Int.J.Curr.Microbiol.App.Sci (2018) *7*(5): 2343-2350

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 7 Number 05 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.705.269

Efficacy of Plant Derived Herbal Methionine on Growth Performance of Broilers Chicken

Kathirvelan Chinnadurai*, M.R. Purushothaman and S. Banupriya

Veterinary College and Research Institute, Tamil Nadu Veterinary and Animal Sciences University, Namakkal, 637 002 Tamil Nadu, India

**Corresponding author*

Keywords

Growth performance, Herbal methionine, Lipid profile, Serum biochemical, Synthetic methionine

Article Info

Accepted:
18 April 2018
Available Online:
10 May 2018

A B S T R A C T

A broiler trial was conducted for a period of 42 days to assess the comparative efficacy of the herbal and synthetic methionine on the performance of broilers. A total of 160 day old Vencobb broiler male chicks were divided into five treatment groups namely T1 group birds were fed standard ration without herbal and synthetic source (Control), T2 (25% herbal methionine: 75% synthetic methionine, T3 (50% herbal methionine: 50% synthetic methionine), T4 (75 % herbal methionine: 25% synthetic methionine) and T5 (100% herbal methionine). Each treatment group had four replicates with eight birds in each replicate. The feed intake, mortality, weekly weight gain and feed efficiency were recorded throughout the experimental period. In overall phase, weight gain, feed intake and feed efficiency in T3 group was significantly comparable with control. At the end of the trial, six birds were slaughtered from each treatment revealed that dressing percentage; heart, liver, kidney, abdominal fat and intestinal length do not vary among the groups except for gizzard weight which was higher in T4 and T5 groups when compared to control. The albumin, albumin globulin ratio, triglycerides, total cholesterol, HDL, LDL, AST and ALT levels did not differ significantly. Total protein and globulin levels were found to be numerically higher in T3 and T4 respectively. The liver and breast muscle lipid content was found to be numerically reduced in T3, whereas in thigh higher lipid content was found when compared to control. Supplementation of methionine (T2, T3) was found to provide better returns over that of the control. It can be concluded that feeding of 50% herbal and 50% synthetic methionine is more economical as compared to other treatment groups.

Introduction

Methionine is the first limiting essential amino acid, which is needed for healthy and productive poultry. It plays a significant role in energy production and protein synthesis. It enhances the size of the eggs, overall growth, feed conversion efficiency and livability of poultry Aerni *et al.,* (2005). It may act as a lipotropic agent through its role as a methyl donor and involvement in choline, betaine, folic acid, vitamin B12 metabolism Chen *et al.,* (1993) and can alter the immune response by reducing the immunological stress. In recent years, synthetic methionine was used in animal feeds, in order to yield maximum meat production. Synthetic methionine is metabolized to highly toxic methyl

thiopropionate, when fed to birds which affects the overall performance. Hence, the present study was conducted to ascertain the efficacy of herbal methionine on broiler performance.

Materials and Methods

A biological trial was conducted with 160 day old Vencobb broiler male chicks. The broiler chicks were divided into five treatment groups; each treatment group had four replicates with eight birds in each replicate. The treatment groups were T1 (standard ration), T2 (25% herbal methionine: 75% synthetic methionine, T3 (50% herbal methionine: 50% synthetic methionine), T4 (75 % herbal methionine: 25% synthetic methionine) and T5 (100% herbal methionine). All the diets were formulated to achieve isocaloric and isonitrogenic. The ingredients used for preparation of experimental rations (Table 1) were analyzed for protein as per AOAC (1995). The birds were fed the pre starter, starter and finisher diets for day 1 to 14, 15 to 28 and 29 to 42 days of age respectively. The birds were housed in deep litter pens using coconut coir pith as litter material and reared from day-old to 42 days of age following standard management practices. Feed and water were provided *ad lib*. All the birds were vaccinated against Ranikhet disease on 7^{th} day and IBD on 14^{th} day of age.

The feed offered and mortality (if any) was recorded daily. Weekly feed intake and body weight of birds were recorded. Feed conversion efficiency (FCR) and production efficiency factor (PEF) was calculated. Production Efficiency Factor (PEF) was calculated to compare the live-bird performance of the flocks.

