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Performance Of Local Sheep by the Application of Fermented Cassava Peel With Local Microorganism (MOL)

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Abstract. Cassava peel is a byproduct of the cassava processing factory. Cassava peel is very potential as an alternative feed source of energy for livestock. However, the use is not optimal because it contains anti-nutritional substances in the form of cyanide acid. Through fermentation technology, it is hoped that the anti-nutritional substances it contains can be eliminated so that the cassava peel can be utilized more optimally.This study aims to examine various doses of fermented cassava peels application with local microorganisms (MOL) on the performance of male local sheep. The study was conducted experimentally using a completely randomized design (CRD), 4 treatments with 5 replications. The treatments given were P0 (ration without fermented cassava peels), P1 (25% fermented cassava peels in rations), P2 (50% fermented cassava peels in rations), and P3 (75% fermented cassava peels in rations). The parameters observed were feed consumption, body weight gain, feed conversion, and *Income over Feed Cost* (IOFC). The results showed that the application of fermented cassava peels by MOL in the ration had no significant effect (P> 0.05) on feed consumption, body weight gain, and had a significant effect (P <0.05) on feed conversion. The IOFC average is: P0 = IDR 449,769.00, P1 = IDR 457,745.00, P2 = IDR 505,481.00, and P3 = IDR 430,404.00. The results showed that fermented cassava peel can be given to livestock up to a dose of 50% with a higher advantage compared to other treatments.

Keywords*:* cassava peel, iofc, performance, sheep

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1. Introduction

Currently, the animal feed industry still depends on imports to meet the need for feed ingredients, even though there are still many potential sources of alternative feed ingredients. Therefore, research is needed to find alternative feed ingredients with abundant availability, quality and guaranteed continuity. Opportunities for alternative feed ingredients that can be used optimally include plantation waste, agricultural industrial waste and food industry waste. Besides being able to reduce production costs, it can also minimize environmental problems due to these wastes.

Cassava peel is one of the cassava waste which can be used as an alternative feed material which can be obtained from industrial waste of tapioca, chips, tape, cassava, and others. [1] recorded that North Sumatra's cassava production amounted to 1,619,495 tons in 2015. Each weight of cassava will produce 16% of cassava peel waste from this weight [2], from this cassava production can produce cassava peel waste. amounting to 259,119.2 tonnes [1].

Cassava peel can be an alternative feed ingredient because it is easy to obtain and guaranteed availability, and has a crude protein content of 5.24%, 10.39% crude fiber, 1.05% crude fat, 11.33% moisture content, and an ash content of 4.31% [3]. In addition, cassava peels also contain antinutrients, namely cyanide acid in the range of 150-360 mg / kg fresh weight [4]. [3] states that cassava peels contain 234.4 mg / kg of cyanide acid.

The level of danger of cassava peels based on cyanide acid content according to]5] is 1) safe for consumption and harmless with cyanide acid levels of less than 50 mg / kg of fresh ingredients; 2) moderately toxic and quite dangerous with cyanide acid levels between 50 and 100 mg / kg of fresh ingredients; 3) very dangerous with cyanide acid levels greater than 100 mg / kg of fresh ingredients.

The HCN content in cassava peels can be reduced to safe limits for use by using several methods, such as physical, chemical, and biological processing, or a combination (fermentation). Currently, fermentation methods are widely used to improve the nutritional quality of feed ingredients as well as reduce anti-nutrient (HCN) in cassava peels. Fermentation results in complex organic compounds being broken down into simpler compounds [6].

[7] stated that microbes originating from the substrate themselves have a high ability to degrade the substrate. The results of [3] study showed that fermentation of cassava peels using local microorganisms (MOL) based on cassava waste can increase protein content and reduce fiber content, and reduce cyanide acid levels from 234.4 mg / kg to 38.53 mg / kg.

Based on the foregoing, the authors are interested in examining the effect of giving fermented cassava peels with local microorganisms (MOL) in the ration on the performance of male local sheep.

2. Material and Methods

2.1. Place and Time

The research was conducted for 12 weeks starting from December 16, 2019 to March 8, 2020 at JalanBungaRinte, Medan Tuntung District, Medan City.

