

Alternative Rations to Maintain High Growth Rate of Bali Bulls Fattened with Leucaena Based Diet in Sumbawa, Eastern Indonesia

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ABSTRACT: Alternative rations to maintain high live weight gain (LWG) of Bali bulls fed leucaena basal diet over season had been studied under field condition in Sumbawa district of West Nusa Tenggara Province. Twenty four male Bali cattle with an initial age of 17±3 months and initial body weight of 163±36 Kg were used. The animals were randomly allocated into four dietary treatments with six replicates per treatment. The treatments were leucaena solely *ad libitum* (LS); Leucaena 1.0% BW with native grass *ad libitum* (LG); Leucaena *ad libitum* with maize 0.5% BW (LM) and Leucaena 1.0% BW with maize 0.5% and native grass *ad libitum* (LMG). Native grass consists of grass, weeds and forbs that commonly fed to animal in the area. Live weight gain and feed intake were determined over 20 weeks. Body weight was recorded twice per month. The LWG was not different for bull fed LM (0.62 Kg/d), LS (0.57 Kg/d) and LMG (0.58 Kg/d) however higher than that of bull fed LG (0.48 Kg/d). Bull fed LM had highest total dry matter (DM) intake (28.7 g DM/Kg LW) and no differences in total DM intake between bull fed LS (26.1 g DM/Kg LW) and LMG (25.8 g DM/Kg LW) while the lowest total DM intake had recorded in bull fed LG (21.0 g DM/Kg LW). Addition of maize of 0.5% BW in the diet have no negative effect on leucaena intake resulted in an increased on total intake. Feeding leucaena restricted to 1% BW with maize 0.5% BW and grasses *ad libitum* resulted on similar total intake to LA diet while without maize and grass *ad libitum* resulted in lower total intake and thus LWG. The proportion of leucaena (50%) in LG diet may be inadequate to have similar response in intake and LWG to LS diet. Leucaena maize, LMG and LG diet can be used as an alternate ration other than leucaena alone to maintain high live weight gain over season under traditional fattening systems in Sumbawa.

Keywords: rations, fattening, liveweight gain, Bali cattle, leucaena

INTRODUCTION

West Nusa Tenggara province is one of prominent cattle sources in Indonesia. Current cattle population in both Lombok and Sumbawa islands is 1 million head (NTB in Figures, 2014). The island of Sumbawa inhabited by 57% of total cattle population in the province with Bali cattle as a dominant breed. Bali cattle are the best local beef breed in the region considered to the ability to adapt in harsh environment condition (Martoyo, 2012). Cattle production in Sumbawa basically bases on extensive systems where mostly cattle graze both native grass in a common land and agricultural residue following harvesting time. Panjaitan (2012) reported that Bali bulls fed tropical grasses and forbs under fully confined traditional fattening system gained weight of 0.26 Kg/d. However, Mastika (2003) recorded when Bali cattle fed high quality feed this local beef breed capable to reach live weight gain (LWG) of 0.85 Kg/d. Leucaena is one of high quality forages that available around the island. Dahlanuddin *et. al.* (2014) reported that feeding leucaena as a sole component of the diet to weaned male Bali cattle increased LWG of 0.47 kg/d. Rhee subdistrict is an area in Sumbawa region that already practiced an intensive fattening system based on leucaena (*Leucaena leucocephala*) more than three decades (Panjaitan *et. al.*, 2014). It had been reported that leucaena feeding in this area resulted in average LWG of 0.42 Kg/d with the highest point of 0.62 Kg/d in a good season where leucaena leaf available lush and leucaena fed to nearly 100% (Panjaitan *et. al.*, 2014). However, LWG of 0.23 Kg/d also recorded during peak of dry season due to inadequate feed offered to animal and leucaena fed less than 50% in the diets. This indicated

that leucaena production predominantly drive LWG thus the availability limit cattle production in this system. An exploration of other feed sources to add to leucaena as main component of diet is needed to improve feeding system in the region. The most available feed source in the region is native grass in the wet season and maize grain in late wet season to peak dry season. Maize grain has high non structural carbohydrate that may enhance rumen available energy to improve LWG while grass have a role to reduce unused rumen degraded N. Addition of maize and or grass in the diet is important to lengthen leucaena supply towards dry season and maintaining high LWG in this system. The objective of this study was to evaluate alternative rations to maintain high live weight gain over season in Bali cattle fatten based on leucaena feeding system in dry tropical Sumbawa.

