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The Use 3 of Banana Peel Meal (*Musa paradisiaca*) as Substitution of Corn in the Diets on Performance and Carcass Production of Hybrid Ducks

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ABSTRACT

This study was aimed to evaluate the utilization of banana peel meal as alternatives to substitution of corn in the diets based on the performance, carcass production, intestinal villi, the best type and utilization level of banana peel meal as corn substitution. A total of 105 male day old duck used in a completely randomized design (CRD), i.e. half of it (25%) and all of it (50%) replacing corn with banana peel meal PB= basal feed without banana peel meal; K25 and K50 = basal feed with Kepok banana peel meal; T25 dan T50 = basal feed with Tanduk banana peel meal; R25 dan R50 = basal feed with Raja banana pel meal. each treatment was done through 3 replications, with each replication consisted of 5 hybrid ducks. The data with significant differences were analyzed using orthogonal contrast. The paramater collected include performance (feed consumption, body weight gain, final weight, and feed conversion), carcass and abdominal percentage (carcass weight and carcass percentage). The results of the study showed that the utilization of banana peel meal on ducks had lower yields ($P<0.05$) in body weight gain, body weight, carcass weight, abdominal fat weight, but had higher feed conversion rather than basal feed treatment. It could be concluded that banana peel meal can not be used as substitution of corn in diets, because it can decrease the performance and carcass production of ducks, banana peel meal Kepok and Tanduk with level of 25% gives best performance and carcass weight when used as substitution of corn.

Keywords: Banana peel meal, Local hybrid ducks, Performance, Production of carcass

Introduction

Hybrid duck is one of the local poultry that's important as a producer of meat, eggs, and fur. Hybrid ducks and various local domestic ducks has contribute to national meat production in 2015 by 31,000 tons (1.09%) and egg production by 272,000 tons (15.84%) (Anonimus, 2010). The ducks population in 2016 and 2017 were 47,42 millions and 49,70 millons ducks, respectively (Statistik Peternakan dan Kesehatan Hewan, 2017).

The duck breeders in Indonesia have developed broiler type of ducks that have relatively faster growth rates, the raising of ducks which is relatively faster demands a given the feed should be of high quality contain and balanced nutrients to obtain the expected performance and production of carcass.

High quality feed is relatively more expensive. Feed ingredients at certain seasons are difficult to obtain, because there are obstacles in the planting period, example is corn. Corn production is generally seasonal, so the supply of corn used as animal feed is very limited.The solution that can be done is to utilize the availability of other feed as an alternative to corn substitution. Banana peel meal is the wasted of food processing which is rarely used to its full potential, it will be increase, so that it can make problems for the environment. Further research on the use of unused banana peels needs to be done so that the banana peel can be increased the value (Damat, 2013). Shah *et al.* (2012) reported that banana peels had 59.09% carbohydrate, 0.9% crude protein, 1.70% crude fat, 31.70% crude fiber, and 19.20 mg/g calcium. Banana peel can be used up to 15% as a substitute for corn in domestic chicken feed, because it has a high metabolic energy content, and a higher crude fiber content than corn, so it can be used as an alternative to substitute of corn in feed (Koni, 2013).

Materials and Methods

This research was carried out at the Laboratory of Nutrition and Animal Feed Science in Animal science Faculty UGM for proximate analysis, Laboratory of Biochemistry Pusat Antar Universitas UGM for GE (Gross Energy) analysis, Ca (calcium), and P (phosphor), hencoop of poultry Laboratory Animal science Faculty UGM for maintenance and treatment in ducks. The research was carried out in 05 Maret 2017 – 29 April 2017.

The equipment used in this research is trial cages, digital scales, thermometers, farm equipment, cleaning tools, and stationery. The research material was 105 male day old hybrid ducks, the feed ingredients used consisted of: corn, rice bran, soybean meal (SBM), meat bone meal (MBM), banana peel meal (Kepok, Tanduk, Raja). Banana peels are obtained from various fried food sellers and some food factories in Banyuwangi, based on their type. Banana peel that has been distinguished by its type, then chopped into small pieces with a size of 3 cm using a knife, then dried under the sun for 5 days. After drying, the banana peel is ground until it becomes crumbs, and ground with a grinding machine until it becomes flour.

The design used was an experiment using a Completely Randomized Design (CRD) one-way pattern consisting of 7 treatments using 3 different types of banana peels, each treatment consisted of 3 replications and each replication consisted of 5 hybrid ducks. All data with significant differences of less than 5% were tested further using Ortogonal contrast: K1 = PB vs K25, K50, T25, T50, R25, R50; K2 = K25, K50 vs T25, T50; K3 = K25, K50 vs R25, R50; K4 = T25, T50 vs R25, R50; K5 = K25 vs T25, R25; K6 = K50 vs T50, R50.

