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The Effect of Addition Myristic acid and *Calliandra calothyrsus* Leaves Flour Substitution on Feed Consumtion, Feed Conversion and Body Weight Gain of Sheep

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ABSTRACT: The aim of this research was to evaluate the effect of myristic acid supplementation and substitution with calliandra calothyrsus leaves flour on nutrients content, feed consumtion, feed conversion and body weight gain of DET sheep.Fifteen male DET sheep with body weight average of 18,70 kg (sd= 1,84) and aged at 8-12 months. This study used an in vivo test with a Randomized Block Design with three treatments and five replications. The three treatments were (P0) concentrate feed without myristic acid and calliandra leaf meal, (P1) 40% corn flour + 10% calliandra leaf meal + 50% concentrate + 30 g/kg myristic acid and (P2) 40% corn flour + 15% calliandra leaf flour + 45% concentrate + 30 g/kgBK myristic acid. Data analysis using ANCOVA, data with significantly different treatment effects were further tested using Duncan's test. The P2 treatment showed the highest value in the observation variable for feed nutrient content of 19.05% (P0 17.54% and P1 18.43%), the total consumption of crude protein was 19.98 g/head/day (P0 19.04 g/day). fish/day and 19.27 g/head/day), the lowest feed conversion showed that the feed consumed was very efficient for BWG of 6.18 (P0 7.32 and P1 6.89) and the highest BWG was 166.67 g/head /day (P0 143.33 g/head/day and P1 152.62 g/head/day).

KEYWORDS: Body Weight Gain, Condens Tannin, Feed Consumption, Feed Conversion, Myristic acid, Nutrient Contents

I. INTRODUCTION

Indonesia is a country with a tropical climate where there are 2 seasons, namely the dry season and the rainy season. Availability of quality forage forage in Indonesia is not available throughout the year due to the difference between the two seasons. Where during the rainy season forage forage is very abundant, while during the dry season forage quality forage is very difficult to obtain. The scarcity of quality forage forage will indirectly affect the decline in livestock productivity. This decrease in productivity is because forage available during the dry season tends to have low nutrient content [10]. During the dry season forage available forage often has low nutrient content and is not in large supply. Therefore, efforts are made to utilize forage animal feed derived from agricultural waste as an alternative to meet the needs. Agricultural waste has low nutrient content and high feed fiber content [18]. Feed is an important factor in achieving a success in a livestock business. In the livestock business, the cost of feed needs reaches 70% of the total costs that must be incurred in the business in the field of animal husbandry [18]. The price of feed ingredients continues to fluctuate, during the famine season, the price of feed ingredients tends to increase which can lead to swelling of animal feed costs. Feed ingredients derived from agricultural waste or industrial waste can be used as an alternative to feed, especially during the dry season. It is known that during the dry season there is a shortage of forage for animal feed. Thus, efforts are needed to overcome these problems by taking into account the potential of the environment while also paying attention to the adequacy of livestock nutrients.

The environmental potential in question is the potential for local feed ingredients which are feed ingredients originating from the surrounding environment that are still rarely used by livestock. Agricultural waste that is easy to find and has low economic value is corn husk. Tebon corn is a by-product of agricultural business, this product tends to be no longer used by farmers because the main product in the form of corn has been taken and utilized by humans. Tebon corn has the potential to meet the needs of forage for animal feed as a source of fiber, as well as being able to reduce feed costs [20]. Efforts to manipulate the rumen fermentation process using feed sources of tannins and the addition of fatty acids in concentrated feed.Ruminants are a large group of meat-producing livestock. Examples of large ruminants are cattle and buffalo, while livestock belonging to

the small ruminant group are goats and sheep. Livestock that are often encountered in smallholder farmers' businesses are cows, goats and sheep.
Sheep has a high potential to meet the demand for meat, especially during times of crisis in the supply of red meat food stocks other than beef. The rapid productivity and population of sheep and goats can be used as an alternative problem solving in meeting the demand for meat [22]. Supported by [5] which states that the Egyptian sheep has an important value as a provider of food sources of animal origin. Utilization of sheep is not only from the production of meat, but sheep also produce by-products in the form of wool and milk. [9] reported that the use of sheep can contribute as much as 6% in meeting the needs of animal protein food in Egypt. The demand for livestock food products continues to increase from year to year. It is suspected that the increasing demand for red meat continues to increase because the human population also increases every year. Various efforts were made to increase the production, reproduction and population of livestock in order to meet the national food needs.