MATERIALS AND METHOD

The experiment was conducted under field condition over 20 weeks between March 2013 and August 2013 at Jatisari (latitude 8°25'8.4"S; longitude 117°15'58.5"E and Altitude 6-42 m) Rhee subdistrict of Sumbawa region, West Nusa Tenggara, Indonesia.

Animals

Twenty four male Bali beef were used in this experiment. The bulls were approximately 17±3 months and initial body weight of 155±36 Kg (mean ± s.d. of the mean) at the commencement of the experiment. All bulls were treated with albendazole to control internal and external parasites before the commencement of the experiment.

Experimental design

The experimental design was a completely randomized design with four treatment and six replicates (animals) per treatment. Animals were randomly allocated into four treatment diets. The four treatments diets were (1) leucaena *ad libitum* (LS), (2) Leucaena *ad libitum* with maize at 0.5% of body weight (LM), (3) Leucaena at 1.0% of body weight with maize at 0.5% of body weight and grasses *ad libitum* (LMG) and (4) Leucaena at 1% of body weight with grasses *ad libitum* (LG). The amount of feed offered was based on dry matter basis. Drinking water was provided once a day between 11:00 and 13:00 hours in a 10 L bucket.

Feed and feeding procedures

Leucaena and grasses were collected in the evening or in the morning before feeding. Leucaena fed first to cattle in a half of daily allowance at 09:00 hours except for LG and LMG where all daily allowance of leucaena fed at once. Maize grain fed at around 11:00 hours following leucaena feeding in the morning. Drinking water provided at between 12:00 and 13 hours and bull allowed to drink to satiety and the remaining feeds offered at around 14:00 hours. Grasses were mainly native grass and a mixture of various grasses and forbs.

Sampling procedure and measurement

Live weight was recorded twice a month over a 138 day period and average live weight gain (LWG) was determined. Feed intake was measured over seven consecutive days on three consecutive months during experiment. Dry matter content of feeds offered and feed refusals was determined by drying sample to a constant weight at 70 °C in a forced fan oven.

Statistical analysis

The study was conducted under completely randomized design. The statistical significance of treatments effect on LWG and intake was tested by analysis of variance (ANOVAs). The significant differences between treatments were tested using Duncan Multiple Range Test (DMRT) procedure. All data were analysed using the statistical package SPSS version 16.0.

RESULTS AND DISCUSSION

Live weight gain

Substitution of leucaena to other locally available feed sources in bull fed leucaena alone primarily are to lengthen availability of leucaena in order to maintain high liveweight gain of Bali bull over season under traditional fattening systems in Sumbawa. Total LWG and daily LWG of Bali bull fed four different diets based on leucaena are given in Table 1. Bull fed leucaena alone (LS) gained weight of 0.57 Kg/d and addition of maize and grass in the diet has no different results in LWG for both LM (0.62 Kg/d) and LMG (0.58 Kg/d) diets. However, bull fed LG had lower LWG than that of bull fed LS, LM and LMG diets.

Table 1. Total and daily liveweight gain of Bali bull fed leucaena (L), leucaena at 1% BW and grass ad libitum (LG), leucaena ad libitum and maize at 0.5% BW (LM) and leucaena at 1% BW, maize at 0.5% BW and grasses ad libitum (LMG).

