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RESEARCH ARTICLE

COMPARATIVE EFFECTS OF DL-METHIONINE AND N-METHIONINE ON GROWTH PERFORMANCE AND BIOCHEMICAL PARAMETERS OF BROILERS

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ABSTRACT

Methionine is essential for various vital functions in body such as: protein synthesis, regulation of cell division, methyl donor, reduces reactive oxygen species etc. it also helps in enhancing overall growth performance, feed efficiency utilization and livability in broilers. Synthetic methionine is metabolized into highly toxic compounds such as methylpropionate, thereby, adversely altering the performance of poultry birds. Synthetic methionine is listed among the prohibited synthetic substances and its usage has been questioned in organic farming practices. Therefore, there is great renewed interest in developing natural alternative supplements to maintain animal performance and well being. The aim of the present experimental study is to evaluate efficacy of herbal formulation N-Methionine (Natural Herbs & Formulation, India) and synthetic methionine in improving overall growth, productivity and performance in poultry birds. In this study we concluded that supplementation of N- Methionine (herbal methionine manufactured by Natural Herbs and Formulation Pvt. Ltd. India) can replace synthetic DL-Methionine as evident by the comparable bird's growth, viability, biochemical parameters.

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INTRODUCTION

Methionine, an indispensable amino acid, must be supplied in the diet of the chicken, as the poultry birds are unable to synthesize it in the amounts necessary to sustain life and growth. Methionine is required at higher level than normal level to fulfill with the increased tissue demands when bird is predisposed to fast growth along with high production performance. Recently the safety of such practices has been questioned and their use is becoming restricted in many regions of the world. Therefore, there is great renewed interest in developing natural alternative supplements to maintain animal performance and well being (Leeson and summer, 2001). Methionine is essential for various vital functions in body such as: protein synthesis, regulation of cell division, methyl donor, reduces reactive oxygen species etc. it also helps in enhancing overall growth performance, feed efficiency utilization and livability in broilers (Binder, 2003). An important aspect of protein and methionine interrelationship is the ability of both to act as lipotropic agents. The production of lean carcasses has become especially important as producers are changing gradually from selling live birds to selling meat.

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Methionine may act as a lipotropic agent through its role as an amino acid in balancing protein or through its role as a methyl donor and involvement in choline, betaine, folic acid and vitamin B metabolism (Young *et al*., 1955). Synthetic methionine is metabolized into highly toxic compounds such as methylpropionate, thereby, adversely altering the performance of poultry birds (Bender, 1975). Synthetic methionine is listed among the prohibited synthetic substances and its usage has been questioned in organic farming practices (Anonymous, 1999). The aim of the present experimental study is to evaluate efficacy of herbal formulation N-Methionine (Natural Herbs & Formulation, India) and synthetic methionine in improving overall growth, productivity and performance in poultry birds. N- Methionine is phytoadditive containing herbal ingredients that mimic the activity of methionine. Under Indian conditions, herbal methionine (N- Methionine) has been found to replace DL-methionine very effectively when used in broiler rations (Chattopadhyay, 2006; Kalbande *et al*., 2009).

MATERIALS AND METHODS

Six months old, commercial broiler chicks were randomly divided into three experimental groups, each of which comprised three replicates. Each replicate consisted of 50 birds. Groups were control (C) - Basal diet without methionine supplementation, treatment 1 (T_1) - Diet with synthetic DL-

methionine at 1.2 kg ton^{-1} of feed and treatment 2 (T_2) - Diet with herbal-methionine as N-Methionine at 1.2 kg ton^{-1} of feed. The rations were isonitrogenic in control and treatment groups and formulated according to BIS (1992). The research was carried at the research center of Natural Herbs & Formulations, India. 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.

Growth parameters

The growth parameters evaluated on week 3 and 6 of their lives were, weight gain, feed intake, feed conversion and viability.

Biochemical parameters: Blood samples were drawn from the right jugular vein and total plasma protein in each sample was determined with the help of UV visible Spectrophotometer as per the method described in diagnostic kit (Keller, 1991).

Plasma albumin in each sample was determined with the help of autoanalyzer, Microlab 300 as per the method described in diagnostic kit (Tietz, 1994). Statistical analysis of the data was done by "one-way ANOVA" followed by Multiple Comparison Test (Genstat 32.0).