The main factor that has a major influence on animal body weight gain is the nutritional content of animal feed [elmalky]. Efforts made to increase livestock production, namely rumen manipulation with the addition of fatty acids in feed at the level of 3-5% showed positive results on increasing feed nutrients, [3] reported that the addition of saturated fatty acids in complete feeds was able to increase the digestibility value of feed and reduce feed intake. production of methane gas by livestock. Referring to [19] on research to find the best level of use of saturated fatty acids in complete feeds on the nutrient content of feed, ammonia content, methane gas, feed digestibility and in vitro rumen microbial modification, the best results were obtained at the level of addition of saturated fatty acids at level 3 %. The use of feed sources of tannins in feed at low to moderate levels showed a good effect on increasing nutrient content, especially crude protein content and increasing the digestibility value of feed. If the nutritional content of feed increases, it is expected that the amount of feed consumption will also increase so that the supply of nutrients that enter the body will increase. The supply of nutrients available in large quantities increases the amount of nutrients digested and absorbed by livestock, how much nutrient utilization by livestock can be seen its effect on body weight gain and livestock growth efficiency.Based on the description above, it is necessary to conduct research to determine the effect of addition myristic acid and substitution with calliandra leaf meal in animal feed concentrate rations on the nutritional content of feed, feed consumption, feed digestibility and body weight gain of male thin tailed sheep (DET).

II. RESEARCH METHOD

The livestock used in this study consisted of fifteen thin tailed rams, aged 8-12 months or cattle in their infancy with an average initial body weight of 18.70 kg, with a coefficient of variation of 1.78%. During the rearing period, livestock are put into individual metabolic cages, prior to data collection, a preliminary period or feed adaptation period is carried out for approximately 2 weeks. The purpose of the adaptation stage is the gradual adjustment of livestock to new feeds to avoid stress.The feed ingredients for the research concentrate ration consisted of pollard, rice bran, cassava flour, copra meal, soybean meal, molasses and minerals. This study also used additional feed, namely myristic acid and feed ingredients as a source of tannins in the form of calliandra leaves. The treatment of calliandra leaves before being substituted with concentrate was done by drying and milling to obtain the same size as other feed ingredients. The shape and particle size of the feed ingredients that make up the concentrate need to be equalized to avoid livestock choosing when given.

Maintenance consists of feeding, health checks, and weighing body weight. The length of the maintenance period was carried out for 2 months after the feed and cage adaptation stage. Feeding was carried out 4 times a day with 2 different types of feed, namely forage and concentrate. After feeding, the next day the remaining feed was collected and recorded the amount of remaining feed in the right feed. Weighing of sheep is done every 2 weeks.Consumption data was collected every day after the preliminary period by routinely recording the amount of feed given and leftover feed using a digital scale. Weighing of sheep is done every 2 weeks to determine body weight gain in a controlled manner. Determination of the daily body weight gain value (PBBH) was carried out by calculations involving initial body weight, maintenance period and last body weight at the time of weighing. Feed conversion is calculated based on the amount of feed consumption and the value of body weight gain (PBB) of livestock.The parameters tested were the nutrient content of the treated feed concentrate, blood glucose and blood urea. This research was conducted by in-vivo method using a Randomized Block Design (RAK) which consisted of 3 treatments and 5 replications in each treatment. The treatments were as follows:

P0 = 40% Tebon Maize + 60% Concentrate,
P1 = 40% Tebon Corn + 10% Calliandra Leaf Flour + 50% Concentrate + Myristic Acid 30 g/kgBK, and
P2 = 40% Tebon Corn + 15% Calliandra Leaf Flour + 45% Concentrate + Myristic Acid 30 g/kgBK.
Analysis of variance was used in this study to determine the effect of treatment on the variables, while to find out the difference between treatments ($P<0.05$), Duncan's Multiple Range Test (UJBD) was used.

III. RESULTS AND DISCUSSION

Nutrient Contents Concentrate Feed.

