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Effect of garlic and holy basil leaf powder supplementation on blood profile of broiler chicks

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Abstract

The purpose of this research work was to evaluate the effect of dietary supplementation with different levels of garlic and holy basil leaf powder on the blood profile of broiler chicks. A total of 280 day-old broiler chicks were procured and randomly distributed into 7 treatments, each treatment had 4 replicates with 10 chicks in each replicate. T₁ was served as control and fed a basal diet formulated as per standards. T₂ and T₃ were fed with garlic powder @ 0.5, 1% feed, respectively. T₄ and T₅ were given with holy basil leaf powder @ 0.5, 1% feed, respectively. T₆ was fed with garlic powder and holy basil leaf powder @ 0.5% each. T₇ was treated with garlic powder and holy basil leaf powder @ 1.0% each. At the end of the 6th week of the feeding trial blood was collected from the jugular vein of the randomly selected bird per replication group using hypodermic needle and syringe. Five millilitre of blood was collected from each chicken and transferred immediately into a set of sterile vacutainers with anti-coagulant (EDTA) for haematological tests. Present study showed that hemoglobin was found significantly ($P < 0.05$) higher in T₅ & T₆ as compare to T₁, T₂ & T₃. While RBC, TLC & DLC (Neutrophil, Eosinophil, Basophil, Lymphocyte and Monocyte per cent) values did not differ significantly among treatment groups. However, the values for all the hematological parameters were within normal range.

Keywords: Garlic, holy basil, broiler, sterile vacutainers, anti-coagulant

Introduction

Sub-clinical application of in-feed antibiotics in animal diets has arisen into a controversial issue worldwide and is facing reduced social acceptance due to the appearance of residues and resistant strains of bacteria. As a result new alternatives are being introduced to livestock producers, among which phytogenic and herbal products have been given considerable attention as possible in-feed antibiotics substitutions. Beneficial effects of bioactive plant substances in animal nutrition may include the stimulation of appetite and feed intake, the improvement of endogenous digestive enzyme secretion, activation of immune responses and antibacterial, antiviral and antioxidant actions.

Garlic (*Allium sativum*) has been a subject of considerable interest as a medicine and therapeutic agent worldwide since ancient times. Main pharmacological effects of garlic are attributed to its organosulphur compounds^[19]. Allicin – the main bioactive component of garlic – may account for some effects of garlic^[2]. *In vitro* studies have shown that garlic possesses antibacterial, antifungal, antiparasitic, antiviral^[3], antioxidant^[13], as well as antithrombotic, vasodilatory and anticancer^[1] activities. It has benefits in lowering total plasma cholesterol, reducing blood pressure and decreasing platelet aggregation^[17].

Tulsi contains eugenol and ursolic acid having pharmacological effects^[12]. Some of the main chemical constituents of Tulsi are: oleanolic acid, ursolic acid, rosmarinic acid, eugenol, carvacrol, linalool^[11]. The plant is reported to possess anti-infertility, anticancer, antibacterial^[9], antidiabetic, antifungal, antimicrobial, hepatoprotective, cardioprotective, antiemetic, antioxidant^[18], antispasmodic, analgesic, anti-ulcerogenic and ulcerhealing properties, adaptogenic^[15]. The purpose of this investigation was to study the effects of supplementing garlic and holy basil leaf powder on blood profile of broiler chicks.

Materials and Methods

A total of 280-day-old commercial broiler chicks (Vencobb-400) were procured and randomly distributed into seven treatment groups of 40 chicks each. Each treatment groups was further subdivided into four replicates of ten chicks each. The herbs used in the study were purchased from local market.

The experimental diets (Table 1) were formulated to meet the nutrient recommendations [4]. Growth trial of 6 weeks was conducted in a complete randomized design comprising seven dietary treatments. T₁ was served as control and fed a basal diet formulated as per [4] standards. T₂ and T₃ were fed with garlic powder (GP) @ 0.5, 1% feed respectively. T₄ and T₅ were given with holy basil leaf powder (HBLP) @ 0.5, 1% feed respectively. T₆ was fed with 0.5% GP and 0.5% HBLP. T₇ was treated with 1.0% GP and 1.0% HBLP.

