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The Effect of Using Crude Enzymes of Cattle Rumen Contents as Bioactivator on the Content of Dry Matter, Organic Matter and Crude Protein of Palm oil Fronds

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Abstract

This research aims to evaluation the effect using of crude enzymes base on the rumen contents of cattle as bio activators with different doses and incubation length on the dry matter, organic matter, and crude protein content of palm oil fronds to be used as ruminants feed. The completely factorial randomized design with 3 replications for each treatment was used in this study. Factor A was the incubation length of the palm fronds, where A1 = 7 days, A2 = 14 days. Factor B dose of crude enzyme; B1 = 5%, B2 = 10%, B3 = 15%. Parameters observed were dry matter content, organic matter, crude protein. The results showed that there was no interaction effect ($p>0.05$) between incubation length and different doses of crude enzymes on dry matter, organic matter, and crude protein content of palm fronds. The highest dry matter content was 93.89%, the highest organic matter was 89.22 and the highest crude protein content was 11.04%. The best results in this study were at a dose of 10% treatment with an incubation period of 7 days.

Keynote : bioactivator, crude enzymes, palm oil fronds

Introduction

Feeding is one of the important factors for the success of a livestock business. The quality of feeding will improve livestock production. The availability of animal feed ingredients has recently become increasingly limited. The forage is feeding a source of fiber for ruminants. This is due to the increasing price of raw materials for animal feed, and the shrinking land for the development of forage production due to the use of land for food and residential purposes. Therefore, it is necessary to find potential sources of feed ingredients to be used as an alternative feed for ruminants that are able to replace part or all of forage feed, and are available throughout the year to overcome these problems. The by-products of palm oil plantations such as leaves and palm oil fronds are some of the ingredients that have the potential to be used as an alternative feed for ruminants. (Imsya, 2007) Said that the barriers to the use of oil palm midrib as animal feed were constrained by the low crude protein content ranging from 2.11–7% and the high crude fiber content reaching 46.75% (Murni et al., 2008). so it requires a technology treatment before being used as animal feed. There are many proteolytic bacteria, which are the most common types of bacteria in the digestive tract of ruminants. Some of species are known to use amino acids as a source of bacteria in the rumen. Some examples of proteolytic bacteria include: Bacteriodes amylophilus, Clostridium sporogenes, Bacillus

licheniformis (Soetanto 1998). The Rumen content is rich in protein, amino acids, vitamins, and minerals. The composition of amino acids, minerals, and vitamins as well as enzymes, also depends on the treatment (Budiansyah et al. 2011).

Rumen content enzymes as an alternative technology that can be used to hydrolyze crude fiber and increase the nutritional value of local feed raw materials (Pamungkas, 2012). there are very large microbial populations In the rumen of ruminants (cows, buffaloes, goats, and sheep). Rumen fluid contains bacteria and protozoa. Rumen contents are still rich in nutrients and can be obtained from abattoirs, their concentration of bacteria is about 10^9 per cc of rumen contents. The rumen contents can be obtained from abattoirs and are still rich in nutrients. This waste is very potent when used as animal feed. The rumen fluid of Cow is content with various enzymes such as cellulose enzymes, amylase, protease, xylanase, and others (Ayuningtyas, 2008), and still contain organic matter (Manendar, 2010).

Material and methods

The research was conducted using the rumen content of cattle and mixed with palm leaves and midrib as a source of microbial energy, added with molasses and soybean soaking water which is used as an energy source to produce several enzymes, and processed for microbial life. The rumen contents as inoculum were taken from the slaughtered.

The materials used in this research were oil palm leaves and palm fronds, the rumen contents of cattle, soybean soaking water, and molasses. This research has done an experimental study using factorial design in, 2 X 3 with 3 replications for each treatment. Further test by Duncan's multiple range tests when the significant effect of data.
Factor A is the lenght incubation; A1 = 7 days, A2 = 14 days. Factor B is Dose; B1 = 5%, B2 = 10%, B3 = 15%.
Research procedure
The Bioactivator Manufacturing Process was:

1. The procedure of this research was started by taking a sample of the rumen contents on the slaughtered putting it in a thermos, and closing it tightly.
2. The oil palm fronds are taken from community plantations in the Payo area, Tanah Garam Village, Lubuk Sikarah District, Solok City.
3. Then the contents of the rumen are weighed as much as 250 grams, then mixed with 250 ml of molasses, 2000 ml of soybean water immersion. After that, 100 grams of mashed palm leaves and midribs were added, consisting of 50% palm leaves and 50% palm midrib. After everything is mixed evenly, it is incubated for 7 days in a jar container and tightly closed

The Fermentation Process of oil Palm frond is:

1. The crude enzyme produces by done centrifuge the bio activator rumen content for 15 minutes at 4000 rpm for each dose (15 ml, 30 ml, and 45 ml).
2. Palm oil fronds and leaves as much as 300 g material were mashed and sterilized using an autoclave (temperature 121^0C) .
3. The crude enzyme be inoculated with oil palm fronds at a dose of 5%, 10%, and 15%.

4. Materials that have been mixed between oil palm fronds and bioactivators crude enzyme are stored for 7 and 14 days with the anaerobic conditions.
5. The treatment was repeated 3 times and harvested at 7 days and 14 days.

Observed parameters: The content of dry matter, organic matter, and crude protein.

