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Production performance of broilers by dietary supplementation of valine

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Abstract
An experiment was conducted by using two hundred commercial (Vencobb), sexed, day-old chicks for a period of six weeks to study the dietary supplementation of valine with respect to production performance of broilers. These chicks were randomly grouped into five treatments with four replicates of ten chicks each and fed with basal diet as T_1 (Control), T_2 (Basal diet + 0.04 per cent valine), T_3 (Basal diet + 0.08 per cent valine), T_4 (Basal diet + 0.12 per cent valine) and T_5 (Basal diet + 0.16 per cent valine). The experimental feed was formulated according to the Vencobb standards by supplementing graded levels of valine for different treatment groups. The supplementation of valine in broiler diets up to 0.16 per cent did not show significant improvement in sixth week body weight. The supplementation of valine in the diet of broilers had significant differences in (P<0.01) feed consumption per bird per day, cumulative feed consumption (P<0.05) and feed conversion ratio (P<0.01) of broilers at sixth weeks of age. The dietary treatments had no significant effect on livability. Based upon this study, it is concluded that supplementation of valine in basal diet at the level of 0.04 per cent (T_2 group) did not affect the production performance of broilers.

Keywords: Commercial broiler ration, livability, production performance, valine

Introduction
Amino acids are important components of all poultry diets. They are in constant turnover in the body and without proper dietary intake; deficiencies can cause detrimental effects on growth, immunity and production. Most of the broiler feed formulation with maize and soya are limited in lysine and methionine. However, recent studies proved that threonine and valine are also important in case of fast growing broilers. The inclusion of L-valine in all vegetable maize soybean meal feeds may further reduce the production cost without altering the performance of broilers since valine has been recognized as the fourth limiting amino acid in this type of diet (Corzo *et al.* 2007) [5]. The availability of L-valine offers a new opportunity to formulate more efficient diet through the optimization of the ideal amino acid profile thereby reduces the dietary crude protein content and as consequence to reduce nitrogen excretion from the birds to the environment. Hence, this research programme has been designed to study the production performance of broilers by including graded levels of valine in the ration.

Materials and Methods
The biological trial was conducted by using two hundred commercial (Vencobb), sexed, day-old broiler chicks belonging to single hatch. These chicks were wing banded, weighed and randomly grouped into five treatments with four replicates of ten chicks each and fed with basal diet as T_1 (Control), T_2 (Basal diet + 0.04 per cent valine), T_3 (Basal diet + 0.08 per cent valine), T_4 (Basal diet + 0.12 per cent valine) and T_5 (Basal diet + 0.16 per cent valine). The experimental feed was formulated according to the Vencobb standards by supplementing graded levels of valine for different treatment groups. All chicks were reared up to 6 weeks in deep litter system in open sided broiler house under standard managemental conditions throughout the experimental period. During this experimental period, data on body weight and feed consumption were recorded and mortality was recorded at occurrence. From the above data, body weight gain, feed conversion ratio and livability were calculated. The data collected on body weight, cumulative feed consumption and livability at sixth week were subjected to statistical analysis as per the methods suggested by Snedecor and Cochran (1989) [12]. Angular transformation was applied to percentages wherever needed before carrying out statistical analysis.

Results and Discussion

The mean (± S.E.) production performance of broilers at sixth week of age as influenced by dietary supplementation of valine are presented in Table 1.

The body weight and body weight gain at sixth week of age did not differ significantly among treatment groups. The highest sixth week body weight gain was recorded in 0.04 per cent dietary valine supplemented (T_2) group (2316.8 g) followed by T_3 (2262.6 g), T_4 (2252.1 g), T_5 (2198.2 g) groups and lowest in T_1 (2141.6 g) group. The results in this study concur with the finding of Baker *et al.* (2002) [1] who stated that weight gain responded quadratically (P<0.01) to increasing doses of digestible valine. Similar observations were made by Corzo *et al.* (2011) [7], Berres *et al.* (2010b) [3] who recorded significantly better body weight gain due to dietary valine supplementation. However, these finding do not agree with those of Gyurcso *et al.* (2011) [9] who stated that crystalline L-valine supplementation does not affect significantly the weight gain of the birds during starter phase.

Significantly (P<0.01) higher feed consumption per bird per day at sixth week was recorded in 0.08 per cent dietary valine supplemented (T_3) group (155.2 g) group, which differ from T_1 (142.6 g), T_2 (136.6 g), T_4 (134.3 g) and T_5 (130.7 g) groups. There were no significant difference among T_1, T_2, T_4 and T_5 groups. The mean cumulative feed consumption was significantly (P<0.05) higher in T_3 (3852.1 g) group which did not differ from T_2 (3692.4 g) group at sixth week. Similarly, data on mean cumulative feed conversion ratio of broilers differ significantly (P<0.01) between treatment groups at sixth week of age by dietary supplementation of valine. The T_4 group (0.12 per cent dietary valine supplementation) recorded significantly (1.67) better cumulative feed conversion ratio at sixth week which did not differ from T_2 (1.68) and T_5 (1.70) groups. These results are in agreement with the earlier reports of Mack *et al.* (1999), Corzo *et al.* (2004) [4], Jianlin *et al.* (2004) [10], Thornton *et al.* (2006) [14] and Tavernari *et al.* (2013) [13] who concluded that dietary valine supplementation achieved significantly better feed conversion ratio at sixth week. However, Gyurcso *et al.* (2011) [9] observed a non-significant effect on feed intake and feed conversion ratio of broilers fed with different levels of valine in the diet.

