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Supplementation of Solid Ex-Decanter on Performance of Cattle Fed Palm Fruit By-Products

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Abstract: The objectives of this study was to evaluate the potential of palm fruit by-products as feed supplement to increase weaned calves performance. Solid ex-decanter were combined with multi mineral and utilized as feed supplement to form a lick block. Ten weaned calves 6 months old (122.34±20.25 kg) were randomly categorized into 2 groups. Control weaned calves receive no Solid Ex-Decanter Multi-Nutrient Block (SEDMB) supplementation and treated calf were given continuously. The experiment was conducted at rural farming areas in Darmasraya and calves fed total mix ratio formulated with palm fruit by product based. Measured parameter were daily weight gain (DWG), body condition score (BCS), feed consumption, feed conversion, *in vivo* dry matter and organic matter digestibility. The treatment were significantly different ($p < 0.05$) on daily weight gain, body condition score and feed conversion but did not significantly different ($p > 0.05$) on feed consumption, dry matter and organic matter digestibility. SEDMB supplementation on weaned calves performance of Simbrah Breed showed the effectiveness of feed consumption.

Key words: Solid ex-decanter, calves, supplement, palm fruit by-products

INTRODUCTION

The world's palm oil production was 36.85 million metric tons while Indonesian as lead of oil palm producers in the world with an estimated planted area 6.07 million hectares (USDA report, 2007). The oil palm industry offers two opportunities to promote animal production; firstly feed source from oil palm industry by-product, palm press fibre and palm kernel cake; secondly from palm plantation, the forages in the inter-rows and oil palm fronds after regular pruning. These are potential feed source as the yields, palatability and nutritive values are adequate for cattle. The objectives of systematic integration of beef cattle and palm fruit agroindustry are cattle maximized palm fruit agroindustry product through optimal use of resources and also use cattle feces as fertilizer to reduce the use of synthetic fertilizers.

Under appropriate conditions and systematic management, cattle can be effectively used for weed control. The use of cattle as a biological weed control mechanism in oil palm plantation allows the establishments of a harmonious relationship between the undergrowth and oil palm. Reduced herbicides usages are environmentally healthy and simultaneously help to reduce total weeding cost through lower volume of chemical use and reduced and labor. Reduced herbicides usage means reduced maintenance cost and less environmental

contamination and pollution (Azid, 2004). Several study shown that integrated farm system between cattle and oil palm plantation under systematic management shows good potential as a livestock production system (Jalaludin, 1997; Wahab, 2003; Devendra and Leng, 2011).

Livestock production in developing countries is largely dependent on fibrous feeds-mainly crop residues and low quality pasture that are deficient in protein, minerals and vitamins (Makkar, 2007). The advantages of the use of multi-nutritional blocks, in diets based on crop by-products or pastures of typical low quality, are well known in terms of providing adequate non-protein nitrogen in the rumen, improving both function and efficiency, which is reflected in higher voluntary intake by the animal and better digestibility of fibre. Nutrition programs are requirement to minimize use of purchased mixed rations that the cost is generally higher and finally calves get to consume some feed provide protein and minerals. Later calves provide nutrition to promote some gain but maintain health status.

MATERIALS AND METHODS

Ten weaned calves 6 month old (122.1±19.27 kg) were randomly categorized into 2 groups. Control weaned calves receive no Solid Ex-Decanter Multi-Nutrient Block (SEDMB) supplementation and treated calf were given continuously or *ad libitum*. The design used in this study

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was t-test assuming a two-way where if $p < (+/-) 0.05$ is significantly different results, while if $p > (+/-) 0.05$ then the result is not significantly different. The experiment was conducted in July to September 2012 and calf fed total mix ratio formulated with palm fruit by-product based.

