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The Effect of Iraqi Propolis Supplementation on Internal Organs and Some Physiological Traits in Broilers

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Abstract: ***An experiment was conducted to investigate the effects of Propolis on a total of 500 one day–old broiler Ross (308) on some physiological traits in broilers. This experiment was carried out in a completely randomized design with 5 treatments (different levels of propolis including 0, 150, 300, 450 and 600 mg/kg diet). At the age of 21 days and at the end of the experiment (42 days of age), blood samples were collected from 10 birds per group for hematological and biochemical study. Packed cell volume (PCV) , hemoglobin(Hb) , red blood cells (RBC), white blood cells (WBC) were measured .The serum was analyzed for total triglyceride, high-density lipoprotein (HDL). Total protein, calcium (CA) and carbohydrates (CHO). Results showed that PCV and Hb were significantly higher for birds fed 150 mg/kg and birds fed 300 mg/kg respectively. RBC and total protein at 42 days were decreased for the experimental treatments .while the levels of 450 and 600 mg/kg propolis didn't affect TG or HDL. Some differences were noticed in Gizzard, Heart, Liver and spleen percentage weights.***

Keywords: broiler, blood traits, internal organs

1. Introduction

Many countries tend to prohibit the use of antibiotics as growth promoters due to their effects and their residual problems in tissue and eggs of birds. Supplementation of natural components in poultry diet is now widely distributed in the world. These components are used as growth promoters, which are healthful and help to improve the performance of animal and poultry without any harmful effect (El-Ghamry *et al*., 2002).

Propolis is one of these components. It is an adhesive, dark yellow to brown colored exudates. It collected by bees from buds, leaves and similar parts of trees and plants like pine, oak, eucalyptus and chestnut and mixed with their wax (Valle, 2000). It is considered as an excellent natural antibiotic and immune system booster (Bratter *et al*., 1999). It has a strong antibacterial activity in addition to antifungal, antiviral and antiprotozoal properties (Scheller *et al.*, 1999). Propolis supplementation is used in many studies in poultry diet with positive effects on its welfare and performance like increase in feed intake and body weight (Shalmany and Shivazad, 2006 and Tatli Seven *et al*., 2008). It is also used as antioxidant, antimicrobial and anti mutagenic based on its rich flavonoid, phenolic acid tetrapenoid contents (Kimoto et al., 1999; Prytzyk et al., 2003 , Wag *et al*., 2003).

A few researches has discussed the use of Iraqi propolis in animal feed and its effects and composition , Hence the purpose of the present study was to determine the possible beneficial effects of dietary propolis on some physiological parameters in broilers.

2. Materials and Methods

The propolis was purchased from a local bee keeper in Baghdad- Iraq and used without any processing , Five hundred one day–old broiler chicks (Ross 308), were housed in fully closed house , weighted individually and randomly allocated to dietary treatments. Feed and water were available ad libitum. Wood shavings were used as litter. The experiment was carried out in Animal science department in The Ministry of science . A completely randomized design was used with 5 treatments each treatment includes 100 (4 replicates) birds. Starter (1-21 days of age) and finisher (21-42 days of age) diets were formulated according to the requirements of the NRC (1994). (Table1). The animal welfare blood sampling was supervised and licensed by ethical committee in Animal science department- Ministry of science. The experimental groups were as follows; group I (control) were fed the basal diet, group II was fed the basal diet +150mg propolis /kg diet, group III fed the basal diet + 300mg propolis /kg diet, group IV fed the basal diet + 450mg propolis /kg diet. Group V fed the basal diet + 600mg propolis /kg diet. Continuous lighting program (23 hours lightning: 1 hour darkness) was used. At the age of 21 days and at the end of the experiment (42 days of age), 3 ml ^{3} of blood was collected from the brachial vein of 10 birds per group for hematological tests using evacuated tube. Packed cell volume (PCV) , Hemoglobin (Hb) , Red Blood Cells (RBC) , were measured . Within one hour of collection the serum was separated by centrifuging . The serum was then analyzed for total triglyceride, high-density lipoprotein (HDL), total protein , Calcium (CA) and Carbohydrates (CHO) were measured, using kits from Biocon© company .packed cell volume was determined according to Wintrobe (1961). Whole blood smears were prepared and stained by Gemsa stain and leukocyte differential count was determined microscopically according to MacGregor (1940). Hemoglobin was assayed by a colorimetric method. Internal quality control was achieved by including control samples of known value in at least two different levels of concentration. at the end of the experiment Gizzard , Heart , Liver and spleen were weighed.

