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A STUDY OF EFFECT SUPPLEMENTATION VARIOUS LEVELS OF BOSWELLIA SERRATA POWDER TO RATION OF BROILER CHICKENS ON SOME PRODUCTIVE AND HEMATOLOGY TRAITS

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Abstract

This research was conducted to regulate the influence of adding different levels of Boswellia serrata into diet on some productive and physiological traits of broiler chickens. The analysis involved 375 Ross 308 chicks divided into 5 treatments of 3 replicates each, and each treatment groups constituted 75 chicks. Boswellia serrata powder was accompanied to the diet of broiler throughout the total period of experiment which persisted 42 days at standard of 0 (C), 1 (BS1), 1.5 (BS1.5), 2 (BS2), and 2.5 (BS2.5) g / kg. Productive parameters which involved body weight (BW), body weight gain (BWG), feed consumption (FI) and feed conversion ratio (FCR) were recorded each week thru the period of experiment. From each replica, three birds were slaughtered at the age of 42 days to analyses the homological traits which included erythrocyte numbers (RBC), hemoglobin concentration (Hb), packed cell volume (PCV) and blood plasma concentrations of total protein, calcium, glucose, cholesterol, triglycerides. Results showed that the (BS2.5) treatment 2.5 g/ kg diet traveled substantial progress ($P<0.05$) in growth performance traits (body weight, weight gain and feed conversion ratio), homological characters (Red blood cell, Hemoglobin, Packed cell volume, Total protein) and decreased ($p>0.05$) (feed intake, glucose, cholesterol and triglycerides) in comparison with (C) group, moreover, BS2, BS1.5 and BS1showed sequentially improved after BS2.5 group. It was consummated that broiler chicken's that dieted Boswellia serrata particularly (BS2.5) might have emphatically affect on growth performance and hematological characteristics of the broilers.

Keywords: Broiler chickens, Boswellia serrata, Productive and hematological

Introduction

In developed countries, the acceptance and application of substitute medicine is increasing following the directives of the World Health Organization, which has led to giving scientific credibility to many medicinal plants and herbs through the publication of many research and studies (Dilhuydy and Patients, 2003). Some of the remedial countenance of herbal plants or their active molecules are due to their secondary metabolites effect (Abd El-Hack et al., 2018). Frankincense, its scientific name is Boswellia carterii, it is a white to yellowish-white substance extracted from the incision of the roots of trees of the genus Boswellia. It flows in the form of tears that are collected after drying (Fan et al., 2005).

Boswellia serrata or frankincense from the Arabian Peninsula belonging to the Burseraceae family, It have various curative activities like anti-inflammatory and bactericidal properties, due

to the presence of numerous aromatic compounds with boswellic acid the utmost active molecule (Kiczorowska, et al., 2016). It contains many active compounds, the proportions of which vary according to climate, soil, harvest season, and storage life. Frankincense oil contains the following active compounds: monoterpenes 13.1%, diterpenes 42.5% and sesquiterpenes 2.7% (Hamm, et al., 2005).

The performance and the digestibility of nutrients in broilers diet can be improves due to the microbiological stabilization of the small intestine by the activity of boswellic acids when the supplementation of phytoextract as Boswellia serrata (Tabatabaei, 2016). Boswellia serrata resin is widely used as aphrodisiac and fertility promoter, it comprises boswellic acid and extra cyclic composites which performance as steroids and depresses fat profile and blood sugar, additionally it has strong antioxidant and antimicrobial influence and used for usage of numerous inflammatory diseases (Maksimović Zoran, 2021). These healing activities can perhaps be used in poultry species to obtain many positive effects on domestic animal and well-being (Al-Yasiry, et al., 2017).

There is a few of studies dealt with Boswellia serrata on broiler performance. For that the present study indicates an estimate of the impact of Boswellia serrata as a accepted appendage in diet on some growth and homological parameter in broiler chickens.

