EFFECT OF LYSINE SUPPLEMENTATION ON GROWTH AND CARCASS YIELD OF BROILERS

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ABSTRACT: *Present study was conducted to observe the influence of different levels of lysine supplement with low crude protein diet on the performance of broilers at poultry production and research center Hyderabad, Sindh. A total of 120 day-old-chicks were randomly divided into four groups (A, B, C and D; 30 chicks in each) and offered feed from 0 to 42days added with lysine at level of 10, 12, 13 and 14g/kg, respectively. The feed intake was significantly high (4036.3±9.10g/bird) in broilers of group A than that of group D (4018.9±11.71g/bird), C (4017.3±10.05g/bird) and B (3991.3±1.28g/bird). The broilers of group B obtained more (P<0.05) body weight (2296.0±15.14g/bird) against group A (2078.4±14.89g/bird) and D (2118.1±67.98g/bird) but statistically similar to that of group C (2161.1±51.54g/bird). The feed conversion ratio of group A, B, C and D was 1.94±0.02, 1.74±0.01, 1.86±0.04 and 1.90±0.07, respectively, where group B broilers had improved feed efficiency in contrast to other groups. The carcass weight found markedly high (P<0.05) in broilers of group B compared to group C, D and A i.e. 1457.1±15.72, 1346.6±29.56, 1301.3±30.00 and 1263.3±13.48g/bird, respectively. The dressing percent was considerably high in group B (63.46±0.49%) compared to group D (61.47±0.56%) and A (60.79±1.01%), except group C (62.32±0.50%) where differences existed non-significant. There were no significant differences observed among all groups for relative weight of liver, heart and/or gizzard of broilers. It could be concluded that 12g/kg lysine level in feed found better for more body weight gain, improved feed efficiency and high carcass yield of broilers.*

KEY WORDS: Broiler chickens, Feed consumption, Live body weight

INTRODUCTION

It is well known that broiler production successful depends on more weight gain within less time period that can be achieved by scientific nutritional feeding and management practices. Therefore several nutrients are combined in the diet to enhance the growth performance of broilers [1]. It has been reported that maximum weight gain of poultry was obtained by the using of lysine supplement in protein diet [2]. It is recognized as the second limiting amino acid of poultry nutrition and is mostly used for synthesis of protein in animal body. In addition lysine is required for ideal body weight gain and feed efficiency [3-5]. To improve breast meat lysine is desired and it accounts for 60% palatable protein of the broiler meat. However, amino acids are critical for muscle development and lysine content in breast muscle is relatively higher than other amino acids [6]. Due to the insufficiency of lysine in diet has been revealed to decrease yield breast meat compared with other muscles [6]. Thus, it needs for ideal development of muscles and meat yield is of maximum importance. Lysine is one of the main amino acid for Synthesis of protein and muscle deposition has also been established to be involved in the cytokines synthesis, as well as proliferation of lymphocytes. Deficiency of lysine in diet would decrease antibody response and cell-mediated immunity in broiler chickens [7]. It is well recognized that the interaction of protein and lysine and is considered as an important aspect which affects growth performance and quality of carcass of growing chicks and so, lysine is fundamental requirement in feed. Therefore, this study was subjected to observe the growth performance of broiler chickens supplemented with different levels of lysine in their feed.

MATERIALS AND METHODS

The experiment was conducted at poultry production and research center Hyderabad, Sindh to determine the effect of lysine supplement with low crude protein diet on broilers performance. Before the arrival of chicks the shed was cleaned and sanitized properly and divided into four partitions. One hundred twenty (n=120) day old Cobb broilers chicks purchased from commercial hatchery Karachi were initially weighed and randomly divided into four groups (n=30 in each group) and identified as A, B, C, D. Each group was consisting of three replicates (10 birds per replicate). Experimental diets were prepared and labelled as A, B, C, and D, these all labelled diets contained same ratio of protein (i.e. 19%) and energy (3000 kcal/kg), while the synthetic lysine was added at the various levels 10, 12, 13 and 14 g/kg, respectively. The feed was given ad-libitum to the broilers from day 01 to day 42. Brooding room temperature was maintained at 95°F for 1st week with increase of 5°F for each week up to 6th week of broilers age. Fresh and clean water was available twenty four hours and light was given twenty two hours throughout the experimental period. At the end of the experiment (after 42 days), three birds from each group/replicate randomly selected were weighed and slaughtered to record dressing percentage. The weight of liver, heart and gizzard was also noted. The data was analyzed through Analysis of Variance (ANOVA) and the treatment means were analyzed computed using Least Significant Difference (LSD) at 5% level of

probability. Student Edition of Statistics (SXW), Version 8.1, Analytical Software, USA, 2005).