The chicks were kept hygienically on floor litter system in separate pens. All the birds were reared adopting uniform management conditions. The chicks were brooded at 35°C during the first week and thereafter the temperature was reduced by 3°C every week until the temperature reached 25±1°C. The birds were vaccinated against prevailing diseases adopting a standard protocol. Haematological analysis was carried out using the blood collected from the experimental chickens at the end of the 6th week of the feeding trial. The birds were kept off feed and water for three hours and blood was collected from the jugular vein of the randomly selected bird per replication group using hypodermic needle and syringe. Five millilitre of blood was collected from each chicken and transferred immediately into a set of sterile vacutainers with anti-coagulant (EDTA) for haematological tests. The erythrocytes values; {Haemoglobin (Hb), Red blood cells (RBC), White Blood Cells (WBC), Differential leucocyte count (DLC) (neutrophils, eosinophil, basophil, monocyte and lymphocytes) were carried out with the automated haematology cell counter MS4s (Melet Schloesing Laboratoires France).

The data were analyzed using general linear model procedure of statistical package for social sciences 20th version (SPSS) and comparison of means tested using Duncan's multiple range test [5] and significance was considered at $P<0.05$.

Result and Discussion

Present study showed that hemoglobin was found significantly ($P<0.05$) higher in T₅ & T₆ as compare to T₁, T₂ & T₃. While RBC, TLC & DLC (Neutrophil, Eosinophil, Basophil, Lymphocyte and Monocyte per cent) values did not differ significantly among treatment groups. However, the values for all the hematological parameters were within normal range. Earlier report also documented that improvement in hemoglobin (Hb) due to addition of herbal in feed supplementation [6]. observed significant increase in Hb level while feeding herbal plant (neem) to the laying hen whereas, non-significant increase on RBC level. While [7] noticed non-significant effect on Hb when fed *Withania somnifera* to the animals. Our result are in agreement with the result of [14] and [7] who reported significant effect on hemoglobin and red cell count, while feeding *Withania somnifera* to animals. The improvements in hematological parameters with the supplementation of holy basil have been also reported by [8] and [16]. While, [10] conducted an experiment to check the efficacy of tulsi (*Ocimum sanctum*) and neem (*Azadirachta indica*) leaves extract as a growth promoter in broiler and found that hematological parameters (TEC, PCV, Hb and ESR) were not significantly changed in the treated and control group and suggesting no side effects of herbal extracts in broiler.

Table 1: Mean values of Hb, RBC, TLC & DLC contents in blood of broilers under different treatments

Treatments	Hb (g/dl)	RBC (m/mm ³)	TLC (th/mm ³)	DLC				
				Neut. (%)	Eos. (%)	Baso. (%)	Lym. (%)	Mono. (%)
T ₁	11.00 ^a ±0.40	2.75±0.25	31.75±0.47	36.50±0.95	4.75±0.47	0.56±0.28	52.00±1.29	6.25±0.25
T ₂	11.00 ^a ±0.12	2.75±0.25	31.00±1.47	36.50±1.65	5.00±0.40	0.43±0.15	51.75±1.65	6.00±0.40
T ₃	11.00 ^a ±0.17	3.25±0.25	30.50±1.70	35.00±1.78	5.75±0.85	0.55±0.09	52.75±1.70	5.75±0.25
T ₄	11.50 ^{ab} ±0.50	3.00±0.00	30.75±1.60	34.50±1.04	5.25±0.25	0.50±0.08	53.00±1.08	6.50±0.28
T ₅	12.00 ^b ±0.10	2.75±0.25	30.25±1.60	37.25±1.25	5.00±0.40	0.40±0.14	51.25±0.94	6.50±0.28
T ₆	12.00 ^b ±0.09	3.25±0.25	29.25±0.85	36.25±1.31	5.50±0.64	0.45±0.05	51.50±1.25	6.15±0.15
T ₇	11.75 ^{ab} ±0.25	3.00±0.00	29.75±1.31	35.25±1.10	5.50±0.50	0.35±0.25	52.50±1.19	6.05±0.25

a,b,c The mean values in same column with different superscripts differ significantly ($P<0.05$)

Conclusion

It was concluded that supplementation of holy basil leaf powder @ 1.0% and combination of garlic and holy basil leaf powder @ 0.5% each in the broilers diet improved hemoglobin concentration in the blood without any adverse effects.

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