Methodology

This experiment was conducted in the poultry farmhouse of the Department of Animal Production Technologies in the Al-Musaib Technical College for the period from 3/4/2022 to 14/5/2022 to find out the effect of adding Boswellia serrata powder to a diet on some productive and physiological characteristics of broiler chickens. In this study, 375 non-sexed Rose 308 broiler chicks were used in one of the private hatcheries in Babylon province, with an initial weight of 41 gm/chicken. The chicks were distributed evenly and randomly on the coop. The experiment included five treatments, each containing 75 chicks distributed among 3 replicates, each replicate 25 chicks. The treatments included adding Boswellia serrata powder to the diet in quantities of 0, 1, 1.5, 2 and 2.5 g/kg of feed for the first, second, third, fourth and fifth treatments, respectively. The chicks were fed ad libitum on a commercial diet that contained 22% protein and energy represented by 2950 kilocalories/kg of feed in the starter diet, which lasted up to 21 days, and 20% protein and energy represented by 3001 kilocalories/kg of feed in the growth diet until the marketing age of 42 days. Since the beginning of the experiment, in each week, the following characteristics were measured body weight, body weight gain, feed intake and feed conversion ratio for the chicks of the experimental treatments. At the end of the experiment period, blood was collected from 9 birds for each treatment 3 birds for each replicate, which were randomly selected by jugular vein and by using tubes of potassium EDTA anticoagulant. After that we divided the blood into two parts, the first was used to measure the total number of erythrocytes (RBC), hemoglobin (Hb) and the packed cells volume (PCV). Which was immediately frozen at a temperature of -20 degrees celsius until tests were performed on it, which included: protein concentration, calcium, phosphorus, glucose, cholesterol, and triglycerides. Total number of

erythrocytes (RBC), hemoglobin concentration (Hb) and packed cells volume (PVC) were estimated according to the methods reported by (Archer 1965). The protein concentration was measured based on Young and Friedman (2001), calcium concentration according to Kramer and Tisdall (1982), phosphorus depending on Fiske and Subbarow (1982), glucose according to Asatoor and King (1954) and high density lipoprotein (HDL), low density lipoprotein (LDL), cholesterol and triglycerides based on Trinder (1969).

To study the influence of various coefficients on the planned traits a complete randomized design was used , important variances among the means were paralleled by Duncan's test (Duncan, 1955), the SAS (1996) program was used in the statistical analysis.

Results and discussion

Productive traits

The productive traits are noticed in Table 1. The diverse levels of Bosswellia serrata significantly ($p < 005$) augmented live body weight and body weight gain at 3 and 6 weeks of broiler age. The highest values ($p < 005$) were noted in groups BS2.5, BS2, BS1.5 and BS1g/kg diet respectively paralleled to the standard group. Broiler chicken that received altered levels of Bosswellia serrata diets significantly ($p<005$) expended fewer feed than the standard during 1–6 week of age. Broiler nourished a diet accompanied with Bosswellia serrata at altered levels (2.5, 2, 1.5 and 1) have a significantly ($p< 005$) improved feed conversion ratio than the control throughout 1- 6 week of age individually. Nonetheless, broilers supplied with 2.5 g Bosswellia serrata /kg verified the greatest feed conversion ratio than standard and rest group. The current research presented benefits of alimentary reinforced by way of Bosswellia serrata on the live body weight and body weight gain of broiler chickens, the identical direction found by Salah et al. (2021) who found that chicks fed diets supplemented with (1.5, 1, or 0.5 g/kg) of Boswellia serrata had a favorable impression on broiler growth case. This increase may be due to the fact that the Bosswellia serrata contains sesquiterpines that affect the hypothalamus and stimulate it to secrete thyroxin, which is responsible for metabolism and growth hormone (Demirci, et al., 2003). Similarly, Al-Yasiry et al. (2017) indicated that alive body weight and body weight gain were improved in broiler fed diets enriched with Bosswellia serrata at lvevel (3, 4, or 5%). Bosswellia serrata have a some active compounds such as boswellic acid may be due to stimulating the ability to digestible nutrients and absorption this was beneficial to improvement in alive body weight and body weight gain (Kiczorowska et al., 2016). In this study, there was a clear effect ($p< 0.05$) on the feed conversion ratio when adding Bosswellia serrata compared with the control group, this may be due to the efficiency of utilization of the components of the feed used by this addition. The research data are not agree with Tabatabai et al., (2012) who stated that the feed conversion ratio in broilers fed using 0.5% Bosswellia serrata was upper than that of broilers nourished in the standard group thru the growth period. Growth and productive qualities promotes through phenolic compounds which included of monoterpene, hydrocarbons, pinene, alpha and oxygenated monoterpenes located in Bosswellia serrata impeded the growing and manufacture of bacterial toxins from their noninverse collaboration with amino acids and manifold peptides of the bacterial cell wall (Tsuchiya et al., 2003).