At the end of the experimental period of 42 days, slaughter parameters (six birds from each treatment) such as carcass, liver, heart, kidney, gizzard weight and intestinal length were measured. The total lipid was extracted from the muscle samples as per the method of Folch *et al.*, (1957) and the total meat cholesterol was estimated by one-step method of Wybenga *et al.*, (1970). The serum biochemical such as total protein, albumin, globulin, total cholesterol, triglycerides, HDL, LDL, enzymes alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels were estimated by diagnostic kits using standard protocols.

The costs of different experimental rations were worked out based on the actual cost of the feed ingredients, supplements and additives. The cost of feed per unit gain in weight in different groups was calculated and compared.

The data collected on various parameters were statistically analyzed as per the methods of Snedecor and Cochran (1989) and the means of different experimental groups were tested for statistical significance by Duncan's multiple range test Duncan, (1955).

Results and Discussion

Weight gain (g), feed intake (g), feed efficiency and economics (₹) of birds fed different levels of herbal and synthetic methionine was presented in Table 2.

Weight gain in the pre starter and starter phase, T3 ($P>0.05$) resulted in higher body weight gain and the other groups whereas in finisher phase, T1 had higher body weight than the other treatment groups. But in the overall period (0 - 42 days), the weight gain in T3 group ($P>0.05$) has significantly comparable with the control than the other treatment groups. Kalbande *et al.*, (2009) demonstrated that broiler chickens fed diets supplemented with herbal methionine had similar performance in terms of body weight gain compared with those birds fed synthetic

methionine. The feed intake was numerically comparable among the treatment groups during the prestarter phase. In starter, finisher and overall phase feed intake was numerically comparable except T4 fed groups when compared to control. However, Kalbande *et al.,* (2009) observed no significant effect of herbal or DL-Methionine supplementation on feed consumption of birds.

Feed efficiency in the prestarter and starter phase, better feed efficiency was observed in T3 than the other treatment groups. In the overall period, better feed efficiency was found in T3 fed group when compared to control. Kiran *et al.,* (2012) who found that supplementation of herbal methionine showed better FCR compared to DL-methionine supplemented birds.

Table.1 Ingredient (%) and proximate composition of the broiler pre starter, starter and finisher rations

Feed Ingredients (%)	Pre-starter	Starter	Finisher
Maize	55.1	56.3	61.8
Soybean meal	39.5	37.2	30.7
Salt	0.29	0.3	0.3
Rice Bran Oil	1.8	3.1	4.2
Calcite	1.7	1.7	1.67
Di-Calcium Phosphate (DCP)	1	0.9	0.9
Additives (%)			
NSP degrading enzyme	0.05	0.05	0.05
Phytase	0.02	0.02	0.02
DL-Methionine	0.26	0.27	0.24
Lysine	0.158	0.162	0.177
Threonine	0.012	0.023	0.034
Sodium bicarbonate	0.144	0.066	0.051
Trace mineral mixture	0.2	0.2	0.2
Toxin binder	0.05	0.05	0.05
Vitamin premix	0.1	0.1	0.1
Salinomycin	0.05	0.05	0.05
Anti-oxidant	0.01	0.01	0.01
Vitamin E 50 %	0.01	0.008	0.005
Emulsifier	0.05	0.05	0.05
Livertonic	0.1	0.1	0.1
Grand Total	100	100	100
Proximate composition and ME			
Dry matter (%)	91.3	90.93	91.74
Crude protein (%)	22.49	21.51	19.45
Crude fibre (%)	3.54	3.26	3.14
Ether extract (%)	4.25	5.42	6.95
Total ash (%)	7.91	7.75	7.62
Nitrogen free extract (%)	53.11	52.99	54.58
Metabolisable energy (kcal/kg)	3,000	3,100	3,200

Table.2 Body weight gain, feed intake, feed efficiency, PEF and feed cost/weight gain (₹) of birds fed with herbal and synthetic methionine