RESULTS

The results presented in Table-1 show that the broilers supplemented with 10g/kg (group A) of lysine in feed consumed more feed (4036.3±9.10g/bird) followed by broilers with lysine at 14g/kg (4018.9±11.71g/bird; group D), 13g/kg (4017.3±10.05g/bird; group C) and 12g/kg (3991.3±1.28g/bird; group B) of lysine in ration. However, statistically the feed consumption of group A was found higher compared to group B, while group C and D both noted statistically similar with these groups. Further Table-1 indicates that the broilers fed ration with lysine at level of 12g/kg (group B) received higher live body weight compared to that of supplemented with lysine at concentration of 13, 14 and 10g/kg i.e. 2296.0±15.14, 2161.1±51.54, 2118.1±67.98 and 2078.4±14.89g/bird, respectively. The live body weight of broilers of group B achieved considerably high ($P<0.05$) than that of group A and D, but it was found statistically similar with group C. Moreover, the results shown in Table-1 reveal that average feed conversion ratio of broilers reared under group A (lysine; 10g/kg), B (lysine; 12g/kg), C (lysine; 13g/kg) and D (lysine; 14g/kg) was 1.94±0.02, 1.74±0.01, 1.86±0.04 and 1.90±0.07, respectively. It was observed that the broilers offered feed supplemented with lysine at level of 12g/kg (group B) was found with improved feed efficiency in contrast to broilers fed with 10, 13 and 14g/kg lysine.

The carcass characteristics of broilers fed with supplementation of various levels of lysine were observed and the results are depicted in Table-2. It was found that the levels of lysine added in broiler ration had significant influence on the carcass weight of broilers. The carcass weight was noted remarkably high ($P<0.05$) in broilers of group B (lysine; 12 g/kg) compared to that of broilers under group C, D and A (carcass weight; 1457.1±15.72, 1346.6±29.56, 1301.3±30.00 and 1263.3±13.48g/bird, respectively). However, the carcass weight of later three groups (group C, D and A) of broilers was observed statistically similar ($P>0.05$) to each other. The influence of different levels of lysine in broilers diet was further confirmed by calculating the dressing percent whereby considerably more dressing rate was obtained in group B (63.46±0.49%) than that of group D (61.47±0.56%) and A (60.79±1.01%) except group C (62.32±0.50%), where differences existed non-significant ($P>0.05$). Furthermore Table-2 reveals that the broilers reared under group B noted with slightly high relative liver weight (3.08±0.12%) than that of group A (2.91±0.05%), C (2.98±0.05%) and D (2.91±0.04%), but statistically there was no significant difference ($P>0.05$) among each other. However, the different groups of broilers fed ration with supplementation of 10, 12, 13 and 14g/kg lysine were noted with statistically similar ($P>0.05$) relative heart and gizzard weight i.e. 0.45±0.04 and 1.11±0.06, 0.45±0.05 and 1.06±0.04, 0.44±0.05 and 1.03±1.02, and 0.42±0.04 and 1.04±0.01%, respectively.

