



## *MUSTAFA KEMAL UNIVERSITY*

**EFFECTS OF PROPOLIS AND POLLEN SUPPLEMENTATIONS ON GROWTH  
PERFORMANCE AND BODY COMPONENTS OF JAPANESE QUAILS (Coturnix  
Coturnix Japonica)**

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# Introduction

Antibiotics have been added to poultry feed

- \* to improve growth performance
- \* to stabilize intestinal microflora
- \* to prevent infection by specific pathogenic microorganisms.

However, concerns about antimicrobial resistance have existed for nearly as long, and recent concerns regarding the prevalence of antibiotic-resistant infections in humans have raised the controversy to new heights.





For these reasons antibiotic growth promoters for poultry diets have been banned for use in the European Union and pressure from consumer groups and major poultry buyers has threatened their removal from diets in the US.



Therefore, studies on alternate products that can result in promotion of growth, improved feed utilization and maintenance of gut health are taking place. For this reason, the natural material propolis is being investigated.

Propolis contains a variety of chemical compounds such as polyphenols (flavonoid aglycones, phenolic acids and their esters, phenolic aldehydes, alcohols, and ketones), terpenoids, steroids, amino acids and inorganic compounds.





Many biological properties, including antibacterial, antiviral, antioxidant, hepatoprotective and immunostimulating activities of propolis have been reported. Now that antibiotic usage in animal nutrition is banned, propolis can be used to replace antibiotics.

Modern herbalists recommend propolis for human use in medicine because of its antibacterial, antifungal, antiviral, hepatoprotective and anti-inflammatory properties to increase the body's natural resistance to infections and to treat gastroduodenal ulcers



The pollen collected by *Apis mellifera* L. from different plant sources generally contains 40% protein, indispensable amino acids, low fat and high minerals.

Pollen is usually consumed in such small quantities that the daily requirements for vitamins, proteins and minerals cannot be taken up through the consumption of pollen alone

Pollen may be used to strengthen the immune system, to reduce the effect of radiation and retard aging because of its antioxidant and flavonoid contents.





## ***What is the purpose of this study?***

The insufficient findings about propolis and lack of availability of work on pollen in poultry encouraged us to conduct the current study in which dietary propolis was used as a substitute for antibiotic growth promoters and pollen as a performance enhancer in Japanese quail.





## Material and Methods

### *Animals, diets and feeding treatments*

This study consisted of two experiments, one using propolis and the other using pollen.

In the propolis and pollen experiments, one hundred and eighty day-old Japanese quail (*Coturnix coturnix japonica*) were used in each.

The same isocaloric and isonitrogenous experimental diet was formulated to meet the nutrient requirements for quail chicks (NRC, 1994) for both experiments.





In the propolis experiment, each kg of the diet was sprayed and mixed with 0 ml (group 1),  
5 ml (group 2)  
10 ml (group 3) propolis ethanolic extract (PEE),

In the pollen experiment, each kg of diet was mixed with  
0 g (group 1)  
5 g (group 2)  
10 g (group 3)  
20 g (group 4) pollen powder.





## ***Growth parameters measured***

During the experimental period, the quails were individually weighed and feed consumption per pen was recorded weekly.

At the end of the experiments, 3 female and 3 male birds of average body weight for both sexes in each replicate group were slaughtered to determine carcass characteristics.





## ***Statistical Analysis***

The data obtained in the experiments were analysed statistically using the One Way ANOVA procedure of SPSS (Windows Version of SPSS, release 10.01) with Duncan's Multiple Range Test to identify the significant differences between the means.





## *Samples of propolis and polen*

Current propolis solid yield and pollen grains were collected from bee colonies on the MKU Research Farm located in Hatay province of Turkey. Hatay is located between latitude 36° north and longitude 36° east in the Eastern Mediterranean region where climatic conditions are hot and dry in summer, and warm and rainy in winter.





