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# Digestibility of dry matter and organic matter of complete rations based on banana stems in Ciayumajakuning muscovy duck

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## ABSTRACT

This study aims to obtain the digestibility of dry matter and organic matter of banana stem-based muscovy duck rations. The study was conducted experimentally using a completely randomized design (CRD) with 5 treatments and 4 replications on twenty drakes. The five treatments are P0 (ration + 0% banana stem as control), P1 (ration + 25% banana stem), P2 (ration + 50% banana stem), P3 (ration + 75% banana stem), and P4 (ration + 85% banana stem). %). Observation data were analyzed using one-way ANOVA, followed by Duncan's Multiple Range Test (DMRT) to determine differences between treatments. The results of the study showed that the Muscovy diet with the addition of 50% banana stems had the best organic matter digestibility and dry matter digestibility, namely 49.28 ± 0.23% and 54.55 ± 0.41%. It could be concluded that the Muscovy ration with the addition of 50% banana stems had the best quality.

**Keywords:** Dry matter, Organic matter, Quality of entog ration

## INTRODUCTION

The banana trunk is the part of the banana tree that is no longer used because the bananas have been harvested. Banana stem is a potential agricultural waste that has not been widely utilized. The Director General of Horticulture Production Development said that the potential for bananas reached 31.87% of the total fruit production in Indonesia. In 2007 the production of bananas reached 5.454 million tonnes (Ramadhan et al., 2019). The fresh weight ratio between banana stems, leaves and fruit is 63%, 14% and 23% respectively. From this comparison, 14.939 million tonnes of fresh stems will be obtained in the same year. In addition to banana stems, there are also leaves, tubers, and leaf sheaths as agricultural waste (Suci et al., 2020).

The nutrient content of banana stems includes dry matter 8.00%; ash 19.50%, crude protein 1.01%; crude fiber 19.50%; crude fat 0.75%; BETN 59.24%, and the nutritional content of banana weevil is dry matter (Kurniawan, 2018). The weakness of banana stems as a feed ingredient is in the form of containing tannins. Tannin is a phenolic compound that can inhibit the digestion of organic matter, especially protein, which forms tannin complex bonds, an excessive protein which is difficult to digest in the digestive tract of mussels and high crude fiber. The technology that can overcome the constraints of utilizing banana stems in musk rations is bioprocessing using the anaerobic fermentation method (ensilase) with the final product being banana stem silage (Harahap et al., 2021).

The final product of silage with a single ingredient usually does not meet the optimal nutritional needs of the musk rations, because of high crude fiber, so it must be enriched to get maximum benefits. Feed ingredients that can be added to enrich banana stem silage include fine bran and catfish waste (Riber & Mench, 2008). Both types of feed ingredients have good nutrient content. Fine bran is a source of energy and protein, and catfish waste is a source of animal protein in the ration. The addition of fine bran and catfish waste to banana stem silage as a complete ration is very necessary for entog in the growth phase.

The Ciayumajakuning muscovy duck is a meat-producing waterfowl that is generally kept in rural areas, especially in the Ciayumajakuning area (Cirebon, Indramayu, Majalengka, and Kuningan). The specialities of entog include being easy to maintain, large body, fast-growing, and able to tolerate high crude fiber in the ration. The demand for entog is increasing along with the preference of rural communities, namely entog villages. Spicy muscovy duck is a processed entog dish that is rich in spices and spicy seasonings, very good for removing the off flavour and odour from entog meat. This makes entog pedesan popular among young people too. Demand for Muscovy is increasing, in one restaurant 50 heads per day weigh 1.5 kg per head. Of course, this is a very good market potential (Widianingrum et al., 2020).

However, the high demand for mussels is not proportional to the income of farmers. There is a high gap. The restaurant maintains high standards at low prices. Breeders want high prices because musk ducks require high production costs, especially the price of rations. Apart from that, many business people sell adult female musk ducks and do not pay attention to musk production. This is supported by data from 2018 that the Ciayumajakuning entog population, which constituted 70% of the West Java entog, West Java Provincial Livestock Service, 2018 in (Widianingrum et al., 2020), has now decreased drastically to 30% like reported by West Java Provincial Food Security and Livestock Service, (2021) in (Widianingrum et al., 2020). Such conditions are very detrimental, over time the mussels will become extinct, so conservation and development of mussels must be carried out.

The development of Ciayumajakuning Muscovy duck can be done by providing good rations and supported by seeds and good management. Muscovy duck rations must have good quality and quantity. The feed ingredients that make up the ration should have high nutrient content, be cheap, be widely available, and not compete with humans (Abdel-Hamid et al., 2020).

The high lignin content in banana stems will affect the work of microbial enzymes in digesting cellulose and hemicellulose in the rumen (Superianto et al., 2018). Cellulose and hemicellulose are the main components that make up plant cell walls and are bound to complex substances that are difficult to digest, namely lignin, which forms lignocellulose and lignohemicellulose. Apart from that, there is tannin, namely a phenol compound which interferes with the digestibility of organic materials, especially protein, by forming tannin-protein complex bonds which are difficult to digest in the sheep's digestive system (Harahap et al., 2021).