RESULTS AND DISCUSSION

The mean weekly body weights of broilers fed with three different dietary levels from 01 to 06 weeks of age and growth and biochemical parameters were observed after 03 weeks (Table 1, Figur1 and Figure 2) and 06 weeks (Table 2, Figure 3 and Figure 4) of age. Maximum weight gain was observed in T_2 (943 gm) after 03 weeks of fed with N-Methionine. Feed gain in T_2 significantly high with S.E.D (2.25), least significant difference (5.49) and coefficient of variance (0.4) at P< 0.01% as compared to control (without methionine supplement) and T_1 fed with synthetic DL-Methionine.

Table 1. Comparative effect of synthetic and Herbal methionine (N-Methionine) on broilers after 03 weeks

Treatment	Weight gain (gm.)	Feed intake(gm.)	Feed conversion rate	Mortality (%)	Total protein (gdL^{1})	Albumin (gdL^{1})
Control	664.77	1002.2	1.51	7.1	3.16	1.288
T_1	693.77	1118.5	1.61	5.17	3.31	1.34
T_2	943.13	1326.9	1.40	1.17	3.66	1.36
S.E.D	2.247	15.35	0.017	0.47	0.03	0.007
CV	0.4	1.6	1.3	12.7	1.1	0.7
LSD	5.49	37.56	0.04	1.14	0.07	0.018
P Value	*	**	*	**	**	*

T_1- treatment of synthetic methionine; T_2- treatment of Herbal methionine (N-Methionine); *- significantly different at P< 0.01 and **- significantly different at P< 0.05

Table 2. Comparative effect of synthetic and Herbal methionine (N-Methionine) on broilers after 06 weeks

Treatment	Weight gain (gm.)	Feed intake(gm.)	Feed conversion rate	Mortality (%)	Total protein (gdL1)	Albumin (gdL1)
Control	1314.2	2022	1.54	8.07	3.18	1.25
T1	1481.3	2486	1.67	5.6	3.27	1.05
T2	1974.3	2880	1.45	1.53	3.59	1.35
S.E.D	6.91	29.5	0.023	0.265	0.03	0.04
CV	0.6	1.5	1.7	6.4	1.1	4.1
LSD	16.91	72.3	0.06	0.649	0.074	0.09
P value	*	*	*	**	*	NS

T_1- treatment of synthetic methionine; T_2- treatment of Herbal methionine (N-Methionine); *- significantly different at P< 0.01; **- significantly different at P< 0.05 and NS- not significantly different

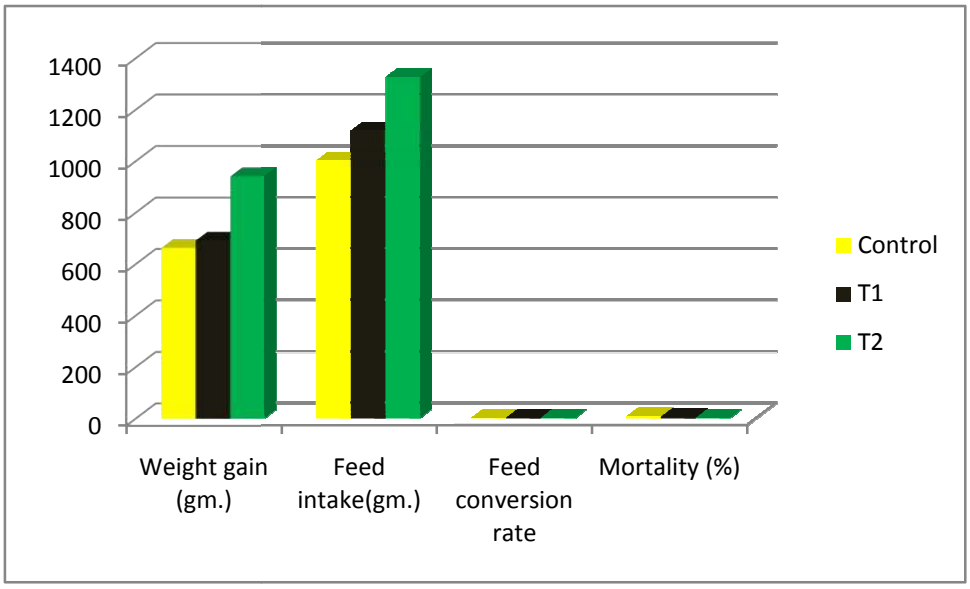

Figure 1. Comparative effect of synthetic and Herbal methionine (N-Methionine) on growth parameters of broilers after 03 weeks

