Improving the Digestibility of Dry Ingredients and Organic Ingredients Broiler Rations Containing Fermented Plantain Peel Meal Rhizopus Oligosporus

Hengkie Liwe[1*], Veybe G Kereh[1], Debby J J Rayer[2], Sonny A E Moningkey[1], Meity R Imbar[1]

[1]Laboratory of Nutrition and Feed Science, Faculty of Animal Science, Sam Ratulangi University, Manado Indonesia (95115)
[2]Departments of Biology, Faculty of Mathematics and Science, State University of Manado, Tondano, Sulawesi Utara, Indonesia (95619)

ABSTRACT

Plantain peels are one agricultural waste that hasn't been used to their full potential. Plantain strip flour can be utilized as an elective feed in oven chicken proportions, yet its dietary substance is low in light of the fact that the protein content is just 4.08% while the unrefined fiber is 12.5%, so its utilization as a poultry apportion isn't ideal. Endeavors to work on the nature of inferior quality feed fixings are one elective that should be possible to work on the nature of these fixings.Fermentation technology using Rhizopus Oligosporus microbes has been applied, and the results can increase the nutritional content of plantain peel flour. To test quality biologically, including dry matter and organic matter digestibility tests. This research was carried out at the Faculty of Animal Husbandry, Sam Ratulangi University, Manado. For 2 weeks using 20 5 week old Arbor Acres CP 707 Strain broiler chickens consisting of 2 treatments, each treatment consisting of 10 broiler chickens as replications. The rations used in this research were plantain peel flour without fermentation and with fermentation of the fungus Rhizopus Oligosporus.The results of the t-student test showed that the digestibility of dry matter and organic matter of the diet using plantain peel flour without fermentation was very significantly different ($P<0.01$) compared to the diet fermented by the mold Rhizopus Oligosporus, with the respective results of dry matter digestibility being 62, 32 % to 71.66%, and organic matter digestibility 66.74% to 73.01%. The results of this research can be concluded that the use of fermented plantain peel flour in rations provides higher digestibility of dry matter and organic matter compared to without fermentation.

KEY WORDS : Plantain, Fermentation, Rhizopus Oligosporus, Broiler

INTRODUCTION

Broilers are the result of genetic engineering that has undergone selection, have fast growth because they are able to utilize feed efficiently, and produce meat in a relatively short time, because they have the genetic ability to grow quickly, namely 5-6 weeks with a body weight of around 1 3-1.6 kg, in broiler maintenance the costs incurred for procuring rations reach 65-70% of the total operational costs.For the most part, the elements for oven chicken apportions incorporate corn, fish feast and soybeans. The interest for these materials is higher than their accessibility, bringing

about imported materials and proportion costs being somewhat costly. To beat this, utilizing eccentric proportion fixings, for example, agrarian waste is essential.

One of the agricultural wastes that has not been utilized optimally is plantain peel containing 4.08% protein and 12.50% crude fiber, the use of which is not widely used as a constituent of poultry rations because its nutrient value is low. An alternative to improving the quality of nutrients is by fermentation, because the fermentation process can improve the quality of the original ingredients. Fermentation using plantain peel with Rhizopus Oligosporus mold with an inoculum dose of 0.4% and a fermentation time of 96 hours can increase the nutritional value, namely increasing crude protein by 18.38%. The research results without fermentation can be used up to 15% in broiler chicken rations. To test the quality of feed, a biological test is carried out by measuring digestibility.

Deciding the quality or characteristics of feed fixings simply through compound analysis isn't sufficient. The real supplement worth of feed fixings can be tried through organic testing to decide absorbability testing. Absorbability is the distinction between food substances ate and those discharged in defecation and thought about assimilated in the gastrointestinal system. So digestibility is an impression of how much supplements in feed fixings that can be used by domesticated animals. Estimating the digestibility of a feed fixing should be visible, including dry matter and organic matter.

Based on this background, research has been carried out to determine the digestibility of dry matter and organic matter of rations containing unfermented plantain peel and fermented products.

MATERIALS AND METHODS

Experimental Livestock

This research used 20 broiler chickens 5 week old Arbor Acres CP 707 Strain, consisting of 2 treatments, each treatment consisting of 10 broiler chickens as replications.

Pen

The enclosure utilized in the examination was a battery confine estimating 40 × 30 × 30cm, which comprised of 20 enclosure units. One broiler chicken is housed in each cage. Every unit is outfitted with spots to eat and drink as well as excreta stockpiling.

