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EVALUATING THE EFFICACY OF METHIONINE SUPPLEMENTATION OPTIONS IN COMMERCIAL BROILER CHICKENS

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INTRODUCTION

Methionine is the first limiting essential amino acid in maize and soybean-based diets (Fancher and Jensen, 1989) for poultry. Methionine plays a significant role in energy production and protein synthesis. It enhances production and size of the eggs, overall growth of the bird, feed conversion ratio (FCR), and livability of broilers and layers (Aerni *et al*., 2005; Binder, 2003). Chickens are unable to synthesize methionine in amounts necessary to sustain life and growth. Usually, large amounts of vegetable protein supplements are used in feeds, with low levels of animal and fish as protein source (North and Bell, 1990). Hence, it is necessary to add methionine to meet the bird's requirement, whether synthetic or herbal source. Synthetic methionine is metabolized into highly toxic compounds such as methylpropionate, thereby, adversely affecting the performance of the birds (Bender, 1975). Keeping the above facts in mind, the present feeding trial was conducted to evaluate the efficacy of poly-ingredient formulation, N-Methionine (manufactured by Natural Herbs and formulations, Roorkee, India) as an alternative to synthetic methionine.

MATERIALS AND METHODS

A total of 3000 one-day-old unsexed broiler chicks of VenCobb strain were randomly divided into three equal groups of 1000 each: one control (T_0) and two treatment groups (T_1 and T_2). The birds were fed with broiler starter and broiler finisher (maize and soybean-based diet) in mash form. Standard managemental and nutritional practices were followed except for the treatment given in deep litter rearing system. In the control group, basal diet without methionine supplementation; in T_1 group, basal diet supplemented with DL-methionine at 1 kg/tonne of feed; and in T_2 group, basal diet supplemented with N-Methionine at 1 kg/tonne of feed, were fed to chicks for 42 days. The trial was conducted at Karuna Poultry Farm, Devanahalli, Bangalore rural district, India.

imalaya Drug Company, Makali, Bangalore, India. HiHHHh

Nutritional analysis of diets was done in compliance to AOAC (1995) standards. Chicks were vaccinated against Ranikhet and infectious bursal diseases on the 7th and 14th days of their lives, respectively. Individual body weight and feed consumption of broilers from all the three groups were recorded on days 0, 7, 14, 21, 28, 35, and 42 of their lives. Mortality in each group was recorded on a daily basis. At the end of the study, "Production Efficiency Factor" (PEF) was calculated to compare the live-bird performance of the flocks. Factors such as live weight, age, livability, and feed conversion efficiency are taken into consideration for PEF, which gives a reasonable idea of the overall technical efficiency. PEF can be calculated from the following equation:

$$PEF = \frac{\text{Livability \% x Mass (kg)}}{\text{FCR x Age (in days)}} \text{ x } 100$$

Statistical analysis of the data was done by "one-way ANOVA" followed by "Bonferroni's Multiple Comparison Test" (GraphPad Prism software, San Diego, California, USA).

RESULTS AND DISCUSSION

Proximate analysis of the basal diet yielded 23.5% and 20.35% crude protein with a metabolizable energy content of ration 2800.5 and 2906.2 kcal/kg for broiler starter and finisher, respectively. At the end of the 42nd day, the average cumulative body weight (g) of chicks in T_0, T_1, and T_2 groups were 1879, 2089, and 2222 g, respectively (Table 1 and Figure 1). The chicks in T_2 group showed a significant (p<0.01) gain in body weight (increase of 343 g) as compared to the chicks in T_0 group

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and numerically higher weight gain (increase of 133 g) as compared to the chicks in T_1 group.

Feed consumption of the chicks was recorded at weekly intervals throughout the period of the trial. The total average feed consumption per bird ranged from 3.795 to 4.262 kg during the experimental period of 42 days. For 0 to 6 weeks of age, the average feed consumption per bird per day (g) was 90.5, 95.23, and 103.57 g for T_0, T_1, and T_2, respectively. The cumulative FCR values were 2.02, 1.91, and 1.95 for T_0, T_1, and T_2, respectively (Figure 2), without any significant differences between the three groups. The results of the trial showed that the chicks in T_2 group consumed more feed and gained more body weight as compared to the chicks in T_1 group.

According to different studies (Ozturkan *et al*., 1993; Simone *et al*., 1995), addition of methionine to the diet of broiler chicks improves their performance in terms of body weight gain and feed conversion efficiency.

Livability of the chicks was 99%, 100%, and 100% (Figure 3) for T_0, T_1, and T_2 groups, respectively without any significant differences between the three groups. Results of the trial showed that the N-Methionine supplement in T_2 group had no detrimental effects on the livability of chicks.

PEF facilitates the comparison of performance within and among the groups and can also be used to assess environmental, climatic, and managemental variables. PEF values of 219.26, 260.41, and 271.06 were calculated for T_0, T_1, and T_2 groups, respectively (Figure 4). A flock with acceptable growth and livability parameters should attain 200 to 225 PEF values.