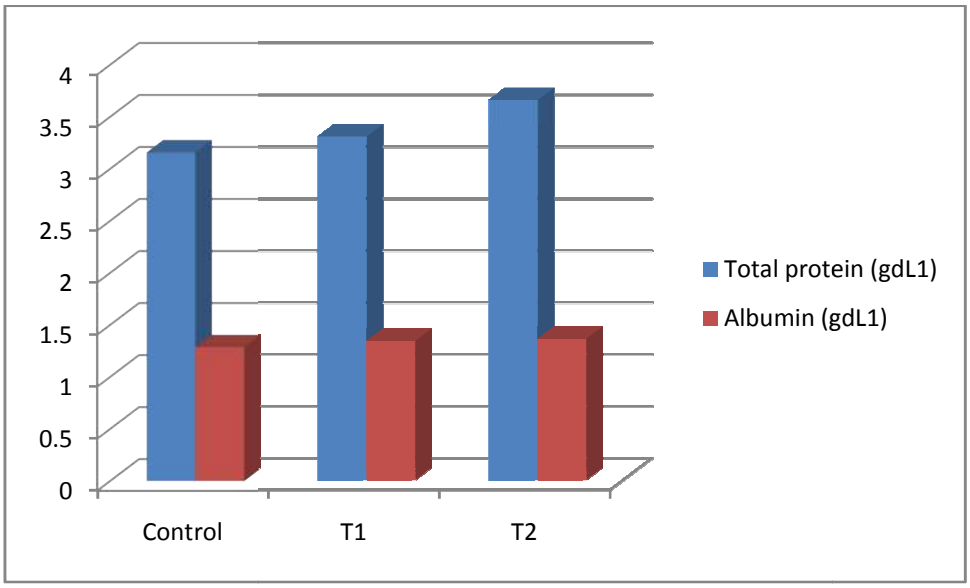

Figure 2. Comparative effect of synthetic and Herbal methionine (N-Methionine) on biochemical parameters of broilers after 03 weeks

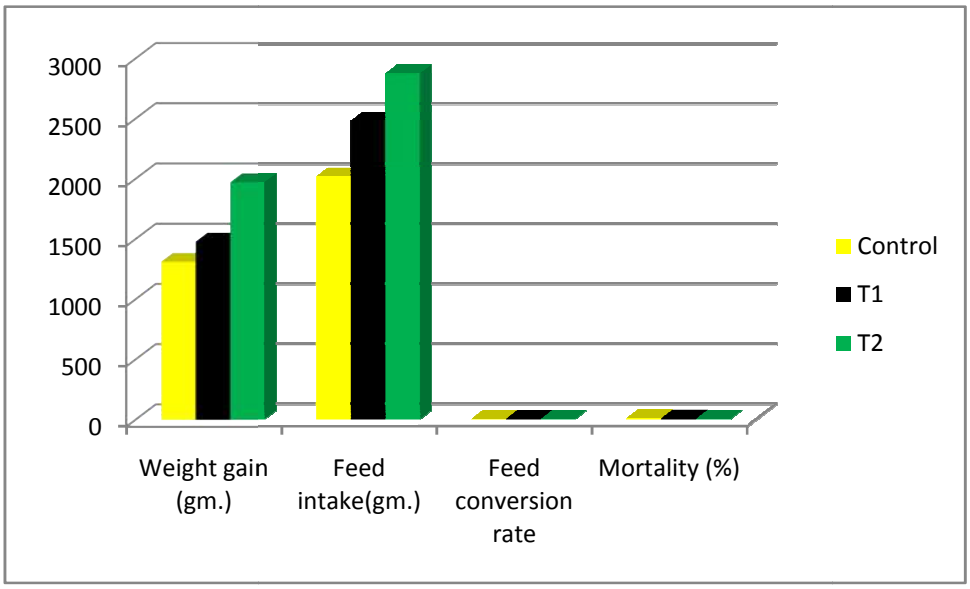

Figure 3. Comparative effect of synthetic and Herbal methionine (N-Methionine) on growth parameters of broilers after 06 weeks

