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ORIGINAL ARTICLE

Performance Assessment of Broiler Poultry Birds Fed on Herbal and Synthetic Amino Acids

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ABSTRACT
A study was conducted to evaluate the efficacy of herbal product containing natural source of choline, Methionine, lysine and biotin for its efficacy in terms of growth, haemato-biochemical, pathological and carcass quality attributes. Seventy five healthy day old broiler poultry chicks of nearly similar live body weight were equally divided into three groups, comprising twenty five chicks each. Group- I was positive control fed with the standard basal diet without any supplementation of natural or synthetic source of choline, Methionine, lysine and biotin. Group-II was fed with basal diet supplemented with herbal phytoadditive (AV/CAP/18) @ 2Kg/tonne of feed (supplied by M/S Ayurvet Ltd., Baddi, H.P., India). Group-III was fed with basal diet supplemented with synthetic choline chloride (600gm/tonne), synthetic methionine (1kg/tonne), synthetic lysine (1kg/tonne) and biotin (150mg/tonne). At the end of sixth week, significantly higher live body weight (859.36, 1788.47 and 1804.14gm) with more economical FCR (2.41, 1.88 and 1.87), carcass yield (464.33, 1304.46 and 1344.98gm) along with marked improvement in digestibility of nutrients from supplementation of herbal amino acids with equal competence as that of synthetic amino acids was observed. More satisfactory results were observed among total serum protein (2.98, 4.83 and 4.97gm/dl), serum albumin (1.40, 2.16 and 2.22gm/dl), serum globulin (1.58, 2.66 and 2.76gm/dl) with lesser but within range values of serum cholesterol (148.38, 118.52 and 115.66mg/dl) and triglycerides (186.10, 160.05 and 163.39mg/dl) along with significantly lower SGPT (20.97, 16.51 and 16.82 U/l) and SGOT (160.11, 131.76 and 133.62 U/l) values showing normal satisfactory liver function from supplementation of herbal as well as synthetic amino acids as compared to control group. This trend also supported with normal haematological parameters (Haemoglobin, PCV percent, TEC, TLC and DLC) in group supplemented with herbal as well as synthetic amino acid which were statistically significant from control group. The treatment group supplemented with herbal phytoadditive product have shown better serum immunoglobulin level with marked improvement in resistance power. The gross, physiological and pathological observations of visceral organs (Liver, Kidney, Spleen and Bursa) supplemented with herbal and synthetic amino acids have shown completely normal, within range and satisfactory results as compare to control group. Stunted growth, reduced feed intake, irrelevant appetite along with nervous symptoms, leg weakness, paralysis of legs and wings, falling towards back and necrotic, haemorrhagic lesions with fatty changes in visceral organs were observed in control group. While group supplemented with herbal or synthetic amino acids were devoid of such lesions and completely normal. It can be concluded that the herbal product (AV/CAP/18) can successfully replace synthetic amino acids (methionine, choline, lysine & biotin) in broiler feed. This may be attributed to the efficacy of constituent herbs of AV/CAP/18 namely Citrullus colocynthes, Achyranthus aspera, Allium sativum & many more that mimics the activity like that of synthetic amino acids.
Key words: *Broilers, herbal amino acids and synthetic amino acids*

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INTRODUCTION

Methionine, choline and Lysine are universally recognized as the most limiting amino acids in broiler diets based on corn and soybean meal [1,2]. The supplementation of broiler feeds with these amino acids ia very common in the poultry industry. However, Synthetic Methionine and choline are metabolized into highly toxic compounds such as methylpropionate, trimethylamine thereby, adversely altering the performance of poultry birds. Synthetic methionine and choline are listed among the prohibited synthetic substances and its usage has been questioned in organic farming practices [3]. Feed rations that are high in plant proteins, such as soyabean meal can be used instead of synthetic amino acid supplements, but may lead to environmental pollution. It is difficult to design diet with sufficient Methionine and choline but without oversupplying protein or adding synthetic amino acids in crystalline form. Alternatively,

many herbs are rich source of these essential amino acids and also mimic the activity like that of methionine, choline or biotin. These may be supplemented along with ration to replace synthetic in feed. The present experimental trial was conducted to evaluate efficacy of polyherbal coded formulation AV/CAP/18 (supplied by M/S Ayurvet Limited, Baddi, India) in comparison to synthetic additives in improving overall growth, productivity and performance in broilers.

MATERIALS AND METHODS

Seventy five healthy day old broiler poultry chicks of nearly similar live body weight were equally divided into three groups, comprising twenty five chicks each. Group- I was positive control fed with the basal diet without any natural or synthetic source of choline, methionine, lysine & biotin. Group-II was fed with basal diet supplemented with herbal formulation containing natural sources of choline, methionine, lysine & biotin (AV/CAP/18) @ 2Kg/tonne of feed (*supplied by M/S Ayurvet Ltd., Baddi, H.P., India*). Group-III was fed with basal diet supplemented with synthetic choline chloride (600gm/tonne), synthetic methionine (1kg/tonne), synthetic lysine (1kg/tonne) and biotin (150mg/tonne). All the three groups were housed separately and maintained on *adlibitum* broiler starter and finisher ration and clean drinking water throughout the experiment. Measured quantity of feed was fed to chicks every day and the feed in balance was recorded after 24 hrs. Mean live body weight (gm/chick/week) was computed at weekly intervals from 1st week to 6th week of study. Periodical blood samples were collected from the experimental birds for haematological and biochemical studies. At the end of the experiment histopathological and carcass traits were also studied. The data of entire study period was analysed as per [4].

