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The Potential of Gelam Leaves (*Melaleuca cajuputi* Powell) as Cattle Feed

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Abstract: Gelam putih (*M. cajuputi* Powell) in Central Kalimantan, has not been exploited well. *In vitro* test conducted to evaluate the potential of gelam leaves as cattle feed. The measured variables were NH_3, volatile fatty acids (VFA), dry matter Digestibility (DMD) and organic matter Digestibility (DMO). Completely randomized design was made with 5 different treatments and 4 replications, in order to get 20 experimental units. Data were analyzed by analysis of Variance (ANOVA) Followed by Duncan's multiple range test with a significance level of 5%. The results showed that the giving 100% of gelam leaves produced NH_3 dan VFA for about 4.01 and 151.25 mM, also DMD and DMO by 58.35 and 52.38%. These results were significant ($p<0.05$), higher than the grass field, so it can be concluded that the waste of gelam leaves, potentially be used as cattle feed.

Key words: *M. cajuputi* Powell, *in vitro*, cattle feed

INTRODUCTION

Gelam (*M. cajuputi* Powell) is a plant belonging to the family Myrtaceae. This plant can be grown on land that has nutrients range from fertile land and rich in nutrient elements, as well as on critical soil with poor elements. In Central Kalimantan, this plant only found in small amounts in this area. Known as tolerant species to extreme conditions, there is the potential to be used for the rehabilitation of degraded peatlands (Nuyim, 2003).

In Indonesia, the leaves *M. cajuputi* Powell, known for its use as raw material for the manufacture of cajuput oil. But in Central Kalimantan, these plants have not been put to good use. Communities around this area, still considers these plants as weeds. fallen leaves of this plant, will cause pollution area, because the process of composting the leaf naturally takes a long time (Murbandono, 1999). Gelam leaf decomposition takes about 3 years due to the nature of the hard leaves crushed with the lignin on the secondary cell (Beguin and Aubert, 1992). These leaves are actually have great benefits when people want to see its potentiality.

There have been many studies that utilize organic waste into useful products and provide additional income. One of them is the use of organic waste as ruminant feed which actually can replace the grasses as the consequences of the lack of its availability. The utilization of agricultural and forestry wastes as feed only reached 30-40% of the potential availability (Indraningsih *et al*., 2012). The aim of this Study is to utilize gelam leaves as cattle feed.

MATERIALS AND METHODS

The study was conducted by an in vitro test by using cow rumen fluid through a procedure that refers to the method of Tilley and Terry (1963). The measured variables were NH_3 production by using Conway Microdifusion (Sutardi, 1994), VFA using steam distillation method (Sutardi, 1994), DMD and DMO through procedures developed by Tilley and Terry (1963). The implementation of an *in vitro* test conducted in Ruminant Nutrition Laboratory, Faculty of Animal Husbandry, Padjadjaran University, Bandung.

Gelam leaf taken from the location where the plants grow in Pulang Pisau District, Central Kalimantan, while the grass was obtained from the grass garden in the Faculty of Animal Husbandry, Padjadjaran University, West Java. Rumen fluid taken from Ongole cattle breed. Experiments performed with Completely Randomized Design consisting of 5 treatments that are R0 (100% field grass), R1 (75% field grass: 25% gelam leaves), R2 (50% field grass: 50% gelam leaves), R3 (25% field grass: 75% gelam leaves) and R4 (100% gelam leaves), with each test using four replications until it recovered 20 experiment units. Data were analyzed by analysis of Variance (ANOVA) and followed by Duncan multiple range test with significance level of 5%.

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RESULTS AND DISCUSSION

Influence of treatment on *Rumen fermentability*: The feed which filled into the rumen will be fermented by anaerobic microbes. The feed protein which filled into the rumen of ruminant live stock will be degraded to ammonia by proteolytic enzymes produced by rumen microbes. Most of the rumen microbes (82%) require NH_3 (ammonia) as a source of energy for the propagation of itself, especially in the synthesis of the cell process (Sutardi, 1979). Sutardi (1979) also stated that ammonia levels needed to support microbial growth ranged from 4-12 mM. The concentration of ammonia in the rumen is an important value because it affects the growth of rumen microbes.