## Results

The results obtained in the propolis experiment are summarized in Table 1. PEE supplementation did not affect weight gain and feed intake of quail chicks. However, PEE affected weight gain for a period of 1–21 days.

Increased dietary PEE supplementation (0, 5 and 10 ml PEE kg<sup>-1</sup>) tended to improve feed efficiency, but not statistically.

Carcass yield and internal organ weight, such as liver, gizzard and heart, were not affected by PEE supplementation.





Table 2. Effects of PEE on growth performance and body

Parameter per bird	Supplemental PEE (ml kg <sup>-1</sup> )			
	0	5	10	SEM
Body weight gain, g	223	226	224	1.39
Feed intake, g	609	615	603	7.47
Feed conversion ratio (g feed : g gain)	2.73	2.72	2.70	0.027
Slaughter weight, g	243	249	247	1.80
Carcass weight, g	178	184	183	1.48
Carcass yield, %	73.0	74.0	74.1	0.294
Liver weight, %	2.67	2.59	2.86	0.065
Gizzard weight, %	3.12	2.95	2.94	0.065
Heart weight, %	1.22	1.25	1.24	0.024





The ethanol extract of propolis was not effective in this study. This may be attributed to the lower dose of propolis and to the fact that birds were kept in hygienic conditions in cages where there were no challenging factors affecting the gastrointestinal health of the birds.

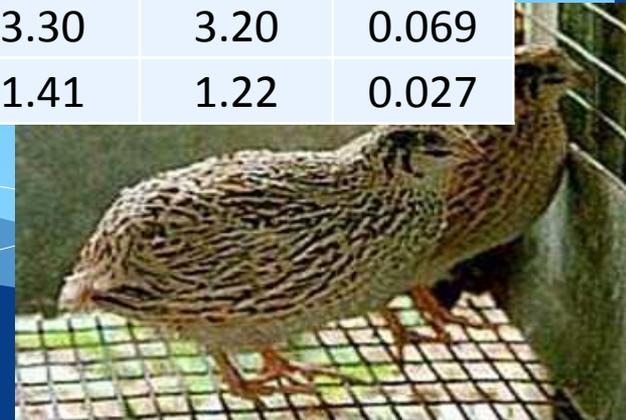
The results obtained in the pollen experiment are summarized in Table 2. Body weight gain tended to increase with increasing levels of pollen supplementation (0, 5, 10 and 20 g pollen powder per kg diet) to the quail diet, but without statistical significance.





Table 2. The effects of pollen supplementation on growth performance and body components of quail

Parameter per bird	Supplemental pollen (g/kg <sup>-1</sup> )				
	0	5	10	20	SEM
Body weight gain, g	218	225	225	225	1.58
Feed intake, g	579 <sup>b</sup>	599 <sup>ab</sup>	614 <sup>a</sup>	622 <sup>a</sup>	5.97
Feed conversion ratio (g feed : g gain)	2.66	2.68	2.74	2.76	0.02
Slaughter weight, g	235	240	237	238	1.50
Carcass weight, g	175	180	176	178	1.29
Carcass yield, %	74.6	75.0	74.1	74.6	0.287
Liver weight, %	3.07	3.46	3.51	3.18	0.084
Gizzard weight, %	3.25	3.17	3.30	3.20	0.069
Heart weight, %	1.29	1.25	1.41	1.22	0.027





Feed intake was higher when pollen was included in the diets. Higher feed intake and the non-significantly reduced feed conversion ratio may be the result of a depression of digestibility by the added pollen.





## *What is the conclusion of the experiment?*

- Under the conditions investigated, PEE (30%) and pollen supplementation did not result in any significant improvement in growth performance and body components of quail.
- Therefore, propolis and pollen cannot be recommended as a growth promoter in quail production.
- However, propolis may show advantageous effects under poor hygienic conditions. Therefore, more extended research should be planned for determining the antiviral, antibacterial and antimicrobial effects of propolis on the immune system in poorer hygienic conditions.

