COMPARATIVE EFFICACY OF HERBAL-METHIONINE AND DL-METHIONINE ON PERFORMANCE OF COMMERCIAL BROILERS

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ABSTRACT

The experiment was conducted on 160 commercial broiler birds from day-old age to 6 weeks of age to study the comparative efficacy of ration containing different concentration of herbal-methionine and DL-methionine on their performance in terms of weekly body weight gain, feed consumption, feed conversion ratio, livability and economics. A significant improvement in overall growth and performance was observed in birds supplemented with 50% herbal methionine and 50% DL-methionine as compared to 100% DL-methionine, 100% herbal methionine and 125% herbal methionine. The study also demonstrated that feeding with combination of 50% DL-methionine and 50% herbal methionine is more economical as compared to feeding of 100% DL-methionine, 100% herbal methionine and 125% herbal methionine in commercial broilers.

KEYWORDS : DL-methionine, Herbal methionine, Broilers, Performance.

INTRODUCTION

Poultry is one of the fastest growing segments among the component of agricultural sector in India. Feed constitutes near about 60-70% total cost of broiler production (Swain and Johri, 1999). Methionine is needed for better health and production in poultry. Methionine may act as lipotropic agent through its role as an amino acid in balancing protein and it is essential for various vital functions in body such as regulation of cell division, methyl donor, reduction in reactive oxygen species, energy production, overall growth performance, improvement of feed conversion ratio and livability in broilers (Kalbande *et al*., 2009). Synthetic methionine is metabolized into highly toxic compounds such as methyl propionate, thereby, adversely affecting the performance of the birds (Bender, 1975), hence herbal methionine is an alternative source to supply limiting amino acid without affecting performance of the birds. The present research work was therefore undertaken to study the effect of supplementation of herbal methionine, DL-methionine and their combination on broiler performance.

MATERIALS AND METHODS

The study was conducted at Poultry Complex, College of Veterinary Science and Animal Husbandry, Anand Agricultural University, Anand, Gujarat. The research work was carried out for six weeks duration on 160 day-old commercial broiler chicks. All the managemental practices required for optimum brooding and rearing of birds were followed. Vaccines administered were Ranikhet disease of F1 strain at the age of 7^{th} day by I/O or I/N route and Infectious bursal disease of Intermediate strain at the age of 14^{th} day by the route of drinking water. One hundred sixty (160) day-old commercial broiler chicks were distributed randomly into four treatment rations, i.e. T_1 ration containing 100% DL-methionine (Control, 135 & 90 g DL methionine/100 kg broiler starter and finisher ration, resp.), T_2 ration containing 100% herbal methionine (135 & 90 g herbal methionine

/100 kg starter and finisher ration), T_3 ration containing 50% DL-methionine plus 50% herbal methionine (67.5 & 45 g DL methionine and 67.5 & 45 g herbal methionine /100 kg starter and finisher ration) and T_4 ration containing 125% herbal methionine (169 & 113 g herbal methionine /100 kg starter and finisher ration). The herbal methionine was procured from Himalaya Drugs, India and DL-methionine from Evonik Industries, Belgium. The broiler starter (0-4 weeks) and broiler finisher (5-6 weeks) feeds were prepared as per the guidelines of BIS (1992). Each treatment of 6 weeks duration had 4 replicates of 10 birds each. The parameters evaluated were weekly body weight, weekly body weight gain, weekly feed consumption, and total feed consumption up to 4th week of age $TFC_{(0-4)}$ and up to 6th week of age $TFC_{(0-6)}$. Further the feed conversion ratio (FCR) at 0-4 and 0-6 weeks, livability and economics as return over feed cost (ROFC) and European performance efficiency index (EPEI) were calculated. The data was analyzed using Completely Randomized Design as per Snedecor and Cochran (1995). Means of replicate under each treatment was considered for analysis.

RESULTS AND DISCUSSION

Body weight and Body weight gain: The least square means and standard error of body weight and body weight gain in various dietary treatment groups are given in Table 1 & 2.

Table 1. Weekly mean body weights (g) at different ages of broilers fed with different rations

Trait	Treatment rations				CD at 5%
	T_1	T_2	T_3	T_4	
BW_0	48.42±0.14	48.33±0.05	48.35±0.18	48.41±0.05	NS
BW_1	131.18^{a}±2.65	140.48^{ab}±2.98	154.06^{c}±6.05	145.20^{bc}±4.61	13.24
BW_2	265.16±6.20	262.31±9.65	292.03±12.43	270.80±14.65	NS
BW_3	562.05^{b}±6.89	515.91^{a}±15.13	584.47^{b}±8.37	520.60^{a}±13.96	35.86
BW_4	1000.40^{bc}±11.92	886.18^{a}±18.00	1049.87^{c}±24.33	956.00^{b}±25.81	64.01
BW_5	1473.57±28.69	1326.52±18.97	1528.11±28.86	1411.05±28.02	NS
BW_6	1962.80^{b}±31.29	1797.92^{a}±27.23	1993.28^{b}±27.70	1896.65^{b}±43.51	102.04

BW= body weight, CD=critical difference, NS=non-significant.
Means bearing uncommon superscripts within the row differ significantly between treatments (P<0.05).