Application of technology to increase the biological value of waste using the anaerobic fermentation (enzymes) method. This method can be used to preserve and increase the nutrient value of feedstuffs with low nutrient quality, by adding nitrogen and sulfur sources. Additions such as nitrogen and sulfur will affect the growth and development of lactic acid bacteria in the substrate. The purpose of providing nitrogen and sulfur sources is to prevent microbes from using the nutrients contained in preserved banana stems and to provide nutrients to the microbes so that they grow fast and stable (Kiple & Ornelas, 2001).

Nitrogen sources have physiological functions for microbes because they are part of proteins, nucleic acids and coenzymes (Wang et al., 2018). The nitrogen source commonly used is inorganic nitrogen, namely urea. Urea is a compound that contains a fairly high nitrogen element of around 46.67% so that it can support the growth of bacteria. The addition of 0.5% urea in anaerobic fermentation (ensilage) can increase the concentration of lactic acid and does not hurt the fermentation process (Wisnu, 2020). The addition of urea can produce ammonia so that it can increase the digestibility of dry matter, organic matter and cell wall components in the form of cellulose and hemicellulose from feed ingredients that are fermented anaerobically (Anggraeni et al., 2018).

Dry matter digestibility is measured to determine the amount of nutrients absorbed by the body. Through analysis, the difference between the amount of dry matter in the ration and faeces can be determined, which is the amount of dry matter that can be digested. The smaller the amount of dry matter contained in faeces, the higher the digestibility of dry matter in a feed. This is caused by the large number of food substances that can be absorbed by the body (Farghly et al., 2018).

Organic materials are a source of energy for body function and production. Measurement of organic matter digestibility includes the digestibility of food substances in the form of organic material components such as carbohydrates, proteins, fats and vitamins (Kurniawan, 2018). The digestibility of dry matter and organic matter can be used as an indicator of the ease with which dry matter and organic matter of feed or rations are degraded and digested by digestive enzymes in the post-rumen (Manullang et al., 2018).

## MATERIAL AND METHOD

### Location, time, and material

The research was carried out at the Non-Ruminant Animal Feed and Nutrition Laboratory and the Entog Center Cages, Faculty of Animal Husbandry, Padjadjaran University, Jatinangor, Sumedang, West Java. The research materials used 45 kg of banana stems, 45 kg of fine bran, 10 kg of catfish waste, and 10 litres of EM4 solution. The research object used 20 muscovy drakes. Research equipment included digital scales, 10 ml syringes, 20 pcs plastic plates, label paper, knives, scissors, buckets, and basins.

### Procedure and variable measurements

The procedure for making complete rations is cleaning and cutting the banana stems, cleaning them and cutting them into 0.5 cm thick pieces. Cleaning, boiling and softening catfish waste. Mix catfish waste, fine bran, banana stems, and EM4 according to treatment until homogeneous. The treatments were P0 (ration containing 0% banana stem as control), P1 (ration containing 25% banana stem), P2 (ration containing 50% banana stem), P3 (ration containing 75% banana stem), and P4 (ration containing 100 banana stems). %). Analyzing the proximate complete ration based on banana stems, to obtain the chemical quality of the ration.

Digestibility measurement procedures. Digestibility is the amount of ration that can be digested by entog from the ration consumed. Digestibility calculations use lignin indicators (Ranjhan, 1980). The research procedure is to place the male muskrat in individual cages. Fasting for 36 hours. Enter the entog ration into the oesophagus according to the treatment, 30 grams per head in paste form, by force-feeding. Slaughter the muskrat and collect its feces. Stool collection is carried out by dissecting the entog and cutting the large intestine where the faeces are still pure and have not been mixed with N-urine.

### Experimental design

The research method used a completely randomized design (CRD) with 5 treatments, namely P0 (ration containing 0 banana stems), P1 (ration containing 25% banana stems), P2 (ration containing 50% banana stems), P3 (ration containing 75% banana stems), and P4 (ration containing 100% banana stem) and each treatment was repeated 4 times.

### Data Analysis

The data obtained were analyzed using analysis of variance (one-way ANOVA) at the 95% confidence level ($\alpha = 0.05$). If the results of the analysis of variance show significant differences between the treatments, then it is followed by Duncan's Multiple Range Test

(DMRT). All data was processed using SPSS for Windows 25$^{th}$ version software and the data is presented in the mean ± standard error means (SEM).

