Digestibility of Ration Based on Banana Peel Bioprocessed with Local Microorganism

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ABSTRACT

This research aimed to evaluate the ruminant ration digestibility of dry matter; organic matter, crude fiber and crude protein based on banana peel have bioprocessed with local microorganisms (MOL) source rumen content as ruminant feed. The forage was grass field and Banana peel fermented MOL (BPFM). The experimental design was a randomized block design with 5 treatments and 3 groups as replications for each treatment. The ration treatments were R1: 40% grass field + 0% BPFM, R2: 30% grass field + BPFM, R3: 20% grass field + 20% BPFM, R4: 10% grass field + 30% BPFM, R5: 0% grass field + 40% BPFM. All of rations contained of 60% concentrate (rice bran, corn flour, coconut male, cattle mix, and salt) and conducted in *in-vitro* method. The parameters observed were dry matter, organic matter and crude protein digestibility of ration treatment. Based on this research was the best results of dry matter and organic matter digestibility on the treatment with 40% banana peel fermented MOL and 0% grass field, were 74.58% dan 72.62%, respectively. The rations base on banana peels fermented with MOL can be used to substitute the grass field as forage source on ruminant ration.

Key word: digestibility, MOL, ruminant ration

INTRODUCTION

The feeding is a major component that high cost to operating in the livestock farming. The quantity and quality of feeding for ruminant production is limitated in Indonesia. Utilization of by product of agricultural as animal feed is one of alternative solution, but there is constrained by content of anti nutrition such a lignin, tannins, and it needs the technology treatment through ammoniating chemical treatments, fermentation and other biological substances.

Banana *(Musa sp.)* peels are widely used by smallholders as complementary feeds for cattle in the tropics. In 2012 the production of bananas in Indonesia was about 6,189,052 tons, (BPS Indonesia, 2014). Banana peel is rich in vitamin, pectin, sugar, lignin, and can be used as cattle feed (Mohaputra *et al.*, 2010). Nutrient contents of banana peel were 10.09% crude protein, 18.01% crude fibber, 5:17% fat, 55.59% dry matter dry matter, 0.36% calcium, 0.10% phosphor and 3727 kcal/kg gross energy. Banana peel also contains vitamin C, E, and B6. Protein and mineral content of banana peel that is high enough to replace the lack of nutrients and minerals lost during heat stress, but has the high crude fiber content and the presence of tannins in the banana peel that makes it difficult to digest. Therefore, its use cannot be too much in the ration (Adlin, 2008). Koni (2009) reported that crude protein of Kepok banana peels fermented with *Rhyzopus oligosporus* could increase 3.63% up 22.15% . Meanwhile, the content of crude protein banana stone peels increased about 54.02%, there was 9.2% up to 14.17% after fermented with *Rhyzopus oligosporus* (Ciptaan and Mirnawati, 2001).

Local Microorganisms is a product of fermented based on the various resources available that suspect containing the bacteria, fungi, and yeast. They are potentially as decomposer of organic matter.

The advantages of MOL are low cost because it uses ingredients from fruits and vegetables waste, animal waste or household waste. It‘s applicable and easy in the manufacturing process. Astuti (2012) reported that the content of dry matter and organic matter banana peels were 96.11% and 81.92% that becomes 95.53% and 80.89% after fermentation with MOL resources of rumen content. It was important to study the effect of bioprocess MOL on banana peel that was formulated in ruminant

rations as a substitution of forage sources on the dry matter, organic matter, and crude protein digestibility of feed.

MATERIALS AND METHODS

The main material used in this researched was the banana peel that has fermented through bioprocess approach by MOL source of rumen ingest. The MOL was source of rumen ingest mixed with coconut water and sugar for 7 days (Amalia, 2008).

The ration consisted of forage and concentrates with comparison 40%: 60%. The Forage consisted of grass field and banana peels. The Banana peels have been dried and fermented with MOL source the rumen ingests. The concentrate consists of rice bran, corn flour, coconut male, catlle mix, and salt. Randomized block design used in this researched with 5 (five) rations treatment and 3 (three) groups as replicates of each treatment and 3 (three) groups as replicates of each treatment. The ration treatments in this treatment were:

R1: 40% grass field + 0% banana peel fermented MOL + 60% concentrate
R2: 30% grass field + 10% banana peel fermented MOL + 60% concentrate
R3: 20% grass field + 20% banana peel fermented MOL + 60% concentrate
R4: 10% grass field + 30% banana peel fermented MOL + 60% concentrate
R5: 0% grass field + 40% banana peel fermented MOL + 60% concentrate

Differences between treatments were test by Duncan's Multiple Range Test (DMRT), (Steel and Torrie, 1991).