The results of the trial are in accordance with the findings of Chattopadhyay *et al.,* (2006) and Kalbande *et al.,* (2009). Both the studies showed that the herbal source of methionine can replace DL-methionine in the diet of commercial broiler chicks. The beneficial effects of N-Methionine could be due to the individual or synergistic action of the ingredients in the product formulation.

CONCLUSION

The chicks fed on basal diet supplemented with N-Methionine showed a significant gain in body weight and lower FCR values as compared to the chicks fed only on basal diet. Hence, the study concludes that 1 kg N-Methionine per tonne of feed can efficiently replace 1 kg synthetic DL-methionine per tonne of feed to improve commercial broiler flock performance (growth, FCR, and livability parameters).

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Table 1: Average Body Weight Gain (g) of Chicks at Weekly Intervals			
Age	Average Body Weight Gain (g)		
	T_0	T_1	T_2
1st week	127.5	132.0	151.0
2nd weeks	321.4	368.0	395.0
3rd weeks	692.9	700.0	740.0
4th weeks	1139.0	1219.0	1251.0
5th weeks	1445.7	1610.0	1680.0
6th weeks	1879.0	2089.0	2222.0[a]
[a]$p<0.01$ as compared to T_0			

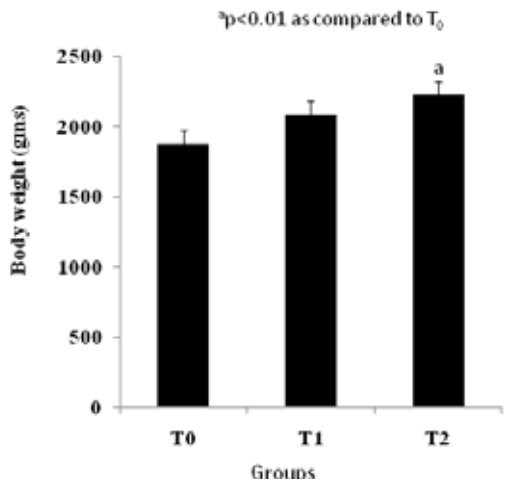

Figure 1. Average weekly body weight (g)

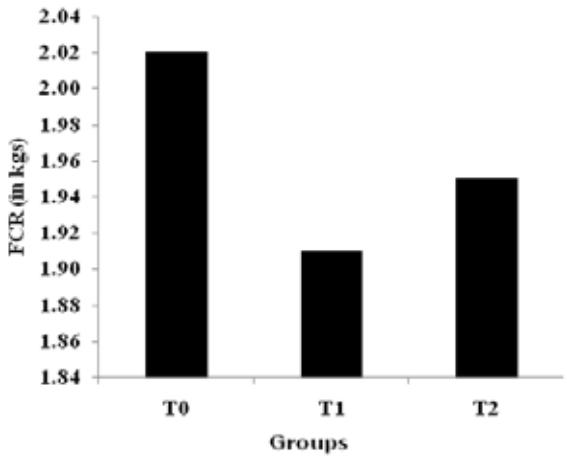

Figure 2. Feed Conversion Efficiency

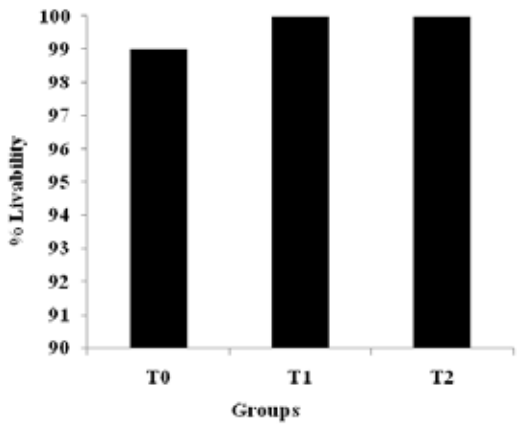

Figure 3. Livability %

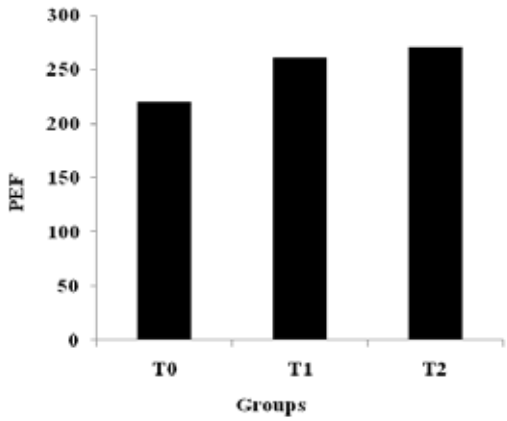

Figure 4. Production Efficiency Factor