
EFFECT OF GRADED LEVELS OF DIETARY LYSINE SUPPLEMENTATION ON CARCASS YIELD OF BROILER FINISHER CHICKENS

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ABSTRACT

This study was conducted to determine the effects of graded levels of dietary lysine supplement on carcass yield of broiler finishers. A total of 150-day old unsexed broiler chickens were brooded for 4 weeks on commercial broiler starter feeds after which they were divided into 5 groups of 30 birds. Each group was further divided into 3 replicates of 10 birds in a Completely Randomized Design. The groups of birds were allotted to 5 diets containing 0.125, 0.100, 0.075, 0.050, and 0.025 % lysine supplement that were fed to the birds for 4 weeks (28 days) duration along with clean drinking water ad libitum. At the end of the 4 weeks feeding of the experimental diets, two birds having their weights closest to the average of each replicate (i.e. 6 per treatment) were selected, slaughtered, scalded, plucked, eviscerated and dissected. The dressed carcass, various carcass components and internal organs were then weighed and expressed as percentage of live weights for each treatment and replicate. Statistical analyses of the results show that there were no significant differences ($P > 0.05$) in dressing percentages and proportions of carcass components to live weights between treatments. It was concluded that broiler finisher chickens can be fed diets with lysine supplements as low as 0.025% (75% less than recommended level) without any adverse effects on growth performance and carcass yield.

Key words: Carcass yield, lysine supplement, broilers

INTRODUCTION

Broiler chickens are fast growing birds that have been selected basically for meat (Mandal *et al.*, 2004). The demand of nutrients for the fast growth are obtained from the various feed ingredients that make up the diet. Therefore, the need to support their fast rate of growth and development must be ensured by provision of the nutrients in adequate amounts and proportions. Though, all nutrients are needed by animals for their various metabolic processes, the need for protein in higher proportions must be met in order to ensure optimum growth and performance of the young of most species and certain breeds of animals such as poultry meat birds; especially growing broiler chickens and turkey and this differs with the different phases of growth (NRC, 1994; Aduku, 2004; MacDonald *et al.*, 2011).

Feeding constitutes over 70 % of the variable cost of raising poultry (Ibrahim and Balarabe, 2023). Protein sources such as fish meal, oil seed meals and essential amino acid supplements such as lysine and methionine are the costliest of all ingredients used in making poultry feed (Aduku, 2004; Olomu, 2011) with the latter 2 being the most expensive per unit weight. Therefore, these are the principal materials the nutritionist or feed maker should consider and review if he or she wants to reduce the overall cost of feed production. Most protein sources contain the essential amino acids, but not in amounts adequate enough to meet the bird's requirement for them and therefore, must be enhanced with the synthetic amino acid supplements such as lysine and methionine (Dozier *et al.*, 2018). However, because of their cost, it has become important to study if the recommended quantities of such supplements can be reduced or even completely withdrawn from their diets provided the other ingredients used can provide the needed amino acids to support ideal performance. This study was therefore, conducted to determine if graded levels of dietary lysine supplements will affect carcass processing traits of finishing broilers.

MATERIALS AND METHODS

Experimental site

The experiment was carried out at the poultry unit of the Livestock Investigation Division, NVRI, Vom. Vom is situated in Vwango district, Jos South Local Government Area of Plateau State Nigeria.

Total area land of 510km². It has an annual rainfall of 131.75cm and a temperature range 12°C - 33°C (54F – 91F) (N V R I, 2006)

Experimental design, diets and management of birds

One hundred and fifty (150) 4 weeks old unsexed broiler finisher chickens initially housed and brooded together on commercial broiler starter diet were divided into 5 groups which were randomly allotted to 5 dietary treatments of 30 birds. Each treatment was further be divided into three replicates of 10 birds in Completely Randomized Design and given the experimental diets (21 % Crude Protein and approximately 2,800 Kcal Metabolizable energy per kg of feed) containing dietary lysine supplement levels of 0.125, 0.100 (control), 0.075, 0.050 and 0.025 %, (Table 1) for 4 weeks (28 days). Initial weights, daily feed intake and subsequent weekly weights were taken and recorded during the experimental period. The birds had free access to feed and water and all necessary vaccinations and preventive medications were given to the birds.

Experimental diets

Table 1: Ingredient composition of broiler experimental diets

Ingredients (%)	Dietary levels of lysine supplement (%)				
	0.125	0.100	0.075	0.050	0.025
Maize	49.250	49.150	49.160	49.200	49.230
Wheat offal	7.385	7.370	7.370	7.380	7.380
Rice bran	4.930	4.920	4.920	4.920	4.930
Soya bean cake	34.310	34.360	34.360	34.390	34.410
Fish meal	1.000	1.000	1.000	1.000	1.000
Bone meal	1.500	1.500	1.500	1.500	1.500
Lime stone	1.000	1.000	1.000	1.000	1.000
Common salt	0.250	0.250	0.250	0.250	0.250
Premix (BF)	0.250	0.250	0.250	0.250	0.250
Lysine	0.125	0.100	0.075	0.050	0.025
Methionine	0.100	0.100	0.100	0.100	0.100
Total	100.000	100.000	100.000	100.000	100.000
Calculated nutrient composition					
M E (kcal/kg)	2780.761	2778.072	2778.410	2780.691	2782.403
Crude protein (%)	21.042	21.051	21.051	21.069	21.082
Crude fibre (%)	4.790	4.791	4.793	4.793	4.796
Ether extract (%)	4.172	4.165	4.164	4.168	4.169
Calcium (%)	0.934	0.933	0.938	0.938	0.938
Phosphorus (%)	0.750	0.750	0.749	0.750	0.750
Lysine (%)	1.314	1.294	1.265	1.242	1.217
Methionine (%)	0.461	0.461	0.461	0.461	0.461

