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Growth Performance of Starter Period Crossbred Native Chickens Fed Silage of Banana Peel

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ABSTRACT

Banana peel is one of the non-conventional feed ingredients, but its utilization is still limited due to high content of crude fiber and tannins. The usage of 10% tapioca and 21 days of fermentation time in silage production was able to reduce crude fiber and tannin levels of kepok banana peel. A four-week dietary treatment was conducted with 160 day old of joper strain, a cross-bred native chickens, to determine the utilization silage of banana peel (SBP). The birds were randomly assigned to four dietary treatments with five replication of eight chicks each in a completely randomized design. The treatments consisted of banana peel silage inclusion at 0, 10, 20, and 30% in the diet. Data were analyze by analysis of variance (ANOVA) and means were compared using Duncan's Multiple Range Test. The results showed that inclusion of SBP had significant effect ($p<0.05$) on weight gain and feed conversion, but had no significant effect ($p>0.05$) on feed intake. It was concluded that the optimal growth response of broilers was indicated in the inclusion of SBP up to 10% of the diet.

Keywords: feed conversion, feed intake, silage banana peel, silage weight gain

INTRODUCTION

Feed is an important factor in animal production. In poultry production, it can reach 70% of the total cost. Reducing feed costs was done by utilizing unconventional feedstuffs at cheap prices. Banana peel is one of the tropical agro-industrial wastes (Sugiharto et al., 2018). It is an industrial and household food waste (Al-sahlany & Al-musafer, 2018). East Nusa Tenggara (NTT) province produced 236497,40 tons of bananas in 2021 (Statistic, 2022) with banana peel mostly being wasted. As the peel represents 25-50% of banana fruit (Anwar et al., 2016; Koni et al., 2019). Based on this information, it can be estimated that 59,124.35- 118,248.70 tons of banana peels generated from banana production. The peels could be an alternative feedstuff for chicks, as reported that inclusion of banana peel up to 10% as corn replacement in broiler diets has no adverse effects on productive performance (Koni et al., 2013; Duwa et al., 2014).

Widjastuti and Hernawan (2012) reported that crude protein, crude fiber, crude fat, calcium, phosphorus and gross energy of banana peels were 10.09%, 18.01%, 5.17%, 0. 36%, 0.10%, and 3727 kcal/kg, respectively. Some studies reported specifically the nutritive value of kepok banana peels (*Musa paradisica normalis*) such as crude protein, calcium, and phosphorus were 5.21%, 0.27%, and 0.26%, respectively (Fitroh et al., 2018); while crude fat and crude fiber were 2.52% and 18.71%, respectively (Koni, 2013). However, banana peels also contain tannin (4.87%) (Hudiansyah et al., 2015) and high crude fiber (36.7%) (Widjastuti and Hernawan, 2012) which could impair the growth rate of chicks (Widjastuti and Hernawan, 2012; Koni et al., 2013). Tanin reduces protein and amino acid digestibility in broiler chickens by forming tannin–protein complexes (Cho et al., 2019).

In previous studies, the ensilage of banana peels can reduce crude fiber and tannin. The decrease of tannins was 76.92% (Koni & Foenay, 2020), and crude fiber was 46.47% on silage using 10% tapioca and 21 days of incubation (Chrysostomus et al., 2020). Therefore, this study aimed to investigate the growth response of starter phase cross-bred native chickens fed with silage of banana peel (SBP).

MATERIAL AND METHOD

Silage of Banana Peel (SBP)

The fermentation procedure refers to Koni and Foenay (2020). Banana peels were obtained at some banana processing from the area of Kupang, East Nusa Tenggara, Indonesia. The banana peel was washed, drained, and cut ± 3 cm in thickness, then mixed with tapioca flour as much as 10% of the weight of the banana peel. Furthermore, each 20 kg of the mixture was placed into a plastic bucket, and the lid were sealed using duct tape to ensure an anaerobic condition. All plastic buckets were placed at room temperature for three weeks fermentation. After 21 days, silage was harvested, and sun dried for 2-3 days. Dried silage then milled using disk mill machine with sieve size of 1.5 mm, and then used as a feed mixture.

Bird, Management and Dietary Treatments

A total of one hundred and sixty day old chickens (DOC) Joper were used in this study. Joper is descendant of crossbred between native male chicken with brown laying hen (Rusli et al., 2019). DOC of crossbred native chickens were obtained from commercial hatchery. Chickens with similar initial body weight of (38.68 ± 0.56 g), were randomly divided into four groups of 20 cages (cage dimensions: 50 wide x 70 cm length and 60 cm height). Five replication pens of 8 birds per pen were allocated for each dietary treatment groups. Cross bred native chickens were administered dietary treatments for 28 days.

The dietary treatments were SBP0: control diet without SBP, SBP10: diet with 10% SBP, SBP20: diet with 20% SBP, SBP30: diet with 30% SBP. Feed formulation was in accordance to nutrient recommendations for the starter phase crossbred native chickens as presented in Table 1 and in accordance to SNI (2013). The experimental feedstuffs were weighed according to the formulation and mixed until homogeneous (Table 1). The feed were made in crumble form.