The parameters analysis in this research are growth performance (feed consumption, body weight gain, final body weight, and feed conversion), carcass production (carcass weight and carcass percentage), abdominal fat (abdominal fat weight and abdominal fat percentage).

Result and Discussion

Performance of Hibrid ducks

The results of performance, carcass and abdominal fat production, are presented in Table 3.

Feed consumption

Feed consumption showed that the use of Kepok, Tanduk, Raja (KTR) banana peel meal with levels of 25 and 50% did not affect the feed consumption of 56 day old ducks. This is because the use of banana peel meal does not affect the energy and crude protein in feed. Feed banana peel of Raja also contains chemical compounds that are antioxidants, namely flavonoids that function as antibiotics and antimicrobials. The energy content of banana peel are 2,624 kcal/kg,

Table 1. Contrast analysis

Contrast	Set contrast						
	PB	K25	K50	T25	T50	R25	R50
1	6	-1	-1	-1	-1	-1	-1
2	0	2	-1	-1	0	0	0
3	0	2	-1	0	0	-1	0
4	0	0	0	3	-1	-1	-1
5	0	2	0	-1	0	-1	0
6	0	0	2	0	-1	0	-1

Tabel 2. Performance, carcass production, and abdominal fat percentage of 56 day old Hybrid ducks

Treatment	Parameter					
	Feed consumption (g/ekor)	Weight gain (g/ekor)	Body weight (g/ekor)	Feed conversion	Carcass weight (g)	Abdominal percentage (%)
PB	4,249	1,455^{c}	1,596^{c}	2.66^{a}	1,087.00^{c}	5.93^{c}
K25	4,407	1,318^{bc}	1,457^{bc}	3.04^{abc}	1,018.33^{abc}	5.48^{bc}
K50	4,253	1,028^{a}	1,163^{a}	3.67^{c}	932.00^{a}	4.38^{a}
T25	4,217	1,331^{bc}	1,462^{bc}	2.90^{ab}	1,036.00^{bc}	5.31^{bc}
T50	4,249	1,093^{ab}	1,233^{ab}	3.48^{bc}	938.00^{a}	4.38^{a}
R25	4,210	1,267^{bc}	1,139^{abc}	3.06^{abc}	982.33^{ab}	5.02^{ab}
R50	4,176	1,103^{ab}	1,243^{ab}	3.37^{bc}	931.67^{a}	4.72^{ab}
SEM	48.48	27.53	28.98	0.18	10.11	0.19
P-Value	0.908	0.009	0.014	0.048	0.006	0.003
Kontras orthogonal[1]						
K1	-	**	*	**	**	**
K2	-	NS	NS	NS	NS	NS
K3	-	**	**	**	**	**
K4	-	**	NS	NS	*	*
K5	-	NS	NS	NS	NS	NS
K6	-	NS	NS	NS	NS	NS

NS= non significant (P>0.05); *= signifikant in (P<0.05); **= significant in (P<0.01)

^{a,b,c} Values within a column show significant differences (P<0.05)

[1]Comparison of orthogonal kontras; K1= PB: K25, K50, T25, T50, R25, R50; K2= K25, K50 : T25, T50; K3= K25, K50 : R25, R50; K4= T25,T50 : R25, R50; K5= K25 : T25, R25; K6= K50 : T50, R50.

Table 3. Nutrient content

Diet composition	Kandungan Nutrien								
	EM (kcal/kg)	CP (%)	C fat (%)	CF (%)	Ca (%)	P (%)	Lys (%)	Met (%)	Trp (%)
Corn[1)]	3,350	8.50	3.80	2.20	1.39	0.10	1.00	0.26	0.06
Rice bran [1)]	2,950	9.30	13.00	11.40	0.53	0.29	0.59	0.26	0.12
Soybean meal[1)]	2,230	50.52	0.80	7.00	2.06	0.08	2.69	0.62	0.74
Meat bone meal[1)]	2,150	51.60	10.00	2.80	10.30	5.10	2.61	0.62	0.27
Premix[2)]	0	0	0	0	0	0	0	0	0
Sand	0	0	0	0	0	0	0	0	0
Palm oil	8,800	0	100	0	0	0	0	0	0
Banana peel meal of Raja[3)]	2,672	7.22	13.70	9.94	0.42	0.32	-	-	-
Banana peel meal of Kepok[3)]	2,864	5.21	18.64	8.48	0.27	0.26	-	-	-
Banana peel meal of Tanduk[3)]	2,862	6.30	11.18	8.29	0.18	0.42	-	-	-

