Performance of EPMp Broiler Ducks Feed with Various Levels of Dietary Lysine up to 10 Weeks of Age

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ABSTRAK

Purba M, Sinurat AP. 2017. Performa itik pedaging EPMp yang diberi pakan dengan berbagai kadar asam amino lisin sampai umur 10 minggu. JITV 22(1): 1-8. DOI: http://dx.doi.org/10.14334/jitv.v22i1.1606

Penentuan kadar asam amino lisin yang optimum dalam ransum, merupakan upaya penting untuk menghindari pertumbuhan yang buruk pada ternak itik. Tujuan penelitian ini adalah untuk mengetahui kebutuhan asam amino lisin optimal dalam ransum untuk itik pedaging EPMp yang dipelihara sampai dengan umur 10 minggu. Penelitian dilakukan dengan menggunakan Rancangan Acak Lengkap (RAL) dengan 4 perlakuan ransum dan 4 ulangan. Setiap ulangan terdiri dari 10 ekor itik EPMp unsexed. Perlakuan ransum terdiri dari kadar total lisin: 0,60% (T1); 0,70% (T2); 0,80% (T3) dan 0,90% (T4). Peubah yang diamati mencakup: konsumsi pakan, pertambahan bobot badan, feed conversion ratio (FCR), persentase bobot karkas dan potongan karkas. Hasil penelitian menunjukkan bahwa rataan pertambahan bobot badan dan FCR itik nyata (P<0,05) dipengaruhi oleh kadar total lisin dalam ransum, akan tetapi konsumsi pakan dan persentase bobot karkas maupun potongan karkas tidak nyata (P>0,05) dipengaruhi kadar asam amino lisin dalam ransum. Rataan pertambahan bobot badan itik dengan pemberian ransum T4 (0,90% lisin) nyata (P<0,05) lebih tinggi dibandingkan dengan T1 (0,60% lisin) akan tetapi tidak nyata (P>0,05) untuk ransum T2 dan T3. Rataan FCR itik dengan pemberian ransum T3 dan T4 nyata (P<0,05) lebih baik dibandingkan dengan perlakuan T1. Disimpulkan bahwa total lisin yang optimal untuk menghasilkan pertambahan bobot badan itik EPMp tertinggi sampai dengan umur 10 minggu adalah 0,70%, sedangkan untuk FCR ditunjukkan oleh itik pada ransum berkadar asam amino lisin 0,80% dan 0,90%.

Kata Kunci: Itik Pedaging EPMp, Asam Amino Lisin

ABSTRACT

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Determining the optimum level of lysine in the ration will be a significant effort to avoid poor growth in duck husbandry. The purpose of this study was to determine the optimum dietary lysine requirement for EPMp broiler ducks, raised up to 10 weeks of age. The study was designed in a completely randomized design (CRD) with 4 dietary treatments, and 4 replicates. Each replicate consisted of 10 ducks. The 4 treatments were diets, containing lysine: 0.60% (T1); 0.70% (T2); 0.80% (T3) and 0.90% (T4). Variables measured included: feed consumption, body weight gain, feed conversion ratio (FCR), carcass and carcass cuts percentages. The results showed that the performance of 10 weeks of age EPMp broiler duck was significantly affected by the level of dietary lysine (P<0.05). The average body weight gain and the FCR of the duck were significantly affected (P<0.05) by dietary lysine level, but not for feed consumption and percentage of carcass (P>0.05). The average body weight gain of EPMp duck with T4 treatment (0.90% lysine) was significantly higher than that T1 (0.60% lysine) but did not significantly difference (P>0.05) with T2 and T3. The average FCR of EPMp duck under T3 and T4 were significantly (P<0.05) higher than that of EPMp duck under T1. It was concluded that the optimum dietary lysine to produce maximum body weight gain of EPMp duck raised up to 10 weeks of age was 0.70%, while for minimum FCR were at the level of 0.80% and 0.90%.

