

## Comparative Effect of *Liquorice root* Extract Medicinal Plants and Probiotic in Diets on Performance, Carcass Traits and Serum Composition of Japanese Quails

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**Abstract:** The aim of the present study was to investigate the effect of dietary supplementation with a comparative effect of *Liquorice root* extract and Probiotic in diets on performance, carcass and blood parameters of Japanese quails. 500 Japanese quails were distributed at seven days of age in a randomized design in four groups and five repetitions. First group GC, control group and did not receive any herbal planets, second group G2, fed 200 ppm of *Liquorice root* extract, third group G3, basal diet containing 1% probiotic (*Lactobacillus acidophilus* and *Lactobacillus casei*) and fourth group G4 fed 200 ppm of *Liquorice root* extract and containing 1% probiotic (*L. acidophilus* and *L. casei*). The highest amount of daily feed intake and body weight gain was observed in the G 4. The highest percent of carcass percentage and liver were observed in group 4, but the highest percent of spleen was observed in group 3. According to the results, total cholesterol (Chol), triglyceride (TG) and Glucose were measured in blood samples of day 42. The amount of total Cholesterol and triglyceride in the serum showed significant differences, but glucose was not significantly different among groups.

**Key words:** *Liquorice root* • Blood • Japanese Quails • Carcass Traits

### INTRODUCTION

After many years, the long term side effects of these products like microbial resistance and increase of the blood cholesterol level in the livestock lead to the ban of these commercial antibiotics. Recently, alternatives for substituting these traditional growth promoters have been evaluated and probiotics have been the most studied. It is well recognized by this time that the probiotics are live microorganisms and when administered through the digestive tract, cause a positive impact on the host's health. Studies on the beneficial impact on poultry performance have indicated that probiotic supplementation can have positive effects [1-4]. Phytogetic compounds are the groups of feed additives that have been reported to possess a potential for growth enhancement of livestock species due to presence of a number of pharmacologically active substances. They are supposed to enhance feed intake, activate digestive enzymes and stimulate immune function [5-6].

The use of antibiotics in poultry diets has been curtailed and scientists have been searching for alternatives to antibiotics. In view of this, aromatic plants

and herbal extracted from plants have become more important due to their potential antimicrobial and stimulating effects in the animal digestive system. Aromatic plants have been used traditionally as antiparasitic, anthelmintic, analgesic, expectorant, sedative, antiseptic and anti-diabetic substances in many parts of the world [7]. Various dietary herbs, plant extracts have been studied for their antimicrobial and growth promoter abilities [8, 9]. Nevertheless, it has been indicated that the outcome of a test can be affected by factors such as the method used to extract herb [10]. It is well recognized by this time that the probiotics are live microorganisms and when administered through the digestive tract, cause a positive impact on the host's health. Studies on the beneficial impact on poultry performance have indicated that probiotic supplementation can have positive effects. To date, probiotics are one of major food supplements for poultry industry. According to concerns about cholesterol, there are a lot of attempts to produce foods with low cholesterol. It has been reported that *L. acidophilus* can absorb cholesterol from in vitro system and this phenomenon can decrease the cholesterol level of medium

[11, 12]. Dietary supplementation of probiotics improved body weight gain and feed intake significantly. The addition of organic acids to the chicken diet reduced the production of toxic components by bacteria and the colonization of pathogens in the gastro intestinal tract [13, 14]. Although there is sufficient literature on the growth promoting effects of probiotics and organic acids, the number of published studies on the effects of essential oils on birds performance and carcass characteristics is still very limited.

Furthermore, limited research has suggested that some aromatic plants and their components could improve feed intake, feed conversion ratio and carcass yield [15, 16]. There are a large number of feed additives available for inclusion in animal and poultry diets to improve their performance. However, the use of chemical products especially (hormones and antibiotics), may cause unfavorable side effects. Moreover, there is evidence indicating that these products could be considered as pollutants for human and threaten the health on the long-run. Attempts to use the natural materials such as medicinal plants could be widely accepted as feed additives to improve the efficiency of feed utilization and productive performance [17].

