Optimization of the utilization of blood meal with palm oil fronds absorbance fermented as feed stuff to changes of nutrition content

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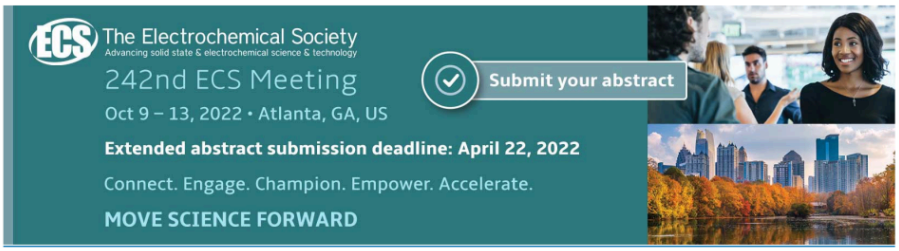

Optimization of the utilization of blood meal with palm oil fronds absorbance fermented as feed stuff to changes of nutrition content

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Abstract. The utilization of agricultural and livestock waste by-products, apart from being an alternative feed ingredient, can also reduce environmental pollution. Palm fronds as a by-product of oil palm plantations are rarely utilized and most of them will be burned and couraging climate change phenomenon. Cattle blood is a by-product of abattoirs that directly impact the environment. Most of the cattle blood not used efficiently, and pollutes the environment. The research aims to increase the use of blood meal with the absorbance of palm fronds fermented as feedstuff on changes in nutritional content. The study used a completely randomized design with a factorial pattern. Factor A is the inoculant treatment, namely A1: *Bacillus amylolytic flavacient* bacteria A2: *Lactobacillus plantarum* bacteria, factor B is the incubation time, namely: B1 = 0 hours; B2 = 60 hours and B3 = 120 hours., each treatment was repeated 3 times respectively. Parameters observed were nutrient content based on proximate analysis The results showed that there was interaction between the type of inoculant and the incubation time used in fermenting blood meal with the absorbance of palm fronds. Incubation time had a significant effect ($P<0.05$) on the content of dry matter, organic matter, crude fiber and crude protein, while the incubation time had no significant effect on ($P>0.05$) crude fat content. Based on the results of the study, it was found that in blood meal with absorbent palm oil fronds, *Lactobacillus plantarum* inoculants with an incubation times of 120 days gave the best results in blood meal with absorbance palm oil fronds fermented.

Key words: Blood meal, fermented, palm oil frond, Lactobacillus plantarum, Amillolitic flavacient, waste

1. Introduction

In Indonesia, like most other developing countries in the tropics, the use of by-products from agricultural waste and livestock waste as alternative feed ingredients has been widely used. The utilisation of agricultural and live stock waste by-products, apart from being an alternative feed ingredient, can also reduce environmental pollution. Palm fronds as a by-product of oil palm plantations are rarely utilized and most of them will be burned and couraging climate change phenomenon. Cattle blood is a by-product of abattoirs that directly impact the environment. Most of the cattle blood not used efficiently, and pollutes the environment. Likewise, cattle blood is a by-product of abattoirs that has a direct impact on the environment. Most of the blood from large numbers of beef cattle is wasted, not used efficiently, and pollutes the environment [1].

Palm fronds have the potential as a source of fiber feed for ruminants, with nutritional content consisting of dry matter (BK) 88.14%, crude protein (PK) 5.28%, Neutral Detergent Fiber (NDF) 65.59%, Acid Detergent Fiber (ADF) 52.72 %, Hemicellulose 12.87%, Cellulose 27.79%, and Lignin 25.42%, the use in rations can reach 40% substitution of native grass after fermenting with *Phanerochaetae chrysosporium* [2]. Blood meal, obtained from cattle blood after drying, contains 80% - 90% crude protein, with a high content of essential amino acids, especially lysine [3]. Constraints on the use of blood meal are the difficulty in the drying process, it will be a good medium for microbial growth when humidity is high, while drying using sunlight takes a long time for 3 days [4]. Several previous studies have applied absorbent technology derived from agricultural waste to speed up the process of drying cattle blood. Research on the processing of blood meal by using absorbent corn waste and obtained the results of the drying process of cattle blood faster and increasing the nutritional content of corn waste as animal feed [5].