2.2 Research Methods

The research used 20 local sheep with an average initial body weight of 12.59 ± 1.22 kg. The feed ingredients used are field grass and concentrate with a composition such as soybean meal, BIS, rice bran, corn bran, onggok, molasses, ultramineral, and urea. Cassava peel-based local microorganisms (MOL). Medicines in the form of kalbazen, antibloat and vitamins. Clean water to meet drinking water needs which is given ad libitum.

The research was carried out experimentally using a completely randomized design (CRD) with 4 treatments and 5 replications. The treatment given is as follows:

P_0 = without fermented cassava peels in rations
P_1 = 25% fermented cassava peels in rations
P_2 = 50% fermented cassava peels in rations
P_3 = 75% fermented cassava peels in rations

2.3. Research Parameters

Feed Consumption Feed
consumption can be calculated by the formula:

Feed Consumption = Feed given (g / head / day) - leftover feed (g / head / day)

Daily Body Weight Gain
daily body weight gain can be calculated using the formula:

$$\text{DBWG} = \frac{\text{Final BW - Initial BW (g / head / day)}}{\text{Maintenance Time (days)}}$$

Feed Conversion

Feed conversion can be calculated using the formula:

$$\text{Conversion} = \frac{\text{Feed consumption (g / head / day)}}{\text{PBBH (g / head / day)}}$$

IOFC Income over Feed Cost (IOFC)
can be calculated using the formula:

IOFC = (PBB x selling price of sheep / kg) - (Total consumption x price of feed / kg)

2.4. Data analysis

Data were analyzed using a completely randomized design (CRD), if there were significant or very significant results, the Duncan's mean range test (DMRT) continued test.

3. Results and Discussion

3.1. Feed Consumption

Average feed consumption of sheep fed with fermented cassava skin ranged from 1755.97-2001.40 g/head/day. The highest average consumption of sheep feed was found in P3, namely 2001.40 g/ head/day and the lowest average consumption of sheep feed was found in P1, namely 1755.97 g/head / day ("Diagram 1").

