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RESEARCH OPINIONS IN ANIMAL & VETERINARY SCIENCES

Research article

# The effect of propolis supplementation on broiler performance

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Article history
Received: 23 Mar, 2017
Revised: 16 Apr, 2017
Accepted: 21 Apr, 2017

## Abstract

An experiment was conducted to investigate the effects of propolis on broiler performance and carcass characteristics. The experiment was carried out with a completely randomized design of 5 treatments, supplemented with propalis at the rate of 0, 150, 300, 450 and 600 mg/kg diet for 6 weeks. Results showed that body weight, weight gain, feed intake and feed conversion ratio were significantly ($P<0.05$) higher in the experimental diets throughout the experiment. From the results of the present study, we concluded that propolis has positive effects on performance and carcass characteristics of broilers.

**Keywords:** Broiler; performance; propolis; carcass characteristics

**To cite this article:** Al-Rubaee MAM and MM Jawad, 2017. The effect of propolis supplementation on broiler performance. Res. Opin. Anim. Vet. Sci., 7(2): 29-32.

## Introduction

Due to the recent ban on the use of antibiotics in poultry feed, there is a strong need to find suitable alternative supplements to maintain the animal health without any compromise on the product. Recently, studies are focused on the use of searching for the alternative products that can improve the growth, feed utilization and maintain gut health (Zhang et al., 2005).

Propolis is a resinous material, collected by honeybees from the buds and bark of certain trees and plants (Bankova et al., 2000). It has been suggested that propolis has many useful properties including antifungal, antibacterial, antiviral, and many other beneficial biological activities such as anti-inflammatory, antitumor, local anesthetic, antiulcer, hepatic-protective and immune stimulating (Bankova et al., 2000; Fatoni et al., 2008).

This study was designed to find the effects of propolis supplementation on broiler performance and carcass characteristics.

## Materials and Methods

Propolis was purchased from a local bee keeper in Baghdad, Iraq. A total of 500 one day old broiler chicks (Ross 308) were raised according to social and behavioural research ethics committee.

Chicks were weighed individually and randomly allocated to 5 dietary treatments. Feed and water were available *ad libitum*. Experiment was carried out in a completely randomized design with 5 treatments, having identical number of birds (4 replicates). Starter and finisher diets were formulated according to the requirements of NRC (1994) (Table1).

The experimental groups were as follows:

Group I (control) fed a basal diet,

Group II fed the basal diet + 150 mg propolis /kg diet, Group III fed the basal diet + 300 mg propolis /kg diet, Group IV fed the basal diet + 450 mg propolis /kg diet. Group V fed the basal diet + 600 mg propolis /kg diet.

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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).

Continuous lighting program (23 hours lightning: 1 hour darkness) was provided. Chicks were individually weighed once a week to obtain the average live body weight and body weight gain. Feed intake was also recorded weekly to calculate feed conversion ratio.

At the end of the growing period (42 days old), five birds from each treatment were randomly selected, weighed and slaughtered. Carcasses and cut up parts were also weighed.

**Statistical Analysis**

All data were analyzed using one way analysis of variances (ANOVA) followed by Duncan Test. Differences between treatments were analyzed using SPSS11.0 statistical software (SPSS, Inc., Chicago, IL,2001).

