

The Assessment of *In Vitro* Digestibility on Combination of Timor-Leste Native Grass, *Leucaena leucocephala*, and *Corypa elata Robx*

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ABSTRACT

The research aimed is to assess the effect of the combination of Timor-Leste Native Grass (NG), *Leucaena leucocephala* (LL) and *Corypa elata Robx* (CR) on *in vitro* Dry Matter (DM) and Organic Matter (OM) digestibility. The NG, LL and CeR were collected from Balibo sub-district, Bobonaro district, Timor-Leste. The study was design as a 3x3 factorial with a combination of NG, LL and CeR and combination (10%, 15%, 20%) as the main factors. The combination of treatments was incubated in the mixture of rumen fluid collected from two cannulated Bali cattle using a 2-stage *in vitro* technique. The incubation was incubated for 6 hours. In the results, DM digestibility of a combination of NG and LL (43.34, $p < 0.05$) were more significant than another combination. The combination of NG and LL (48.41c, $p < 0.05$) also had the highest effect on OM digestibility. It is concluded that a combination of NG and LL could improve digestibility. There was no difference significantly among the combination of 10%, 15%, and 20% after 6 hours of feeding.

Keywords: Timor-Leste Native Grass, *Leucaena leucocephala* (LL), *Corypa elata Robx*, Digestibility. *In Vitro*

1. INTRODUCTION

Timor-Leste is a developing country that belongs to an integrated agriculture group mainly consisting of livestock. An integrated farming system is a system in livestock raising, where more than 10% of dry matter given to livestock comes from plants [1]. However, during this time, Bali cattle's productivity and reproduction in Timor-Leste have not shown maximum results due to the extensive maintenance system, which only relies on natural pastures as the primary source of animal feed. Therefore, most farmers in Timor-Leste still practice extensive cattle rearing [2].

Timor-Leste experiences a tropical climate with a monsoon rain pattern, i.e., there are two distinct rainfall patterns [3]. When the dry season lasts, grass-feed ingredients become difficult to digest due to the high fiber content and low protein content [4]. This condition encourages farmers to look for alternative feeds to meet

the requirements of livestock. Alternative sources of feed are *Corypa elata Robx* and *Leucaena leucephala*. *Corypa elata Robx* is commonly used as cattle feed by farmers in Timor-Leste. Extensive maintenance is supported by the extent of natural grazing land, which is around 200,000 Ha which is 10% of Timor-Leste's 15,007 km² area [5].

Corypha elata Robx obtained from the contents of the pith, contains high starch and crude fibre, while low in protein; is a source of energy ranging from 3,480 kcal/kg [6]. Tabun et al. [7] reported that *Corypha elata Robx* contained 87.64% of dry matter nutrients, 12.36% of water content, 5.21% of ash content and 82.02% of organic matter content, while the crude protein content was 2.53%, crude fibre 12, 04%, and energy 4210 kcal. Giving *Corypha elata Robx* to cattle as a supplement is expected to increase the cow's body weight or suppress the decrease in body weight of the cow during the dry season. *Corypha elata Robx* has been widely used by cattle farmers in Timor-Leste as a feed ingredient after

cattle have been grazed. Pastures in Timor-Leste are mostly covered with *Corypha elata Robx* trees.

Apart from *Corypha elata Robx*, farmers have long been familiar with the *Leucaena leucephala* tree, which is commonly found around PPA, but farmers in Timor-Leste do not know that *Leucaena leucephala* leaf is an essential source of protein for cattle growth. Based on the research of Pamungkas et al. [8], *Leucaena leucephala* plant is a perennial plant that has been widely used as animal feed because it has a comparative advantage when compared to other leguminous plants, one of which is as a source of protein. Forage production is quite varied and is influenced by variety, soil fertility level, spacing, rainfall, temperature, and resistance to fleas attack. Forage production under good management produces about 20 tons of dry matter per ha with 3-month cut intervals with a total material of 50,000 stems per ha. *Leucaena leucephala* leaves have a chemical composition of 29.5% of dry matter, 23.4% of crude protein, 21.3% of crude fiber, and 8.2% of ash. Therefore, *Leucaena leucephala* is classified in proteinaceous roughages or fibrous protein source feed ingredients based on this chemical composition.

For this reason, researchers are interested in researching the increase in digestibility of forage originating from natural pastures when supplemented with local feed ingredients, consisting of *Corypha elata Robx* and *Leucaena leucephala* leaves.

2. MATERIALS AND METHOD

The research was carried out for three months, and conducted the Laboratory of Animal Food Technology and Animal Feed Nutrition Laboratory, Faculty of Animal Science, Gadjah Mada.

The research material was sample of field grass feed ingredients, *Leucaena leucephala* leaves and *Corypha elata Robx* from Timor-Leste. The rumen liquid was obtained from two cannulated Bali cattle which with 223 kg body weight and 316 kg cattle. Cannulated cattle were fed rations based on the dry matter needs of livestock as much as 3% of the body weight. The ratio consists of forage 70% and 30% concentrate. Research variables included: proximate analysis of field grass, *Leucaena leucephala* leaf and *Corypha elata robx* dry matter and organic material. Data analysis used variance (ANOVA) analysis followed by Duncan’s multiple range test (DMRT).