The crude protein content of Tebon corn is classified as very low and has a high crude fiber content, so that the provision of Tebon corn as animal feed needs to be balanced with the provision of other high protein feeds to cover the shortcomings of Tebon corn. The content of crude protein and crude fiber in corn flour has different values but not so significant. Differences in the nutritional value of corn husks are caused by corn plant varieties, cutting age, plant varieties and maintenance methods that use chemical fertilizers or not, greatly affect the nutritional value of corn husks themselves [8]. Reported [24] which states that low forage content causes an increase in methane gas production, one of the efforts that can be done is by adding fatty acids to animal feed rations. One of the fatty acids that has proven its positive effect on reducing methane gas and increasing fermentation efficiency in the rumen. The mechanism of reducing methane gas by the addition of myristic acid, namely myristic acid plays a role in coating the walls of the protozoa which causes the protozoa to not be able to carry out metabolic activities properly which has an impact on decreasing the production of methane gas**.** The type of leguminous plant used in this study is calliandra plant, it is known that the calliandra plant has a fairly good nutrient content where the crude protein content of calliandra is based on the results of the research by [21] which shows the crude protein content of calliandra obtained from the proximate analysis of calliandra leaf flour, namely by 25.27%. the use of feed ingredients that have a high crude protein content in the concentrate can indirectly increase the nutrient content of the concentrate feed**.** The preparation of the concentrate is done by arranging the feed ration according to the treatment by reducing each proportion of the use of feed ingredients along with the amount of concentrate replacement with calliandra leaf flour. The feed ration is a combination of animal feed that has been made according to the needs of livestock and consists of several types of feed ingredients. [22] stated that supplementation in feed rations is a one of the efforts to overcome the low nutrient content, especially during the dry season. the proportion of use of feed ingredients for concentrate and the nutritional content of concentrate feed is shown in Table 1.

Proportion of use of feed ingredients for concentrate			
Feed ingredients	P0	P1	P2
Pollard	24	21,6	20,4
Rice bran	19	17,1	16,15
Cassave fluor	18	16,2	15,13
Copra meal	23	20,7	19,55
Soybean meal	9	8,1	7,65
Molasses	5	4,5	4,25
Mineral	2	1,8	1,7
Calliandra leaves flour	0	10	15
Total	100	100	100
Myristic acid	0	30 g/KgBK	30 g/KgBK
Nutritional content of concentrate feeds			
Dry matter (%)	89,2	88,7	88,7
Organic matter (%)	88,93	90,76	90,96
Ash (%)	11,07	9,24	9,04
Crude protein (%)	17,54	18,43	19,05
Crude fiber (%)	23,58	14,59	15,12
Crude Fat (%)	2,66	4,8	4,6
BETN (%)	45,20	52,92	52,17
TDN (%)	59,12	66,09	65,78

The results of the proximate analysis showed that the content of DM concentrate P0 was 89.2% and decreased in the P1 and P2 concentrates, namely 88.7%. On the other hand, the OM content of P0 concentrate was 88.93%, an increase in P1 concentrate was 90.76% and P2 was 90.96%. The highest CF content was in the P0 concentrate at 23.58% and the lowest CF content in the P1 concentrate at 14.59%. The difference in the amount of CF is thought to be due to the difference in CF in each of the feed ingredients that make up the concentrate. The increase in crude fat content in the feed is thought to be influenced by the addition of fatty acids, where the concentrate P0 feed without adding myristic acid has the lowest crude fat content of 2.66% while P1 and P2 show almost the same results, namely 4.8% and 4.6 %. The results of the proximate analysis on the treated concentrate feed showed that the crude protein content of P0 was 17.54%, P1 was 18.43% and P2 was 19.05%. The increase in crude protein content in the concentrate feed was thought to be due to the increased use of calliandra leaf meal. Calliandra itself has sufficient crude protein content, so that feed that has low nutrient content and high feed prices can be linearly replaced with calliandra. when viewed from the amount of crude protein content, this concentrate is already very good in meeting the basic needs of sheep. Crude protein needed to meet the basic needs of life is at least 11%.

Effects supplementation myristic acid and substitution with calliandra leave flour on feed concumtion of DET sheep on concentrate feed and corn stover.

Forage fodder used in this study is a by-product of agricultural business, namely Tebon corn. Tebon corn has a high crude fiber content and nutrient content of feed, especially low crude protein content and has a fairly high lignin content that can interfere with feed consumption [4]. The use of calliandra leaf meal in treated feed concentrates can affect the value of feed consumption [28]. Based on [26] it is explained that the provision of feed containing tannins can have a positive or negative effect on livestock productivity which is described by the level of feed consumption. The difference in responses displayed based on feed consumption was influenced by the type of livestock used, the amount of feed containing tannins given, and the composition of the concentrate feed ingredients given. One of the factors that affect the level of feed consumption is palatability which is a reference to the level of preference of livestock for feed given [7]. The feed source of tannins used in this study was the red flower calliandra plant. The selection of red flower calliandra plants was based on a higher level of feed palatability when compared to white flower calliandra plants, so it is expected that the use of red flower calliandra plants is more effective and does not cause significant disturbances to feed consumption [27]. Feed concumtion shown in

Tabel 2.