Table 1. Effects of dietary supplementation of Boswellia serrata powder on productive traits of broiler chickens during 3 and 6 weeks of breeding period.

Overall growth performance 3 weeks	**C**	**BS1**	**BS1.5**	**BS2**	**BS2.5**
Final body weight/g	1069.33^{b} ±51.10	1264.05^{a} ±10.86	1277.72^{a} ±67.19	1290.40^{a} ±87.32	1296.81^{a} ± 52.42
Final body weight gain /g	765.20^{b} ±31.07	887.68^{a} ±51.13	913.89^{a} ±67.22	963.88^{a} ±57.79	977.19^{a} ±44.38
Total feed intake/g	1215.09 ± 74.61	1220.18 ±87.87	1176.32 ±78.45	1134.63 ±43.10	1119.24 ± 53.90
Feed conversion ratio	1.58^{a} ±0.13	1.37^{b} ± 0.11	1.28^{b} ±0.15	1.17^{c} ±0.02	1.14^{c} ± 0.01
significantly	P <0.05	P <0.05	P <0.05	P <0.05	P <0.05
Overall growth performance 6 weeks	**C**	**BS1**	**BS1.5**	**BS2**	**BS2.5**
Final body weight/g	1842.28^{b} ±68.20	2179.67^{a} ±77.85	2193.14^{a} ±56.15	2198.97^{a} ±58.97	2223.66^{a} ±89.15
Final body weight gain /g	1752.69^{b} ±46.21	2111.42^{a} ±88.53	2107.35^{a} ±54.62	2152.33^{a} ±91.42	2167.23^{a} ±67.46
Total feed intake/g	3048.20 ± 95.18	2996.55 ± 84.21	2891.11 ±72.22	2866.77 ±85.23	2669.42 ±80.56
Feed conversion ratio	1.73^{a} ±0.03	1.41^{b} ±0.07	1.37^{b} ±0.05	1.33^{b} ±0.06	1.23^{c} ± 0.04
significantly	P <0.05	P <0.05	P <0.05	P <0.05	P <0.05

The different letters a, b, c within the same row are significantly different among themselves at p < 0.05.C = control; BS1= control +1g Boswellia serrata /kg diet; BS1.5 = control + 1.5 g Boswellia serrata /kg diet; BS2 = control + 2 g Boswellia serrata /kg diet; BS2.5 = control + 2.5 Boswellia serrata /kg diet.

Hematological traits

The results of the hematology parameters exposed in Table 2. There appeared a significant (P<0.05) difference between the experimental treatments, where we notice an increased in the number of red blood cells, hemoglobin, packed cells volume, concentration of protein, calcium and phosphorus in favor of the groups to which the Boswellia serrata was added. The highest values were in favor of the BS2.5 (2.5 g/kg diet) of BS2, BS1.5 and BS1 compared to the standard group (C). Data showed that with management of Boswellia serrata, broilers presented enhancement in foremost blood parameters**.** From this result, we conclude that Boswellia serrata ensures a beneficial influence on the hematology characteristics of broilers. An improvement in the processes of consumption and assimilation is escorted by an upsurge in the number of erythrocyte, as they are answerable for transferring oxygen and nutrients to the numerous cells of the body. Sturikie (2000) stated that the rise in the number of erythrocyte is convoyed by an