Table 2. Mean weekly body weight gain (g) at different ages and cumulative weight gain (g) of broilers fed with different treatment rations

Traits	Treatment				CD at 5%
	T_1	T_2	T_3	T_4	
BWG_{0-1}	82.76^{a}±2.70	92.10^{ab}±2.97	105.70^{c}±5.93	96.78^{bc}±4.59	13.12
BWG_{1-2}	133.96±4.62	121.82±6.75	137.95±6.60	125.60±10.10	NS
BWG_{2-3}	296.88^{b}±8.15	253.60^{a}±7.61	292.44^{b}±9.92	249.80^{a}±3.44	23.60
BWG_{3-4}	438.35^{b}±10.40	370.27^{a}±9.65	465.39^{b}±18.43	435.40^{b}±12.68	62.21
BWG_{4-5}	473.17±21.74	440.34±9.64	478.24±12.23	455.05±18.17	NS
BWG_{5-6}	489.22±5.21	479.09±11.70	465.17±25.81	485.60±23.55	NS
BWG_{0-4}	951.97^{bc}±11.86	837.84^{a}±17.96	1001.43^{c}±24.32	907.58^{b}±25.81	63.93
BWG_{4-6}	962.40±25.23	911.43±11.06	943.14±22.61	940.65±32.74	NS
BWG_{0-6}	1914.37^{b}±31.30	1749.28^{a}±27.21	1944.92^{b}±27.81	1848.23^{ab}±43.52	102.06

BWG= body weight gain, CD=critical difference, NS=non-significant.
Means bearing uncommon superscripts within the row differ significantly between treatments (P<0.05).

The mean body weight of day-old chicks (BW_0) had no significant differences among various experimental rations, while the body weight at subsequent weeks (BW_1, BW_2, BW_3, BW_4 and BW_6) differed significantly ($P<0.05$) with each other. At the end of 6th week the body weight of T_3 ration was higher than other treatment rations (Table 1). The body weight gain of birds supplemented with T_3 and T_1 ration was significantly ($P<0.05$) higher as compared to birds fed with T_2 ration. The body weight gain of birds fed with T_4 ration differed non-significantly with T_1, T_2 and T_3 rations. Body weight gain was apparently higher in birds fed with T_3 ration as compared to birds fed with T_1, T_2 and T_4 rations (Table 2). In present study, the significantly higher body weights and body weight gains in T_3 ration (combination of herbal and DL-methionine) clearly indicated the beneficial effects of combination of herbal and DL-methionine in improving the nutrient utilization required for growth of broilers. These results are in close agreement with those of Chattopadhyay *et al*. (2006), Halder and Roy (2007), Kalbande *et al*. (2009) and Narayanswamy and Bhagwat (2010), who found higher body weight and body weight gain in birds supplemented with herbal methionine as compared to control birds. Contrary to this, Yuan *et al*. (2012) observed that the birds fed with synthetic methionine or DL-methionine group performed significantly better than other treatment groups.

Feed Consumption and Feed Conversion Ratio: The weekly mean feed consumption of the birds fed with T_1 and T_3 rations was significantly ($P<0.05$) higher than the birds fed with T_2 and T_4 rations (Table 3).

Table 3. Weekly mean feed consumption at different ages (kg/bird/week) of broilers fed with different treatment rations

Trait	Treatment				CD at 5%
	T_1	T_2	T_3	T_4	
FC_1	0.141±0.001	0.134±0.002	0.139±0.001	0.138±0.001	NS
FC_2	0.316^{ab}±0.002	0.305^{a}±0.004	0.327^{b}±0.003	0.310^{a}±0.005	0.013
FC_3	0.475^{bc}±0.005	0.446^{a}±0.008	0.495^{c}±0.006	0.456^{ab}±0.007	0.022
FC_4	0.933^{c}±0.008	0.691^{a}±0.020	0.808^{b}±0.019	0.732^{a}±0.017	0.053
FC_5	1.070±0.030	0.997±0.021	1.074±0.016	1.036±0.016	NS
FC_6	0.949±0.027	0.954±0.031	0.995±0.015	0.960±0.041	NS
TFC_{0-4}	1.865^{c}±0.010	1.576^{a}±0.028	1.768^{b}±0.021	1.635^{a}±0.022	0.069
TFC_{5-6}	2.018±0.055	1.951±0.046	2.069±0.006	1.996±0.045	NS
TFC_{0-6}	3.883^{b}±0.056	3.526^{a}±0.072	3.837^{b}±0.022	3.630^{a}±0.063	0.176

FC= feed consumption, TFC= total feed consumption, CD=critical difference, NS=non-significant.
Means bearing uncommon superscripts within the row differ significantly between treatments ($P<0.05$).