Parameters observed were daily weight gain (DWG), body condition score (BCS), feed consumption, feed conversion, *in vivo* dry matter and organic matter digestibility. All calves were weighed before feeding on d-0 and at d-7 intervals thereafter. On weigh days, drinkers were turned off and emptied. Number of days on test required to attain the predetermined market weight was recorded. Total average daily gain (ADG) was computed as the difference between initial body weight (BW) and final BW divided by number of days on test. Each morning the feed bunks were observed and adjustments were made in the amount of feed offered daily depending on the amount of residual feed in the feed bunks. Body condition was scored using standard procedures basen on a scale of 1 to 9, as describe by Eversole *et al.* (2009). Calves were scored for body condition every 2 weeks.

RESULTS AND DISCUSSION

Daily weight gain (DWG): Beef producers face the challenge of remaining economically viable despite continuously changing paradigms in beef cattle production. Cow calf producers may want to consider early weaning as a management practice when traditional production systems cannot effectively address adverse conditions such as lack of forage, unfavorable market trends, noncompetitive freight rates and poor weather conditions.

Weaning weight can be increased by genetic (crossbreeding, growth potential) and environmental (creep feeding) manipulations or by age of calf (calving earlier and/or weaning later). Production efficiency can be enhanced by using nonharvested forage (Lamb *et al.*, 1996), but nutrient availability in forage can be limiting as forage matures. Nutritional status of cattle grazing mature native range forage can be increased with appropriate supplementation (Kartchner, 1980; Adams *et al.*, 1994; Sanson *et al.*, 1990).

As shown in Table 2, the results of daily weight gain of weaned calves after supplemented by solid ex-decanter multi-nutrient block (SEDMB) were significantly higher ($p < 0.05$) compared with non supplemented calves (0.563 Vs 0.37 kg/day). Leadley and Sodja (2003) reported that rates of weight gain up through weaning are lots of variations. The lowest rate of gain reported was 0.7 pounds (0.317 kg) per day for 42 days. The highest rate was 1.3 pounds (0.589 kg) per day for 56 days. Fluharty *et al.* (2000) also reported about daily weight gain of weaned calves after 36-70 day after weaning ± 0.8 kg/day on normally weaned (205 day old).

Table 1: Ration composition based on palm agroindustry by-product

No	Feed ingredients	Composition (%)
1	Native pasture	75
2	Solid ex-decanter	10
3	Palm midrib mill	14.5
4	Palm press fibre	0.5
	Total	100

Body condition score (BCS): Body condition scores (BCS) are numbers used to suggest the relative fatness or body composition of the cow. For BCS to be most helpful, producers need to calibrate the system under their own conditions with their own cattle. A nine-grade system is commonly used by researchers in the United States. Body condition was scored using standard procedures basen on a scale of 1 to 9, with a score of 1 representing very thin body condition and 9 extreme fatness (Eversole *et al.*, 2009).

SEDMB supplementation on weaned calves were significantly different ($p < 0.05$) than control (Table 3). BCS obtained were in line with increase of daily weight gain of Simbah breed weaned calves. Fluharty *et al.* (2000) reported body condition score of weaned calves with normally weaned (205 day old) were 4.4 after 99 day weaned. This score were lower than calves with early weaned (100 day old).

Body condition at weaning also is related to reproductive performance. Bowman and Sowell (1998) reported nine-year summary of data from more than 77,000 cows clearly shows that cows that are thin at weaning are less likely to become pregnant during the following breeding season. Mathis *et al.* (2002) suggested that every beef operation is different and producers using BCS as a tool should set BCS targets based on their willingness to assume risk. It probably is most effective to sort out thin cows at weaning and provide them with additional energy directly after weaning when their requirements are low.