Source: 1. (NRC, 1994)
2. multivitamin, micromineral, multienzim, choline
3. *EM* : based on the calculation of 70% GE (*gross energy*) (Patrick Schable, 2004)
CP, CF, C fat: analysis of animal feed technology laboratory of Fapet UGM (2016)
Ca, P : analysis of pusat antar universitas laboratory (PAU) of UGM (2016).

so it can be used as a mixture in poultry feed (Atapattu dan Senevirathne, 2013). Pary *et al*. (2016) reported that the energy contained in banana peel are 2,864 kcal/kg, so that banana peels can be used as feed ingredients for poultry. Banana peel also contains different levels of starch, because each type of banana that is different will have different levels of starch (Musita, 2009).

Body weight gain

Body weight gain showed that the use of Kepok, Tanduk, Raja (KTR) banana meal with levels of 25 and 50% caused ducks given banana peel meal have lower body weight gain (P<0.01) compared body weight gain given basal feed (PB). Body weight gain (Table 3) showed that the duck in group treated with basal feed had higher body weight gain (P<0.01) than the duck in group treated with banana peel meal on contrast orthogonal test 1 (PB vs K25, K50, T25, T50, R25, R50). This is because of differences in the content of crude fiber and crude fat. The higher level of Kepok, Tanduk, Raja (KTR) banana peel meal, then duck growth decreases, although feed consumption is not different, it is suspected that banana peel meal can increase crude fiber to 8.10%, so that the treatment feed which has higher crude fiber content causes digestibility in ducks to be lower, in treatment K25 to R50 than PB treatment.

Mangisah *et al.* (2009) reported that giving feed containing crude fiber up to 15%, can still be tolerated by Tegal ducks, because ducks are able to digest fiber in sufficiently high amounts. The process of absorption that occurs in the body of the livestock is influenced by the age, so that the feed given to livestock should be adjusted to the age of the livestock. The use of different feed ingredients with certain treatments causes differences in body weight gain in broiler chickens (Shaddel-Tili *et al*., 2016).

Body weight gain (Table 3) showed that the duck in group treated with Kepok banana peel meal had higher body weight gain (P<0.01) than the duck in group treated with banana peel meal of Raja on contrast orthogonal test 3 (K25, K50 vs R25, R50). This showed that banana peel meal of Kepok is better when compared to banana peel meal of Raja as substitution of corn. This is due to the energy content, crude protein, crude fiber, crude fat, and minerals in Kepok banana peel meal can meet the nutrient requirements in ducks. Tillman *et al*. (2005) reported that digestion of crude fiber depends on each content of crude fiber in the feed, if the duck consumes too much crude fiber, it can interferes with the digestive process. Digestion of crude fiber is influenced by several factors, including crude fiber, composition of feed, and activity of microorganisms in the body of poultry (Maynard *et al*., 2005). The use of different banana peels can change the balance of nutrient feed (Fanimo dan Oduronbi, 2006).

On the contrast orthogonal test 2 (K25, K50 vs T25, T50), 4 (T25, T50 vs R25, R50), 5 (K25 vs T25, R25), and 6 (K50 vs T50, R50) have no difference. Body weight gain (Table 3) showed that the duck in group treated with banana peel meal of Kepok had the same body weight gain, with the duck in group treated with banana peel meal of Tanduk, on contrast orthogonal test 2 (K25, K50 vs T25, T50). This is because banana peel meal of Kepok and Tanduk contains crude fiber which is not much different. Feed which has different crude fiber that is 30 and 40%, does not affect body weight gain in geese, this is because have no difference in feed consumption, so that the resulting body weight gain is also the same. The content of different crude fibers in feed can affect the amount of feed consumption, so that nutrients obtained by livestock for growth in the same amount, resulting in the same weight gain (Hsu *et al.,* 2000).

Body weight gain (Table 3) showed that the duck in group treated with banana peel meal of Tanduk had the same body weight gain as the duck group in treated with banana peel meal of Raja on contrast orthogonal test 4 (T25, T50 vs R25, R50). This is because banana peel of Tanduk and Raja in the feed have crude fiber