Key Words: EPMp Broiler Duck, Dietary Lysine

INTRODUCTION

EPMp duck is one of the local broiler ducks that has been being developed at the Indonesian Research Institute of Animal Production at Ciawi, Bogor. The nutrient requirements of the local broiler duck is very important to understand in order to formulate optimum diets that can effectively and efficiently support high production. The nutritional needs of birds can be affected by several factors including: the type, age, anatomical structures and physiological status of the animal (Helmbrecht 2012). Lysine is the second limiting amino acid in poultry diets and the level of this amino acid is usually critically considered in diet formulation for ducks, but there is little research on the lysine requirements of early starting and growing Pekin ducklings. Lysine is an essential amino acid as it cannot be synthesized in the body of the poultry. Insufficient or

excessive dietary lysine can result in poor performance of the animal, thus increasing the cost of feed for livestock production (Dozier et al. 2010).

Nutritional requirements, especially lysine for both laying and broiler meat type of chicken has been reported quite a lot (Bouvarel et al. 2004; Kamran et al. 2008; Dozier et al. 2010), but relatively little for ducks (Adeola 2006; Cho et al. 2014). The nutritional requirements of the duck generally refer to the NRC recommendations (NRC 1994; Chen 1996) including the nutritional requirements of local ducks as well as layer and broiler. Lysine requirement for Pekin duck at growing-finishing period was 0.65% and a total energy was 3000 kcal ME/kg (NRC 1994). The nutritional value of protein and energy in the feed serves as a building block and regulators in animal body to achieve maximum production (Kamran et al. 2008; Pesti 2009). Adeola (2006) reported that lysine, methionine and threonine considered as the essential amino acids to help increase growth in commercial ducks. Lysine deficiency in the body could lead to duck slow growth, whereas when the energy content of the diet was not enough, the feed consumption was then high. In addition to protein level, appropriate energy level also played an important role in determining the cost of feed (Adeola 2006). Metabolizable energy requirements for Pekin duck of growing and finishing period were 3050 and 3075 kcal/kg (Leeson et al. 1996).

Level of lysine in the feed was varied for local broiler ducks and FCR generated was also relatively high. Ketaren et al. (2011) reported the need of lysine to PMp duck (crossed of Pekin duck male with white Mojosari female) finisher period was 0.90%. The average FCR generated during the period finisher was 4.33; while Purba et al. (2015) showed that the need lysine to produce optimal performance during the starting period for PMp duck was 0.70 to 0.85%. FCR local broiler ducks achieved in previous studies was still relatively high around 4.68 to 5:34 (Purba et al. 2014b), so that the optimal nutritional requirements for broiler ducks still needs to be researched and studied to obtain a better FCR values and the resulting in the best performance.

The requirement of lysine for poultry not only needs for growing and production but also for basic needs (maintenance). Lysine requirement in Pekin ducks of 0-2 weeks of age was 0.90%, while at the age of 2-7 weeks was 0.65% (NRC 1994). Adeola (2006) stated that the requirement of lysine and methionine of Pekin ducks aged one week after hatching was not more than 1.20% (lysine) and 0.60% (methionine). Information needs of the amino acid lysine, especially for the local ducks are still varied. Choo et al. (2014) reported that the optimum level of lysine, SAA (total sulfur amino acids) and threonine to produce maximum growth in local ducks in Korea were 1.20%, 0.98% and 0.93% respectively. Lysine requirement for the most optimal and efficient in EPMP broiler ducks aged 10 weeks were conducted as described in this paper.

MATERIALS AND METHODS

The material used were EPMp broiler ducks obtained from crossing of male Muscovy duck by artificial insemination (AI) with female PMp duck (one of new strain from the IRIAP). The whole process of raising of parent ducks was conducted according to standard operational research of IRIAP. EPMp ducklings were then reared in 16 cages, equipped with feed and drinking water. The ducklings were allocated at random from age of 0 to 10 weeks. The study was satistically analyed using completely randomized design (CRD) with 4 dietary treatments and 4 replications. Each replication consisted of 10 ducks. Dietary treatments consisted of four difference lysine with the same metabolizable energy content. The dietary treatments followed:

T1: Diet containing total lysine of 0.60 %, crude protein 16.26%, energy of 2768 kcal EM/ kg;
T2: Diet containing total lysine of 0.70%, crude protein 16.44%, and energy of 2765 kcal ME/kg.
T3: Diet containing total lysine content of 0.80%, crude protein of 16.68%, and energy of 2758 kcal ME/kg.
T4: Diet containing total lysine of 0.90%, crude protein of 16.16%, and energy of 2769 kcal ME/kg.