There are a lot of reports indicating the positive effects of herbs like anti-coccidal, anti-oxidant, anti-fungi and etc. Some of medical effects of herbs are related to their secondary metabolites such as phenols, necessary oils, saponins and etc [18]. Herbs have been used for some disease since long time ago because of availability, easy usage, nonsideeffects. After many years, the long term side effects of these products like microbial resistance and increase of the blood cholesterol level in the livestock lead to the ban of these commercial antibiotics [19, 20]. The objective of this study was to investigate the interaction effects of supplementation of probiotic (*L. acidophilus* and *L. casei*) and *Liquorice root* extract on performance, carcass quality and blood biochemical parameters.

## MATERIALS AND METHODS

500 Japanese quails were distributed at seven days of age in a randomized design in four groups and five repetitions. First group GC, control group and did not receive any herbal planets, second group G2, fed 200 ppm of *Liquorice root* extract, third group G3, basal diet containing 1% probiotic (*L. acidophilus* and *L. casei*) and fourth group G4 fed 200 ppm of *Liquorice root* extract and

containing 1% probiotic (*L. acidophilus* and *L. casei*). from days 7-42, unbound water and dietary was in poultries' access. Dietary, chick and weigh feed consumed was recorded daily, the uneaten discarded and feed conversion ratio (FCR) was calculated. For the experimental period of 42 days the quails were kept in cages (20x 22 x 25 cm), four quails per cage. some analyzes were done via SAS in the statistical level of 5% according to data gathered from dietary, weight improvement, average of FCR, weight of rearing period and carcass yield. After 9-12 h of keeping hungry to defecate the digestive system contents, the quails were weighted and then slaughtered in order to determine the carcass total weight and carcass characters percent At 6 weeks of age, three quails per replicate were randomly chosen, slaughtered and carcass percent to live weight and percent of carcass parts to carcass weight were calculated. On 42 day of experimental period, 3 ml of blood was collected from brachial vein from one bird of each pen (from four birds of each treatment). Serum was isolated by centrifugation at 3,000×g for 10 min. The serum concentrations of total triglyceride, cholesterol and level of glucose were analyzed by an automatic biochemical analyzer.

Table 1: Ingredients and chemical analysis composition of diets

Ingredients (g/kg)	
Corn	47.50
Soybean oil	2.80
Soybean meal	41.00
Fish meal	5.00
Dicalcium	1.80
Vitamin premix*	0.25
Mineral premix**	0.25
Methionine	0.25
Analyzed chemical composition (g/kg)	
Dry matter	92.20
Crude protein	23.90
Fat	3.46
Fiber	4.13
Ash	6.70
Calcium	1.22
Phosphorus	0.41
ME by calculation (MJ/kg)	12.21

\* Vitamin premix (/kg diet): Vitamin A - 1.000 IU; vitamin D<sub>3</sub> - 1.000 IU; vitamin E - 42 g; vitamin K<sub>3</sub> - 4 g; vitamin B<sub>1</sub> - 3.6 mg; vitamin B<sub>2</sub> - 7 g; vitamin B<sub>6</sub> - 8 mg; vitamin B<sub>12</sub> - 0.02 mg; niasin - 24 mg; folic acid - 12 mg; biotin - 0.05 mg; cal-D-pentothemat (pantothenic acid) - 12 mg; cholin chloride - 150 mg; vitamin C - 60 mg

\*\* Mineral premix (mg/kg diet): Fe - 72; Zn - 72; Cu - 6; I - 1.2; Co - 0.24; Se - 0.18; Mn - 96

**RESULTS AND DISCUSSION**

During the period of 7-42 days, the effects of *Liquorice root* extract and probiotic on performance of Japanese quails s are showed in Table 2. The highest amount of daily feed intake and body weight gain was observed in the G 4 (p<0.05).

