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The Use of Cocoa Bean Waste as a Supplement in Male Bali Cattle Feeding

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ABSTRACT

Cattle breeding farmers generally give less attention in the management, particularly post weaning calf feeding to produce breeding stock. This study aims to improve the performance and efficiency of post weaning Bali cattle with feed supplementation using local feed ingredients. The study was conducted in farmers pen in the Village of Karya Mukti, District Dampelas, Donggala Region, Central Sulawesi Province. Twenty young male Bali cattle with average initial body weight of 102 kg, at the age of eight months old, was randomly placed in individual pen. Feed given about 3% of body weight based on dry matter with ratio forage to concentrate 50 to 50%. Feed supplement as a treatment consist of: I (rice bran) and II (rice bran 60% + 40% cocoa bean waste), with 10 replications in each treatment. Data of feed consumption, daily weight gain, feed conversion were analyzed using T-test. The results of the study showed that the consumption of dry matter, organic matter, and ether extract between treatment I than II were not significantly different. Consumption of crude fiber of treatment I was higher than treat II (0.65 vs 0.39 kg/day). Consumption of crude protein in the first was lower than the second treatment (0.353 vs 0.407 kg/day). Total digestible nutrient in the first treatment was lower than the second (2.18 vs 2.25 kg/day). Increased daily body weight on the first treatment was lower than the second (0.251 vs 0.375 kg/day). Feed conversion on the first treatment was higher than the second (17.77 vs 10.64). From this study, it can be concluded that a mixture of 60% rice bran as a source of energy with 40% cocoa bean waste as a feed source of protein supplementation resulted in better daily weight gain and feed efficiency than rice bran supplementation.

Key Words: Bali Cattle, Feed Supplementation, Cocoa Beans Waste, Performance

INTRODUCTION

Beef cattle raised by farmer is generally aiming to produce a calf. Low productivity of local cattle is indicated by high level of livestock mortality, especially calf and cow mortality which reaches 20-40% and 10-20%, respectively. It is mainly due to lack of feed and water especially during the dry season. Low productivity of local cattle is related to the condition of beef cattle farms, which are about more than 90% characterized by: (1) The relatively small-scale businesses, ranging between 1-5 heads; (2) As household business; (3) Traditional maintenance; (4) Cattle are often used as a source of labor; and (5) As a livestock manure producer and as savings that provide security in the dry season (Rohaeni & Sumanto 2006).

Bali cattle is one of the native genetic resources in Indonesia. Bali cattle has high capability in adjusting the body conditions and maintains high reproductive performance so that the cow is very adaptive to fit their specific agro-ecosystems. Efforts towards intensification program or breeding cow calf operation using Bali cattle can help overcome the problems of lack feeder supply in beef industry in Indonesia (Dwiyanto & Priyanti 2008). In this regard, management improvement of Bali cattle can be done by utilizing the

feed ingredients from agricultural by-products as one of the alternative feed, which more productive and efficient.

The increase in production, productivity and competitiveness of agribusiness beef cattle would be more meaningful when done by utilizing local resources in an optimal (comparative advantage) and, coupled with support by innovative technologies (competitive advantage) as well as other innovations. This can be done through optimize the genetic potential of beef cattle through improved management, more efficient feed supply, and give attention to the interaction between genetic factors and environment (genotype environment interaction, GEI) (Diwyanto 2008). Therefore the technological innovations should be developed, both in terms of breed selection and the feed offered. This include feeding management which not be generalized and adjusted to the availability of raw feed ingredient as source of fiber, energy and protein which is available in the location of agribusiness.

Local cattle development rely more on local resources, so it does not require too much addition of raw feed from outside. Considering that the Central Sulawesi Province is one of the largest cocoa producer in Indonesia, bean waste as cocoa beans by-products consisted of pieces of cocoa beans and bean waste, is considerable potential residual 10% from cocoa beans industry (Burhanuddin 2001). The potential of cocoa beans waste at 551,211 tonnes/year (bean skin, pulp, and placenta). Cocoa beans waste can be used as energy and protein source, so it can be used as an alternative feed for cattle (Soeharsono et al. 2014).

Cattle breeding ranchers enterprises generally give less attention in the management primarily feeding to calf post weaning to produce feeder. Consequently post weaning calf growth is very slow, so that at a certain age, it is not ready to be fattened. One strategy is improved feeding to post weaning young bulls. This study aims to improve the performance and efficiency of young Bali cattle through feed supplementation using local feed ingredients so that the sale value of feeder cattle on farmer level can be increased.

MATERIAL AND METHODS

Research of feed supplementation was done in Bali cattle farmers group member of Maju Bersama Farmer Group, in Mukti Karya Village, Dampelas District, Donggala Region. Central Sulawesi Province. A total of 20 young male Bali cattle with average initial body weight 102 kg, at age eight months old, were randomly placed in individual pen. Feed given about 3% of body weight based on dry matter with a proportion of forage:concentrate = 50:50%. King grass was used as the basal diet as forage source. Feed supplement as a treatment consisted of: I (rice bran) and II (rice bran 60% + 40% cocoa bean waste). Each treatment had 10 heads as replication The chemical composition of feed ingredients are presented in Table 1. Cocoa beans waste in the form of granules with dimensions ranging from 0.1 to 0.5 cm in the rest of the processing of dry beans and obtained from the warehouse of a merchant.

The study was conducted over 72 days. Forage was given twice a day and feed supplement was given once a day in the afternoon. Water was given *ad libitum*. Feed consumption was measured every seven days and increasing body weight was measured every month. Parameters measured include daily gain, feed intake, and feed conversion. Data were analyzed T-test.