Meanwhile, feed carbohydrate fermented into volatile fatty acids, in addition to other products such as CO_2 and CH_4 (Van Soest, 1994). Volatile fatty acids are also important sources of metabolic energy and carbon source for the synthesis of microbial chain fatty acids because they capable of supplying more than 60% of the energy needed by ruminants. The difference between the effect of the treatment performed by using Duncan's multiple range test. The result can be seen in Table 1.

Table 1: Averaging of NH_3 production and VFA levels in each treatment

Variables	R0	R1	R2	R3	R4
NH_3 (mM)	3.25^a	4.75^c	3.75^b	3.34^a	4.01^c
Fly fatty acid (mM)	122.00^b	131.50^c	116.5^b	103.5^a	151.25^d

Superscript different in the same row indicate significantly different ($p<0.05$)

Table 1 showed that in general, the use of gelam leaves production can increase NH_3. The increasing of NH_3 production is due to the protein content on the leaves of *M. cajuputi* Powell is higher than the protein content of the grass field. The previous proximate test performed on leaves of *M. cajuputi* Powell showed the result of protein content of 8.85%. This protein value is greater than the value of the protein contained by grass field that is equal to 8.199% (Supriyadi, 2013).

The protein in the feed will influence the content of NH_3 in the rumen. The larger the protein content in the feed, the increase the content of NH_3 in the rumen, because 60% protein feed will be converted to NH_3 while the rest goes to abomasum and small intestine to digest and to absorb (Haresign and Cole, 1981). The high presence of NH_3 indicate the facility for the gelam leaves protein to degrade in the rumen. The value of NH_3 at above of 4 mM in gelam treatment (100%) indicating that both have the potential to be used as cattle feed.

The use of gelam leaves as cattle feed is also turned out to produce volatile fatty acids in the normal range, even in the 100% treatment, gelam leaves are able to improve its content. Sutardi *et al.* (1983) stated that the VFA levels in the range of 80-160 mM, may still be sufficient for optimal microbial protein synthesis. Gelam lignin content in leaves was not preclude the rumen microbes in digesting the feed fiber, mainly cellulose and hemicellulose. Lignin is a compound that is an anti-nutrition because in nature these compounds bind to cellulose and hemicellulose and will hamper the fermentation by rumen microbes such as compounds into volatile fatty acids.

Influence on digestibility: The digestibility of feed ingredients that are high in animal ruminants, indicating the better the quality of the feed (Schneider and Flatt, 1975). Duncan multiple range test for the averaging of DMD and DMO of their conduct is presented in Table 2.

Table 2: Averaging DMD and DMO in each treatment

Variables	R0	R1	R2	R3	R4
DMD (%)	50.46^c	37.88^a	45.63^a	48.17^b	58.35^d
OMD (%)	45.42^d	40.21^b	37.74^a	40.91^c	52.38^e

Different superscripts in the same row indicate significantly different ($p<0.05$)
DMD: Dry matter digestibility
OMD: Organic matter digestibility

The using of gelam leaves, real ($p<0.05$) increased the digestibility of dry matter and organic matter indicates that gelam leaves effected on rumen microbial activity in the fermented waste. This is reinforced by the data in Table 1 which provides information that NH_3 and VFA concentrations of gelam leaves is higher than grass field. In addition, gelam leaves is expected contains antioxidants which help rumen microbe in digesting the feed. Kitta *et al.* (1978) reported that antioxidants can increase the activity and the life of bacteria, which can increase the digestibility of the feed material.

Conclusion: Gelam leaves (*M. cajuputi* Powell) has the potential to be developed as a cattle feed, because it can increase the production of NH_3 (4.01 mM), VFA (151.25 mM), DMD (58.35%) and DMO (52.38%).

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