## RESULTS AND DISCUSSION

### Quality of Complete Ration Based on Banana Stem

The quality of complete rations based on bananas stems from the research results presented in Appendix 1. The organic matter digestibility of complete rations based on banana stems P2 (rations containing 50% banana stems) was 49.28 ± 0.23, showing a significant difference ($p < 0.05$) over higher compared to P0 (47.82 ± 0.41), P1 (48.54 ± 0.19), P3 (47.97 ± 0.13), and P4 (46.91 ± 0.21). This proves that the use of banana stems in complete rations up to 50% does not have a negative effect on the digestibility value of organic matter. The increase in the digestibility of organic matter is in line with the increase in the digestibility of dry matter because most of the components of dry matter consist of organic matter so the factors that influence the level of digestibility of dry matter will also influence the level of organic matter and do not have a negative effect on the digestibility value of organic matter (Handayani, S. H., Yunus, A., Susilowati, 2015).

Table 1. Organic and dry metter digestibility of banana stem-based complete rations

| Variable | Treatment | | | | |
|---|---|---|---|---|---|
| | P0 | P1 | P2 | P3 | P4 |
| Organic Matter Digestibility | 47,82±0,41 $^{b}$ | 48,54±0,19$^{bc}$ | 49,28±0,23$^{c}$ | 47,97±0,13 $^{b}$ | 46,91±0,21$^{a}$ |
| Dry Matter Digestibility | 52,72±0,61$^{b}$ | 53,20±0,44$^{b}$ | 54,55±0.41$^{c}$ | 52,05±0,23 $^{b}$ | 50,78±0,18$^{a}$ |

*Information: P0 (ration containing 0% banana stems), P1 (ration containing 25% banana stems), P2 (ration containing 50% banana stems), P3 (ration containing 75% banana stems), and P4 (ration containing 85% banana stems) %). Superscript on the same line does not show a significant difference (p>0.05).*

The increase in the digestibility of organic matter is in line with the increase in the digestibility of dry matter because most of the dry matter components consist of organic matter so the factors that affect the high or low digestibility of dry matter will also affect the high and low organic matter. The digestibility of organic matter is affected by the digestibility of the organic matter components, namely protein, carbohydrates (BETN and crude fiber) and fat. To achieve optimal digestibility of organic matter, the nutritional value of organic matter components must be adjusted to the needs of the livestock itself (Superianto et al., 2018).

The high digestibility value of organic matter is due to the expansion of the cell wall tissue of the banana stem substrate, thereby increasing the flexibility of the cell wall, and in the end, will facilitate the penetration of cellulase enzymes produced by rumen microbes. The more penetration of enzymes, the better the degradation of organic matter and will increase digestibility. The amount of degraded organic matter will increase the digestibility of the materia (Suci et al., 2020).

Digestibility of banana stem organic matter in the P2 study (ration containing 50% banana stem) was 46.91 ± 0.21% - 49.28 ± 0.23% lower than the results of (Ramadhan et al., 2019) who obtained digestibility of the organic matter organic banana stem 39.27% - 56.18%. This difference is due to the method of processing banana stems, (Ramadhan et al., 2019) used banana stems that had been pre-processed using the ensiling method, while this study used fresh banana stems.

The dry matter digestibility of the complete ration P2 with the addition of 50% banana stems was 54.55 ± 0.41%, showing a significant difference ($P < 0.05$) which was higher compared to P0 (52.72 ± 0.61%), P1 (53, 20 ± 0.44%), P3 (52.05 ± 0.23%), and P4 (50.78 ± 0.18%). This is due to the quality of the ration. The dry matter digestibility of a feed ingredient is the digestibility of organic and inorganic matter in the feed ingredient. High dry matter digestibility indicates high digestibility of nutrients. The higher the digestibility value of a feed ingredient, the higher the quality of the feed ingredient (Ramadhan et al., 2019). The high digestibility of dry matter in the N 2.5% and S 0.15% treatment is because the balance of N and S follows the balance required by bacteria during ensilation (Yu et al., 2017).

The dry matter digestibility of the results of this study was 52.05 ± 0.23% - 54.55 ± 0.41% lower when compared to the research results of (Ramadhan et al., 2019) which obtained dry matter digestibility of 54.76% - 64.48%. This is because Ramadhan's research used banana stems that had been processed first using the ensilage method, while this research used fresh banana stems. The results of the dry matter digestibility of the study showed that it was still within the normal range. This is following the opinion of (Suci et al., 2020) that the normal range of dry matter digestibility of a feed ingredient is 50.7 - 59.7%. Also, in line with research by (Ramli & Wahab, 2020), the dry matter digestibility of fermented palm leaves supplemented with nitrogen, sulfur, phosphorus and cassava leaves ranged from 51.51 - 61.59%.

## CONCLUSION

The Muscovy ration with the addition of 50% banana stems showed a significant difference in increasing digestibility. Organic matter digestibility is 49.28±0.23 and dry matter digestibility is 54.55±0.41.

## CONFLICT OF INTEREST

We declared that there is no conflict of interest with any party regarding the material discussed in the paper, funding, and differences of opinion between the authors. Dini Widianingrum dan Rachmat Somanjaya serves as an editor of the Agrivet Journal but has no role in the decision to publish this article.

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