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Feasibility of Introducing Feeding Technology on Beef Cattle Fattening in Timor Island, East Nusa Tenggara

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ABSTRACT

This activity was part of the acceleration programs in order to support the improvement of beef cattle beef self-sufficiency in East Nusa Tenggara which was held in South Central Timor in the period of 2010-2014. The materials used in the assessment were natural grasses, herbaceous legume, and concentrates derived from agricultural byproduct such as bran, cassava fractions, skin pod green beans, corn, husks and cobs of corn, pith of *Corypha elata robx*, and *Gliricidia sepium* leaves. The study purpose was to know the feasibility of feeding technology made from herbaceous legume and concentrates which created based on local ingredients. Financial Analysis results showed that this feeding technology gave additional revenue compared the existed technology in nominal value (Rp 9,504,600; Rp 9,303,200; and Rp 3,875,400) and R/C (1.84; 1.23; and 1.17) point of view. The quantity, quality and continuity of forage is still a major obstacle until now. This is due to availability depends on the season, while many alternative technologies that can be applied by farmer, one of which is herbaceous legumes and concentrates derived from local raw materials. In conclusion, concentrate feeding technology was highly feasible to be developed as a low cost alternative feeding as well as utilizing crop byproduct.

Keywords*:* Fattening, Feasibility of technology, Timor Island

INTRODUCTION

Cattle population in East Nusa Tenggara was 778,663 head in 2012 with the highest population was in South Central Timor (SCT) District (167,783 head). This population indicated that cattle growth was still good even in low feeding availability and high calf mortality (>30%).

Feeding became important factor since its availability had been depended by season. Because of it, feeding technology was needed in order to overcome the shortage of feed itself as well as to improve feed quality. Several feeding technologies applied were silage technology, herbaceous legume farming, local concentrate feeding. Especially for local concentrate feeding, the ingredients used were bran, dried Gliricidia leaves, Leucaena leucocephala leaf, corn straw, corn cobs, corn flour and the remaining parts of crops harvested.

Local concentrate feeding had a significant impact in Bali Cattle for both growth and body weight gain. It had been proved by Rubianti *et al* (2013) and Ratnawaty *et al* (2014) that giving 1% local concentrate feeding from Calves Body Weight contributed 0.52 gr/day daily body weight gain, while 1,5% local concentrate feeding added with pith of the *Corypha elata robx* giving 0.34 until 1.09 kg/day daily body weight gain.

Study result on forage in Timor Island giving new hope and significantly improve farmer which only depend on native ranch grass which limited in quantity and quality. Planting herbaceous legume like *Clitoria ternatea*, *Centrosema pascuorum* dan *Dolichos lablab* giving 214.0 kg DM/ hectare; 218,0 kg DM/ hectare; and 448,7 kg DM/ hectare for feeding need.

The quantity, quality, and continuity of forage was still a major obstacle because it still had been depended on the season until now. Meanwhile there are many technologies can be applied in order to maximize local feeding potentiality. Based on this the study would investigate the feasibility of introducing feeding technology on beef cattle fattening in Timor Island, East Nusa Tenggara.

MATERIALS AND METHOD

Location and time

This activity was part of the acceleration activities in order to support of the beef cattle beef self-sufficiency in East Nusa Tenggara which held in South Central Timor (SCT) period 2010 – 2014.

Materials

The materials used are natural grass, legume herbs and concentrates derived from agricultural waste (bran, cassava fractions, skin pod green beans, corn, husks and cobs of corn, pith of *Corypha elata robx*, and *Gliricidia sepium* leaves).

Methods

The analytical method used is the financial analysis, the feasibility analysis in both manufacturing concentrate from agricultural waste and herbaceous legume utilization.

RESULTS AND DISCUSSIONS

Farming condition on Timor Island

Cattle population is 814 450 head in East Nusa Tenggara (East Nusa Tenggara Central Bureau of Statistics, 2013), with the highest percentage of population in West Timor which is 73.95% (East Nusa Tenggara Agricultural Statistics, 2012). This indicated good progress although not optimal due to the availability of highly fluctuating feed and the calf mortality which reach more than 30%.

East Nusa Tenggara which had 47.350 km^2 area with 4,355,121 people inside, 832,228 hectare ranch, more than 800,000 cattle was not sufficient in productivity improvement because of people intervention on narrowing carrying capacity including drinking water and feeding procurement for cattle (Anonymous, 2009). Meanwhile, even East Nusa Tenggara had 760,000 hectare potential land for agriculture, the most suitable business was beef cattle because it had dry climate. Its potentiality had been described by population improvement for the last 5 years (Table 1).