Table 4. Composition of feed

Diet composistion	PB	K25	K50	T25	T50	R25	R50
Corn	50	25	0	25	0	25	0
Rice bran	15	15	13	15	13	14	14
Soybean meal	18	17	19	17	17	18	18
Meat bone meal	10	10	9	10	12	10	10
Palm oil	3	4.5	6.5	4.5	6	4.5	6.5
Premix	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Banana peel meal	0	25	50	25	50	25	50
Sand	3.5	3	2	3	1,5	3	1
Total	100	100	100	100	100	100	100
Nutrient content							
EM (kcal/kg)	2,997.90	2,938.10	2,908.70	2,985.60	2,979.60	2,930.90	2,937.40
CP (%)	19.85	19.02	19.01	19.02	19.09	19.43	19.11
C fat (%)	7.69	11.51	15.44	11.51	15.27	11.38	15.66
CF (%)	4.35	6.21	8.03	6.21	7.97	6.17	8.10
Ca (%)	2.17	1.91	1.59	1.92	1.88	1.94	1.70
P (%)	0.62	0.67	0.67	0.67	0.82	0.67	0.72
Lys (%)	1.30	1.07	0.82	1.05	0.84	1.07	0.82
Met (%)	0.35	0.29	0.21	0.27	0.22	0.28	0.21
Trp (%)	0.20	0.19	0.18	0.18	0.17	0.19	0.17
Val (%)	0.90	0.82	0.69	0.78	0.72	0.80	0.70

PB= Basal feed
K25 dan K50 = basal feed with 25 and 50% of banana peel meal of Kepok
T25 dan T50 = basal feed with 25 and 50% of banana peel meal of Tanduk
R25 dan R50 = basal feed with 25 and 50% of banana peel meal of Raja.

content which is not much different. The same composition of feed can affect feed consumption in livestock, so that it can also affect body weight gain (Hsu *et al.*, 2000).

Body weight gain (Table 3) showed that the duck in group treated with banana peel meal of Kepok had the same body weight gain as the ducks treated with banana peel of Tanduk and with a half level (25%), on contrast orthogonal test 5 (K25 vs T25, R25). This is because in this treatment group using half corn and half flour banana peel. The level uniformity between Kepok banana meal, Tanduk, Raja is half (25%), so the feed has the same crude fiber content. Crude fiber in feed with the same level is 14%, does not affect body weight gain in broiler chickens during the 42-day maintenance period (Kras *et al.*, 2013).

Body weight gain (Table 3) showed that the duck in group treated with banana peel meal of Kepok had the same body weight gain as the duck in group treated with banana eel meal of Tanduk and Raja with a whole level (50%), on contrast orthogonal test 6 (K50 vs T50, R50). This is because the use of banana peel meal with the same level is entirely (50%) without corn, so that crude fiber is in the same feed (Table 3). Feed with the same crude fiber content as the level of 14% does not affect broiler chicken body weight gain during the 42-day maintenance period (Kras *et al.*, 2013). Oyedeji *et al.* (2015) reported that replacing corn with banana peel meal up to 50% in feed, causing a negative effect on the body weight gain of starter phase broilers, but it has a positive effect on finisher phase broilers, because the cell tissue in the chicken's body is functioning optimally when the chicken enters finisher phase. Corn is the main source of feed energy in poultry feed (Sinaei dan Houshmand, 2016).

Final body weight

The final body weight showed that the use of Kepok, Tanduk, Raja (KTR) banana meal with levels of 25 and 50% caused ducks given banana peel meal to have lower body weight ($P<0.05$) compared to the final body weight of ducks treated. On contrast orthogonal test 1 (PB vs K25, K50, T25, T50, R25, R50) and 3 (K25, K50 vs R25, R50).

Final body weight (Table 3) showed that the duck in group treated with basal feed had higher final body weight ($P<0.05$) than the duck in group treated with banana peel meal on contrast orthogonal test 1 (PB vs K25, K50, T25, T50, R25, R50). This is caused the use of banana peel meal at levels 25 and 50% in feed causes the crude fiber content to increase to 8.10%, so that the body weight of ducks be lower compared to the treatment of basal feed. The high crude fiber in the feed, caused feed that is digested by ducks easily comes out with the excreta, before the absorption process occurs (Wulandari *et al.*, 2013). The most important amino acids contained in corn are lysine and tryptophan. Both amino acids are a fraction of essential amino acids which are very important in the growth of poultry (Prasanna *et al.*, 2001). Amino acid is a constituent of protein, one of its functions is to increase growth in livestock, besides that. Banana skin has antinutrient content such as oxalate, phytate, and saponins which can cause the growth of livestock to be inhibited, so that use in feed needs to be limited (Muliani, 2006).

Final body weight (Table 3) showed that the duck in group treated with Kepok banana peel meal had a higher final body weight ($P<0.01$) than the duck in group treated with banana peel meal of Raja, on contrast orthogonal 3 (K25, K50 vs R25, R50). This is caused Kepok banana peel meal has a lower oxalate content of 50.00 mg (%) (Anhwange, 2008) than banana peel meal of Raja which is 280.88 mg (%) (Romelle *et al.,* 2016). The oxalate contained in the feed has a negative effect on the growth of broiler chickens, especially in the final weight produced (Clement *et al.,* 2017).