Feed consumption and feed conversion: The key variables affecting the profitability of feedlots are: store cattle purchase price; finished cattle sale price; cost of feed consumed and live-weight gain. This fact sheet deals with feed consumption and live-weight gain. As shown in Table 3, the level of consumption on treated weaned calves were not significantly different ($p = 0.294$). Control calves were higher average feed consumption (12.71 kg/day). Although the average feed consumption of treated calves are lower than control, the daily weight gain of treated weaned calves shows higher value (Table 2) and gives significantly effect (statistical test). SEDMB supplementation on weaned calves also affecting feed conversion. Higher feed conversion (Table 3) shows on control weaned calves (35.22) than treated weaned calves (23.39). T-test results shows a significantly different ($p = 0.042$). It suggest that solid

Table 2: Body weight gain of Simbrah crossbred weaned calves on integrated farm system between cattle and palm fruit plantation

Calves	Control			Treatment		
	Initial weight (kg)	Final weight (kg)	Daily weight gain (kg)	Initial weight (kg)	Final weight (kg)	Daily weight gain (kg)
1	87	107	0.408	100	128	0.571
2	110	135	0.510	143	170	0.551
3	119	135	0.326	146	182	0.734
4	125	143	0.367	125	140	0.306
5	116	128	0.244	150	182	0.653
SD	111.4±11.9	129.9±11.2	0.37±0.08	132.8±16.8	160.4±20.3	0.563±0.13*

*: Significant difference (p<0.05). SD: Standard deviation

Table 3: Average Body Condition Score, Feed Consumption and Feed Conversion of Simbrah Breed on integrated farm system between cattle and oil palm plantation

Measured parameters	Control	Treatment	p-value
Body condition score	3.00*	3.75*	0.00021*
Feed consumption, kg	12.71	12.44	0.294 ^{ns}
Feed conversion	35.22	23.39	0.042*

*: Significant difference (p<0.05), ns: Not significant difference (p>0.05).
a: Body condition score: 1: Severely emaciated, 2: Emaciated, 3: Very thin, 4: Thin, 5: Moderate, 6: Good, 7: Very good, 8: Obese, 9: Very obese

Table 4: *In vivo* dry matter and organic matter digestibility

Measured parameters	Control	Treatment	p-value
Average dry matter digestibility, (%)	76.92	74.16	0.095 ^{ns}
Average organic matter digestibility, (%)	63.39	64.48	0.296 ^{ns}

*: Significant difference (p<0.05), ns: Not significant difference (p>0.05)

ex-decanter multi-nutrient block gives feed efficiency. Calves will instinctively lick a solid ex-decanter multi-nutrient block if felt needed mineral intake.

Dry matter and organic matter digestibility: Apparent digestibility is a naturally feed digestibility occurring in the digestive tract in the body of the ruminant livestock. The process of digestion occurs in the rumen were assisted by microorganisms in it. Digestion by microorganisms also performed by enzymatic that the enzyme produced by the cells of microorganisms in the rumen (Tillman *et al.*, 1991).

Commodities used in feedlot rations vary considerably in dry matter content (DM). Hay and grain are approximately 90% DM, molasses 75% DM and silage 40% DM. A basic guide for estimating dry matter consumption of feedlot animals is to calculate 2.7 to 3.0% of their live weight (in kilograms). Therefore, an animal consuming a grain based diet of 90% DM, would have an estimated intake of fresh feed between 3.0% (2.7% x 100/90) and 3.33% (3.0% x 100/90) of their live weight. The dry matter content of a ration refers to the amount of dry material available in a given ration. A number of factors influence the average daily dry matter consumption of lot-fed cattle. These include, live weight (other required maintenance energy requirements), body condition, energy concentration of the ration, health status and ration palatability (Sarah, 2012).

Based on the data in Table 4, the treatment were not statistically different (p>0.05) on dry matter and organic matter digestibility. Dry matter digestibility of control weaned calves were higher than treated weaned calves.

However, organic matter digestibly of weaned calves supplemented with SEDMB were higher even the statistically test were not significantly different (p>0.05). It was suggested that SEDMB supplementation promote rumen microbial activity to reach optimal digestibility with lower dry matter intake.

Conclusion: Based on the results of the study it can be concluded that the supplementation of solid ex-decanter multi-nutrient block as *ad libitum* can improve weaned calves performance. The treatment were significantly improved daily weight gain, body condition score and feed conversion. However, solid ex-decanter multi-nutrient block did not affect the apparent digestibility of the ration.

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