Table 1. Livestock growth on East Nusa Tenggara period 2008 – 2012

No	Commodity	Year (head)				
		2008	2009	2010	2011	2012
1	Cow	566,464	577,552	599,279	778,665	814,450
2	Buffalo	147,754	150,405	150,357	150,038	152,449
3	Horse	103,601	105,379	104,173	105,981	109,160
4	Goath	527,103	511,211	544,829	552,515	575,829
5	Sheep	60,329	60,849	61,683	62,876	63,109
6	Pig	1,533,072	2,266,750	1,615,487	1,699,705	1,724,316

Source: Statistic of NTT (NTT in figure, 2013)

Based on Table 1, population indicated that cattle growth was still good even in low feeding availability and high calf mortality for all commodity as an impact of non-intensive farming. The decrease of livestock population in East Nusa Tenggara was caused by either livestock distribution to outside the island or productive female cattle slaughtering without proper regulation. The other problems were health problem associated with rearing cattle by local farmer while the business itself takes approximately 5 years in order to get full profit, thus requiring a medium-term responsible management.

Livestock rearing varied in East Nusa Tenggara, but mostly dominated by extensive and semi-intensive system because East Nusa Tenggara consisted of savanna with dry climate characteristic. Based on the system, there were several dominant cattle rearing system: (1) Intensive system, Livestock tied all day, primarily raising livestock for fattening; (2) Livestock tied during the day and housed at night; (3) Cattle reared collectively in savanna during the day and then stabled at night; and (4) Livestock was released throughout both day and night then collected occasionally by owner when needed. Cattle population development in dry land East Nusa Tenggara encountered some obstacles and constraints among them, such as: (1) Feed quality and quantity decreased during dry season; (2) High calves mortality, especially Bali calf mortality can reach 20-50%, depend on the length of the dry season and mainly occurred in cattle grazing on natural pastures; (3) Cattle easily became ill as a result of poor maintenance system and declining condition of livestock during the dry season; (4) Breeding activities were still regarded as a sideline business, making it less serious efforts to increase productivity and value-added farm products East Nusa Tenggara; and (5) Livestock production was low because of feed and water scarcity during the long dry season, and also declining in genetic quality of livestock itself.

The level of productivity of cattle, especially reared extensively, was relatively low and fluctuate depend on the seasons. Feed quality increased during the rainy season, while declined during the dry season especially for Crude Protein and mineral. For the Crude Fiber, it increased at the dry season. Due to this phenomenon, the decline in body weight of cattle was extreme until 20% from optimal weight during the rainy season and caused by several factors: (1) Farmers tended to sell male animals that have high growth, resulting in a scarcity of good genetic quality bulls as genetic resources; (2) Productive female cattle, that have a calving interval (CI) 1 year, decreased; (3) Limited food availability in the dry season which resulted in declining fertility; and (4) Pattern-born calf is more likely to be concentrated in the dry season (April - October with

a peak in July). Therefore, as a first step, feed sufficiency in both quantity and quality throughout the year and easy to be reach was required by farmer

Feed availibility in Timor Island

The land area of East Nusa Tenggara land is 2,962,571 hectares with 60% dominated by savanna utilized as native pastures with livestock density of 4-5 individuals / km^2. This situation puts East Nusa Tenggara as the largest in both grazing area and cattle production of Indonesia. According to Bamualim (1994), pasture forage production in rainy season (1.7 ton DM / hectare / year) was three times higher than in dry season (0.54 ton DM / hectare / year). Carrying capacity for cattle ranged from 1.4 to 2.8 ST / ha / year (Nulik and Bamualim, 1998), this condition was still in the range of grassland world, namely 0.2 -7 head / hectare (McIlroy, 1977).

NTT was dominated by arid climates with cultivation business. According to the classification from Oldeman (1980), this area belong to the climate type D4 has a wet month 3-4 months and 7-9 months dry month, with low rainfall (<1000 mm), the type Vertisol soil and the soil has a pH of 7 and an average temperature of 27-28^oC.

Rearing livestock on the island of Timor was traditional, which rely on a primary food source of natural pasture. Farmers were usually release their cattle in group to the grass land which called communal grazing land but without control. This way made pasture forage quality lower than it should be, then affecting cattle growth.

Forage used for cattle derived from native grasses and crop waste peanut and corn which newly harvested. This feed was usually given during the dry season, while in the middle of the dry season farmers used feed which grown in their garden, such as leucaena (*Leucaena leucocephala*), Gliricidia (*Gliricidia sepium*), Turi (*Sesbania grandiflora*) and king grass (*Pennisetum hybreed*). In the dry season, farmers took feed from forest, such as white kabesak leaves (*Acacia leucophloea*), banyan leaves (*Ficus benyami*na), kmel (*Melia azaderach*), plugs (*Melochia umbelata*) as well as the leaves and stems of sweet potatoes (*Ipomea batatas*). In Table 2, there were several kinds of feed in addition to natural grass in two districts of Timor Island.