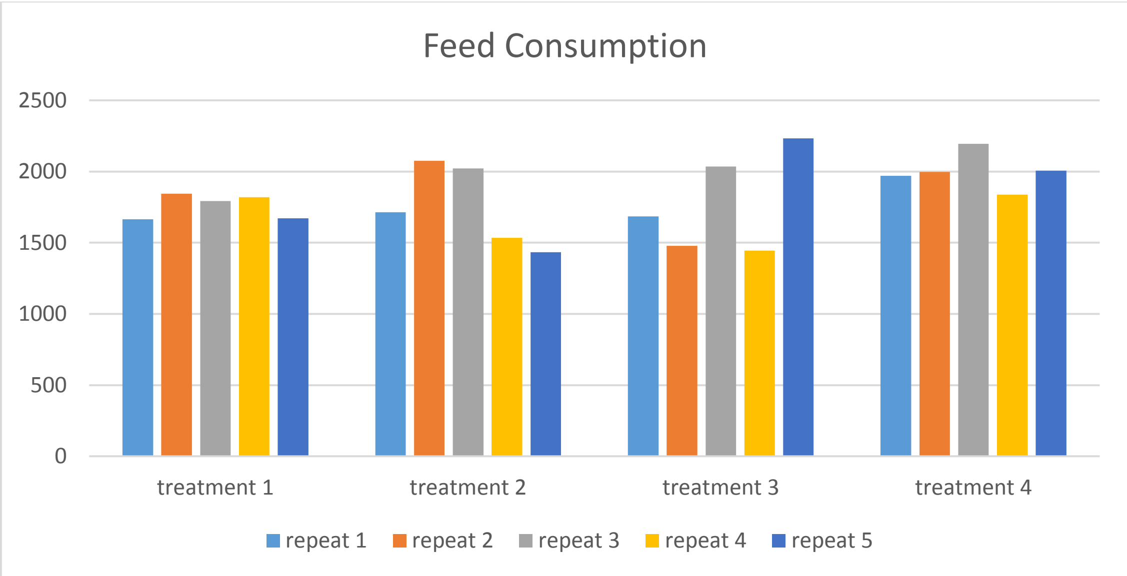

Figure 1. Average feed consumption of sheep fed with fermented cassava peel

The feed consumption obtained was higher than [8] study of the substitution treatment of cassava skin with grass at a dose of 0-60%, the average consumption of which was 503.71-608.60 g/head/day. Likewise, the results of [9], treatment by using grass *Brachiaria humidicola* and cassava peels at 0-75% cassava peel doses showed an average consumption of 364.80-411.42 g/head/day. The results of [10] study using fermented cassava root flour with *Aspergillus niger*at a dose of 0-45% resulted in consumption ranging from 421.76-526.54 g/head/day. Research by [11] used fermented cassava peels at the level of 0-300 grams results in an average consumption ranging from 677-739 g/head/day, and [12] using fermented cassava skin with starbio at a dose of 0-60% shows consumption ranges from 330.01 to 402,92 g/head/day.

The fermentation treatment of cassava peels with local microorganisms based on cassava peel waste itself indicates that this MOL is more adaptive in hydrolyzing complete compounds to be simple and producing more palatable organic acids. This is indicated by the fragrant aroma and sour taste of the fermentation product, which is preferred by livestock to the provision of 75% in the ration.

The results of the analysis of variance showed that the application of fermented cassava peels with local microorganisms in the ration had no significant effect (P> 0.05) on the feed consumption of male local sheep. The provision of fermented cassava peel feed with MOL up to a dose of 75% shows a tendency for consumption to continue to increase, but the increase has no significant effect. The increase in consumption could be due to the fact that the fermented feed given can increase palatability which includes the taste and aroma of the fermentation. The fermentation process of the cassava peels forms a sour taste and fragrant aroma that is favored by livestock, thereby increasing the palatability and consumption of sheep. This is in accordance with the statement of [13] which states that fermentation can add flavor and aroma and affect the palatability of the ration. [14] states that the level of consumption in livestock is influenced by feed palatability. High ration palatability causes the amount of ration consumed to increase.

The increase in feed consumption is due to the effect of adding a local microorganism solution (MOL) to the fermented cassava peel, the fermentation process that occurs is able to change the nutritional content in feed such as increasing protein content and reducing crude fiber so that digestive work activity also increases. The PK content of cassava peels before fermentation was 4.17%, after fermentation increased to 5.24% while the SK content of cassava peels decreased from 16.88% before fermentation to 10.39% after fermentation. This is in accordance with [3] statement which states that to improve the quality of feed it is necessary to carry out a fermentation process using microorganisms. This indicates that during fermentation the lignocellulose and hemicellulose bonds are broken.

3.2. Daily Weight Gain The

Average weight gain of sheep fed with fermented cassava skin ranges from 133.64 to 156.20 g/ head/day. The lowest average sheep body weight gain was 133.64 g/head/day (P3) and the highest average body weight gain was 156.20 g/head/day (P0) ("Diagram 2").

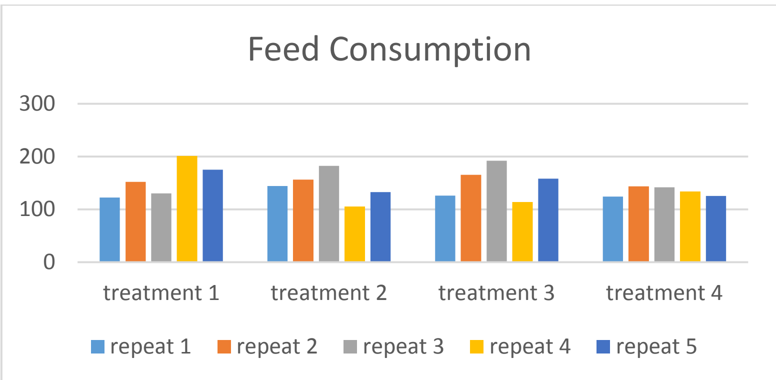

Figure 2. Average body weight gain of male local sheep during the study (g/head/day).