The use of oil palm fronds as absorbent for processing cattle blood has never been studied, therefore this study will examine the role of oil palm fronds as absorbent of blood meal and the fermentation process with different inoculants as feed ingredients for ruminants. The purpose of this study was to examine the fermentation process with different inoculants and incubation times on blood meal with palm frond absorbance on changes in nutrients content.

2. Materials and method

2.1 Materials

Material of the research: Palm oil frond, blood meal, *Bacillus Amilolityc flavacient, Lactobacillus plantarum,* rice brands, material for proximate analysed

2.2 Methods

The study used a completely randomized design with a factorial pattern. Factor A is the inoculant treatment, namely A1: *Bacillus amylolytic flavacient* bacteria A2: *Lactobacillus plantarum* bacteria, factor B is the f incubation time, namely: B1 = 0 hours; B2 = 60 hours and B3 = 120 hours., each treatment was repeated 3 times respectively. Parameters observed were nutrient content based on proximate analysis (Dry matter, organic matter, crude protein, crude fiber and crude fiber)

2.3 Research implementation

2.3.1. Inoculant preparation. The inoculant used was 100g rice bran, sterilized using an autoclave for 15 minutes at 121oC, 1 atm pressure, then cooled to room temperature of 24°C. Ten millilitres of distilled water was put into a petri dish that had been grown with pure cultures of *Bacillus Amilolityc flavacient* and *Lactobacillus plantarum* bacteria and shaken to mix. The mixture of distilled water and bacteria was entered to an Erlenmeyer tube which already contained 190 ml of aquadest and then it mixed into the sterilized rice bran media and incubated for 24 hours. The inoculants were dried at 60°C.

2.3.2 Processing of blood meal with palm oil fronds absorbent. Processing of blood meal with absorbent refers to Makinde and Sonaiya [5] (modified method). The palm fronds were chopped and air-dried under the sun for 24 hours. The absorbent was mixed with fresh blood in a ratio of 1:1 (w/w). To prevent coagulation, the blood is mixed with 18g/litre of blood salt. The blood and absorbent mixture was dried for 3-4 hours. The resulting mixture is then mixed with blood in a ratio of 5: 4 (w/w) and fermented.

2.3.3. Fermentation process. Three percent inoculant was mixed with blood meal and absorbent, incubated according to the treatment, namely 0 hours, 60 hours and 120 hours at 40°C. After the incubation period was complete, the fermented material was dried at 60°C for 24 hours. Fermentation results in the analysis of nutritional content with proximate analysis. The result of Fermentation analysed with proximate analysis.

2.4 Statistical analysis

Data were analyzed as completely randomized design using Factorial Pattern the General Linear Means procedure of SAS (2000) for analysis of variance (ANOVA). Differences between treatment were resolved by Duncan's multiple range test of the SAS statistical package.

3. Results and discussion

Based on statistical analysis, it was found that there was an interaction (P<0.05) between the kind of inoculant and the incubation time on changes in the nutritional contents of blood meal and absorbance of palm fronds fermented, namely the content of dry matter, organic matter, crude protein and crude fiber. Based on further tests on dry matter content, it showed that incubation time had a significant effect (P<0.05) with the using *of Bacillus Amilolityc flavacient*, while incubation time had no effect (P>0.05) for *Lactobacillus plantarum* on dry matter content (Figure 1).

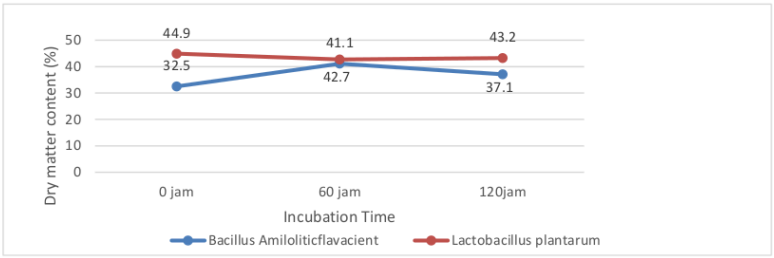

Figure 1. Dry matter content of blood meal with palm frond absorbance fermented

The dry matter content increased by 31.39% with the use of Bacillus Amilolityc flavacient inoculants and an incubation time of 60 hours compared to before fermentation. The dry matter content at an incubation time of 120 hours decreased by 13.11% compared to the dry matter content at an incubation time of 60 hours.