Trial Rations

The feed ingredients used are unfermented plantain, plantain fermented with the fungus Rhizopus oligosporus, yellow corn cake, coconut meal, fine bran, fish meal, soybean flour, and topmix. The composition of food substances and metabolic energy of the feed ingredients that make up the ration are listed in Table 1, Table 2 lists the composition of the feed ingredients of the experimental ration without fermentation of fermented products and Table 3 contains the composition of food substances and metabolic energy of the experimental ration.

Table 1. Composition of Food Substances and Metabolic Energy of Feed Ingredients in Rations.

Food material	Protein (%)	Crude fiber (%)	Extract ether (%)	Ca (%)	P (%)	Ash (%)	Metabolic Energy (Kkal/kg)
Banana Peel Flour	7.64	17.50	3.02	0.53	0.25	-	2897.6
Fermented Banana Peel Flour	12.13	14.12	2.50	0.74	0.56	-	2752.8
Yellow Corn	9.42	2.15	5.17	0.22	0.60	15.13	2983.5
Soybean Flour	40.38	6.56	9.91	0.24	0.58	-	2540.00
Coconut Meal	24.74	15.02	9.36	0.11	0.47	6.95	3279.75
Fine Bran	13.44	6.35	6.07	0.19	0.73	10.33	2695.50
Fish flour	58.52	2.95	13.90	7.04	3.67	-	3851.8
Coconut oil	-	-	100	-	-	-	881.2
Top Mix	-	-	-	5.38	1.44	-	-

Table 2. Food Ingredient Composition of Trial Rations

Food material	Treatment	
	Unfermented	**Fermented**
Yellow Corn	48.45	48.45
Banana Peel Flour	8.55	8.55
Soybean Flouri	13.00	13.00
Coconut Mea	6.00	6.00
Fish flour	14.00	14.00
Fine Bran	8.00	8.00
Top Mix	1.00	1.00
Coconut oil	1.00	1.00
Total	**100**	**100**

Table 3. Composition of Food Substances and Metabolic Energy of Experimental Rations*

Food material	Perlakuan	
	Unfermented	**Fermented**
Protein (%)	21.44	21.83
Crude fiber (%)	5.23	4.90
Extract ether (%)	7.04	7.00
Ca (%)	1.19	1.21
P (%)	1.21	1.03
Metabolic Energy (Kkal/kg)	2972.29	2959.91

*) Calculated based on Table 1 and Table 2.

Research methods

A total of 20 broiler chickens were divided into 2 treatments and each treatment consisted of 10 broiler chickens as replications. The treatment was a ration containing unfermented plantain peel flour and fermented plantain peel products.

Research procedure

Before the research begins, the cages and equipment used are cleaned and lighting is prepared in each cage unit, with the research stages as follows:

1. In the adaptation stage, 20 broiler chickens 5 week old were divided into 2 treatments consisting of 10 replications and 1 broiler chicken was placed in each replication. At the adaptation stage, broilers are given a basic ration and then replaced with a treatment ration. The adaptation stage of the treatment feed is carried out for 7 days to replace and familiarize the livestock with the treatment feed and eliminate the influence of the previous feed.

2. Data collection stage

The data collection stage lasted 3 days after the 7 day adaptation stage, the first day of data collection was calculated based on the time of feeding and waited 1×24 hours, after that the data and fresh weight of excreta were taken, then dried and the dry weight data for each treatment was taken and his reply.

Variables Measured

The variables measured were dry matter digestibility and organic matter digestibility calculated based on the formula Tillman et al, (1998):

1.Dry matter digestibility

Dry matter digestibility is calculated using the formula:

$$\%\text{DMD} = \frac{\text{DMC} - \text{EDM}}{\text{DMC}} \text{ X } 100\%$$

Keterangan:
DMD = Dry matter digestibility
DMC = Dry matter consumption
EDM = Excreta dry matter

2.Organic matter digestibility

Organic matter digestibility is calculated using the formula:

$$\%\text{OMD} = \frac{\text{OMC} - \text{EOM}}{\text{OMC}} \text{ X } 100\%$$

Keterangan:
OMD = Organic matter digestibility
OMC = Organic matter consumption
EOM = Excreta organic matter

RESULTS AND DISCUSSION

Effect of Treatment on the Digestibility of Dry Material of Unfermented Plantain Peel Flour and Fermented Products

The average digestibility of dry matter feed containing plantain peel flour in broiler chickens can be seen in Table 4, specifically plantain strip flour without maturation is 62.32% and aged items are 71.66%. In light of the Understudy's t-test, it showed that the utilization of plantain strip flour as a matured item was fundamentally unique (P<0.01) contrasted with that without maturation. This is consistent with the findings of Abun (2007), who found that broiler chickens digest dry matter more easily when fed fermented plantain peel.