Results and Dicussion

The average data of dry matter, organic matter, and crude protein content of oil palm fronds have been incubated with crude enzyme rumen contents for 7 and 14 days with a different dose, shown in Table 1.

Table 1. Average dry matter content, organic matter, and crude protein incubated palm fronds using bio activator crude enzyme based on rumen content of cattle

	Factor B			Average
Factor A	5	10	15	
Dry matter				
7 days	89.67	89.63	93.89	91.06
14 days	87.38	88.01	79.97	90.20
Average	88.53	88.82	86.93	SE=11.96
Organic matter				
7 days	79.34	79.29	87.89	82.17
14 days	74.71	76.01	89.22	79.98
Average	77.03 ^{b}	77.65^{b}	88.55^{a}	SE = 1.79
Crude protein				
7 days	9.34	10.88	7.30	9.17
14 days	11.04	10.12	7.51	9.63
Average	10.19 ^{a}	10.50^{a}	7.40^{b}	SE= 0.20

Note: The different superscripts in the same line show hight significant different effects (P<0.01)

Dry matter

The results of the varian analysis showed that the interaction between incubation length and the dose of crude enzyme rumen content of cattle showed no significant effect (P>0.05) on the dry matter content of oil palm fronds, as well as the factor of different incubation lengths on the different dose factors (5%, 10%, and 15%), showed no significant effect (p>0.05). The highest dry matter content of the treatment in this research was found in the 7-days incubation treatment with a dose of 15% (93.89%), followed by incubation for 14 days there was a decrease in the dry matter content of the oil palm fronds. The decrease of dry matter content indicates an increase in the water content of the substrate. This condition because the crude enzyme used was a product bioactivator from the contents of the cow's rumen which causes the fermentation process to occur. The longer of length incubation on the substrate causes the water content to increase as a result of the fermentation product. Data in Table 1, shows a decrease in the dry matter content at all treatment doses at 14 days of incubation. Processing of oil palm fronds with the addition of a bio activator crude enzyme based on rumen content of cattle to produces different water content.

Organic matter

The results of the analysis varian showed that there was no interaction effect (p>0.05) between the incubation length of 7 and 14 days with different doses (5%, 10%, and 15%) on the organic matter content of the palm fronds, and the treatment of factor A, incubation length. no significant effect (p>0.05), but factor B dose of the crude enzyme showed a hight significant effect (P<0.01) on the organic matter content of oil palm fronds. Further test results with Duncan's Multiple Range test showed that the 15% dose was significantly higher than the 5% and 10% doses. This indicates that the highest organic matter content was found in factor B were a dose of 15%. This is because the higher the dose, caused more crude enzyme content obtained by microorganisms contained in the bio activator. This is in accordance with the opinion of Wilkinson (1988) which states that the fermentation process carried out by microorganisms causes changes that affect the nutritional value of carbohydrates for lactic acid bacteria.

Crude Protein

Based on the analysis varian, it was shown that there was no interaction affect (P>0.05) between curing time and the dose of crude enzyme in the rumen contents on the crude protein content of oil palm fronds. Likewise, the curing time of 7 days and 14 days showed no significant affect (P>0.05). However factor B, with different doses of 5,10, and 15% showed hight significant affect (P<0,01). Further testing with DMRT showed that the treatment of factor B with a dose of 10% showed a significantly higher crude protein content than factor B3 with a dose of 15% and B1 with a dose of 5%. This is due to the high content of crude protein in the contents of the rumen so that it can provide a good source of microbial energy for the fermentation process of oil palm fronds. In the process of making a bio activator that, many microbes live in it, and are coupled with an energy source from molasses, which increases the content of crude protein. The main component of enzymes is protein. Crude enzymes in this research are organic compounds that function to accelerate the course of metabolic reactions in the body without affecting the balance of reactions. Wahyu (2017) The properties of enzymes are: 1. Enzymes have large molecular sizes. 2. The enzyme does not participate in the reaction, the structure of the enzyme does not change or remain. 3. Enzymes work in reverse. 4. Enzymes are colloidal. 5. Enzymes can react with acids, bases as well as anions and cations. 6. Enzymes are biocatalysts (capable of changing the rate of reaction) that, even in small amounts, can advance the rate of reaction without changing the balance of the reaction. The results of this study are in line with the research of Sukaryana (2011), namely local microorganisms from the rumen contents of cows and buffaloes produce microbial activity, so as to increase protein digestibility.

Tilman et al. (1998) the digestibility of foodstuffs is determined by several factors, namely the type of livestock and the chemical composition of the food. The success of the fermentation process is determined by the ability and ability of microbes to adapt to the substrate to be used as nutrients for microbial growth and development (Zakaria et al, 2013). Microbes that are unable to adapt and have difficulty digesting substrate will die slowly (Soeprijanto et al., 2008).

Conclusion

Based on this research can be concluded that the incubation of oil palm fronds for 7 and 14 days with doses of 5, 10, and 15% using a crude enzyme based on rumen content as bio activator. the results of the analysis of diversity showed that there was no interaction (P> 0.05) between incubation length and dose of crude enzyme on the value of dry matter content, organic matter, and crude protein, but Factor B incubation time showed a significantly different affect (P<0.05). The best results in this study were at a dose of 10% treatment with an incubation period of 7 days.

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