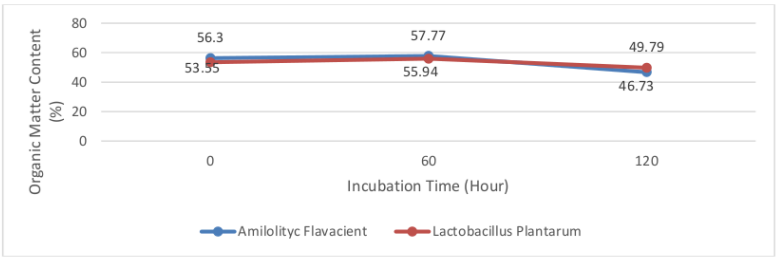

Figure 2. Organic matter content of blood meal with absorbent palm fronds fermented

Incubation time had a significant effect (P<0.05) on the organic matter content of blood meal with absorbant palm oil fronds in both kind of inoculants (Figure 2). During the incubation period of 60 hours, there was an increase in organic matter by 2.61% for *Amilolityc flavacient* inoculants and 4.46% for *Lactobacillus plantarum* inoculants compared to incubation time of 0 hours. At the incubation time 120 hours there was a significant decrease in organic matter (P<0.05) 7.02% with the using of

Lactobacillus plantarum and 16.99% for the using of *Amilolityc flavacient* inoculant compared to the incubation time of 0 hours. The kind of inoculant not significant effect (P>0.05) on changes of the organic matter content of blood meal with the absorbant palm oil fronds fermented. Changes in the content of dry matter and organic matter in all treatments were caused by the fermentation process of blood meal with the absorbance palm fronds resulting in changes of nutrients such as crude protein and crude fiber. Crude protein and crude fiber are part of dry matter and organic matter, as in the nutrient scheme based on proximate analysis [6]. Organic matter is part of the dry matter, while organic matter is composed of proteins, carbohydrates, fats and vitamins [7].

Crude protein in blood meal with absorbant palm oil fermented increased significantly (P<0.05) until an incubation time of 120 hours in both *Amilolityc flavacient* and *Lactobacillus plantarum* inoculants (Figure 3). The increase of crude protein was due to the higher inoculant activity with increasing incubation time. The Increasing of inoculant activity resulted in increased enzymes, thereby increasing crude protein. The research of [8] showed that at an incubation time of 120 hours, fermented blood meal with *Amilolityc flavacient* with coconut pulp absorbent resulted in an increase in crude protein. The use of blood meal with corn waste absorbance also resulted in an increase in crude protein [9].[10]stated that in the fermentation process, inoculants form like is bacteria, yeast or fungi are a source of protein for the substrate, in addition to carbohydrate degradation in the fermentation process will result in an increasing of crude protein [11]. Saxena and Singh [12] stated that there was an increase in protein content as the fermentation time increased. [13] also reported that the results of pods fermentation using *Bacillus subtilis* with 48 hours can increase protein up to 1.4 times which can be related to the synthesis time of microbial enzymes for substrate decomposition.

The use of *Lactobacillus plantarum* inoculants showed an increase in crude protein content which was higher than *Amilolityc flavacient* inoculants, especially at an incubation time of 60 hours. it was suspected that *Lactobacillus plantarum* activity was higher than *Amilolityc flavacient* on fermentation of blood meal with absorbent palm oil fronds

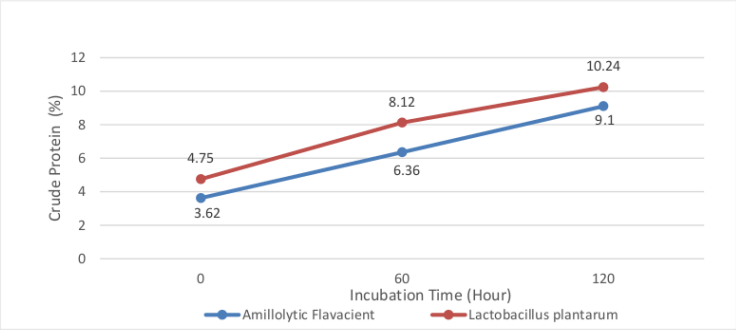

Figure 3. Crude protein content of blood meal with absorbent palm oil fronds fermented