Crude fiber which is high in feed, can reduce life weight, because livestock quickly feel full due to voluminous fiber, which can reduce feed consumption (Prawitasari *et al.,* 2012). Digestion of crude fiber in the duck's caecum is assisted by microorganisms, resulting in volatile fatty acid (VFA) which can be absorbed by the body properly, but microorganisms in the caecum has a limited amount, so the ability of ducks to digest crude fiber is not optimal (Sandi *et al*., 2012). Poultry has a low ability to utilize crude fiber, but fiber is still needed to support growth (Tossaporn, 2013).

On contrast orthogonal test 2 (K25, K50 vs T25, T50), 4 (T25, T50 vs R25, R50), 5 (K25 vs T25, R25), and 6 (K50 vs T50, R50) have no difference. Final body weight (Table 2) showed that the duck in group treated with Kepok banana peel meal had the same final body weight, with the duck in group treated with banana peel meal of Tanduk, on contrast orthogonal test 2 (K25, K50 vs T25, T50). This is caused the use of Kepok and Tanduk banana peel meal does not change the presence of crude protein and energy in feed, so that the body weight of ducks is not different. The growth of Poultry depends on the composition of nutrients in feed, such as energy, protein, crude fiber, crude fat, and vitamins, if there are differences or uniformity of energy, protein, fiber content, then, causing differences in body weight in poultry (Kompiang *et al.,* 2001).

Final body weight (Table 3) showed that the duck in group treated with banana peel meal of Tanduk had the same body weight as the duck in group treated with banana peel meal of Raja, on contrast orthogonal test 4 (T25, T50 vs R25, R50). This is caused the use of banana peel meal of Tanduk and Raja does not change the energy and protein content in the feed made uniformly, so that ducks get the same amount of energy and protein. Feed with different levels of crude protein 12, 14, 16, 18 and 20%, with the same energy of 2900 kcal/kg, gave no different effect on the weight of Lueyang black-boned chickens aged 20 weeks (Liu *et al.*, 2015).

Final body weight (Table 3) showed that the duck in group treated with Kepok banana peel meal had the same body weight as the duck in group treated with banana peel meal of Raja dan Tanduk with a half level (25%), on contrast orthogonal test 5 (K25 vs T25, R25). This is caused the use of banana peel meal with the same level causes crude fiber in the feed is not much different, so have no difference in body weight in ducks. The uniformity of crude fiber content in feed was 3.32%, using sunflower seed flour, did not give a difference to the body weight of 42 days old broiler chickens, that is, 1074 g/head (Sangsoponjit *et al.*, 2017).

Final body weight (Table 3) showed that the duck in group treated with Kepok banana peel meal had the same body weight as the duck in group treated with banana peel meal of Tanduk and Raja with a all of level (50%), on contrast orthogonal test 6 (K50 vs T50, R50). This is caused the level of banana peel meal is used in the same amount. The crude fiber which is uniform in feed is 15%, using sunflower seed meal, which gives no significant effect on body weight of broiler chickens that are maintained up to 42 days (Araujo *et al.*, 2011).

Body weight in ducks is also influenced by strains, sex, and genetics (Lukaszewicz *et al.,* 2011). Bochno *et al.* (2005) reported that between male and female ducks with the same strain, have different body weights, because growth in male ducks is faster. Male ducks from different strains have different body weights due to different genetic factors (Witak, 2008).

Feed conversion

Feed conversion showed that the use of Kepok, Tanduk, Raja (KTR) banana peel with levels of 25 and 50% caused ducks given banana peel meal to have a higher feed conversion ($P<0.05$) compared to ducks treated with basal feed. Contrast orthogonal test showed that have a effect on contrast 1 (PB vs K25, K50, T25, T50, R25, R50) and 3 (K25, K50 vs R25, R50).

Feed conversion (Table 3) showed that the duck in group treated with basal feed had lower feed conversion ($P<0.01$) than the duck in group given banana peel meal, on contrast orthogonal test 1 (PB vs K25, K50, T25, T50, R25, R50). This is caused banana peel meal causes a decrease in final body weight, so that when calculated by the formulation of feed conversion value, in ducks given banana peel meal has a higher feed conversion than basal feed treatment. Reddy *et al*. (2010) reported that nutrients in feed such as energy, protein, and crude fiber can affect body weight in livestock, so the conversion of feed produced depends on the body weight of the livestock during maintenance. Feed consumption, final body weight, and body weight gain have a positive correlation to feed conversion value (Sjofjan, 2008).