The nutrient content of rations was formulated based on nutritional requirement for duck under the recommendations of NRC (1994), and Ketaren (2002). Feed was given twice a day in the morning and afternoon, while drinking water was provided *ad libitum*. Ingredients and the composition of the dietry treatment are presented in Table 1.

Ducks were weighed once a week to collect body weight data as well as consumption and feed efficiency data. At the age of 10 weeks, ducks were weighed and slaughtered for carcass analysis. Slaughtering was practiced following Islamic way by cutting the carotid artery and jugular vein. The dead ducks were dipped into a bucket of hot water with a temperature 60-70°C for 40-50 seconds and then immersed in cold water to keep the carcass skin quality. After soaking the body of the ducks was cleanly plucked. The whole carcass was cut to separate the head, neck and legs. The body cavity was opened by applying incision from the sternum to the cloaca.

Cloaca and viscera or internal organs of were then removed. Liver, gall bladder, gizzard, heart, and intestine were separated. The content of gizzard was removed as well as the bile of ducks was separated from the liver then weighed. Variables measured were: feed intake, body weight gain, feed conversion ratio (FCR), carcass and viscera weight.

Table 1. The composition and nutrient content of the dietary treatments

Ingredients	T1	T2	T3	T4
Rice bran (%)	36.31	36.33	36.40	36.70
Corn (%)	34.35	34.10	33.94	34.00
Soybean meal (%)	7.95	8.20	8.50	7.00
Fish meal (%)	6.30	6.25	6.25	5.50
Commercial Broiler Ration (%)	14.00	13.85	13.25	15.00
Methionine (%)	0.00	0.02	0.19	0.08
Lysine (%)	0.00	0.13	0.25	0.42
Vitamin and mineral premix (%)	0.09	0.07	0.07	0.07
Crude palm oil (%)	0.35	0.40	0.50	0.58
Dicalcium phosphate (%)	0.50	0.50	0.50	0.50
Salt (%)	0.15	0.15	0.15	0.15
Total (%)	100	100	100	100
Calculated nutrient content				
Crude protein, (%)	16.26	16.44	16.68	16.16
Lysine (%)	0.60	0.70	0.80	0.90
Energy (kcal ME[1)]/kg)	2768	2765	2758	2769
Crude fiber (%)	6.15	6.15	6.15	6.18
Calcium (%)	0.93	0.93	0.92	0.88
Phospor (%)	0.78	0.78	0.78	0.77

[1)] ME = Metaboliz able Energy

Data were analyzed by procedure of General Linear Model (GLM) applying Statistical Analysis System (SAS, ver. 6.12, 1997).

RESULTS AND DISCUSSION

Feed consumption

The average feed, protein, and lysine consumption are presented in Table 2. Feeding with various lysine levels did not significantly (P>0.05) affect feed consumption of EPMp broiler ducks during the first 10 weeks of age. The average feed consumption of EPMp broiler duck feed under T3 and T4 treatments seemed to be lower than of them under T1 and T2 treatments, but based on statistical analysis, it was not significantly different (P>0.05). The lowest average protein intake in this study was found in the T4 treatment (1499 g/bird), although it showed the insignificant (P>0.05) highest lysine consumption (83.50 g/bird). The study showed that the increasing total lysine content in the ration up to 0.90%, which caused the slight increase in the amount of lysine consumed and decrease in total feed consumption, indicated the phenomena of decreasing feed consumption by increasing dietary lysine.

It was thought that feed consumption to be related to the response of each individual to take advantage of the nutrients, especially protein content in diet. Alleman et al. (2000) and Pesti (2009) stated that each type of animal had different response to the nutrition, especially protein content and amino acid obtained through diet consumed. The results also showed that the amino acid lysine appeared to have a role to reduce the feed consumption of the duck. The results were consistent with the opinion of Hernandez et al. (2004), Fan et al. (2008), Hidalgo et al. (2004), and Kamran et al. (2008).