The weight gain of sheep from this study was higher than [8]) study which used cassava skin substitution with daily body weight gain ranging from 15.32 to 50.54 g/head/day and [9] using grass *Brachiaria humidocola* and cassava skin with daily body weight gain ranged from 78.33-141.67 g /head / day. Likewise, the results of [10] using fermented cassava root flour with *Aspergillus niger* have body weight gain ranging from 30.12-53.45 g/head/day, [11] uses cassava peels. fermentation has a body weight gain ranging from 43-56 g/head/day, and [12] using fermentation of cassava tuber skin with starbio has a body weight gain of around 52.86-101.80 g/head/day.

The results of the analysis of variance showed that the use of fermented cassava skin with local microorganisms in the ration had no significant effect ($P > 0.05$) on body weight gain of local male sheep. This shows that giving fermented cassava peels using MOL at different doses gives a relatively similar response to body weight gain of local male sheep.

Daily body weight gain in the treatment of fermented cassava peels (P1, P2, P3) tended to decrease, namely in the range of 133.64–151.02 g/head/day while ration consumption tended to increase in the range of 1755.97-2001.40 g/head/day. The higher the ration consumption, the higher the HCN accumulation. The fermented cassava peels used in this study contained 38.53 mg/kg of HCN of fermented cassava peels. When calculated, the average consumption of HCN per sheep based on the treatment is P1 of 5.68 mg/kg, P2 of 12.48 mg/kg, and P3 of 23.64 mg/kg. According to [15], the safe dose for consuming HCN is 2.5-4.5 mg/kg per head/day, but if sheep consume grass it can withstand up to 15-20 mg / kg per head / day.

During the research, sheep were fed grass and fermented cassava peels so that the HCN consumption of 5.68 mg / kg (P1) and 12.48 mg / kg (P2) per head / day were still in the safe category because they were still below the threshold for HCN consumption of sheep. who consume grass, which is 20 mg / kg per head / day. The consumption of HCN in the P3 treatment was 23.64 mg / kg indicating that the amount of HCN consumed was greater than the threshold for the sheep's ability to receive HCN. This explanation illustrates that the average HCN content in the P3 ration exceeds the limit of the sheep's ability to receive it, so this causes the daily body weight gain in P3 to be relatively smaller than other treatments.

The presence of HCN in the body can interfere with electron transport which can lead to oxygen reduction so that respiration or cell oxidation is disturbed [15], besides HCN can bind oxygen in the blood resulting in shortness of breath in sheep [16]. [17] states that in small amounts, HCN can be neutralized by the body to thiocyanate, whereas large amounts can result in death in a short time due to respiratory failure.

3.3. Feed Conversion

Average feed conversion of sheep fed with fermented cassava skin ranged from 11.62 to 15.01. The lowest average feed conversion was 11.62 (P0) and the highest average feed conversion was 15.01 (P3) ("Diagram 3").