Data were analyzed using ANOVA complete randomized design followed by Duncan multiple range test between treatment mean(Duncan,1955) with the aid of SPSS 11.0 statistical software (Spss, Inc, Chicago, IL,2001).

3. Results and Discussion

Birds fed 150 and 450 mg/kg propolis had a significantly higher PCV (table 2) at 21 days of age compared with other treatments , at 42 days of age birds fed 150 and 300 mg/kg propolis had the higher PCV ($p<0.01$). From the same table , Birds fed 300 ,450 and 600 mg/kg propolis had significantly the highest Hb at 21 days of age , while at 42 days of age birds fed 150 and 300 mg/kg propolis had the higher Hb ($p<0.01$). birds fed 150 mg/kg propolis had the highest RBC count at 21 days, and control had the higher RBC count at 42 days. birds fed 150 and 300 mg/kg propolis was significantly higher than other treatment for total protein at 21 days , at 42 days of age birds fed 450 and 600 mg/kg propolis had the higher total protein ($p<0.01$).

All experimental diets except 450 mg/kg propolis had higher ($p<0.01$) blood ca at 21 days, while only 300 mg/kg propolis had a significantly high blood ca at 42 days of age . birds fed 600 mg/kg propolis had the higher blood glucose at 21 days ($p<0.01$). while no differences were noticed at 42 days .

Birds fed 450 and 600 mg/kg propolis had higher ($p<0.01$) blood triglycerides at 21 days , while only 600 mg/kg propolis had a significantly high blood triglycerides at 42 days of age, birds fed 150 mg/kg propolis had the higher blood high density lipoprotein at 21 days ($p<0.01$). Birds fed 6oo mg/kg propolis had the higher blood CHO at 21 days of age ($p<0.01$). while no differences were noticed at 42 days. Birds fed 150 and 300 mg/kg propolis had the higher blood high density lipoprotein at 42 days birds fed 300 mg/kg propolis had the highest ($p<0.01$) heart and liver percentage weight . while birds fed 450 mg/kg propolis had the higher gizzard percentage weight and birds fed 150 mg/kg propolis had the highest spleen percentage weight .

Propolis had a significant role in Hb increase by raising the availability and absorption of iron which led to higher Hb building (Al-Sultany, 2011) . can be explained by the presence of active compounds in propolis like flavons and flavonoids which indicate a good response to the stressors , this result agrees with the results of Galal et al (2008) who found .

The increased total protein and RBC count for the experimental diets at 42 days of age can be done by the metabolic effects of propolis which stimulate the production of immune proteins because of its high rates of flvons , flavonoids , and amino acids . this result agreed with those of Campos et al (2003) and Mametha et al (2011) who found an anabolic effect for the propolis contributing in body tissue building and growth by its concentrates of growth stimulating compounds like amino acids especially Alanine and Arginine fatty acids , vitamins , and minerals leading to improve birds health. PCV results agrees with those of Haro et al (2000) who noticed higher PCV for broilers fed proplis which they explained it by its role in increasing iron availability and renewing hemoglobin efficiency . Propolis had a very important role in enhancing oxygen delivery to all body tissues as a response to RBC increase, this role played by propolis came from its direct effect on hemitropic tissue in bone marrow which increase the red blood cells synthesis (Marcucci ,1995). The results also agreed with those of Cetin et al (2010) who fed the laying hens 3g/kg and recorded a significant increase in PCV. Propolis can help in prophylaxis from anemia in broilers by boosting iron absorption and metabolism and hemoglobin renewing (Haro et al ,2000).

Total proteins in broilers blood is a direct reflection of metabolism status because blood proteins , especially the albumin do a great job in transferring carbohydrates , fatty acids , vitamins , and some hormones like thyroxin which is essential in metabolism (Abo- salem et al,2009). The total protein results agree with those of Galal et al (2008) who noticed higher total protein in the blood of broilers fed on propolis which they explained by its metabolic effects and the stimulating of immune proteins synthesis under the effect of flavons.

HDL results agrees with the results of Ozan et al (2007) who recorded a therapeutic effects by increasing HDL by changing the liver metabolism .While it disagree with the results of Mametha (2011) who didn't notice any changes in HDL levels in broilers blood when fed different levels of propolis . Its also disagree with Mani et al (2007) who didn't find any differences in HDL levels in mice blood when fed 1,3,or 6 mg/kg propolis.