Table 2. The average feed, protein and lysine consumption of EPMp broiler ducks fed various levels of dietary lysine up to 10 weeks of age

Treatments	Feed consumption (g/bird)	Consumption of	
		Protein (g/bird)	Lysine (g/bird)
T1 (total dietary lysine content 0.60%)	9472±23.3	1540	56.83
T2 (total dietary lysine content 0.70%)	9498±21.5	1561	66.49
T3 (total dietary lysine content 0.80%)	9237±21.5	1541	73.90
T4 (total dietary lysine content 0.90%)	9278±16.1	1499	83.50

The effect of nutrient content in diets to support good performance depends on the capacity of the duck to change dietary intake to meet changing of calories needs. Feed intake during the starter period will differ from grower and finisher period. In the starter period, duckling is likely to have physical limitations in consuming huge amount of feed. During growing and finishing period, eventually feed consumption will increase according to the increase in physical capacity and stability of the digestive organs.

The results presented in Table 2. were similar to the previous study of Purba et al. (2015). The study provided information that the average lowest of feed consumption was achieved under T4 treatment (0.90% of lysine), with average feed intake of 8037 g/bird. Therefore in terms of efficiency, the feed containing 0.90% of lysine level was most advisable to obtain a lower feed consumption of EPMp broiler ducks at the age of 10 weeks. Increasing dietary lysine content of 0.3% which reduced feed up to 200 g/bird, seemed to be economically advantage in broiler duck husbandry.

Body weight gain

The average body weight gain of EPMp broiler ducks by administration with various total lysine content in the treatment rations are presented in Table 3. Overing of various total lysine levels in the ration had significant ($P<0.05$) effect on the body weight gain of EPMp broiler duck up to 10 weeks of age. The average body weight of EPMP broiler duck under T4 treatment (0.90% total lysine) was significantly higher ($P<0.05$) when compared to the one under T1 treatment, but not significantly different ($P>0.05$) from the one under T2 and T3 treatments.

The highest body weight gain in this study was shown under T4 treatment (2351±22.93 g/bird) while the lowest was found under T1 treatment (2161±20.10 g/bird). The higher body weight gain of EPMp broiler duck under T4 treatment was influenced by the amount of lysine amino acid consumption. When seen in Table 2, the amount of lysine consumption under T4 treatment was higher when compared with other treatments that affected the increase in body weight gain of the ducks up to 10 weeks of age. The results of the study are in line with the results of the other studies. Bons et al. (2002) and Xie et al. (2006) reported that the growth and performance of male Pekin duck was significantly increased in line with the increase of the amino acid lysine in the diet. The administration of lysine of 1.20% in feed weight gain produced increased body weight of local duck in Korea (Choo et al. 2014).

Normal growth in ducks was highly dependent on nutritional content, especially essential amino acids (Kamran et al. 2008). Other researchers also stated that besides proper nutritional diet, genetics, and management had great influence on the performance and carcass quality of Pekin ducks (Adeola 2006; Xie et al. 2014). Normal growth in poultry is not enough only with limited availability of source materials or energy substrate as a result of the synthesis of proteins (amino acids), but also very influential in the groove in the regulation of growth, protein synthesis by their interaction with growth hormone (Dorup 2004). During the period of growth, Zeng et al. (2015) suggested that the level of energy and digestible lysine in Pekin ducks each of 13.75 MJ ME/kg (approximately 3280 kcal ME/kg) and 1.21% digestible lysine. Their lysine and energy level were much higher than the level used in this study. Lysine requirement is also influenced by the type of poultry. Nutritional requirement (lysine) of Muscovy duck or mule duck in Taiwan according to Chen (1996) for finisher period was 0.90% supporting the average weight gain of about 2.77 kg/bird and the feed consumption was 8.86 kg/bird at 10 weeks age. Dozier et al. (2008) reported that lysine requirement to produce weight gain and FCR optimal for broiler finisher period was 0.79 to 0.83%. This study gave that the impression that diet contained 0.70% of lysine with 16.26% of crude protein and 2768 kcal ME/kg was considered to be sufficient to produce maximum weight gain of EPMp broiler duck up to10 weeks of age.