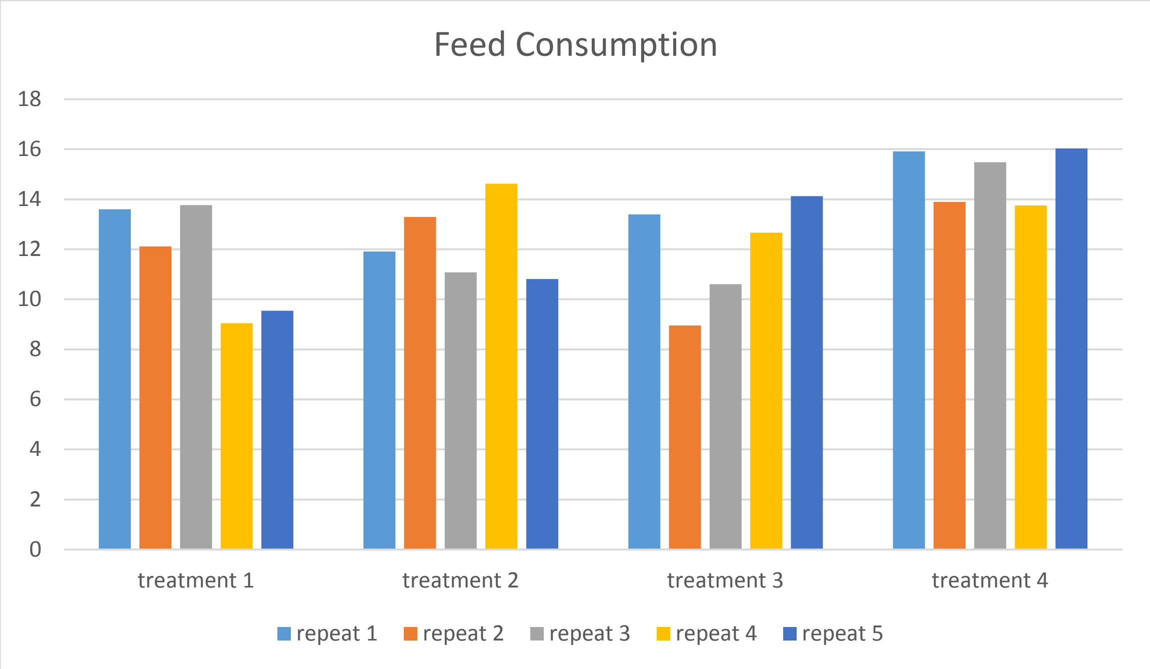

Figure 3. Conversion of sheep feed fed with fermented cassava peel

The feed conversion from this study was lower than research by [8] ranging from 12.47 to 37.43 (using cassava peels) and research by [11] ranging from 12.5 to 17.2 (using fermented cassava peels)) but it is higher than research by [10] which ranging from 10,12-14,65 (using fermented cassava root flour with *Aspergillus niger*) and research by [12] ranging from 4.04-6.42 (using cassava root fermented by starbio).

The results of the analysis of variance showed that the use of fermented cassava peels with local microorganisms had a significant effect ($P < 0.05$) on the feed conversion of male local sheep. The average feed conversion between treatments ranged from 11.62-15.01, which means that to increase 1 kg of body weight requires 11.62-15.01 kg of feed. This result is less efficient than [12] research which ranging from 4.04 to 6.42 (using cassava skin fermented by starbio). This is because the fermented cassava skin in the pulungan study was in the form of flour so that it had better digestibility and more efficient absorption of nutrients.

In the P3 treatment with the highest feed consumption, the lowest body weight gain was obtained so that the feed conversion (15.01) was greater than the other treatments. This is thought to be due to the accumulation of HCN in the body from the consumption of fermented cassava peels. P3 sheep consume fermented cassava skin more than other sheep, so the amount of accumulated HCN contained in their bodies is also more than other sheep. This HCN accumulation causes sheep to experience health problems such as respiratory problems [16] and growth [15]. [17] mentioned that apart from the accumulation of HCN, too acidic rumen conditions will interfere with rumen microbial activity in degrading nutrients.

The provision of feed containing fermented cassava peels on the feed conversion has a significant effect, with the KK value (coefficient of diversity) = 3.62, so to determine which treatment has the most potential (to find out the differences between treatments) it is necessary to find the comparison value first and carry out further tests. namely the *Duncan's Multiple Range Test* (DMRT).

The results of the DMRT further test showed that the P3 treatment was significantly different from the P0, P1, and P2 treatments. Treatments P0, P1, and P2 have the same notation, meaning that the treatments are not significantly different. This shows that the use of cassava peels up to a dose of 50% (P2) still has the same effect as the control treatment (P0).

3.4. Income over Feed Cost (IOFC)

Table 4 shows the average *income over Feed Cost* sheep by fermenting cassava peel-range from IDR 430,404.00 IDR 505,481.00 averaging lowest IOFC IDR 430,404.00 (P3) and the average of the highest feed conversion of IDR 505 481 , 00 (P2) ("Table 4").

Table 1. Average *Income over Feed Cost of* sheep during the study (IDR).

Treatments	Repeat					Average
	1	2	3	4	5	
P0	383.128	445.880	431.802	447.039	540.994	449.769
P1	486.203	467.904	580.850	332.880	420.886	457.745
P2	418.107	560.440	653.373	354.352	541.135	505.481
P3	399.118	467.512	455.390	435.170	394.832	430.404

The average *income over feed cost* (IOFC) of fermented cassava peels given to male local sheep tends to increase compared to the *income over feed cost* (IOFC) without fermented cassava skin. Treatment P2 with a dose of 50% fermented cassava peel has a better IOFC value than other treatments. This is because the treatment has a good balance between body weight gain, low feed conversion value and relatively cheaper feed costs so that the benefits can be greater. This is in accordance with the opinion of [18] which states that good growth does not necessarily guarantee profits, but good growth followed by good feed conversion and minimum feed costs will get maximum benefits.