Feed conversion (Table 3) showed that the duck in group treated with Kepok banana peel meal had a lower feed conversion ($P<0.01$) than the duck in group treated with banana peel meal of Raja, on contrast orthogonal test 3 (K25, K50 vs R25, R50). This is caused ducks given banana peel meal of Kepok have a higher final body weight than ducks that are given banana peel meal of Raja, so that when calculated into the formulation, it causes a difference in the conversion value of the feed produced. Haryanto *et al*. (2016) reported that the value of feed conversion is affected by the consumption of feed spent by livestock. Santiago *et al.* (2010) reported that with the change of feed ingredients, can affect the value of feed conversion in livestock with each treatment. Reduction in the proportion of corn in feed, it turns out can cause differences in FCR values in broiler chickens by 2.43; 1.73; 1.67; 1.58; and 1.52 (Singh *et al.*, 2013).

Contrast orthogonal test 2 (K25, K50 vs T25, T50), 4 (T25, T50 vs R25, R50), 5 (K25 vs T25, R25), and 6 (K50 vs T50, R50) have no

difference. Feed conversion (Table 2) showed that the duck in group treated with banana peel meal of Kepok had the same feed conversion the duck in group treated with banana peel meal of Tanduk, on contrast orthogonal test 2 (K25, K50 vs T25, T50). This is causeed the use of banana peel meal of Kepok and Tanduk does not change the energy content and crude protein in feed, so ducks consume the same amount of feed and produce the same body weight, when calculated into the formulation, produce the same feed conversion value. The amount of feed consumption, the same body weight, produces the same feed conversion value (Saber *et al*., 2011).

Feed conversion (Table 3) showed that the duck group in treated with banana peel meal of Tanduk had the same feed conversion the duck in group treated with banana peel meal of Raja., on contrast orthogonal test 4 (T25, T50 vs R25, R50). This is caused the use of banana peel meal of Kepok and Tanduk in feed does not change the energy content and crude protein in the feed, so ducks consume the same amount of feed, with the same body weight, thus giving the same feed conversion value when calculated based on the feed conversion formulation. The giving of probiotics of 100 mg/kg in feed, does not affect the amount of feed consumption and body weight of broiler chickens, so it has the same feed conversion value (Khaksefidi dan Rahimi, 2005).

Feed conversion (Table 3) showed that the duck in group treated with banana peel meal of Kepok had the same feed conversion of the ducks treated with banana peel meal of Tanduk and Raja with half level (25%), on contrast orthogonal test 5 (K25 vs T25, R25). This is caused the use of banana peel meal with the same level in feed, so that ducks consume the same amount of feed and the same body weight produced, the conversion of the feed produced is also same. Restrictions on feeding with nutrient uniformity, caused no effect on feed conversion of broilers aged 42 days, this caused that nutrient uniformity in feed does not affect feed consumption and body weight (Kusuma *et al*., 2016).

Feed conversion (Table 3) showed that the duck in group treated with banana peel meal of Kepok had the same feed conversion with the ducks treated that give banana peel meal of Tanduk and Raja of all level (50%), on contrast orthogonal test 6 (K50 vs T50, R50). This is caused the use of banana peel meal with the same level of 50% in feed, so that ducks consume the same amount of feed and produce the same final body weight, so the conversion of feed produced is also same. The uniformity of nutrient content in feed did not give different results on feed conversion of broilers aged 28 days (Nugraha *et al*., 2017). The giving of feed in mash to ducks of different ages, caused feed conversion which is equally higher, because feed in the mash is easily spilled and scattered (Khetani et al., 2005). Each type of duck has a different ability in growth, laying type ducks have a value of adjusted feed conversion from the amount of egg production, while broiler type duck feed conversion value is adjusted from the results of the final weight produced at the end maintenance period (Men *et al.,* 2002).

Carcass weight

Carcass weight showed that the use of Kepok, Tanduk, Raja (KTR) banana peel with levels of 25 and 50% caused the carcass weight of the duck group given banana peel meal to be lower ($P<0.01$) compared to the duck group in treated with basal feed. pada kontras 1 (PB vs K25, K50, T25, T50, R25, R50), 3 (K25, K50 vs R25, R50), and 4 (T25, T50 vs R25, R50).

Carcass weight (Table 3) showed that the duck in group treated with basal feed had higher carcass weight ($P<0.01$) than the duck in group treated with banana peel meal, on contrast orthogonal test 1 (PB vs K25, K50, T25, T50, R25, R50). This is caused the use of banana peel meal causes differences in final body weight of ducks, so that it also affects the carcass weight produced. The high crude fiber up to 8.10% causes the final body weight of ducks to decrease, because the digested feed easily comes out with excreta before the absorption process occurs. High coarse fiber in feed can reduce the live weight in poultry, because inside the caecum microorganisms that help digest fiber are measly (Sandi *et al*., 2012).