Table 3. The average of weight gain of EPMp duck fed various levels of dietary lysine up to 10 weeks of age

Treatments	Weight gain (g/bird)
T1 (total dietary lysine content of 0.60%)	$2161^{a1)}$±20.10
T2 (total dietary lysine content of 0.70%)	2244^{ab}±19.90
T3 (total dietary lysine content of 0.80%)	2261^{ab}±23.64
T4 (total dietary lysine content of 0.90%)	2351^{b}±22.93

[1)] Values in the same column with the different superscript are significantly difference (P<0.05)

Table 4. The average of FCR of EPMp duck fed various levels of dietary lysine up to 10 weeks of age

Treatments	FCR
T1 (total dietary lysine content of 0.60%)	$4.39^{a1)}$±0.08
T2 (total dietary lysine content of 0.70%)	4.23^{ab}±0.03
T3 (total dietary lysine content of 0.80%)	4.09^{bc}±0.05
T4 (total dietary lysine content of 0.90%)	3.95^{c}±0.07

[1)] Values in the same column with the different superscript are significantly difference (P<0.05)

Feed conversion ratio (FCR)

The average feed conversion ratio (FCR) of EPMp broiler duck up to 10 weeks with feeding treatments containing various levels of dietary lysine was described in Table 4. Provision of various lysine total levels in the treatment ration was significantly (P<0.05) affected the FCR. The average FCR of EPMp ducks under T4 treatment (0.90% total lysine) was significantly different (P<0.05) when compared to T1 and T2 treatments, but not to T3 treatment (P>0.05). There were decline pattern of FCR with increasing dietary lysine (Table 4). The lowest FCR of EPMp broiler duck was found under T4 treatment (3.95±0.07) while the highest was found in T1 treatment (4.39±0.08).

The increase in of feed efficiency seemed to be the effect of reducing feed consumption due to the increase in dietary lysine (Table 2), as it was expected. The results are consistent with the research results of Kamran et al. (2008) who reported that in addition to the role of lysine in the ration not only served to sustain growth, but also reduced feed consumption and lower FCR. Bons et al. (2002) had also noted that the increasing content of digestible lysine decreased FCR of growing Pekin duck. The decrease of FCR due to increasing lysine content in this study also confirmed by other researchers who claimed that application of amino acids in the grower-balanced diet causing low FCR due to the more efficient in forming muscle fibers in the form of meat (Dorup 2004; Fan et al. 2008).

Ketaren (2006) reported that FCR of muscovy duck fed diets contained pollard at level of 30, 40 and 50% respectively were 3.42; 3.39 and 3.47, while feed intake respectively were 6059, 6190 and 6111 g/bird for ducks raised up to 8 weeks of age. The study indicated that the diet contained lysine of 0.80% and 0.90% with 16.16% crude protein and metabolizable energy of 2769 kcal/kg was optimum to support minimum FCR of EPMp duck raised up to 10 weeks of age.

Carcass and carcass cuts

The mean percentage carcass and carcass cuts of EPMp duck under various dietary lysine levels for 10 weeks were presented in Table 5. The average percentage of carcass weight, breast, thigh, back and wings of EPMp ducks were not significantly effected by dietary lysine levels for 10 weeks.

The average carcass weight of EPMp duck ranged from 61.43 to 62.21%. Administration of various levels of dietary lysine did not affect significantly (P>0.05) empty carcass and carcass cuts. Table 5 shows that there was a pattern of increasing percentage of empty carcass of duck in line with the increasing of lysine content in ration. Pesti (2009) reported that the nutritional content of amino acids that were sufficient in accordance with the needs was very useful to encourage the growth of body tissue including the muscle tissue (meat) in poultry. Table 5 shows also that the percentage of the breast, thighs and wings was also not statistically significant (P>0.05) influenced by the administration of various dietry lysine levels. The average weight of duck breast meat ranged from 16.48 to 18.83%. The highest mean weight of breast meat was found under T4 treatment (0.90% lysine). The average thigh meat weight ranged from 14.41 to 14.94%. Feeding various dietary levels of lysine did not significantly affected (P>0.05) percentage of thigh meat.