Table 4. Average Digestibility of Dry Matter and Organic Matter of Unfermented Plantain Flour and Fermented Products.

Replication	Dry matter digestibility		Organic matter digestibility	
	Unfermented	**Fermented**	**Unfermented**	**Fermented**
1	65.86	71.53	68.62	74.47
2	60.44	70.26	65.56	70.25
3	60.52	71.56	66.56	74.43
4	60.72	70.91	65.54	70.57
5	63.32	72.76	67.62	73.74
6	63.36	72.90	68.65	75.90
7	62.17	70.23	65.01	71.81
8	60.56	72.53	66.35	73.41
9	64.51	71.64	65.12	73.24
10	61.70	72.26	68.32	72.31
Mean	**62.32^{a} ±1.49**	**71.66^{b}±0.97**	**66.74^{a} ±1.46**	**73.01^{b}±1.79**

Note: Superscripts on the same line are significantly different (P<0.01)

The dry matter of fermented plantain peel flour was significantly (P<0.01) higher than that of unfermented plantain flour, as demonstrated by the Student's t-test. This shows that in the aging system Rhizopus oligosporus produces compounds that can debase cellulose into less complex parts so the healthful absorbability worth of the matured item increments. Mokoolang et al (2017) expressed that maturing plantain strip flour utilizing Rhizopus Oligosporus with an inoculum portion of 0.4% and a maturation season of 96 hours expanded the sustenance of the feed. In accordance with the assertion of Achi (2005) and Buckle et al., (2007) that aged feed has higher absorbability since protein, fat and polysaccharides have been hydrolyzed by microorganisms during the maturation cycle.

The digestibility of the components of dry matter that are present in the material itself, such as protein, carbohydrates, fat, and ash, also has an effect on the digestibility of dry matter. Aside from that, the fermentation process alters the nutritional quality of the feed (Rompas et al., 2016). In light of the aftereffects of this examination, matured banana strip flour items with Rhizopus Oligosporus can increment dry matter absorbability.

Effect of Treatment on the Digestibility of Organic Materials of Unfermented Plantain Peel Flour and Fermented Products

The typical absorbability of organic feed containing plantain strip flour should be visible in Table 5, specifically plantain strip flour without maturation is 66.74% and aged items are 73.01%. In light of the Understudy's t-test, it shows that the utilization of plantain strip flour as a matured item is fundamentally unique ($P<0.01$) contrasted with that without maturation. This implies that the utilization of aged plantain strip flour items with Rhizopus oligosporus can expand the digestibility of organic materials. The organic matter of fermented plantain peel flour was significantly ($P<0.01$) higher than that of unfermented plantain peel flour, as demonstrated by the Student's t-test.

The maturation cycle of plantain strip flour in this study brought about an expansion in supplements, an expansion in protein and a diminishing in unrefined fiber. This adjustment of supplement worth and quality further builds the helpful worth of plantain strip flour, a matured item in the chicken's stomach related framework. This is upheld by the assessment of Tillman et al. (1998) who expressed that the element that impacts the absorbability of organic matter is the nourishing substance in the apportion. The scope of organic matter absorbability in this study is higher than the aftereffects of organic matter digestibility research by Mangisah et al., (2009) which went from 52.81% - 72.41%.

The digestibility of organic matter has a positive relationship or is straightforwardly corresponding to the absorbability of dry matter, implying that the higher the absorbability of organic matter, the higher the dry matter digestibility worth or the other way around. This is in line with Abun (2007) assertion that organic matter digestibility is directly proportional to dry matter digestibility, with higher dry matter digestibility corresponding to higher organic matter digestibility. Sutardi (1980) detailed that the expansion in organic matter absorbability is in accordance with the expansion in dry matter digestibility, in light of the fact that the vast majority of the parts of dry matter absorbability comprise of organic matter absorbability so that factors that impact the degree of dry matter digestibility will likewise impact the degree of organic matter digestibility. This implies that the utilization of rough fiber in the proportion in this study was still inside as far as possible. According to Kartadisastra (1994), no more than 5% should be used in broiler chicken rations. Assuming the level of unrefined fiber is unreasonable in the proportion, it will hinder the retention of supplements in the chicken's body.

CONCLUSION

Based on the results and discussion, it can be concluded that the use of fermented plantain peel products up to 8.55% in the ration provides better results for the digestibility of dry matter and organic matter compared to without fermentation.

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