Carcass weight (Table 3) showed that the duck in group treated with banana peel meal of Kepok had a higher carcass weight ($P<0.01$) than the duck in group treated with banana peel meal of Tanduk, on contrast orthogonal test 3 (K25, K50 vs R25, R50). This is caused banana peel meal of Kepok is better able to meet the nutrient requirements needed by ducks in producing carcasses, while banana peel meal of Raja is thought to reduce carcass production, because it can increase crude fiber content, so that had lower carcass production. Feed is the main thing in determining the production produced by livestock (Meliandasari *et al*., 2015). The high crude fiber in feed can reduce carcass production in ducks (Meliandasari *et al*., 2015).

Carcass weight (Table 3) showed that the duck in group treated with banana peel meal of Kepok had higher carcass weight ($P<0.05$) than the duck in group treated with banana peel meal of Tanduk, on contrast orthogonal test 4 (T25, T50 vs R25, R50). This is caused banana peel meal of Tanduk has a lower amount of crude fiber than banana peel meal of Raja seen in Table 3, but when used as a substitute for corn in feed, it can balance the content of crude fiber, crude fat, and minerals needed by ducks, so banana peel meal of Tanduk provides better carcass production than banana peel meal of Raja. Feed is the main thing in determining the production produced by livestock (Meliandasari *et al*., 2015).

On contrast orthogonal test 2 (K25, K50 vs T25, T50), 5 (K25 vs T25, R25), and 6 (K50 vs T50, R50) have no difference. Carcass weight (Table 3) showed that the duck in group treated

with banana peel meal of kepok has the same carcass weight with the duck in group treated banana peel meal of Tanduk, on contrast orthogonal test 2 (K25, K50 vs T25, T50). This is caused the use banana eel meal of Kepok and Tanduk does not affect the amount of feed consumption and body weight of ducks, so the carcass weight produced is the same. The use of black jintan up to 6% in feed as an antioxidant turned out to give insignificant on the carcass weight of broiler chickens, because the carcass weight was closely related to the amount of feed consumption and cut weight produced (Salam *et al*., 2013).

Carcass weight (Table 3) showed that the duck in group treated with banana peel meal of Kepok has the same carcass weight as the duck in group treated with banana peel meal of Raja, on contrast orthogonal test 5 (K25 vs T25, R25). This is caused the same level (25%) of the use of banana peel meal in feed does not affect the amount of feed consumption and body weight of ducks, so the carcass weight produced is the same. The uniformity of nutrient content in feed does not affect the amount of feed consumption and body weight of ducks, this causes carcass weight also does not give effect (Kim *et al*., 2007).

Carcass weight (Table 3) showed that the duck in group treated with banana peel meal of Tanduk had the same carcass weight as the duck in group treated with banana peel meal of Raja, on contrast orthogonal test 6 (K50 vs T50, R50). This is caused the all of level (50%) of the use of banana peel meal in feed does not affect the amount of feed consumption and body weight of ducks, so that the carcass weight produced is not different. The restrictions of feed on broiler chickens do not affect the carcass weight, because all nutrients in the feed have the same value, so that the feed consumption and body weight produced are the same (Jahanpour *et al*., 2015). Sunari *et al.* (2001) reported that the ratio of carcass weight to life weight is often used as a measure to determine carcass production (carcass weight) in the field of animal husbandry.

Abdominal fat percentage

The percentage of abdominal fat from the analysis of variance (Table 3) showed that the use of Kepok, Tanduk, Raja (KTR) banana peel meal with levels of 25 and 50% caused the percentage of abdominal fat of duck in group that given banana peel meal was lower (P<0.01) compared to duck in groups treated with basal feed. Contrast orthogonal test showed that there is difference on contrast orthogonal test 1 (PB vs K25, K50, T25, T50, R25, R50), 3 (K25, K50 vs R25, R50), and 4 (T25, T50 vs R25, R50).