Table 2. The dominant type of feed given to cattle in addition to natural grass in Kupang Regency and North Central Timor (NCT), East Nusa Tenggara

Location	Dominant Feed	Source	Role of corn straw as a substitute for natural grass (%)
Kupang	-Corn Leaves -Straw -Putak -Leucaena	Feed garden, meadow, yard	62.50 ± 33.70
NCT	-Leucaena -Turi -Banana Tree	Feed garden, meadow, yard	44.41 ± 32.49

Source: Ratnawaty *et al.*, 2004

Yard was the important source of forage because it was closer to the farm. Type forage on yard was diverse, such as waste food crops, local natural grass (*Bothriochloa timorensis*),

leaves and stems of banana (*Musa sp*), leucaena (*Leucaena leucophloa*), Gliricidia (*Gliricidia sepium*), Kapok (*Ceiba petandra*), jackfruit (*Artocarpus integra*) and so on. Food technology was an important factor because it could become major obstacle in the development of the farm, where the availability of feed is dependent on the season. Technology that can be used for feed was preserving forage such as silage, concentrate from local resource, and herbaceous legume introduction. Making concentrate from local resource could be done by using legume trees (Gliricidia and lamtoro), corn cobs, corn straw and rice bran which can be used to reduce production cost and maximize crop byproduct utilization.

Giving concentrate on pregnant cows (8-9 months gestation) in observation for technological assistance at the level of farmers, the impact on calf growth better and faster lust and bunting compared to cows that did not receive concentrates. Similarly, the provision concentrates on lactating cows can accelerate estrus and pregnant again, compared with lactating cows that did not receive concentrates.

Table 3. Performance of calves treated concentrate

	Initial Body Weight	SKT	Final Body Weight	SKT	Daily Weight Gain
With Treatment	74.5	2-3	122.5	4	0.52
Without Treatment	77.40	2-3	97.45	3	0.24

Source: Rubianti et al, 2013

Table 3 showed that the administration of concentrates had a positive impact on calf's growth, because they needed sufficient energy and protein to meet their body functions. Based Ratnawati et al., (2014) concentrates provision of 1.5% of body weight (BW) can increase by 0.39 to 0.64 kg BW / day, while the mother lactation, BW does not decline, when compared with lactating cows that did not receive the concentrate decreased by -0.01 BW up to - 0.06 kg / day. Likewise in calves receiving milk from the mother who got extra concentrates increased by 0.28 to 0.42 kg BW / day.

Technology feasibility analysis

The feasibility analysis technology was used to determine whether the introduction of new technologies applied profitable and feasible to be developed further than the existing technology. This study would compare the technology of feed concentrates, feed technology and existing technology herbaceous legume
assumptions:

- The price of cattle Rp.3.000.000, - the BW 150 kg
- The price of herbaceous legume Rp.5000 / kg DM (giving 3% of BW)
- Price concentrates Rp.2600 / kg (giving 3% of BW)
- The duration of 3 months (90 days)
- The selling price of cattle Rp. 25,000 (if DBWG 250 kg, the addition of each increment Rp.200 25 kg BW)
- Total provision luguminosa herbaceous 810 kg / DM (90 days)

- Total Provision concentrate 450 kg

Uraian	Treatment		
	Control (Rp)	Herbaceous Legume (Rp)	Concentrate (Rp)
Cattle	3,000,000	3,000,000	3,000,000
Herbaceous legume		4,050,000	
crop byproduct concentrate			1,170,000
worker	300,000	500,000	1,000,000
Cost	3,300,000	7,550,000	5,170,000
Cost Production	215.3	320.8	325.5
Sale Price	18,000	29,000	29.200
Revenue	3,875,400	9,303,200	9,504,600
Profit	575,400	1,753,200	4,334,600
R/C	1.17	1.23	1.84
MBCR		1.28	4.01

The results of the financial analysis of the two technologies, the introduction of technology herbaceous legume forage and concentrate feed technology provided additional revenues compared to revenues of existing technology. Concentrate feed technology provided the highest revenues of Rp 9.5046 million with R / C = 1.84. The second highest reception Rp 9.3032 million with R / C = 1.23 had received by herbaceous legume forage technology. Existing technology was the lowest revenue Rp 3.8754 million with R / C = 1.17.

Variation occured because of differences in body weight of cattle at the end of the study. Differences in body weight was certainly due to different diets given for 3 months of the study. During 3 months of feeding, different concentrate feed technology gave cattle 325.5 kg BW, while the herbaceous legume forage technology gave 320.8 kg BW. Existing technology only reached 215.3 kg BW.

To see whether the introduction of viable technologies developed than existing technology, one of which was using MBCR analysis. Application of the technology still required the introduction of technological improvements farmers who require the additional costs that would affect the increase of production costs that would be offset by the increase in production. MBCR value> 1 described that the introduction of more feasible technology developed than existing technology / farmer. Although it required additional higher production costs but provide

an adequate profit. MBCR value of 4.01 indicated that the technology concentrates very viable technology developed from the existing technology / farmer.

CONCLUSION

Concentrate feeding technology was highly feasible to be developed as a low cost alternative feeding as well as utilizing crop by product.

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