Table 1. Chemical composition of feed ingredients on Bali cattle younger male rearing

Feed ingredient	Chemical composition[1]							
	DM	OM	Ash	CF	CP	EE	ETN	TDN[2]
	---------- % DM ----------							
King grass	21.28	90.02	9.98	24.27	9.70	3.60	52.46	59.48
Cocoa bean waste	82.70	88.83	8.17	10.89	16.66	5.23	59.05	64.49
Rice bran	86.29	91.88	8.12	10.14	9.43	5.72	66.59	59.12
60% rice bran + 40% cocoa bean waste	85.06	90.71	11.09	10.44	12.32	5.53	63.57	61.27

DM: Dry matter; OM: Organic matter; CF: Crude fiber; CP: Crude protein; EE: Ether extract; ETN: Extract non nitrogen; TDN: Total digestible nutrient; [1]The results of proximate analysis done at Laboratory of Animal Feed Nutrition, Livestock and Fisheries Faculty, Tadulako University, Central Sulawesi; [2]TDN was calculated according to Hartadi et al. (2005)

RESULTS AND DISCUSSION

Feed intake

The consumptions of dry matter, organic matter, crude fiber, crude protein, ether extract, and total digestible nutrient are presented in Table 2.

Table 2. Consumption of DM, OM, CF, CP, EE, and TDN (kg) in male Bali cattle with different feed supplementation

Parameter	Feed supplementation	
	Rice bran (n = 10)	Rice bran + cocoa bean waste (60:40) (n = 10)
DM	3.684±0.262	3.740±0.427
OM	3.348±0.235	3.379±0.385
CF	0.650±0.063	0.672±0.104
CP	0.353±0.025	0.407±0.041
EE	0.167±0.015	0.167±0.015
TDN	2.185^{a}±0.156	2.255^{b}±0.254

[a,b]Different superscript in the same row indicates significantly different ($P<0.05$)

Supplementary feeding in male Bali cattle at growing stage in both treatments met the feed requirement of cattle. The bull with body weight of 150 kg with daily gain of 0.25 kg/day requires dry matter consumption of 3.80 kg/day, crude protein 400 g/day and 1.8 kg TDN/day (Kearl 1982).

Dry matter, organic matter, crude fiber, and extract ether intakes of both diet were not significantly different. Whereas crude protein and TDN consumptions in rice bran and cocoa beans waste mixture supplement were higher than rice bran supplementation (0.407, 2.255 kg/day vs 0.353, 2.185 kg/day), respectively. Based on the nutrient intake, supplementation of 60% rice bran with cocoa beans waste 40% mixture has better nutritional value compared to rice bran supplementation. Cocoa beans waste can be used as crude protein and TDN source for ruminant feed material, with low crude fiber content (Table 1).

Performance

Result on the performances of young male Bali cattle is presented in Table 3. Average daily gain (ADG) in the treatment of rice bran supplementation was lower than the 60% rice bran with 40% cocoa beans waste mixture supplementation (0.251 vs 0.375 kg/day). The higher ADG on feed supplementation in the form of rice bran 60% with 40% cocoa bean waste mixture was due to higher crude protein and TDN consumption (Table 2). Better quality feed followed by higher consumption affected on higher growth rate (Table 3). The consumption of protein and higher energy will generate faster growth rate (Soeparno 2005). Degradation of carbohydrate and N supply in the rumen of cattle affected the efficient use of energy and protein and the growth rate (Valkeners et al. 2004). Changes source of carbohydrates and protein in the feed are influenced by specific changing substrates such as starch and protein NDF with the NPN important effect on the balance (Cabrita et al. 2006). This is possible because the cocoa bean waste which consisted of seeds' hull, pulp and placenta has crude fiber and crude protein contents (10.89 and 16.66%). The balance of rumen fermentation is influenced by substrate feed ingredients, environmental conditions rumen, rumen microbes, and rumen fermentation products. Protein synthesis rumen microbial can be maximized by synchronizing the availability of energy and N degraded in the process of fermentation rumen (Soeharsono 2011).

Table 3. Performance of Bali cattle younger male with different feed supplementation

Parameter	Feed supplementation	
	Rice bran (n = 10)	Rice bran + cocoa bean waste (60:40) (n = 10)
Initial body weight (kg)	105.250±11.628	97.820±25.656
Final body weight (kg)	123.350±11.952	124.850±23.507
Average daily gain (kg)	0.251^{a}±0.097	0.375^{b}±0.103
Feed intake (kg)	3.684±0.262	3.740±0.427
Feed conversion	18.000^{b}±10.654	10.702^{a}±3.375

^{a,b}Different superscript in the same row indicates significantly different ($P<0.05$)

Feed conversion in treatment rice bran feed supplementation was higher compared to the rice bran and cocoa beans waste mixture (18.00 vs 10.70). The results provide an indication that the larger ADG on fattening will lead to the efficient use of feed, and profitable. Efficient use of energy and protein for microbial growth thus improved feed conversion efficiency, decreased absorption of NH_3, and lower N excretion (Reynolds & Kristensen 2008). The results of this study shows that supplementing with a mixture of 60% rice bran as a source of energy and 40% of cocoa beans waste as a protein source in young male Bali cattle feeding resulted in higher ADG and feed efficiency.

CONCLUSION

It can be concluded that supplementation mixture of 60% rice bran as a source of energy and 40% cocoa beans waste as protein source to young male Bali cattle increased daily body weight gain, and resulted in better feed efficiency compared to rice bran as single supplement.

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