The percentage of abdominal fat (Table 3) showed that the duck group treated with basal feed had a higher percentage of abdominal fat (P <0.01) than the duck group treated with banana peel meal, on contrast orthogonal test 1 (PB vs K25, K50, T25, T50, R25, R50). This is caused the use of banana peel meal, the percentage of abdominal fat decreases, this is due to the increase in crude fiber content which varies in feed shown in Table 1. Crude fiber in feed can reduce abdominal fat deposits in poultry (Fuji *et al*., 2013). The giving azolla with crude fiber up to 18.25%, can improve incomplete digestion, due to exfoliation of the intestinal mucosa, thus disrupting absorption due to gross fiber that is too high, besides it can trigger digestive pH to be lower and suppress the activity of enzymes that synthesize fat, consequently the lipogenesis process becomes inhibited (Samudera dan Hidayatullah, 2008). The process of digesting high crude fiber requires more energy, so that do not have excess energy to be stored in the form of abdominal fat in poultry (Mahfudz, 2000). Abdominal fat deposits in duck carcasses can decrease by means of inhibition of fat absorption in the digestive tract, which is caused by low production of bile salts, because are bound by fiber (Letis *et al*., 2017).

The percentage of abdominal fat (Table 3) showed that the duck in group treated with banana peel meal of Kepok had a higher percentage of abdominal fat (P<0.01) than the duck in group treated with banana peel meal of Raja, on contrast orthogonal test 3 (K25, K50 vs R25, R50). This is because banana peel meal of Kepok has a lower crude fiber content compared to the treatment with banana peel meal of Raja, thus affecting the percentage of abdominal fat produced. Dong *et al*. (2007) reported that the use of alfalfa as a source of fiber in feed up to 26%, can reduce abdominal fat without affecting duck meat production. The high content of crude fiber in feed can reduce the digestibility of crude fiber, due to the rate of flow of food substances in the small intestine are increases, so that the digestibility of fat are decreases (Leeson dan Summers, 2000).

The percentage of abdominal fat (Table 3) showed that the duck in group treated with banana peel meal of Tanduk had a higher percentage of abdominal fat (P<0.05) than the duck in group treated with banana peel meal of Raja, on contrast orthogonal test 4 (T25, T50 vs R25, R50). This is caused banana peel meal of Tanduk has a lower amount of crude fiber than banana peel meal of Raja seen in Table 3, so that when added to the feed the abdominal weight in ducks is lower than that of ducks given banana peel meal of Raja. The high content of crude fiber in feed can affect the amount of abdominal fat in poultry (Massolo *et al.*, 2016). The digestive process of crude fiber in chickens requires as much energy as possible, so that the chicken does not have excess energy to store in the form of abdominal fat (Mahfudz, 2000). Suryani dan Bidura (2000) reported that the distribution of fat in the body will decrease, with an increase in the crude fiber content in the feed. Fat deposits in poultry's body are sourced from triglycerides obtained from feed by 95% and only 5% are synthesized into the liver (Pratikno, 2011).

Contrast orthogonal test 2 (K25, K50 vs T25, T50), 5 (K25 vs T25, R25), and 6 (K50 vs T50, R50) have no effect. The percentage of

abdominal fat (Table 3) showed that the duck in group treated with banana peel meal of Kepok had the same percentage of abdominal fat as the duck in group treated with banana peel meal of Tanduk, on contrast orthogonal test 2 (K25, K50 vs T25, T50). This is caused the use of banana peel meal of Kepok and Tanduk in feed causes the content of crude fiber in the feed is not much different, so the percentage of abdominal fat in ducks is the same. The percentage of abdominal fat is the amount of fat accumulation in the body of poultry, abdominal fat deposits can be affected by crude fiber in the feed. The content of crude fiber in the feed with the same amount causes the same abdominal fat produced (Sadeghi *et al.*, 2015).

The percentage of abdominal fat (Table 3) showed that the duck in group treated with banana peel meal of Kepok had the same percentage of abdominal fat as the ducks treated with banana peel meal of Tanduk and Raja with half level (25%), on contrast orthogonal test 5 (K25 vs T25, R25). This is caused the use of banana peel meal with the same level, causing crude fiber in the feed is not much different (Table 1). The uniformity of crude fiber in feed with a level of 3.51%, gives no significant effect on the percentage of abdominal fat of 42 days old male broiler chicken (Sarikhan *et al.*, 2010).

Percentage of abdominal fat (Table 3) showed that the duck in group treated with banana peel meal of Kepok had the same percentage of abdominal fat as the duck in group treated with banana peel meal of Tanduk and Raja with all of level (50%), on contrast orthogonal test 6 (K50 vs T50, R50). This is caused the use of banana peel meal with the same level, causing crude fiber in feed is not much different (Table 1). The same crude fiber in feed causes the average percentage of abdominal fat to have the same value in broiler chickens, which is 1.72 g/head (Mourao *et al.*, 2008).

Conclusions

Banana peel meal cannot be used as a substitute for corn in hybrid ducks feed, because it can reduce carcass performance and production.

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