4. Conclusion

The fermented cassava peel with local microorganisms (MOL based on cassava peel waste) can be given in rations up to a dose of 50% with an *income over feed cost* (IOFC) of IDR. 505,481.

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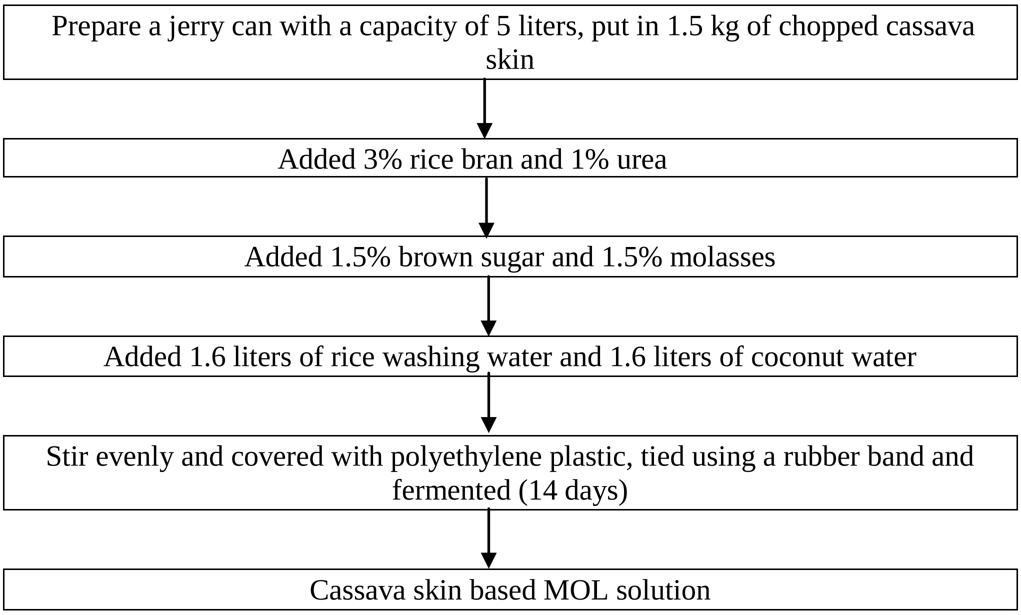

Figure 4. Schematic of Making a solution of local microorganisms [3]

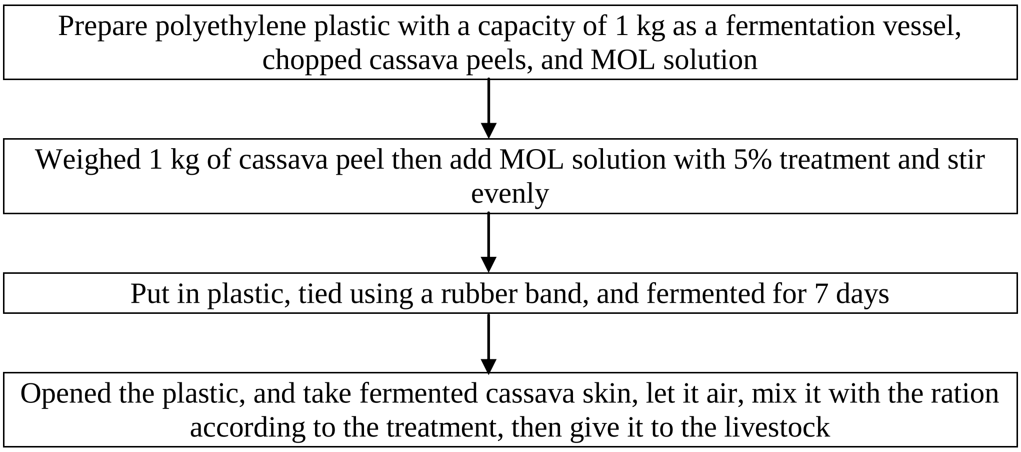

Figure 5. Fermentation scheme of cassava peels