Attribute		Treatments					C.D. (5%)
		T1	T2	T3	T4	T5	
Body weight gain (g)	Pre starter (0-14 d)	299^{ab}±7	290^{a}±7	316^{b}±6	286^{a}±6	280^{a}±6	19.04
	Starter (15-28 d)	707±20	737±17	761±14	702±17	707±19	NS
	Finisher (29-42 d)	1009^{b}±28	949^{ab}±28	943^{ab}±34	869^{a}±41	878^{a}±27	89.6
	Overall (0-42 d)	2015^{c}±41	1986^{bc}±40	2019^{c}±42	1857^{a}±59	1868^{ab}±39	123.8
Feed intake (g)	Pre starter (0-14 d)	451^{a}±10	457^{a}±17	445^{a}±11	445^{a}±12	442^{b}±3	36.27
	Starter (15-28 d)	1344±35	1338±27	1350±10	1386±25	1414±28	NS
	Finisher (29-42 d)	1946±52	1890±70	1905±51	1981±142	1821±42	NS
	Overall (0-42 d)	3741±63	3686±43	3702 ±46	3813±125	3667±61	NS
Feed conversion ratio	Pre starter (0-14 d)	1.518^{ab}±0.096	1.585^{ab}±0.098	1.410^{a}±0.052	1.562^{a}±0.065	1.781^{b}±0.023	0.22
	Starter (15-28 d)	1.904±0.073	1.819±0.060	1.774±0.034	1.980±0.083	2.000±0.049	NS
	Finisher (29-42 d)	1.752±0.038	1.839±0.104	1.871±0.132	2.041±0.143	2.119±0.090	NS
	Overall (0-42 d)	1.857^{ab}±0.014	1.858^{ab}±0.028	1.836^{a}±0.035	2.065^{c}±0.099	2.001^{bc}±0.033	0.16
Overall livability (%)		96.8	96.8	100	93.75	78.12	
Production efficiency factor (PEF) - Overall (0-42d)		250.08	250.08	254.49	245.46	167.26	
Economics (₹)	Cost of pre starter feed	30.58	30.4	30.22	30.04	29.86	
	Cost of starter feed	28.75	28.59	28.43	28.28	28.12	
	Cost of finisher feed	28.15	28	27.88	27.74	27.6	
	Cost of feeding (0-6 weeks)	107.23±1.80	105.12±1.19	105.00±1.28	107.57±3.47	104.95±1.71	NS
	Cost of feed / kg weight gain	53.22±0.42	52.98±0.84	52.08±1.00	58.27±2.82	56.23±0.93	NS
	Difference in feed cost over the control		0.24	1.14	-5.05	-3.01	

Values in a row with atleast one common superscript is not significant (P>0.05).
Each value of weight gain is the mean of 32 observations. Each value of feed intake and feed efficiency is the mean of 4 observations.
T1- 100 % Synthetic methionine; T2 - 25 % Herbal methionine 75% Synthetic methionine; T3- 50% Herbal methionine + 50% Synthetic methionine,
T4- 75% Herbal methionine + 25% synthetic methionine; T5- 100% Herbal methionine
In all treatments, synthetic source of lysine was used

Table.3 Serum biochemical parameters and lipid profiles (liver and muscle) of birds fed with herbal and synthetic methionine

Attribute	Treatments					C.D. (5%)
	T1	T2	T3	T4	T5	
Serum biochemical parameters						
Albumin (mg/dl)	1.74±0.04	1.76±0.11	1.53±0.78	1.78±0.02	1.69±0.03	NS
Globulin (mg/dl)	1.60±0.09	1.22±0.13	2.57±0.83	2.48±0.85	1.55±0.22	NS
Albumin Globulin ratio	1.10±0.08	1.49±0.22	0.73±0.22	0.87±0.22	1.14±0.15	NS
Total protein (mg/dl)	3.33±0.09	2.99±0.05	4.10±0.78	4.26±0.85	3.26±0.21	NS
Total cholesterol (mg/dl)	128.29±11.20	136.59±13.63	124.25±12.81	134.09±6.34	130.28±7.42	NS
Triglycerides (mg/dl)	107.57±12.70	119.98±3.11	124.39±1.24	113.66±4.49	115.68±6.38	NS
HDL (mg/dl)	60.54±5.20	56.11±4.00	57.72±21.51	59.37±10.47	75.07±10.91	NS
LDL (mg/dl)	39.24±7.72	66.49±17.76	51.66±17.69	41.99±9.32	32.07±2.97	NS
ALT (U/L)	17.02±4.81	21.38±1.31	16.58±0.87	19.64±2.18	19.20±0.87	NS
AST (U/L)	85.55±2.62	101.26±1.75	85.55±14.88	62.85±3.50	106.94±10.06	NS
Liver and muscle lipid profile						
Liver (mg/100g)	226.30±12.79	189.84±59.29	194.53±8.09	248.43±0.52	255.20±4.17	NS
Breast muscle (mg/100g)	208.33±1.56	182.29±4.17	192.18±10.97	200.00±7.31	193.22±8.88	NS
Thigh muscle (mg/100g)	104.94^{a}±0.26	153.38^{b}±0.78	196.09^{c}±11.75	191.6^{c}±3.65	162.5^{b}±5.79	22.06

Values in a row with atleast one common superscript is not significant (P>0.05). Each value is the mean of 6 observations.