Table 5. Average percentage of carcass and carcass cuts of EPMp duck fed various levels of dietary lysine up to 10 weeks of age

Treatment	Empty Carcass (%)	Breast (%)	Thigh (%)	Back (%)	Wings (%)
T1[1)]	61.73±0.27	17.48±0.46	14.94±0.18	18.98±0.24	9.97±0.07
T2	61.43±0.32	17.55±0.74	14.41±0.43	18.58±0.11	10.43±0.14
T3	61.85±0.20	16,49±0.90	14.80±0.52	18.91±0.67	10.39±0.22
T4	62.21±0.48	18.83±0.96	14.63±0.30	18.00±0.39	9.86±0.11

1) T1 = total dietary lysine of 0.60%; T2 = total dietary lysine of 0.70%; T3 = total dietary lysine of 0.80%; T4 = total dietary lysine of 0.90%

Table 6. Average percentage of visceras of EPMp duck fed various levels of dietary lysine up to 10 weeks of age

Treatment	Abdominal fat (%)	Liver (%)	Gizzard (%)	Intestine (%)	Intestine length (cm)
T1[1)]	0.99±0.04	2.07±0.05	3.39±0.06	3.86±0.05	170±1.04
T2	0.84±0.12	2.19±0.14	3.55±0.12	3.80±0.14	169±1.54
T3	0.74±0.19	2.19±0.11	3.54±0.07	3.50±0.35	174±1.70
T4	0.81±0.13	2.04±0.10	3.40±0.19	3.53±0.08	164±1.57

1) T1 = total dietary lysine content 0.60%; T2 = total dietary lysine content 0.70%; T3 = total dietary lysine content 0.80%; T4 = total dietary lysine content 0.90%

Carcass cuts

The average percentage of visceral of EPMp broiler ducks under various levels of dietary lysine up to 10 weeks of age are presented in Table 6. The lowest abdominal fat weight (0.74%) was found under T2 treatment while the highest (0.99%) was found under T1 treatment. Based on statistical analysis, abdominal fat was not significantly affected by administration of various levels of dietary lysine. The results are in line with Hyun et al. (2014), who reported that abdominal content and organ weight in broiler chickens were not significantly influenced by amino acid content in diet given during period finisher.

Based on efficiency aspect to produce low abdominal fat weight administration of dietary lysine of 0.80% was considered sufficient. Abdominal fat content in duck meat was one important factor in the acceptance of duck meat by consumers.

Duck meat that contains high fat is generally less preferred so that it became one of the attention of nutrition researchers preparing proper dietary formula. Another factor that can affect abdominal fat content in ducks was the energy and protein content in the ration. Fan et al. (2008) reported that diet with 18% protein content and 3002 and 3006 kcal EM /kg significantly increased abdominal fat content in Pekin duck at 6 weeks. Purba & Prasetyo (2014b) also reported that a crude fiber content of 9% in feed could lower abdominal fat of EPMp duck for 12 weeks.

The average percentage of liver, gizzard, intestine, and intestine length presented in this study did not significantly ($P>0.05$) influenced by the administration of various dietary lysine levels. The development of liver, gizzard and intestines in poultry were started early because these three organs are very important role for growth process (Leckerck & Carville 1985). The average percentage of liver of EPMp duck ranged from 2.04 to 2.19%. The result was almost equal to the average percentage of Rouen liver ducks. The average percentage of liver of Rouen ducks at 10-week-old according to Omojola (2007) was 2% for male and 2.81% for female, while the average percentage of liver of Pekin ducks at the same age were 2.60% for male and 1.48% for female, respectively.

The average percentage of gizzard under the administration of various dietary levels of lysine ranged from 3.39 to 3.55%. Percentage of gizzard was not affected by the dietary treatment. Percentage of gizzard were considerably normal. The gizzard of the ducks and in poultry mechanically serves as a digestive tool Adeola (2006) reported that the percentage of Pekin duck gizzard at 10 weeks was 2.23% for male and 2.97% of female.