Treatment	DMI	OMI	PMI
P0	119,17 ± 9,11	103,37 ± 7,76	19,04 ± 1,59[a]
P1	115,14 ± 10,59	100,89 ± 9,38	19,27 ± 1,44[a]
P2	117,01 ± 5,68	102,53 ± 5,00	19,98 ± 1,23[b]

The results of statistical analysis can be seen in Table 2. showed that the DMI value in treatment P0 showed the highest number compared to treatments P1 and P2. The results showed that there was a decrease in DMI in P1 treatment compared to the control feed treatment, namely 119.17 g/head/day to 115.14 g/head/day, while in P2 treatment there was an increase in DMI compared to DMI P2, which was 115.14 g/head/day to 117.01 g/head/day. Based on the statement [12] which said that the decrease in the level of consumption of feed ingredients was influenced by the content of the feed ingredients given. It is known that this study used calliandra leaf flour which has a tannin content and a palatable level that is not too high. Thus, the addition of calliandra leaf flour to concentrate feed has an effect on decreasing the level of feed consumption. The components of the feed ingredients given, the proportion and ratio of feeding can affect the level of feed consumption [24] Another source also explained that the nutrient content of feed affects the amount of dry matter consumption, where the higher the amount of dry matter consumption indicates that the higher the amount of feed nutrient content that enters the body.

Based on the results of statistical analysis in Table 2. the results of the analysis of variance to determine the effect of adding myristic acid and replacing concentrate with calliandra leaf flour at different levels did not show a significant difference to OMI (P> 0.05). The results of statistical analysis showed that the P0 treatment decreased when compared to the amount of organic matter consumption in P1 treatment, which was 103.37 g/head/day to 100.89 g/head/day, while there was an increase in OMI in P2 treatment compared to P1

treatment, which was 100. .89 g/head/day to 102.53 g/head/day. OMI shows almost the same results as DMI. It is known that DMI and OMI are 2 indicators that are interconnected in determining the quality of feed ingredients, this can happen because OM has the same components of substances contained in it as dry matter except ash. In the results of the PMI statistical analysis in Table 2. The results of the analysis of variance concluded that the effect of adding myristic acid and replacing concentrate with calliandra leaf flour at different levels gave a very significant difference to the PMI ($P<0.01$). The results of statistical analysis showed that the P0 treatment increased when compared to the amount of crude protein consumption in the P1 and P2 treatments, namely 19.04 g/head/day to 19.27 g/head/day and 19.98 g/head/day. [11] stated that the nutrient content of the feed was positively correlated with the amount of feed consumption. if it is related to the nutrient content of the feed, especially crude protein, it shows the value of the nutrient content continues to increase in line with the increase in the use of calliandra leaf meal in the feed ration. The value of feed consumption is not fully influenced by the nutrient content of the feed given, there are several other factors that affect the level of feed consumption. Feed intake by livestock is influenced by 3 main factors, namely the method of feeding (stress level of livestock, feeding method and frequency of feeding in a day), feed (feed palatability level, feed size, and type of feed). feed given) legume or grass feed will give different results on the value of feed and livestock consumption (nutrient needs of livestock, species, and types of livestock). This is reinforced by the statement of [7] which explains that the diversity of feed consumption values is influenced by individual factors, species and breeds of livestock, physiological status, energy needs of feed, quality of feed provided and environmental conditions.

Effects supplementation myristic acid and substitution with calliandra leave flour on feed conversion of DET sheep on concentrate feed and corn stover.

Feed conversion is a value that describes how much feed is consumed to produce the first body weight gain in a certain period of time [1]. Thus, the value of feed conversion is closely related to the value of feed consumption and daily body weight gain (PBBH) of livestock (Tabel 3).