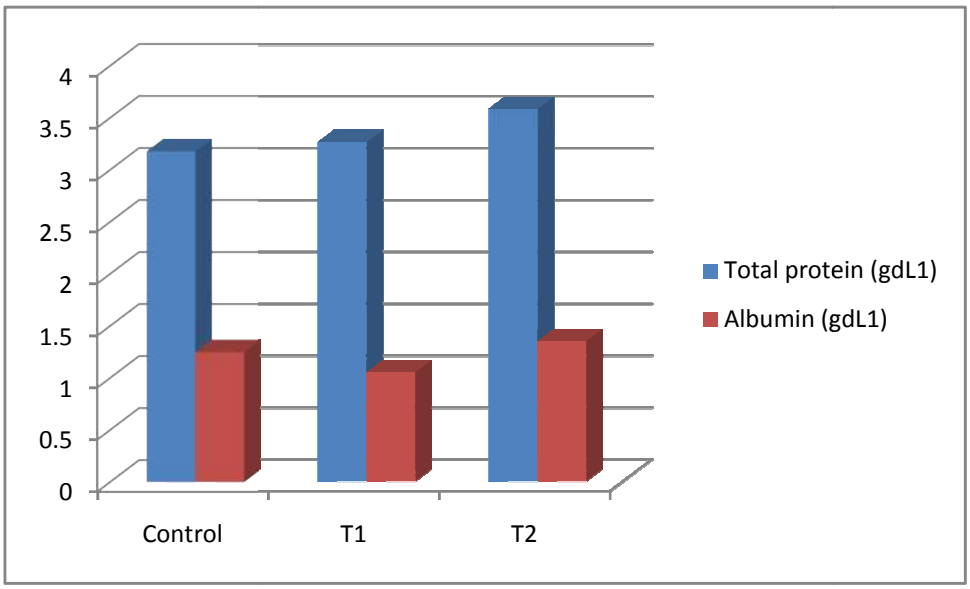

Figure 4. Comparative effect of synthetic and Herbal methionine (N-Methionine) on biochemical parameters of broilers after 06 weeks

Other growth parameters feed intake, FCR and livability were found best in T_2. Feed intake (1326.9 gm) was observed maximum whereas mortality and FCR were found minimum (1.17) and (1.40) in T_2 and significantly different at $P< 0.05$, $P< 0.01$ and $P< 0.05$ respectively. Results of growth parameters were also noted in same trend after 06 weeks. All growth parameters were significantly different at $P< 0.01$accept mortality. Similar results were reported by (Narayanswamy and Bhagwat, 2010) who found that the birds in herbal methionine group showed a significant increase gain in body weight as compared to the birds in control group and numerically higher weight gain as compared to the chicks in synthetic methionine group. Similar results with regards to FCR were also observed by (Chattopadhyay, 2003) who found that supplementation of herbal methionine at the rate of 15g/kg showed better FCR compared to DL-methionine supplemented birds. Furthermore, increasing in body weight gain, feed intake, FCR and viability of chicks with herbal methionine supplementation is similar to the findings of (Itoe *et al*., 2010; Chattopadhyay, 2006; Kalbande *et al*., 2009). The increase in weight gain was attributed to the potential role of methionine in promoting growth (Itoe *et al*., 2010). In regards of biochemical parameters, they were also observed maximum 3.66 gdL^1 and 1.36 gdL^1 for total protein and albumin protein respectively in T_2. Concentration of total protein and albumin protein were significantly different with S.E.D. (0.03 and 0.01), least significant difference (0.07 and 0.018) and Coefficient difference (1.1 and 0.70) at $P< 0.05$ and $P< 0.01$ respectively after 03 weeks of age. Similar trend was also observed after 06 weeks but results for albumin in serum were not significantly different among the treatments. Total protein and albumin concentration in plasma were in the normal range throughout the experiment (Prabhakaran *et al*., 1996 and Halder and Roy, 2007).

Conclusions

The experiment clearly indicated that supplementation of N-Methionine along with normal diet in commercial broiler ration could be beneficial for enhancing or better growth of chicks as compared to synthetic Methionine.

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