3. RESULT AND DISCUSSION

Regarding *Leucaena leucephala* leaf supplementation level, the results of statistical analysis showed that the difference in supplementation of 10, 15, and 20% was not significant. There was no difference in dry matter digestibility because field grass already contained relatively high crude protein 10.50%. *Leucaena leucephala* leaf supplementation of 10% only added 1.2% crude protein, and 15 and 20% supplementation of *Leucaena leucephala* leaf only added 1.8% and 2.4%, respectively. Likely, this amount does not significantly increase rumen NH₃. The statistical analysis results also showed that the difference in 10, 15, and 20% supplementation was not significant. There was no difference in dry matter digestibility because the grass already contained relatively high organic matter, 77.88%. 10% leaf supplementation only added 9% organic matter, as well as 15 and 20% leaf supplementation only added 13.5% and 18%, respectively. Likely, this amount did not significantly increase the microbes in the rumen. The assessment results of dry matter and organic matter digestibility are presented in Tables 1 and 2 below.

Table 1. Dry matter digestibility

Level	Combination			Average
	NG+LL	NG+CR	NG+LL+CR	
10%	37.28 ^a ± 1.44	41.43 ^{bc} ± 2.34	38.67 ^{ab} ± 2.10	39.13 ^a ± 1.96
15%	38.06 ^a ± 1.41	43.97 ^{cd} ± 2.97	39.71 ^{ab} ± 2.37	40.58 ^a ± 2.25
20%	37.57 ^a ± 2.52	44.62 ^d ± 1.06	38.63 ^{ab} ± 1.90	40.27 ^a ± 1.83
Average	37.64 ^a ± 1.79	43.34 ^b ± 2.12	39.00 ^a ± 2.12	

^{a-d}different superscript letters are significantly different (p<0.05)

Table 2. Organic matter digestibility

Level	Combination			Average
	NG+LL	NG+CR	NG+LL+CR	
10%	40.40 ^a ± 1.13	46.79 ^{bc} ± 2.17	46.25 ^b ± 1.88	44.48 ^a ± 1.73
15%	40.95 ^a ± 1.38	48.90 ^{cd} ± 2.19	45.34 ^b ± 2.02	45.06 ^a ± 1.86
20%	40.27 ^a ± 2.19	49.53 ^d ± 1.50	45.88 ^b ± 2.31	45.23 ^a ± 2.00
Average	40.54 ^a ± 1.57	48.41 ^c ± 1.95	45.82 ^b ± 2.07	

^{a-d}different superscript letters are significantly different (p<0.05)

Table 2 shows that the dry matter digestibility at 6 hours of addition of field grass supplemented with *Leucaena leucephala* leaf also increased from 32.13% to 37.28% or an increase of 17%. *Leucaena leucephala* leaf supplementation was able to increase dry matter digestibility (P<0.05), but the increase was not higher than *Corypha elata robx* feed ingredients. The protein source of *Leucaena leucephala* leaf can support the requirements of microbes in the rumen to maintain and carry out activities. Protein is an essential feed nutrient for the body of livestock. The availability of sufficient protein causes the activity and growth of microorganisms to increase the digestive process and consumption [9].

Statistically, variations in the addition of levels (10, 15, 20%) of *Leucaena leucephala* leaf and *Corypha elata robx* supplementation did not significantly affect the digestibility of organic matter. It was probably because the feed ingredients provided had not met the ideal balance between energy and protein sources from *Corypha elata robx* and *Leucaena leucephala* leaves. There was no difference in the digestibility of organic matter because the grass already contained relatively high crude protein, which was 10.50%. Therefore, *Leucaena leucephala* leaf supplementation of 10% only added 1.2% crude protein and 15 and 20% supplementation of *Leucaena leucephala* leaves only added 1.8% and 2.4%. Likely, this amount does not significantly increase rumen NH₃.

Based on the analysis results, the organic matter digestibility of field grass supplemented with *Leucaena leucephala* and *Corypha elata robx* leaves at 6 hours of incubation also increased by 43%, from 32.13% to 46.25%. However, the digestibility of organic matter supplemented with *Leucaena leucephala* was lower than the digestibility of organic matter supplemented with *Corypha elata robx* or combination of them. The decrease in the level of organic matter digestibility was due to the results obtained that were not following the hypothesis that *Leucaena leucephala* leaves and *Corypha elata robx* resulted in the highest organic matter digestibility. It is presumably due to several factors, one of which is the ability of the rumen microbes to digest the feed given is not as good as if only given *Leucaena leucephala* leaves, or *Corypha elata robx* only. Rubianti [9] added that the ability to digest feed is determined by

several factors such as the type of livestock, the chemical composition of the feed, and the feed preparation. It was further explained that the digestibility of a feed ingredient or ration depends on the compatibility of the feed nutrients contained therein.

Another influential factor is the extensive rearing system that causes livestock to obtain feed ingredients with low energy and protein sources, reducing livestock production and productivity. Therefore, the use of *Corypha elata robx* supplementation as an energy source and *Leucaena leucephala* leaf as a protein source is expected to increase livestock production and productivity and *in vitro* digestibility.

Supplementation of *Leucaena leucephala* alone did not cause an increase in digestibility, possibly because DL is a high source of crude protein and is easier to digest than grass [10] and has the property of being rapidly degraded in the rumen, so that it will quickly produce ammonia. However, because at the same time as the formation of ammonia, sufficient energy is not available to form microbial protein, it is suspected that the number of rumen microbes does not increase, causing digestibility also not to increase. It is in line with Lieweyn [11] which states that only protein supplementation cannot increase microbial activity in the rumen. A balanced availability of energy and nitrogen is required [12]. An imbalance in the ratio of energy and nitrogen is thought to be unable to optimize microbial growth; thus, digestibility does not increase.

4. CONCLUSION

The combination of native grass with *Corypha elata robx* as an energy source and *Leucaena leucephala* leaf as a protein source increased the *in vitro* digestibility value given at 6 hours of addition. To obtain a more comprehensive conclusion, research is needed in the dry season when grass quality in natural pastures declines.

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