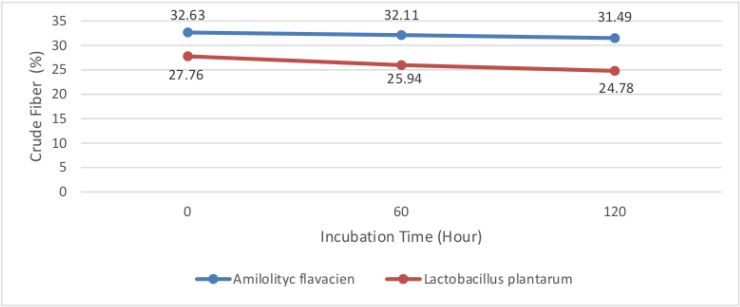

Figure 4. Crude fiber content of blood meal with absorbent palm oil fronds Fermented

Parameters of crude fiber content showed a significant decrease ($P<0.05$) until the incubation time of 120 hours (Figure 4). This decrease was due to the activity of cellulase and hemicellulose enzymes produced by *Amilolityc flavacient* bacteria and *Lactobacillus plantarum*. Cellulase and hemicellulase enzymes produced by inoculants will degrade crude fiber into simple carbohydrate compounds such as glucose. Simple carbohydrate compounds will be utilized by inoculants as an energy source. Amylolytic flavacient bacteria are cellulolytic bacteria that can degrade crude fiber because they produce cellulase and hemicellulase enzymes [14]. The longer of incubation time, the more enzymes will be produced so that the level of degradation of crude fiber will increase. Ramadhan et al. [15] stated that the length of fermentation can reduce crude fiber because the opportunity for enzymes to degrade crude fiber, especially cellulose and hemicellulose, becomes more perfect with increasing fermentation time. According to Chiang et al. [16] also stated that fermentation treatment with cellulosic bacteria can reduce crude fiber content. The decrease in crude fiber at incubation time of 120 hours for *Amilolityc flavacient* inoculants was 3.49% compared to incubation time of 0 hours. *Lactobacillus plantarum* inoculants resulted in a decrease in crude fiber of 10.73% at 120hour incubation time. Based on the level of decrease in crude fiber during the same incubation period, the activity of Lactobacillus plantarum inoculants indicated that they were more active than the *Amilolityc flavacient* inoculants.

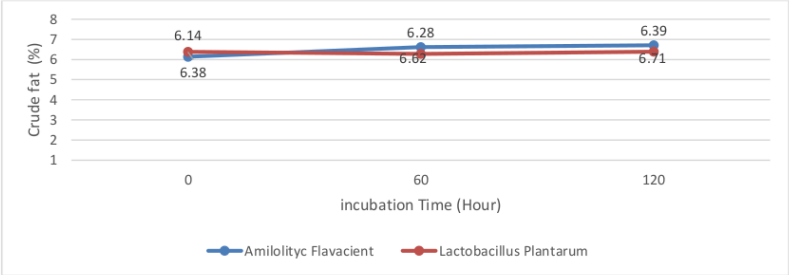

Figure 5. Crude fat content of blood meal with absorbent palm oil fornds fermented

There was not significant effect (P>0.05) of incubation time and type of inoculant on crude fat content (Figure 5), it was because Lactobacillus plantarum and Amilolityc flavacient inoculants did not have lipase enzyme activity to degrade fat content in blood meal with absorbent palm fronds. The average fat content of blood meal with absorbance of palm fronds fermented with Lactobacillus plantarum inoculants was 6.35% and Amilolityc flavacient inoculants were 6.71%.

4. Conclusion

Based on the results of the study, it was found that there was a reduction in pollution from livestock waste such as blood and agricultural waste due to increased efficiency in the use of blood meal and palm frond waste as animal feed. The blood meal with absorbent palm oil fronds, *Lactobacillus plantarum* inoculants with an incubation time of 120 days gave the best results in blood meal with absorbance palm oil fronds fermented. The nutritional contents of blood meal with absorbance of palm oil frond fermented with Lactobacillus plantarum, incubation time of 120 hours is dry matter 43.20%, organic matter 49.79%, crude protein 10.24%, crude fiber 24.78% and crude fat 6.71%.

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