RESULTS AND DISCUSSION

At the end of sixth week, the results were assessed on grounds of effect on growth, feed efficiency, carcass traits, serum biochemical, haematological gross and histo-pathological studies.

Growth and carcass studies: Significantly higher live body weight (859.36, 1788.47 and 1804.14gm) with more economical FCR (2.41, 1.88 and 1.87), carcass yield (464.33, 1304.46 and 1344.98gm) along with marked improvement in digestibility of nutrients from supplementation of herbal amino acids with equal competence as that of synthetic amino acids was observed. In poultry ration along with the vitamins and minerals, proteins play a critical role, amongst these Methionine and lysine are essentially required for overall growth and performance [5]. Herbs namely *Cicer arientinum, Phaseolus mungo, Mucuna pruriens* are rich source of proteins and essential amino acids [1]. The significant increase in mean final body weight and body weight gain in treatments may be attributed to the supplementation of essential amino acids in basal ration. Addition of methionine over and above the recommended requirement of broilers improves their performance in terms of body weight gain and food conversion efficiency [6]. The results in the present study are in corroboration with those reported by Kalbande et al., [7], that addition of herbal source of Methionine along with feed improved performance in terms of body weight gain and feed efficiency in broilers. Chattopadhyay et al., [8] observed significant difference in case of carcass yield among control and either herbal or synthetic Methionine treated groups.

Serum Biochemical studies: More satisfactory results were observed among total serum protein (2.98, 4.83 and 4.97gm/dl), serum albumin (1.40, 2.16 and 2.22gm/dl), serum globulin (1.58, 2.66 and 2.76gm/dl) with lesser but within range values of serum cholesterol (148.38, 118.52 and 115.66mg/dl) and triglycerides (186.10, 160.05 and 163.39mg/dl) along with significantly lower SGPT (20.97, 16.51 and 16.82 U/l) and SGOT (160.11, 131.76 and 133.62 U/l) values showing normal satisfactory liver function from supplementation of herbal as well as synthetic amino acid combination as compare to control group. The findings of this study is in corroboration with Kalbande et. al., [7] and Halder and Roy, [9].

Haematological studies: Among haematological parameters, Haemoglobin content of treated groups were found significantly higher as compared to control. However no significant variation was found in PCV percent, TEC, TLC and DLC in all the three experimental group. The findings of this study are in corroboration with Igbasan et al., [10].

Gross and histo-pathological studies: The gross, physiological and pathological observations of visceral organs (Liver, Kidney, Spleen and Bursa) supplemented with herbal amino acid and synthetic amino acid have shown completely normal, within range and satisfactory results as compare to control group. Stunted growth, reduced feed intake, irrelevant appetite along with nervous symptoms, leg weakness, paralysis of legs and wings, falling towards back and necrotic, hemorrhagic lesions with fatty changes in visceral organs were observed in control group. While group supplemented with herbal or synthetic amino acids were devoid of such lesions and completely normal.

Table 1. Overall performance of the birds during experimental period.

Parameters	Group I	Group II	Group III
		Live Body Weight (gm)	
	859.36[a]	1788.47[b]	1804.14[b]
Feed Conversion Ratio (FCR)	2.41[a]	1.88[b]	1.87[b]
Carcass yield (gm)	464.33[a]	1304.46[b]	1344.98[b]
Total Serum Protein (gm/dl)	2.98[a]	4.83[b]	4.97[b]
Serum Albumin (gm/dl)	1.40[a]	2.16[b]	2.22[b]
Serum Globulin (gm/dl)	1.58[a]	2.66[b]	2.76[b]
Serum Cholesterol (mg/dl)	148.38[a]	118.52[b]	115.66[b]
Serum Triglyceride (mg/dl)	186.10[a]	160.05[b]	163.39[b]
SGPT (U/l)	20.97[a]	16.51[b]	16.82[b]
SGOT (U/l)	160.11	131.76	133.62
Haemoglobin (gm/dl)	8.49[a]	9.68[b]	9.65[b]
Packed Cell Volume (%)	23.96	24.57	24.40
Total Erythrocyte Count (10^6/cumm)	2.98	2.87	2.96
Total Leucocyte Count (10^3 /cumm)	26.12	27.87	27.41

Means with different superscripts differ significantly.

It can be concluded that the herbal product (AV/CAP/18) can successfully replace synthetic amino acids (methionine, choline, lysine & biotin) in broiler feed. This may be attributed to the efficacy of constituent herbs of AV/CAP/18 namely *Citrullus colocynthes, Achyranthus aspera, Allium sativum* & many more that mimics the activity like that of synthetic amino acids.

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