CHO results show no differences at the end of the experiment which agrees with the results of Mametha (2011) who didn't find any significant effect for the propolis on CHO blood levels when fed to broilers at 100,200, 300 mg/kg . The low TG levels in broilers blood fed 300,450 ,600 mg/kg is caused by the effect of Flavons which can increase the use of TG as an energy source , this result agrees with the results of Ahmet et al (2011) and Seven et al (2010) who noticed a significant decrease in TG blood levels .Internal organs percentage weight results showed a wide deferences between the treatments. Birds fed 600 mg/kg propolis had the lowest ($p<0.01$) percentage weights of the gizzard , heart , liver, and spleen . Which could be attributed to the accumulative effect of high dose of propolis (Ahmet et al ,2011)

4. Conclusion

From the results of this study it can be concluded that the propolis supplementation to broilers feed have a wide spectrum effects on blood traits , these effects caused by the vital compounds in propolis like flavons , vlavonoids and fatty acids , whch can change the metabolism of energy in the lever . thus , improving the physiological status of the body .

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Table 1: Dietary composition of experimental starter and finisher broiler diets

Ingredients (g/kg)	Starter (1- 21 days)	Finisher (21- 42 days)
Maize	30	30
Soybean meal	28	20
Wheat	27.7	35.5
* Protein concentrate	10	10
Vegetable oil	3	3
Limestone	1	1.2
Salt	0.3	0.3
TOTAL	100	100
Protein %	22.74	20.16
ME (kilocalorie / kg)	3078	3125.2

*Protein concentrate (44% protein , 2800 kilocalorie, 12% fat, 25% ash, 2.5 % ca , 2.9% p)

Table (2): The effect of propolis supplementation on RBC, TP, PCV, HB ,TG,HDL, CA, CHO, at 21 and 42 days of age and the percentage weights of gizzard, heart, liver, and spleen

			0 propolis	150 mg/kg propolis	300 mg/kg propolis	450 mg/kg propolis	600 mg/kg propolis
RBC	Age (day)	21	170.2±0.06c*	225.2±0.01a	173.6±0.05c	186.9±0.06b	176.1c
		42	160±0.01a	156±0.06b	148±0.04c	156±0.05b	131d
Total protein	Age (day)	21	33.9±0.52c	38.3±0.36a	35.7±0.31b	35±0.27b	38.9a
		42	49.2±0.51a	43.4±0.44b	40.9±0.26c	48.1±0.32a	49.2a
Pcv	Age (day)	21	22.0±0.16 b *	28.7±0.22a	22.7±0.31b	26.3±0.06a	22.10b
		42	25±0.50c	33±0.33a	32.7±0.26a	26.7±0.43b	24.7c
Hb	Age (day)	21	6.5±0.26b	6±0.27b	8.7±0.53a	8.1±0.38a	7.9a
		42	7.63±0.44c	10.30±0.25a	10.17±0.36a	8.20±0.29b	7.50c
TG	Age (day)	21	94.0±0.80d	101.4±0.96c	113.2±0.57b	118.0±0.73a	118.2a
		42	113.7±0.86c	78.7±0.59e	93.7±0.96d	118.9±0.88b	127.7a
HDL	Age (day)	21	15.9±0.56c	28.2±0.56a	17.1±0.56bd	14.2±0.56e	12.0f
		42	20.6±0.29a	18.2±0.58ab	19.9±0.43a	11.9±0.49c	12.3c
CA	Age (day)	21	1.65±0.24b	1.85±0.39a	1.80±0.06a	1.60±0.16b	1.85a
		42	3.0±0.26b	3.15±0.09b	3.40±0.17a	1.80±0.08e	2.30d
CHO	Age (day)	21	118.1±0.88c	120.2±0.90c	131.3±0.93b	107.8±0.85d	146.6a
		42	134.7±0.06	130.1±0.07	138.5±0.06	137.4±0.03	139.9
Gizzard %			2.30±0.27 b*	2.29±0.69 b	2.03±0.36 c	2.45±0.54 a	2.03 c
Heart %			0.97 ±0.02a	0.82±0.03 b	0.96±0.03 a	0.52±0.04 d	0.60 c
Liver %			3.41±0.58b	3.52±0.58 b	3.89 ±0.45a	3.12±0.43 c	2.76 d
Spleen %			0.215±0.06 b	0.240 ±0.07a	0.155 ±0.02c	0.106±0.01 e	0.146 d

*The different letters in the same row indicate a significant differences.