The average percentage of intestine of ducks by giving various dietary levels of lysine ranged from 3.50 to 3.86%, while the average length of intestine ducks ranged from 164 to 174 cm. The intestinal organs are part of the digestive tract until the nutrients derived from the feed are absorbed by the body. Intestines in

poultry can be affected by various factors, including sex. Omojola (2007) reported that the average length of intestinal length of *Chairina moschata* for 10 weeks old was significantly influenced by sex. It was reported that the average intestine length of male C*hairina moschata* was 194.90 cm, while *Chairina moschata* female was 137 cm. The study are also in line with Sutrisna (2010) reported that the length of intestine length and proventrikulus in Tegal ducks were not influenced by the provision of various levels of crude fiber in the ration. The study indicate that the lysine level from 0.60 to 0.90% over for 10 weeks can meet the nutritional requirements of EPMp duck to produce prime percentage carcass cuts.

CONCLUSION

Administration of various dietary lysine significantly affected the weight gain and FCR of EPMp broiler duck up to 10 weeks of age. The optimal total lysine level to produce maximum body weight gain and low FCR of EPMp broiler ducks for 10 weeks was 0.80% and 0.90% and 0.70%, respectively. In terms of efficiency to reduce abdominal fat in EPMp broiler ducks, the use of 0.80% of lysine in the ration was considered optimum.

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REFERENCES

Adeola O. 2006. Review of research in duck nutrient utilization. Int. J. Poult. Sci. 5:201-204.

Alleman F, Michel J, Chagneau M, Leclercq B. 2000. The effect of dietary protein independent of essensial amino acids on growth and body composition in genetically lean and fat chickens. Br Poult Sci. 41:214-218.

Bons A, Timmler R, Jeroch H. 2002. Lysine requirement of growing male Pekin ducks. Br Poult Sci. 43:677-686.

Bouvarel I, Barrier-Guillot B, Larroude P, Boutten B, Leterrier C, Merlet F, Vilarino M, Roffidal L, Tesseraud S, Castaing J, Picard M. 2004. Seqquential feeding programs for broiler chickens: twenty-four and forty-eight-hour cucles. Poult Sci. 83:49-60.

Chen TF. 1996. Nutrition and feedstuffs of ducks. In: The training Course for Duck Production and Management. Taiwan Livestock Research Institute, Monograph No. 46. Committee of International Technical Cooperation, Taipei.

Choo YK, Kwon HJ, Oh ST, Kang CW, Kim HK, Hong EC, Heo KN, Lee SK, An BK. 2014. Growth performance and carcass characteristics of Korean native ducks fed diets with varying levels of limiting amino acids. Asian Australas. J. Anim. Sci. 27:518-523.

Dorup I. 2004. The impact of minerals and micronutrients on growth control. In: te Pas, MFW, Everts ME, Haagsman HP, editors. Muscle development of livestock animals physiology, genetics and meat quality. Oxford (UK): CABI Publishing, CAB International Wallingford Oxfordshie OX10 8 DE. p. 125-136.

Dozier III WA, Behnke KC, Gehring CK, Branton SL. 2010. Effects of feed form on growth performance and processing yields of broiler chickens during a 42-day production period. J Appl Poult Res. 19:219-226.

Dozier III WA, Kerr BJ, Corzo A, Kid MT, Weber TE, Bregengahl K. 2008. Apparent metabolizable energy of glycerin for broiler chickens. Poult Sci. 87:317-322.

Fan HP, Xie M, Wang WW, Hou SS, Huang W. 2008. Effect of dietary energy on growth performance and carcass quality of white growing Pekin ducks from two to six weeks of age. Poult Sci. 87:1162-1164.

Helmbrecht A. 2012. Amino acid nutrition in ducks. Proceedings of 24th World's Poultry Congress. Salvador, Bahia (Brazil). p. 1-7.

Hernandez DJ, Madrid, Garcia V, Orengo J, Megias MD. 2004. Influence of two plants extracts on broilers performance, digestibility, and digestive organ size. Poult Sci. 83:169-174.

Hidalgo MA, Dozier III WA, Davis AJ, Gordon RW. 2004. Live performance and meat yield responses to progressive concentration of dietary energy maintained at a constant metabolizable energy-to-crude protein ratio. J Appl Poult Res. 13:319-327.