Table.4 The slaughter characteristics of birds fed with herbal and synthetic methionine

Attribute	Treatments					C.D. (5%)
	T1	T2	T3	T4	T5	
Dressing percentage (%)	77.01±0.39	78.80±0.52	76.98±0.93	78.79±1.14	79.45±1.10	NS
Heart weight (%)	0.56±0.05	0.58±0.05	0.58±0.02	0.49±0.02	0.54±0.06	NS
Liver weight (%)	2.11±0.03	2.28±0.12	2.26±0.14	2.14±0.16	2.50±0.06	NS
Kidney weight (%)	0.42±0.03	0.58±0.06	0.54±0.06	0.49±0.02	0.54±0.06	NS
Gizzard weight (%)	1.61^{a}±0.11	1.82^{ab}±0.07	1.86^{b}±0.04	2.00^{b}±0.05	2.00^{b}±0.05	0.23
Body fat (%)	0.91±0.08	0.84±0.05	0.81±0.05	0.87±0.02	0.84±0.06	NS
Intestinal length (cm)	199.83±3.48	197.33±6.27	195.83±10.31	197.50±6.40	205.66±12.07	NS

Values in a row with at least one common superscript is not significant (P>0.05). Each value is the mean of 6 observations.

The feed costs to produce one kg live weight was lower in T2 and T3 groups (₹ 52.98 and 52.08/- respectively) when compare to control (₹ 53.22). The better returns were found in methionine supplemented groups (T2 and T3) over the control. Methionine at 50% herbal: 50% synthetic (T3) combination had the highest additional returns of ₹ 1.14/- followed by T2 (₹ 0.24/-) over the control.

Livability of the chicks was 97%, 100%, 94%, 78% and 91% for T1, T2, T3, T4 and T5 groups, respectively. Results showed that the methionine supplement in (T2, T3 and T5) group had no detrimental effects on the livability of chicks. PEF values of 250.60, 254.49, 246.11, 167.00 and 202.26 were calculated for T1, T2, T3, T4 and T5 groups, respectively. A flock with acceptable growth and livability parameters should attain 200 to 225. T4 group had lower PEF value this could be due to livability, lower weight gain and poor feed efficiency throughout the experimental period. The highest PEF values indicates higher average body weight, good livability and better feed efficiency in stipulated number of days and thus give overall economics of the birds. The slaughter characteristics were presented in the Table 4. The slaughter characteristics were not influenced by the inclusion of herbal and synthetic methionine except for gizzard weight which was higher in T4 and T5 when compared to control. Similar result was reported by (Igbasan and Olugosi, 2013).

The serum biochemical parameters and lipid profile of birds fed with herbal and synthetic methionine was presented in Table 3. Inclusion of methionine resulted in higher total protein and globulin content (mg/dl) in T3 and T4 groups when compare to control. This was concurring with the observation of Hassan *et al.,* (2003). Albumin, albumin globulin ratio, alanine amino transferase (ALT) and aspartate amino transferase (AST) were not influenced by the inclusion of methionine. Total cholesterol (mg/dl), triglycerides (mg/dl), HDL (mg/dl) and LDL (mg/dl) levels were not influenced due to the addition of herbal and synthetic methionine. However, moderate increase in ALT and AST were seen in methionine fed groups, this might be due to stress which increases the

enzyme activity. Sheila *et al.,* (2014) reported that the effect of dietary treatment on total protein, LDL, triglycerides, cholesterol, AST and ALT were not significant at day 42. In contrast, (Kalbande *et al.,* 2009; Rekhatel *et al.,* 2010), who reported that herbal methionine proved better than DL-methionine in lowering total cholesterol and triglyceride concentrations.