Key: BF = Broiler Finisher M E = Metabolizable Energy

Determination of carcass yield and data analyses

The birds were fasted for 18 hours and their final weights were recorded, after which two birds having their weights closest to the average of each replicate for all the 5 treatments were selected, slaughtered, bled, scalded and plucked. Heads and shanks of each of the birds were severed (cut off), the carcass eviscerated and the dressed carcass weighed. The different meat yielding parts of the carcass (breast, back, wings, thighs, drumsticks), abdominal fat and internal organs (heart, liver, gizzard and spleen) were dissected at specific points as described by Hann and Spindler (2002) and weighed using a sensitive electronic scale. The weights of the various carcass components were then expressed as percentages of their respective live weights (Table 2). All data obtained were subjected to One-way Analysis of Variance using SPSS version 25 software package. Where applicable, significant differences between means were determined using the Duncan's option of the same package.

RESULTS AND DISCUSSION

There were significant differences ($P < 0.05$) in the parameters measured in the treatments for dressing percentages, proportions of breast, drumsticks, heart and gizzard. Birds fed diets containing 0.050 and

0.075 % lysine supplements recorded significantly higher ($P<0.05$) dressing percentages compared to the other treatments. The pattern is not clear since those that were fed levels of lysine supplement lower and higher than these two treatments had significantly less dressing percentages. Therefore, the differences cannot be attributed to levels of lysine in the diets.

Table 2: Carcass yield of broiler finishers fed diets containing graded levels of dietary lysine supplement

Parameters	Levels of dietary lysine supplement inclusion (%)					S E M
	0.125	0.100	0.075	0.050	0.025	
Live weights (g)	2300.00	2166.67	2233.33	2146.00	2216.67	50.84 ^{NS}
Carcass components expressed in % live weight						
Dressing percentages	73.68 ^b	75.05 ^b	82.21 ^a	85.01 ^a	77.01 ^b	1.53 [*]
Necks	3.75	3.68	4.03	4.23	4.64	0.29 ^{NS}
Backs	10.23	10.53	11.15	10.52	11.63	0.30 ^{NS}
Breasts	27.54 ^a	25.79 ^{ab}	23.66 ^b	26.49 ^a	28.51 ^a	0.76 [*]
Wings	8.30	7.85	8.34	8.25	8.71	0.28 ^{NS}
Thighs	11.08	10.14	11.51	10.40	11.35	0.44 ^{NS}
Drumsticks	9.95 ^{ab}	9.30 ^b	10.53 ^{ab}	10.90 ^a	11.03 ^a	0.32 [*]
Abdominal fat	0.48	0.26	0.40	0.44	0.22	0.10 ^{NS}
Internal organs (giblets)						
Heart	0.49 ^{ab}	0.49 ^{ab}	0.46 ^b	0.53 ^a	0.49 ^{ab}	0.02 [*]
Liver	2.27	2.13	2.21	2.10	2.05	0.06 ^{NS}
Gizzard	2.19 ^a	2.19 ^a	2.02 ^b	2.20 ^a	1.87 ^b	0.07 [*]
Spleen	0.13	0.12	0.19	0.11	0.14	0.02 ^{NS}

^{a, b} Means in the same row with different superscripts are significantly different ($P<0.05$)

S E M = Standard Error of Means,

N S = Not significant ($P>0.05$)

Rather, it may be as a result of individual differences among the birds. Breast proportions were least ($P<0.05$) in birds fed diets containing 0.075 % lysine and highest in those fed diets containing 0.025 % lysine supplement. Drumstick proportions were highest in birds fed diets with 0.025 % and least in birds fed the control diets (0.100 % lysine supplement). Similar, but not exactly the same patterns were observed with the heart and gizzards where broiler chickens fed diets containing 0.050 % lysine supplement recorded higher proportions of these components compared to those of birds fed diets with 0.075 % lysine supplement. Thus, the differences are not necessarily as a result of levels of lysine supplement which agrees with the report of Holsheimer and Ruesink (2018) that at later stages of growth, broilers were not affected by dietary lysine levels but however not in agreement with statement of Dozier *et al* (2018) that high dietary lysine levels gave higher carcass weights in broiler chickens compared to those fed lower dietary lysine levels.

CONCLUSION

Based on the results of this study, it is concluded that levels of lysine supplement as low as 0.025 % of the diet does not have any significant effect on carcass yield of broiler finisher chickens provided other ingredients used are of high-grade quality

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