## Results

The effect of different levels of propalis on performance and carcass characteristics are given in Table 2. Chicks fed a diet containing 300 mg propolis showed a significantly (P<0.05) higher body weight on day 14 and 21 of the experiment. On day 28, body weight was significantly (P<0.05) high in birds fed with 150 mg/kg propalis. On day 35 and 42, body weight was significantly (P<0.05) high in birds fed with 150 and 300 mg/kg propalis. Weight gain was significantly (P<0.05) high in group of birds fed with 300 mg/kg propalis during the first week. During second and third week, it was significantly (P<0.05) high in birds supplemented with 150 mg/kg. During the fourth week, weight gain was significantly (P<0.05) high in al the treated groups compared to the control with no significant difference between the treated groups. During week 5 and 6, birds fed with 150 and 300 mg/kg propalis in the treated groups compared to the control. Feed intake was significantly (P<0.05) low in birds fed with propalis at the rate of 600 mg/kg in first and second week. In week 3, 4 and 5, feed intake was significantly (P<0.05) low in birds supplemented with 450 mg/kg propalis. In the last week, feed intake was significantly (P<0.05) low in birds fed with propalis at the rate of 300 mg/kg. Feed conversion ratio was significantly (P<0.05) high in birds fed with propalis at the rate of 600 mg/kg during first, second and third week. In week 4, FCR was significantly high in birds supplemented with 450 mg/kg propalis. In the week 5, FCR was significantly (P<0.05) high in all the treated groups compared to the control. During the last week, FCR was significantly (P<0.05) high in birds supplemented with 450 mg/kg propalis.

Dressing percentage and breast weight percentage were significantly (P<0.05) low in birds supplemented with propalis at the rate of 300 mg/kg, while leg weight was significantly (P<0.05) high in the same group (Table 2). Thigh and back weight were significantly (P<0.05) high in birds supplemented with 600 mg/kg propalis. Wings weight were significantly (P<0.05) low in all the treated groups. The neck weight was significantly (P<0.05) high in birds supplemented with 450 and 600 mg/kg propalis.

## Discussion

Results obtained here indicated that addition of propolis improved broiler performance and carcass characteristics. The results were in agreement with the finding of previous research reports (Açikgoz et al., 2005; Sibel et al., 2007; Seven et al., 2008; Abdullah, 2009; Hassan and Abdulla, 2011). The results are in contrast with the findings of the other reports (Sahin et al., 2003; Ziaran et al., 2005; Daneshmand et al., 2012) which indicated that the supplementation of propolis in the bird's diet had no significant effects on live body weight. The improved results may be due to the antimicrobial activity of propalis, resulting in better intestinal health and improved digestion and absorption (Denli et al., 2005). Propolis has been developed for use as an alternative to antibiotics in the animal industry because of its biological properties such as antimicrobial, antioxidant and antiseptic activities. Propolis reduces the population of the lactate-producing bacteria, which predominate in the upper gastrointestinal tract of the broiler. The reduction of the bacterial microflora may increase the nutrient availability for the host (Seven et al., 2011).

The results of the carcass characteristics in our study are in agreement with the finding of the previous reports (Sahin et al., 2003; Seven et al., 2008; Abdullah, 2009; Hassan and Abdullah, 2011).

**Conclusion**

In the present study, performance and carcass characteristics were increased with propolis supplementation.

**Table 2: The effect of propolis supplementation on body weight, body weight gain, feed intake, feed inversion ratio, dressing percent and carcass cuts**