Parameters		L	LG	LM	LMG
Initial weight	Kg	151.6±37.6	154.8±32.5	180.5±42.0	135.3±25.6
Final weight	Kg	230.8±35.9	221.2±23.4	266.7±48.0	215.7±22.1
Total LWG	Kg	79.2±10.4 ^a	66.3±14.8 ^b	86.2±7.1 ^a	80.3±13.0 ^a
LWG	Kg/d	0.57±0.08 ^a	0.62±0.05 ^a	0.48±0.11 ^b	0.58±0.09 ^a

This study confirmed that feeding Bali bull with high content of leucaena in the diet resulted in high LWG. The results found agree with previous study reported by Dahlanuddin *et. al.* (2014), Panjaitan *et. al.* (2013) and Panjaitan *et. al.* (2014) who has reported a LWG above of 0.40 Kg/d in cattle fed high content of leucaena in diets. However, lower LWG in bull fed LG diet may be associated with proportion of leucaena in the diet. Feeding leucaena at 1% BW with grass ad libitum may not be enough to attain minimum limit of leucaena to have a high LWG as reach by bull fed leucaena solely.

Intake

Intake is the most important factor affecting LWG and the intake of leucaena and total dry matter intake of bull fed various leucaena based diet under traditional fattening system are shown in Table 2. Male Bali beef fed leucaena as the sole diet (LS) consumed leucaena at 26.1 g DM/Kg BW/d or 2.6% of BW and this leucaena intake was no different to bull fed LM diet where the intake of leucaena was 24.2 g DM/Kg BW/d as a result, bull fed LM diet that received maize at 0.5% BW had higher total dry matter intake than that of bull fed LS diet. The intake of leucaena in bull fed LG and LMG as expected lower than that of the intake of leucaena in bulls fed LS and LM as leucaena offered to bull for both diet restricted to 1% BW. Interestingly, grass intake for bull fed both LG and LMG diets was fairly similar to around 1% BW despite bulls fed LMG diet received maize to 0.5% BW. The highest total dry matter intake was in bulls fed LM diet, followed by LS and LMG but with no different to each other while the lowest was in bulls fed LG diet.

Table 2. Intake of leucaena in each diet and total dry matter intake of bull fed leucaena (L), leucaena at 1% BW and grass *ad libitum* (LG), leucaena *ad libitum* and maize at 0.5% BW (LM) and leucaena at 1% BW, maize at 0.5% BW and grasses *ad libitum* (LMG).

Parameters	L	LG	LM	LMG
Intake (g DM/kg LW d-1)				
Leucaena	26.1±1.1 ^a	10.4±0.8 ^b	24.2±3.0 ^a	11.0±1.2 ^b

Maize	n.a	n.a	4.5±0.1	4.5±0.3
Grasses	n.a	10.6±1.6	n.a	10.1±1.2
Total	26.1±1.1 ^a	21.0±1.6 ^b	28.7±2.9 ^c	25.8±1.5 ^a
Leucaena proportion (%)	100±0.0	49.8±4.7	84.0±1.7	42.8±4.2

Leucaena intake in bull fed leucaena solely in this study lower than previous study reported by Dahlanuddin *et. al.* (2014) who recorded leucaena intake of 29.3 g DM/Kg BW/d on weaned male Bali calves fed leucaena hay *ad libitum*. Differences in class of animal may be responded differently to similar diet. Animals in the current study were older thus range of nutrients required for growth may be different. However, when maize added up to 0.5% BW with leucaena *ad libitum* did not affect leucaena intake thus resulted total dry matter intake of 28.7 g DM/kg BW/d and close to total dry matter intake of weaned male Bali cattle fed leucaena as sole diet reported by Dahlanuddin *et. al.* (2014). Feeding leucaena at 1% BW with or without addition of maize at 0.5% BW in diets was only able to stimulate intake of grass to around 1% BW. Thus resulted total intake of LMG diet relatively similar to LS diet but below LM diet. This indicated that more than 1% BW of leucaena required to compost leucaena grass diet with or without maize at 0.5% BW to have an optimal intake.

Liveweight gain obtained in this study was in accordance pattern with total dry matter intake. Although LWG of bull fed LM was not significantly different to bull fed LS and LMG but showed similar trend to the total dry matter intake. This suggests that feeding LM, LMG and LG diets result relatively similar LWG to LS diet.

CONCLUSION

Leucaena-maize, leucaena-maize-grass or leucaena-grass provided an option rations to leucaena sole diet to maintain high growth rate of Bali bulls fatten based on leucaena thus lengthen leucaena supply over season in order to sustain fattening activities year around.

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