Treatment	Feed Conversion
P0	7,32±0,63
P1	6,89±1,26
P2	6,18±0,63

The results of the statistical analysis of feed conversion are shown in Table 3. It can be concluded that the addition of myristic acid and the replacement of concentrate with calliandra leaf meal at different levels did not show a significantly different effect ($p>0.05$). The conversion value of feed treatment P0 (feed without the addition of myristic acid and replacement of concentrate with calliandra leaf meal) showed a decrease when compared to the average conversion value of feed treatment P1 (feed with the addition of myristic acid and replacement of concentrate with calliandra leaf meal at 10% level) which was 7 .32 to 6.89, the decrease in feed conversion value also applies to treatment P2 (feed with the addition of myristic acid and replacement of concentrate with calliandra flour at the level of 15%) which is 6.89 to 6.18. According [6] which states that the lower the feed conversion value indicates that the content of feed quality is getting better. A low amount of dry matter consumption does not necessarily cause a low feed conversion value, and vice versa, a high dry matter consumption value does not necessarily cause a high feed conversion value. This is because the value of feed consumption is influenced by the quality of feed nutrients consumed and the value of PBBH is influenced by the efficiency of utilization of feed nutrients. So that the amount of PBBH livestock is caused by how much the amount of feed nutrients are digested and absorbed by livestock. The more nitrogen availability, the rumen microbial activity will also increase, followed by an increase in livestock production performance.

Effects supplementation myristic acid and substitution with calliandra leave flour onbody weight gain of DET sheep on concentrate feed and corn stover.

Livestock body weight gain (BWG) is one of the benchmarks used to determine the performance of livestock production and livestock growth [14]. Determination of body weight gain (BWG) is calculated by involving the amount of body weight of livestock and the increase in body weight gain every week which is then averaged to determine daily body weight gain (DBWG). In line with [17] stated that initial body weight has a close relationship with body weight gain (BWG). In addition, the factors that affect the value of PBB are the type and age of livestock. In this study using sheep aged 8-12 months, young cattle tend to be better in production performance so that the use of feed is more efficient [23]. The type of livestock used is the male because it

considers the factor of growth and hormone secretion levels. This assumption is reinforced by the statement of [15] which shows that the daily body weight gain (DBWG) in male cattle shows a higher value when compared to the daily body weight gain (DBWG) shown by female cattle. The results of the statistical analysis of daily body weight gain (DBWG) are shown in Table 4.

Treatment	Daily Body Weight Gain (g/head/day)
P0	143,33 ± 12,05
P1	152,62 ± 33,46
P2	166,67 ± 23,59

The results of statistical analysis on daily body weight gain (DBWG) obtained results that were not significantly different ($p>0.05$). The value of daily body weight gain (DBWG) in treatment P0 showed an increase in the value of daily body weight gain (DBWG) when compared with treatments P1 and P2 linearly showing an increase in DBWG in a row, namely P0 of 143.33 g/head/day, P1 of 152.62 g/head/day and P2 of 166.67 g/head/day. It is suspected that the increase in daily body weight gain (DBWG) was due to the nutrient content of the treatment feed which continued to increase along with the increase in the replacement of concentrate with calliandra leaf meal, and referring to the results of feed nutrient consumption and feed digestible nutrient consumption, P2 treatment was the best result among the 3 treatments. Calliandra plants are a class of tree legume species, where it is known that leguminous plants have a high crude protein content but also contain anti-nutritional substances that can be toxic to livestock growth. [17] stated that the addition of leguminous plant species to the feed ration was able to increase the crude protein content of the ration so that it was expected that more and more consumption of feed containing high nutrients could be optimally seen from the increased BWG.

IV. CONCLUSION

The conclusion in this study was the effect of adding myristic acid and replacing it with calliandra leaf meal on feed concentrates in P2 treatment seen from the nutrient content of feed, feed consumption, feed conversion and body weight gain. The nutritional content of the concentrate feed was P0 (17.54%), P1 (18.43%, and P2 (19.05%). The results of the study on feed consumption parameters showed a decrease in DMI at P0 (119.47%) to P1 (115 .14%) and increased by P2 (117.01%), in line with OMI, namely P0 (103.37%), P1 (100.89%), and PMI showed significant results in the P0, P1 and P2 treatments, respectively. - respectively 19.04%, 19.27%, 19.98%. The lowest feed conversion value was in the P2 treatment of 6.18 while the highest feed conversion value was in the P0 treatment. The lower the feed conversion value, the better the feed used. Assessment The quality of feed seen from body weight gain, the higher the BWG indicates the more efficient the feed consumed to support livestock growth.

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