| | | Propolis (mg/kg) | | | | |
|---|---|---|---|---|---|---|
| | | 0 | 150 | 300 | 450 | 600 |
| Body weight (g) | 14 days | 122.7$^{c}$ | 126.0$^{b}$ | 138.0$^{a}$ | 127.3$^{b}$ | 126.7$^{b}$ |
| | 21 days | 273.3$^{b}$ | 326.0$^{a}$ | 310.7$^{a}$ | 248.3$^{c}$ | 280.0$^{b}$ |
| | 28 days | 703$^{d}$ | 840.0$^{a}$ | 777.0$^{b}$ | 737.0$^{c}$ | 783.0$^{b}$ |
| | 35 days | 1037$^{c}$ | 1157.0$^{a}$ | 1154.0$^{a}$ | 1045.0$^{c}$ | 1120.0$^{b}$ |
| | 42 days | 1340$^{b}$ | 1550.0$^{a}$ | 1523.0$^{a}$ | 1493.0$^{a}$ | 1490.0$^{a}$ |
| Weight gain (g) | 1-7 days | 78.7$^{c}$ | 81.9$^{b}$ | 95.00$^{a}$ | 83.3$^{b}$ | 83.7$^{b}$ |
| | 7-14 days | 150.7$^{c}$ | 193.3$^{a}$ | 168.7$^{b}$ | 157.3$^{c}$ | 153.3$^{c}$ |
| | 14-21 days | 226.7$^{b}$ | 268.7$^{a}$ | 224.7$^{b}$ | 214$^{c}$ | 268.0$^{a}$ |
| | 21-28 days | 202$^{b}$ | 245$^{a}$ | 242$^{a}$ | 238$^{a}$ | 235.0$^{a}$ |
| | 28-35 days | 333$^{c}$ | 378$^{a}$ | 378$^{a}$ | 307$^{b}$ | 337.0$^{a}$ |
| | 35-42 days | 303.3$^{b}$ | 369$^{a}$ | 369$^{a}$ | 365.7$^{a}$ | 365.7$^{a}$ |
| Feed intake (g) | 1-7 days | 183.5$^{a}$ | 174.3$^{a}$ | 169.2$^{a}$ | 156.7$^{b}$ | 121.1$^{c}$ |
| | 7-14 days | 337$^{b}$ | 370$^{a}$ | 347$^{b}$ | 343$^{b}$ | 282.0$^{c}$ |
| | 14-21 days | 401$^{a}$ | 365$^{b}$ | 345$^{c}$ | 345$^{c}$ | 363.0$^{b}$ |
| | 21-28 days | 424$^{b}$ | 440$^{a}$ | 450$^{a}$ | 395$^{c}$ | 439.0$^{a}$ |
| | 28-35 days | 562$^{a}$ | 476$^{c}$ | 584$^{a}$ | 464$^{c}$ | 526.0$^{b}$ |
| | 35-42 days | 536$^{c}$ | 619$^{b}$ | 569$^{c}$ | 604$^{b}$ | 714.0$^{a}$ |
| Feed conversion ratio | 7 days | 2.31$^{a}$ | 2.37$^{a}$ | 1.77$^{b}$ | 1.90$^{b}$ | 1.33.0$^{c}$ |
| | 14 days | 2.33$^{a}$ | 1.93$^{d}$ | 2.07$^{c}$ | 2.17$^{b}$ | 1.83.0$^{e}$ |
| | 21 days | 1.7$^{b}$ | 1.36$^{d}$ | 1.53$^{c}$ | 1.63$^{a}$ | 1.36.0$^{d}$ |
| | 28 days | 2.13$^{a}$ | 1.76$^{d}$ | 1.86$^{c}$ | 1.70$^{e}$ | 1.90$^{b}$ |
| | 35 days | 1.7$^{a}$ | 1.53$^{c}$ | 1.56$^{c}$ | 1.56$^{c}$ | 1.60$^{b}$ |
| | 42 days | 1.73$^{a}$ | 1.56$^{b}$ | 1.53$^{b}$ | 1.43$^{c}$ | 1.73$^{a}$ |
| Dressing percent and carcass cuts (%) | Dressing | 73.86$^{a}$ | 72.89$^{a}$ | 66.52$^{b}$ | 69.84$^{ab}$ | 71.0$^{a}$ |
| | Breast | 31.9$^{a}$ | 30.2$^{ab}$ | 28.5$^{b}$ | 31.3$^{a}$ | 31.3$^{a}$ |
| | Leg | 16.1$^{b}$ | 15.8$^{c}$ | 17.6$^{a}$ | 16.7$^{b}$ | 16.4$^{b}$ |
| | Thigh | 12.73$^{c}$ | 13.45$^{b}$ | 13.14$^{b}$ | 13.89$^{b}$ | 14.79$^{a}$ |
| | Back | 19.8$^{b}$ | 17.8$^{c}$ | 21.8$^{a}$ | 19.9$^{b}$ | 21.9$^{a}$ |
| | Wings | 12.03$^{a}$ | 10.08$^{b}$ | 10.06$^{b}$ | 9.68$^{c}$ | 9.88$^{c}$ |
| | Neck | 8.61$^{b}$ | 8.19$^{b}$ | 8.10$^{b}$ | 7.74$^{a}$ | 7.76$^{a}$ |

Mean values bearing different superscripts in a row differ significantly (P<0.05).

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