The liver and muscle lipid content were not influenced, however in T3 group, the liver and breast muscle lipid content was reduced by 32 mg/dl and 24 mg/dl respectively when compared to T1 whereas in thigh it was observed high lipid content. Liver lipid content was reduced when diet was formulated with methionine which indicates the lipotropic activity of methionine. The results indicated that inclusion of methionine (50% herbal and 50% synthetic) had the tendency in lowering the liver and breast lipid content.

From this study, it could be concluded that feeding with 50% herbal and 50% synthetic methionine combination is more economical and can efficiently replace 100% DL-methionine to improve the broiler performance.

Acknowledgements

The authors are grateful to the Dean, Veterinary College and Research Institute, Namakkal and Tamil Nadu Veterinary and Animal Sciences University, Chennai for providing the necessary facilities for carrying out this research work. We greatly acknowledge the financial assistance from Indian Herbs, Panchkula for carrying out this research work.

References

Aerni, V., Brinkhof, M. W. G., Oester, W.H and Frohlich, E. 2005. Productivity and mortality of laying hens in aviaries: a systematic review. *World Poultry Science Journal* 61: 130-42.

AOAC.,1995. Official methods of analysis, Association of Official Analytical Chemists 15th edn. AOAC,Washington. D.C.

Chen, F., Noll,S.L., Waibel, P. E., Hawkins. 1993. Effect of folate, vitamin B12 and choline supplementation on turkey breeder performance. *Poultry Science* 72:73.

Duncan, D.B., 1955. Multiple range and multiple ‘F’ test. *Biometrics* 11: 1-42.

Folch, J., Less, M., and Stanley, S. G. H. 1957. A simple method for the isolation and purification of total lipids from animal tissue. *Journal of Biological Chemistry* 226: 497- 09.

Hassan, I.I., Khashaba, B.M and Hindawy, M. M. 2003. Effect of methionine and some feed additive supplementations on the performance of broiler chicks. *Journal of Egyptian Poultry Science* 23: 485 - 05. (Original not seen. Abstr. Seen. From CAB Abstr. AN-20053017787).

Igbasan, F. A and Olugosi, O.A., 2013. Performance characteristics, biochemical and haematological profiles of broiler chickens fed synthetic and herbal methionine supplemented diets. *African Journal of Food Science* 7(6): 159-67.

Kalbande, V.H., Ravikanth, K., Maini, S and Rekhe, D. S. 2009. Methionine supplementation options in poultry. *International Journal of Poultry Science* 8: 588-91.

Kiran Kumari., Tiwari, S.P., Subhankar Nanda., Saxena, M. J., Ravikanth, K and Maini Shivi. 2012. Studies on comparative efficacy of herbal aminoacid (Methiorep) supplement with synthetic DL-Methionine on Broiler growth performance and

carcass quality traits. *International Journal of Scientific and research Publication* 2(8): 1-3.

Rekhatel, D.H., Maini, S., Pathak, V. P., Ther, S.V., Mahajan, N., Datir, D.K., Kale, M and Hardas, R.P. 2010. Haemobiochemical profile study in commercial broilers fed on diet supplemented with herbal methionine (Methiorep) and DL-methionine. *Indian Journal of Agricultural Research* 44: 197-03.

Sheila Hadinia., Mahmood Shivazad., Hossein Moravej., Majid Alahyari-Shahrasb and Mohammad Mehdi Nabi. 2014. Bio-efficacy comparison of herbal-methionine and DL-methionine based on performance and blood parameters of broiler chickens. *Veterinary Research Forum* 5(2) 81 87.

Snedecor, G.W and Cochran, W. G. 1989. Statistical Methods. 8th edn, Iowa State University Press, Ames, Iowa, U.S.A.

Wybenga, D. R., Pileggi, P. H,, Dirstine, J and Giorgio, J. D. 1970. Direct manual determination of serum total cholesterol with a single stable reagent. *Clinical Chemistry* 16: 980-984.

How to cite this article:

Kathirvelan Chinnadurai, M.R. Purushothaman and Banupriya, S. 2018. Efficacy of Plant Derived Herbal Methionine on Growth Performance of Broilers Chicken. *Int.J.Curr.Microbiol.App.Sci.* 7(05): 2343-2350.
doi: https://doi.org/10.20546/ijcmas.2018.705.269