Livability was 100 per cent in all treatment groups up to three weeks of age except T_5 group. This result is in accordance with the findings of Berres *et al.* (2010b) [3], Corzo *et al.* (2010) [6] and Dozier *et al.* (2011) who reported that minimum mortality was noticed due to various levels of supplementation of valine in the diet. Contrary to this finding recorded, Berres *et al.* (2010a) [2] who stated live broiler performance was more sensitive to valine supplementation in diet and dietary treatments did not influence the incidence of mortality.

Table 1: Mean (± S.E.) Production performance of broilers at sixth weeks of age as influenced by dietary supplementation of valine

Treatment groups	Body weight at sixth week (g)	Body weight gain at sixth week (g)	Feed consumption per bird per day at sixth week (g)	Cumulative feed consumption per bird (g)	Cumulative feed conversion ratio	Livability (%)
T_1- Basal diet	2185.6 ± 29.2	2141.6 ± 29.9	142.6^{B}± 2.2	3663.5^{b} ± 70.4	1.93^{B} ± 0.01	100.00 ±0.00
T_2- Basal diet+ 0.04 per cent valine	2360.5 ± 49.1	2316.8 ± 49.1	136.6^{B} ± 3.0	3692.4^{ab} ±37.1	1.68^{A} ± 0.02	100.00 ±0.00
T_3 - Basal diet+ 0.08 per cent valine	2305.5 ± 50.0	2262.6 ± 49.8	155.2^{A} ± 5.2	3852.1^{a} ± 23.8	1.92^{B} ± 0.02	100.00 ±0.00
T_4 - Basal diet+ 0.12 per cent valine	2295.6 ± 42.3	2252.1 ± 42.3	134.3^{B}± 5.3	3546.8^{b} ± 81.6	1.67^{A} ± 0.04	100.00 ±0.00
T_5 - Basal diet+ 0.16 per cent valine	2299.2 ± 60.6	2198.2 ± 81.5	130.7^{B}± 3.9	3548.4^{b} ± 59.6	1.70^{A} ± 0.05	97.50 ± 2.50

$^{A \text{ and } B}$ Means within a column with no common superscript differ significantly (P<0.01)

$^{a \text{ and } b}$ Means within a column with no common superscript differ significantly (P<0.05)

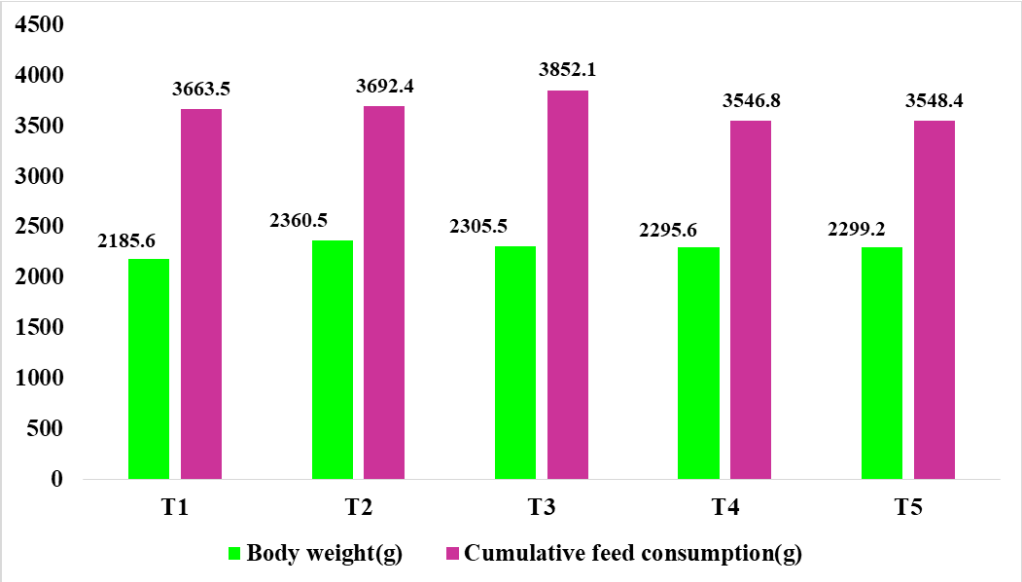

Fig 1: Body Weight and Cumulative Feed Consumption of broilers at sixth weeks of age as influenced by dietary supplementation of valine

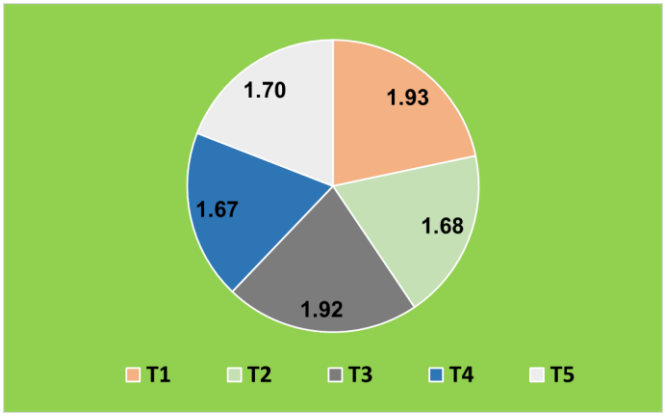

Fig 2: Cumulative Feed Conversion Ratio of broilers at sixth weeks of age as influenced by dietary supplementation of valine

Conclusions

The supplementation of valine in broiler diets up to 0.16 per cent did not show significant improvement in sixth week body weight. However, significantly better feed conversion ratio (P<0.01) was recorded in 0.04, 0.12 and 0.16 per cent valine supplemented groups when compared to 0.08 per cent valine supplemented and control group. Based upon this study, it is concluded that supplementation of valine in basal diet at the level of 0.04 per cent (T_2 group) did not affect the body weight of broilers.

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