Preparation of banana peels fermentation was conducted as follows. Banana peels that have been dried, pulverized, sterilized, and then fermented with MOL. Banana peels was incubated for 7 days. When the incubation was end that material was dried under sunlight, so it could be stored for a long time. Banana peel is ready to be formulated with other ingredients as livestock feed. The digestibility of ration analysis was carried out by *in vitro* method in the accreditted laboratory of Livestock Research Center in Ciawi, Bogor.

Parameters observed in this study were: dry matter digestibility, digestibility of organic matter, and digestible crude protein.

RESULTS AND DISCUSSION

The data in Table 1. was the average content of ration nutrition treatment and Table 2 was the average of digestibility of nutrient ration base on banana peels were substitutes grass field with a banana peels fermentation with MOL of rumen ingest on the content of dry matter digestibility and organic matter ruminant rations.

The results of statistical analysis showed that there is no significant ($P > 0.05$) effect to all treatment of the digestibility on dry matter ration, but the significant effect ($P < 0.05$) on the digestibility of organic matter and crude protein. Based on Table 1, shown the highest digestibility of dry matter and organic matter was in the R5 treatment, with composition of the ration formulation with 40% fermented banana peel MOL, 0% grass field and 60% concentrates.

Table 1 . The average content of ration nutrition treatment (%)

Ration	DM	OM	CF	CP
R1	88.22	82.66	17.44	10.24
R2	88.13	83.12	15.35	9.76
R3	87.99	83.07	19.86	9.89
R4	87.93	82.62	19.22	9.43
R5	87.84	82.69	17.31	9.51

This researched consistent with Astuti (2013) that an increased about 15.29% -24.05% dry matter digestibility of fermented banana peels with various sources of MOL. There was being suspected that the increasing the digestibility of fermented banana peels with the MOL, because of MOL contains bacteria and fungi that contributed to increasing the digestibility values of the material. The fermentation can improve the quality of the material, such as increasing the crude protein content, amino acids and vitamins, as well as reduce the content crude fiber, and increases the value of the

digestibility (Sukaryana *et al.*, 2011 in Koni 2013). It is also consistent with research Nurhaita *et al.* (2012) the increasing of digestibility dry matter and organic matter in the fermentation of sugarcane bagasse with *Neurospora sitophilla*.

Table 2. The average digestibility of nutrient ration base on banana peels fermented by mol source of rumen ingest (%)

Rations	DM	OM	CP
R1	72.74	69.35[ba]	74.11 [a]
R2	72.47	69.09[b]	65.93 [b]
R3	72.52	69.21 [b]	65.70 [b]
R4	74.00	71.58 [a]	65.92 [b]
R5	74.58	72.62 [a]	64.33 [b]
Average	72.93	69.81	67.91

Note : Different (a,b) in the same column indicates significantly different (P<0.05)

The digestibility of crude protein more lower when the banana peels were increased. The protein for ruminants were source of microbial proteins and food proteins that escape of degradation in the rumen (bypass protein). The ruminant get protein for the body only microbial protein when the quality of fiber feed was low. According to Sutardi (1997) although microbial protein was high in quality, but the amount will not be enough to achieve optimum production, it is necessary an additional form of by-pass protein, a protein that is qualified for the post-rumen and high-value biodiversity. The higher digestibility of protein in the rumen will be less the amount of protein by-pass to qualify for the post-rumen, and vice versa.

In Table 1 shown that the treatment ration base of fermented banana peels with MOL was lower of digestibility protein in comparison to the control diet containing no banana peels MOL.

The results obtained in this researched accordance with the purpose to improving the digestibility feedstuffs research mainly the digestibility of dry matter and organic matter, presumably this was due MOL of the fermentation process that contributed microorganisms such as lactobacillus, yeast, etc, that can improve the quality of feed through fermentation.

Research of Gusmanizar and Sari (2009) found that in a MOL there were microbes such as Rhizopus, lactobacillus and yeast.

Based on the results of this researched shown that the utilization of banana peels that has bioprocess through fermentation with MOL can be used as a substitute source of forage grass field. It also suggests that banana peel can be used 100% as forage.

CONCLUSION

Based on the results of this study concluded that banana peels can be used as a substitute source of forage grass field for 100%. Ration based fermented banana peel MOL can be recommended for areas of high banana production and processing of banana industry.

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