DISCUSSION

The results of current study illustrated that levels of lysine in ration had significant influence on the feed intake of broilers. However broilers fed with 10g/kg of lysine were found with remarkable increased feed intake (4036.3±9.10g/bird), whereas with increase of lysine levels 14, 13 and 12g/kg decrease in feed intake was noted as 4018.9±11.71, 4017.3±10.05 and 3991.3±1.28g/bird, respectively. The live body weight of broilers at level of lysine 12g/kg was observed considerably high (2296.0±15.14g/kg; $P<0.05$) than that of broilers at 13, 14 and 10g/kg (2161.1±51.54, 2118.1±67.98 and 2078.4±14.89g/bird, respectively) of lysine. The feed conversion ratio (FCR) was also noted to be better for broilers reared under group B (1.74±0.01) which provided feed with lysine at 12g/kg compared to groups offered feed with lysine at 10 (1.94±0.02), 13 (1.86±0.04) and 14g/kg (1.90±0.07). The results are in agreement with the findings reported by (Fritts *et al*. 2001) [8] who stated that the various levels of Lysine improved weight gain and feed conversion ratio. While, in other study reported by (Javad and Kheiri 2011) [9]. it was observed that 1.2% lysine with diet increased the body weight gain and feed intake but did not influence on FCR. However, (Costa *et al*. 2001) [10] reported that there was a linear increase from 9.07g to 10.91g in feed intake with dietary lysine levels of 1.06 to 1.30%, respectively. The results of present study regarding live body weight are also supported by (Vazquez and Pesti 1997) [11] who found that the broilers fed 1.209% lysine with diet obtained maximum body weight. However, findings related to FCR found under present study are also supported by other studies [12-15] their results showed that the best feed conversion ratio obtained in broilers fed 12g/kg lysine level in diet. Under current study the carcass weight found markedly high ($P<0.05$) in broilers fed with lysine 12g/kg (1457.1±15.72g/bird) compared to that of broilers with level of 13 (1346.6±29.56g/bird), 14 (1301.3±30.00g/bird) and 10g/kg (1263.3±13.48g/bird). Similarly the dressing percent was achieved significantly more in broilers supplemented with lysine at level of 12g/kg (63.46±0.49%) followed by 13 (62.32±0.50%), 14 (61.47±0.56%) and 10g/kg (60.79±1.01%). Further in current study there was no significant difference found for relative liver, heart and gizzard weight in broilers fed with supplementation of various levels of lysine. The results so observed under current study are in line with the findings of other researchers

Table-1 Effect of lysine on growth performance of broilers

Variables	Groups of broilers fed with lysine				LSD (0.05)	SE±
	A (10g/kg)	B (12g/kg)	C (13 g/kg)	D (14 g/kg)		
Feed intake (g/bird)	4036.3 ±9.10[a]	3991.3 ±1.28[b]	4017.3 ±10.05[ab]	4018.9 ±11.71[ab]	29.399	12.74
Body weight (g/bird)	2078.4 ±14.89[b]	2296.0 ±15.14[a]	2161.1 ±51.54[ab]	2118.1 ±67.98[b]	143.34	62.161
FCR	1.94±0.02[a]	1.74±0.01[b]	1.86±0.04[a]	1.90±0.07[a]	0.1179	0.0511

Table-2 Effect of Lysine on carcass characteristics of broilers

Characteristics	Groups of broilers fed with lysine				LSD (0.05)	SE±
	A (10g/kg)	B (12g/kg)	C (13g/kg)	D (14 g/kg)		
Carcass weight (g/bird)	1263.3 ±13.48[b]	1457.1 ±15.72[a]	1346.6 ±29.56[b]	1301.3 ±30.00[b]	88.644	36.227
Dressing percent	60.79 ±1.01[c]	63.46 ±0.49[a]	62.32 ±0.50[ab]	61.47 ±0.56[bc]	1.2516	0.5115
Relative liver weight (%)	2.91±0.05[a]	3.08±0.12[a]	2.98±0.05[a]	2.91±0.04[a]	0.1936	0.0791
Relative heart weight (%)	0.45 ±0.04[a]	0.45 ±0.05[a]	0.44±0.05[a]	0.42±0.04[a]	0.1803	0.0737
Relative gizzard weight (%)	1.11±0.06[a]	1.06±0.04[a]	1.03±1.02[a]	1.04±0.01[a]	0.1460	0.0597

[16-18] they stated that such lysine level in diet increased carcass as well as breast yield in broilers. In addition results of present study are also supported by (Ahmed and Abbas 2014) [19] who reported that various levels of lysine in the feed did not affect weight percentage of gizzard and liver, and the results were also non-significant (P>0.05). This is because of the higher feed efficiency of diets with lysine, which allow a better transformation of amino acid intake into tissue synthesis and accretion. This is possibly related to a higher availability of amino acid to synthesize muscle. Thus feeds formulated by lysine level promoted a better conversion of amino acid into carcass and breast yield [9].