The mean FCR of the birds with the combination of herbal methionine (50%) and DL-methionine (50%) was non-significantly lower than the birds fed with control ration (100% DL-methionine) (Table 4). Halder and Roy (2007) and Salome *et al*. (2010) observed that birds fed with DL-methionine supplemented diet showed significantly higher feed intake as compared to control and herbal methionine supplemented groups. Kumari *et al*. (2012) found non-significant difference in feed intake up to 6th week of age among DL-methionine supplemented group and DL-methionine + herbal methionine supplemented groups. The present findings on FCR, however, differed from those of Chattopadhyay *et al*. (2006), who observed significantly improved ($P<0.01$) FCR with supplementation of herbal methionine than control group. Halder and Roy (2007) reported improved feed conversion ratio in herbal and DL-methionine supplemented group as compared to control. Kalbande *et al*. (2009) and Yuan *et al*. (2012), however, reported significantly better FCR in DL-methionine supplemented group as compared to herbal methionine group.

Table 4. FCR at different ages of broilers fed with different treatment rations

Trait	Treatment				CD at 5%
	T_1	T_2	T_3	T_4	
FCR_{0-1}	1.706^{b}±0.04	1.460^{a}±0.06	1.330^{a}±0.09	1.435^{a}±0.05	0.20
FCR_{1-2}	2.366±0.07	2.523±0.12	2.380±0.13	2.508±0.19	NS
FCR_{2-3}	1.603±0.05	1.762±0.07	1.697±0.08	1.824±0.03	NS
FCR_{3-4}	2.130^{c}±0.03	1.886^{b}±0.06	1.736^{ab}±0.03	1.684^{a}±0.07	0.16
FCR_{4-5}	2.267±0.06	2.269±0.10	2.248±0.07	2.284±0.07	NS
FCR_{5-6}	1.939±0.04	2.023±0.02	2.155±0.11	1.983±0.08	NS
FCR_{0-4}	1.959^{c}±0.02	1.882^{bc}±0.04	1.766^{a}±0.02	1.804^{ab}±0.04	0.11
FCR_{4-6}	2.097±0.01	2.140±0.06	2.194±0.06	2.127±0.07	NS
FCR_{0-6}	2.028±0.01	2.014±0.04	1.970±0.03	1.966±0.04	NS

FCR= feed conversion ratio, CD=critical difference, NS=non-significant.
Means bearing uncommon superscripts within the row differ significantly between treatments (P<0.05).

Livability: Under the standard managemental practices of rearing, the livability in the birds fed with T_1, T_2, T_3 and T_4 ration was 100, 97.5, 97.5 and 100 per cent, respectively. It was observed that the mortality in the experimental birds was negligible suggesting that various treatments had no adverse effect on the livability of the birds. Similar findings were reported by Chattopadhyay *et al.* (2006), Kalbande *et al*. (2009) and Maksoud *et al*. (2010), who showed that methionine supplemented diet had no detrimental effect on livability.

Economics: Economics was calculated in terms of ROFC and EPEI. Return over feed cost (ROFC) was calculated considering the selling price of Rs. 72/kg live weight of birds and cost of broiler feed. Price (Rs./kg) for feed of broiler starter ration was 22.23, 22.05, 22.19 and 22.09 and broiler finisher ration 22.02, 21.84, 21.93 and 21.87 in T_1, T_2, T_3 and T_4 rations, respectively. Return over feed cost (Rs.) in the birds fed with T_1, T_2, T_3 and T_4 rations was found to be 55.24, 52.08, 58.92 and 56.82, respectively. The highest ROFC was found in the birds fed with T_3 ration followed by T_4, T_1 and T_2. These findings are in agreement with those of Kumari *et al*. (2012), who reported that economics of raising broiler chickens was better in herbal methionine + DL-methionine supplemented group than DL-methionine supplemented group, while Halder and Roy (2007) reported highest net profit in herbal methionine supplemented group. The EPEI value during 0 to 6 weeks of age was highest in T_3 (235.14) than T_1 (230.44) followed by T_4 (230.31) and T_2(207.49) ration. The higher EPEI values indicate higher average body weight, good livability and higher feed efficiency in stipulated number of days and thus give overall economics of the birds considering various important traits.

CONCLUSIONS

The broiler chicks fed on ration supplemented with combination of 50% herbal- and 50% DL-methionine showed a significantly greater body weight and body weight gain as compared to the chicks fed with other treatment rations. Feeding with combination of 50% DL-methionine and 50% herbal-methionine is more economical as compared to feeding of 100% DL-methionine, 100% herbal methionine and 125% herbal methionine in commercial broilers. Hence, the study concludes that 50% herbal and 50% DL-methionine can efficiently replace 100% DL-methionine to improve growth parameters in commercial broiler flock.

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