upsurge in the concentration of hemoglobin and the volume of compacted blood cells, and is escorted by an increase in the active metabolites in the bloodstream, which are used in building processes within the body, such as protein, calcium and phosphorus. The results of our study do not agree with Devi et al.,(2012) who was reported when he added different dosages of 1000, 500 and 100 mg / kg of alcoholic extract of Boswellia ovalifoliolata by mouth till 28 days, as no noteworthy differences appeared between the experimental group and the standard group. We found that there is a harmony with what Al-Yasiry et al., 2016 found when he added (3 g Boswellia serrata / l water) where his results showed a remarkable improvement ($P < 0.05$) in blood qualities (number of red blood cells, hemoglobin concentration and PCV volume) and decreased ($p > 0.05$) glucose and cholesterol. It is also observed in Table 2 that the addition of Boswellia serrata powder to the ration (BS2.5, BS2, BS1.5 and BS1) of broiler led to a significant ($p < 0.05$) reduction in the concentration of cholesterol, triglycerides, and LDL and to a substantial ($p<0.05$) upturn in the concentration of HDL in blood plasma compared with the control group. This is due to the fact that Boswellia serrata contains phenolic compounds such as carbolic and phonic acid, which work to inhibit the intentions of liver cells, thus reducing the secretion of cholesterol from the liver, which leads to a decrease the cholesterol and triglycerides in the blood (Owsley and Chaing, 2003). The search results did not agree with 5 who reported that no significant differences in serum glucose of broilers fed nutrition added using 5, 4, and 3% Boswellia serrata (Al-Yasiry et al., 2017). On the other hand, Baak (2004) proved that phenolic acids reduce blood pressure and low-density lipoproteins, this is consistent with the results of our current research.

Table 2. Effects of dietary supplementation of Boswellia serrata powder on some blood characteristics and content of plasma (mean ± standard error) of broiler chickens at 42 days.

Traits	**Treatments**				
Blood characteristics	**C**	**BS1**	**BS1.5**	**BS2**	**BS2.5**
RBC ($\times 10^6$/mm^3)	2.72^c ±0.3	3.31^b ±0.4	3.34^b ±0.3	3.39^b ±0.4	4.41^a ±0.4
Hb (g/100 ml)	8.6^c ±0.7	8.9^b ±0.6	9.1^b ±0.7	9.9^b ±0.5	10.2^a ±0.4
PCV (%)	30.1^c ±1.2	31.7^b ±0.8	31.9^b ±1.2	33.2^b ±1.3	35.2^a ±0.8
protein concentration (g/100 ml)	3.8^c ±0.6	4.2^b ±0.4	4.8^b ±0.3	5.1^a ±0.4	5.7^a ±0.3
Calcium concentration mg/100 ml	7.7^c ±0.7	8.2^b ±0.5	9.1^b ± 0.5	10.9^a ±0.3	11.1^a ±0.5
Phosphorus concentration mg/100 ml	5.1^c ±0.4	6.1^b ±0.2	6.3^b ±0.3	6.7^b ±0.2	7.3^a ±0.3
Content of blood plasma	**Treatments**				
	C	**BS1**	**BS1.5**	**BS2**	**BS2.5**
Glucose (mg/100 ml)	252.2^a ±11.4	200.4^b ±10.7	198.6^b ±12.2	190.9^c ±11.8	190.1^c ±10.3

Cholesterol (mg/100 ml)	111.1[a] ±8.6	100.3[b] ±6.4	98.7[b] ±6.8	95.1[c] ±7.8	92.2[c] ±8.6
Triglycerides(mg/100 ml)	50.4[a] ±8.2	46.1[b] ±6.8	44.6[b] ±5.2	39.5[c] ±7.2	36.6[c] ± 4.8
HDL (mg/100 ml)	24.2[c] ±1.4	25.8[b] ±1.3	26.6[b] ±1.4	30.1[a] ±1.6	31.2[a] ±1.2
LDL (mg/100 ml)	11.1[a] ±0.7	10.4[b] ±0.6	9.9[b] ±0.8	7.8[c] ±0.6	7.4[c] ±0.4

The different letters a,b,c within the same row are significantly different among themselves at $p < 0.05$.C = control; BS1= control +1g Boswellia serrata /kg diet; BS1.5 = control + 1.5 g Boswellia serrata /kg diet; BS2 = control + 2 g Boswellia serrata /kg diet; BS2.5 = control + 2.5 Boswellia serrata /kg diet.

Conclusion

Boswellia serrata showed a variety of positive effects, especially the effects on poultry vitality by showing the best performance in terms of productive and blood traits. Boswellia serrata can correct a malfunctioning metabolic pathway in the body when supplementation in broiler diet .

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