CONCLUSIONS

The results of study conclude that the broilers offered feed with level of lysine 12g/kg showed high live body weight as well as better feed efficiency. Further the carcass yield and/or dressing percent of broilers was found high at level of 12g/kg lysine in feed.

REFERENCES

[1] Rahimi R G, Hafezian M H and Saiyahzadeh H. 2005. The effect of intermittent lighting schedule on Broiler performance. International of Journal Poultry Science. 4: 396-398.

[2] Hurwitz S, Sklan D, Talpaz H and Plavnik I. 1998. The effect of dietary protein level on the lysine and arginine requirements of growing chickens. Poultry Science. 77: 689-696.

[3] D'Mello JPF. Responses of growing poultry to amino acids. In: D'Mello JPF, editor. Amino acids in animal nutrition. 2nd Ed. New York: CAB International; 2003. P.237-260.

[4] Barboza W A, Rostagno H S, Albino L F T and Rodrigues P B. 2000. Lysine levels for broiler chickens from 1 to 21 and 15 to 40 days of age. Brazilian Journal of Animal Science. 29: 1082-1090.

[5] Labadan M C, Hsu K N and Austuc R E. 2001. Lysine and arginine requirements of broilers chickens at two-to three-week intervals to eight weeks of age. Poultry Science. 80(5): 599-606.

[6] Tesseraud S. Peresson R, Lopes J and Chagneau A M. 1996. Dietary lysine deficiency greatly affects muscle and liver protein turnover in growing chickens. British Journal of Nutrition. 75: 853-865.

[7] Geraert P A and Mercier Y. 2010. Amino acids. Beyond the building blocks! Antony: ADISSEO France SAS.

[8] Fritts C A, Burnham D J and Waldroup P W. 2001. Relationship of dietary lysine level to the concentration

of all essential amino acids in broiler diets. Poultry Science 80: 1472–1479.

[9] Javad N and Kheiri F. 2011. Effect of different lysine levels on Arian broiler performances. Italian Journal of Animal Science. 10: 32.

[10] Costa F G P, Rostagno H S, Albino L F T, Gomes P C and Toledo R S. 2001. Niveis dietary lysine broiler in periods of 01 to 21 and 22 to 42 days. Journal of Animal Science. 30(5): 1490-1497.

[11] Vazquez M and Pesti G M. 1997. Estimation of lysine requirement of broiler chicks for maximum body gain and feed efficiency. The Journal of Applied Poultry Research. 6: 241-246.

[12] Cafe M B and P W Waldroup. 2006. Interactions between levels of methionine and lysine in broiler diets changed at typical industry intervals. International Journal of Poultry Sciences. 5: 1008-1015.

[13] Corzo A, Moran J E T and Hoehler D. 2002. Lysine need of heavy broiler males applying the ideal protein concept. Poultry Science. 81:1863-1868.

[14] Waldroup P W, Jiang Q and Fritts. 2005. Effects of glycine and threonine supplementation on performance of broiler chicks fed diets low in crude protein. International Journal of Poultry Science. 4: 250-257.

[15] Carlos T C F I, Marino C T I, Silva N V P, Barbosa L C G S I, Reis R N I I, Muramatsu K I I, Araujo C S I and Araujo L F I. 2014. Evaluation of different digestible lysine levels for male broilers during the period of 18 to 40 days of age. Brazilian Journal of Poultry Science. 16: 83-88.

[16] Gorman I and Balnave D. 1995. The effect of dietary lysine and methionine on the growth characteristics and breast meat yield of Australian broiler chickens. Australian Journal of Agricultural Research. 46: 1569-1577.

[17] Han Y and Baker H D. 1991. Digestive lysine requirement of male and female broiler chicks during the period three to six weeks post hatching. Poultry Science. 73: 1739-1745.

[18] Kidd M T, Kerr B J, Halpin K M and McWard G W. 1998. Lysine levels in starter and grower finisher diets affect broiler performance and carcass traits. Journal of Applied Poultry Research. 7: 351-358.

[19] Ahmed M E and Abbas T E. 2014. Growth performance and carcass characteristics of broilers fed different levels of dietary lysine. International Journal of Applied Poultry Research. 3(1): 1-3.