Table 1. Formulation and nutrient content of feedstuffs

Feed Ingredient	SBP (%)			
	0	10	20	30
SBP	0.00	10.0	20.0	30.0
Maize	50.0	46.0	42.0	38.0
Rice bran	18.0	12.0	6.00	0.00
Meat bone meal	8.60	8.60	8.60	8.60
Soybean meal	18.0	18.0	18.0	18.0
Palm oil	3.00	3.00	3.00	3.00
Premix	0.25	0.25	0.25	0.25
DL-Methionine	0.30	0.30	0.30	0.30
L-Lysine HCl	0.60	0.60	0.60	0.60
Dicalcium phosphate	1.00	1.00	1.00	1.00
Salt	0.25	0.25	0.25	0.25
Total	100	100.	100	100
Nutrient Content				
Dry matter (%)[1]	93.8	93.8	93.3	93.0
Crude protein (%)[1]	19.7	19.3	20.1	18.7
Crude fat (%)[1]	8.13	9.34	9.44	12.7
Crude fiber (%)[1]	10.8	10.6	7.32	5.40
Ash (%)[1]	8.89	8.94	9.15	8.34
Metabolizable energy (Kcal/kg)[2]	2803.5	2849.2	2872.0	2894.6
Ca (%)[2]	1.09	1.11	1.12	1.34
P (%)[2]	1.06	1.09	1.11	1.13

Note: SBP = Silage of banana peels; [1]Analyzed at the Laboratory Nutrition and Animal Feed, Faculty of Animal Science, Universitas Brawijaya; [2]calculated value

Variables

Birds and feed intake were weighed weekly. Feed conversation was calculated by dividing the feed intake and weight gain.

Statistical Analysis

Data were analyzed using one-way analysis of variance. If differences between treatments were significant ($p<0.05$), then mean values were compared using Duncan Multiple Range Test at significance level of 5%.

RESULT AND DISCUSSION

Feed Intake

Dietary inclusion of SBP on growth performance of crossbred native chicks at starter period (0-28 days) were presented in Table 2. There was no significant difference between SBP and controls on feed intake ($p>0.05$). There were no differences among treatments in feed intake that may be attributed to the same metabolize energy of the feed. Similar findings were reported by Koni et al. (2013) and Hudiansyah et al. (2015). This observation tallies to the report of (Duwa et al., 2014) that replacing maize with banana peel meal up to 15% in broiler feed showed no effect on feed intake.

Weight Gain

The weight gain indicated significance ($p<0.01$) difference in the control group and 10% SBP. The finding is similar to the report of Duwa et al., (2014) who observed that inclusion of banana peel up to 10% in broiler diet have the same weight gain to control. Reduction of growth rate at SBP treatment might be due to the presence of tannin in banana peel which act as inhibitor of protein digestive. This may be attributed to the anti-nutritional factor (tannins) in banana peel which may affect its utilization by animal (Tartrakoon et al., 1999). Tannins reduce the digestibility of protein and amino acid in broiler chickens (Cho et al., 2019). Abel et al. (2015) reported decreasing of weight gain in broilers that received treatment of banana peel meal to replace maize and other ingredients.

Feed Conversion Ratio (FCR)

FCR of birds fed with maximal 10% SBP was more efficient ($p<0.05$) compared to birds fed with 20 and 30% SBP. Lower weight gain and higher FCR of chickens fed with SBP might be due to lower feed intake and underutilization of nutrients because the presence of tannins. Hudiansyah et al. (2015) reported that kepok banana peel contains 3.72% tannins.

Inclusion of SBP at levels 20 and 30% have higher value of feed conversion ratio ($P<0.05$) compared to birds treated with control diet. This were due to similar feed intake but the final body weight were decreased along with inclusion level of SBP. The result was inconsistent with Farman et al. (2016) who reports feed consumption, final body weight, and body weight gain have a positive correlation to feed conversion value.

The result of the feed conversion ratio in this study is similar to the report of (Duwa et al., 2014) who reported that inclusion of 10% banana peel meal generated lower feed efficiency compared to diet control. Chiks fed with 20 and 30% SBP have lower ($p<0.05$) feed conversion ratio as a result of anti-nutritional factors such as tannin. The tannin content in banana peels ranges from 53.2-58.5 g/kg (Ramdani et al., 2016).

Table 2. Growth performance of crossbreed native chicken fed silage of banana peel (SBP)

Parameters	SBP (%)				SEM	Probability
	0	10	20	30		
Feed intake (g/week)	184	183	182	180	1.98	0.940
Weight gain (g/week)	85.2^{a}	84.1^{a}	73.7^{b}	68.2^{c}	1.71	0.000
Feed Conversion Ratio*	2.11^{c}	2.16^{bc}	2.37^{ab}	2.5^{6aa}	0.05	0.002

Note: *Feed intake/weight gain; ^{a,b} means in the same row without a common letter are different at $p<0.05$; SEM: Standard error of the mean

CONCLUSION

It was concluded that silage banana peel can be used up to 10% in the crossbred native chicken diet at starter period.

CONFLICT OF INTEREST

We certify that there is no conflict of interest with any financial, personal, or other relationships with other people or organization related to the material discussed in the article.

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