Hyun YK, Boontiam W, Ji YJ, Fang LH, Kim HJ, Y.Y. Kim YY. 2014. Effects of lysophospholipids on growth performance, nutrient digestibility, blood profiles and carcass traits in broilers. Subandriyo, Kusmartono, Santosa AK, Kurnianto E, Purnomoadi A, Sodiq A, Wiryawan GK, Darodjah S, Inounu I, Darmono, Priyanti A, Wynn P, Han LJ, Tay-Hsu J, Idrus Z. Proceedings of the 16th AAAP Animal Science Congress. Yogyakarta (Indones): Gadjah Mada University. p. 1995-1998.

Kamran Z, Sarwar M, Nisa M, Nadeem MA, Mahmood S, Babar ME, Ahmed S. 2008. Effect of low-protein diets having constant energy-to-protein ratio on performance and carcass characteristics of broiler chickens from one to thirthy-five days of age. Poult Sci. 87:468-474.

Karimi A. 2006. The effects of varying fishmeal inclusion levels (%) on performance of broiler chicks. Int J Poult Sci. 5:255-258.

Ketaren PP, Sinurat AP, Prasetyo LH, Rahardjo YC, Purba M. 2011. Effect of lysine and metabolizable energy levels

on productivity performance of Mule ducks. Proceedings of the 3rd International Conference, on Sustainable Animal Agriculture for Developing Countries. Nakhon Ratchasima (Thailand): Suranaree University of Technology.

Ketaren PP. 2002. Kebutuhan gizi itik petelur dan itik pedaging. Wartazoa. 12:37-46.

Leeson S, Castol L, Summers JD. 1996. Broiler response to dietary energy. Poult Sci. 75:529-535.

[NRC] National Research Council. 1994. Nutrient requirement of poultry. Washington DC (USA): National Academy Press.

Omojola AB. 2007. Carcass and organoleptic characteristics of duck meat as influenced by breed and sex. Int J Poult Sci. 6:329-334.

Pesti GM. 2009. Impact if dietary amino acids and crude protein levels in broiler feeds on biological performance. J Appl Poult Res. 18:477-486.

Purba M, Ketaren PP. 2011. Konsumsi dan konversi pakan itik lokal jantan umur delapan minggu dengan penambahan santoquin dan vitamin E dalam pakan. JITV. 16: 280-287.

Purba M, Prasetyo LH. 2014a. Effects of high crude fiber and various levels of protein in the diet on the performance of EPMp broiler ducks at 10 weeks. Subandriyo, Kusmartono, Santosa AK, Kurnianto E, Purnomoadi A, Sodiq A, Wiryawan GK, Darodjah S, Inounu I, Darmono, Priyanti A, Wynn P, Han LJ, Tay-Hsu J, Idrus Z. Proceedings of the 16th AAAP Animal Science Congress. Yogyakarta (Indones): Gadjah Mada University. p. 1980-1983.

Purba M, Prasetyo LH. 2014b. Respon pertumbuhan dan produksi karkas itik pedaging EPMp terhadap perbedaan kandungan serat kasar dan protein dalam pakan. JITV. 19:220-230.

Purba M, Haryati T, Sinurat AP. 2015. Performans itik pedaging EPMp dengan Pemberian pakan yang mengandung berbagai level lisine selama periode starter. JITV. 20:58-63.

Sutrisna R. 2010. Peranan ransum berserat kasar tinggi dalam sistem pencernaan fermentatif itik (Disertation). [Yogyakarta (Indones)]: Universitas Gadjah Mada.

[SAS] Statistical Analysis System. 1997. SAS/STAT guide for personal computers. Ver:6.12 Edit. Cary, NC: SAS Institute Inc.

Xie M, Hou SS, Huang W. 2006. Methionine requirements of male white Pekin ducks from twenty-one to forty-nine days of age. Poult Sci. 85:743-746.

Xie M, Jiang Y, Tang J, Wen ZG, Huang W, Hou SS. 2014. Effect of stocking density on growth performance, carcass traits, and foot pad lesions of white Pekin ducks. Poult Sci. 93:1644-1648.

Zeng QF, Cherry P, Doster A, Murdoch R, Adeola O, Applegate TJ. 2015. Effect of dietary energy and protein content on growth and carcass traits of Pekin ducks. Poult Sci. 94:384-394.