every 1 kilogram of feed resulted in a 0.13 kg increase in body weight (P0). This study's results were 0.07 greater than those of Jarmuji et al. (2017) in Kaur cattle given a feed of 75% palm fronds, 25% Setaria grass, and 0.4 kg commercial block sakura. This result is also more significant than that of Handayanta et al. (2017), who found a ration efficiency of 0.021 for beef cattle-fed field grass in the Gunung Kidul area of Yogyakarta. According to Siregar (2001), the effectiveness of diets in beef cattle ranges from 0.08 to 0.11. The higher the efficiency rating of the ration, the less likely the ration consumed is to cause body weight growth. Several factors influence ration efficiency, including the ration's digestibility value, the adequacy of nutrients for basic life and production, and the diet's quality (Pond et al., 2005).

Feed cost per gain

Feed Cost per Gain (FC/G) is the cost of a feed to produce one kilogram of body weight gain. The FC/G ratio was obtained by dividing the price of the ration material at the time of the study by the daily body weight increase. The results showed that the average feed cost per gain in the control treatment (P0) was IDR 30,563, whereas the treatments of cattle which received sakura block plus were IDR 25,442 (P1), IDR 22,603 (P2), and IDR 24,136 (P3) (Table 3). Cattle-fed palm frond-based feeds with 12% sakura block plus (P2) had the lowest costs to improve body weight gain when compared to controls (P0), 10% Sakura block plus (P1), and 14% Sakura block plus (P3). This low FC/G value is linked to the high feed efficiency value, which means that even though the ration consumption is relatively large and expensive, it can provide better body weight gain than other treatments.

Table 3. Average values of RE, FC/G, IOFC and R/C

Parameter	Treatment			
	P0	P1	P2	P3
RE	0.13	0.14	0,15	0.15
FC/G (IDR)	30,563	25,442	22,603	24,136
IOFC (IDR)	28,561	34,366	43,003	39,970
R/C ratio	3.29	3.29	3.57	3.42

Compared to the findings of Handayanta et al. (2017), who found that the value of FC/G in cattle fed by purchasing forage during the dry season may reach IDR 46,166, this result is much better. Palm fronds are a high-potential by-product for use in cattle ration. Palm fronds have so far only been discarded in oil palm plantation areas, where they can develop nests for rats, porcupines, or pigs, causing harm to the oil palm plantations. Because of the large availability of palm fronds in the oil palm plantation area, the rupiah value of ammoniated palm fronds is relatively cheap, around IDR 250/kg. Although the ration in P2 contains 40% palm fronds, 12% block plus sakura, and 48% concentrate (capped cassava, tofu dregs, and palm oil cake) with a rupiah worth of IDR 3,078.8 / kg, it can result in increased body weight gain.

Income over feed cost

Income Over Feed Cost (IOFC) is used to determine the economic value of feed concerning the income of beef cattle breeders. Table 3 shows growing cows fed a treatment ration of palm fronds and additional feed in the form of sakura blocks. The rupiah value of body weight gain and fertilizer production from faeces is a parameter of the farmer's income when raising growth phase cows. Although not significantly different (P>0.05), descriptively, the group of cattle that received a ration based on palm fronds with 12% sakura block plus (P2) produced a higher IOFC than the others. IOFC P2 value of IDR 43,003/head/day or an increase of 50.57% from the group of cattle that were given a ration based on palm fronds with 10% cherry commercial block (P0), which was IDR 28,561. The value of IOFC P1 and P3 is IDR 34,366/head/day (20.32% increase from P0) and IDR 39,970/head/day (39.94% of P0) (Table 3).

In this study, IOFC differences were caused by disparities in body weight gain and ration costs. P2, although having a higher rupiah value for feeding costs than P0, the resulting body weight gain is more efficient. The findings of this study outperformed the IOFC average in the group of cattle grown during the dry season consuming pasture, which was IDR 3,464.32. (Handayanta et al., 2017). PO cattle were fed field grass and concentrate in palm oil cake, palm oil sludge, and soy sauce waste with a crude protein level of 14%, resulting in an IOFC of IDR 10,783.7 per head/day, according to Zakiatulyaqina et al. (2017). The same thing was reported by Setiawan (2012); a group of PO cattle given a ration of field grass, mulberry leaf meal, and corn flour produced an IOFC of IDR 16,251 per head/day. The higher the IOFC value will provide good cattle farming business profits.

Revenue cost ratio

Another parameter to consider in a cattle breeding business is the Revenue Cost Ratio (R/C), the ratio of business revenue to business (Fitriadi dan Nurmalina, 2008). Cattle-raising business is said to be profitable if R/C > 1; otherwise, if R/C < 1, then the business is inefficient or detrimental. Based on table 3, the average R/C for each treatment is > 1; this means that the fattening of Kaur cattle fed ammoniated palm fronds, concentrate feed, and block plus sakura produces better profits. Even though it was not different (P>0.05), the best R/C value was produced in the group of cattle that received 12% sakura block plus (P2) supplementation, which was 3.57. Meanwhile, R/C P0 was 3.29, P1 (3.29), and P3 (3.42). This study's outcomes were comparable to those of other forms of meals. According to Amalia et al. (2003), PO cattle fed a feed of fermented corn cobs mixed with rice bran had an R/C of 1.08.

CONCLUSION

Economically, kaur cow fattening, which gains palm fronds-based diet with supplementation 12% sakura block plus, tends to result in higher benefits than supplementation sakura block plus at 10% and 14% dosage or supplementation 10% sakura block commercial. Even though the diet cost is higher, economically, palm fronds-based diet delivery with 12% sakura block plus is more efficient. It was shown by lower feed cost per gain and higher income over feed cost compared to other treatments. Earthworms are a material component that provides a high value in the cost of making sakura blocks. This could be a business opportunity to gain maximum profit by improving the performance of cows integrated with oil palm.

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