Endens [21] reported that probiotics improved digestion, absorption and availability of nutrition accompanying with a positive effect on intestine activity and increasing digestive enzymes. Jin *et al.* [22] reported that in low levels of *Lactobacillus* culture (0.05, 0.01%), feed intake rate have been increased, while Timmerman *et al.* [23] found inconsistent results, maybe because of type of diet ingredients which can affects probiotic’s growth or their metabolites.

The addition of a mixture of herbal extract to the diet increased (P < 0.05) body weight gain of the quails at 42 days of age. The improvement in body weight gain in this study agreed with results reported by Hertramp [16], McCartney [24], These results suggest that the improved digestibility of the nutrients leads to a more balanced gut flora with the potential to reduce the proportion of pathogenic bacteria. The benefits of the use of essential oils in broiler nutrition may be due to the greater efficiency in the utilization of feed, resulting in enhanced growth.

The improvement of body weight gain and feed conversion are due to the active materials found in herbal, causing greater efficiency in the utilization of feed, resulting in enhanced growth. There is an evidence to suggest that herbs, spices and various plant extracts have appetite and digestion stimulating factors, in addition to their antimicrobial activity against bacteria found in the intestine [10, 25]. According to the data, there are significant differences in the carcass characters (p<0.05).

Table 3 shows the effect of *Liquorice root* extract and probiotic on carcass parameters. According to the data, there are significant differences in the carcass characters (p<0.05). The highest percent of carcass percentage and liver were observed in group 4, but the highest percent of spleen was observed in group 3.

Aromatic plants and essential oil extracted from these plants have been used as alternatives to antibiotics. For this reason, these plants are becoming more important due to their antimicrobial effects and the stimulating effect on animal digestive system [20]. Herbal planet could stimulate the digestion system in poultry, improve the function of liver and increase the pancreatic digestive enzymes. Enhancement of the metabolism of herbal planet,

Table 2: Effect of *Liquorice root* extract and Probiotic on performance of Japanese quails from 7-42

Treatments	GC	G2	G3	G4	SEM
Feed conversion ratio	3.58 <sup>a</sup>	3.52 <sup>a</sup>	3.34 <sup>ab</sup>	3.22 <sup>ab</sup>	0.45
Feed intake (g/day)	12.13 <sup>a</sup>	12.99 <sup>ab</sup>	13.08 <sup>ab</sup>	13.11 <sup>ab</sup>	1.42
Average daily gain (g/day)	3.35 <sup>a</sup>	3.84 <sup>ab</sup>	3.98 <sup>ab</sup>	4.15 <sup>ab</sup>	0.36

a-b Means with different subscripts in the same column differ significantly (P < 0.05)

Table 3: Effect of *Liquorice root* extract and Probiotic on carcass of Japanese quails from 7-42

Characters (%)	GC	G2	G3	G4	SEM
Carcass percentage	77.64 <sup>a</sup>	79.18 <sup>ab</sup>	79.86 <sup>ab</sup>	79.98 <sup>ab</sup>	2.78
Spleen	2.28 <sup>a</sup>	2.38 <sup>a</sup>	2.98 <sup>ab</sup>	2.86 <sup>ab</sup>	0.71
Liver	2.30 <sup>a</sup>	2.95 <sup>ab</sup>	3.14 <sup>ab</sup>	3.15 <sup>ab</sup>	0.84
Gizzard	7.21 <sup>a</sup>	7.29 <sup>a</sup>	7.81 <sup>a</sup>	7.94 <sup>ab</sup>	0.26

a-b Means with different subscripts in the same column differ significantly (P < 0.05)

Table 4: The effect of *Liquorice root* extract and Probiotic on blood biochemical of Japanese quails

Blood Parameter	Treatments				SEM
	GC	G2	G3	G4	
Glucose (mmol/L)	124.22	124.36	124.11	123.71	1.45
Cholesterol (mg/dl)	117.20 <sup>a</sup>	115.51 <sup>ab</sup>	114.22 <sup>ab</sup>	114.07 <sup>ab</sup>	3.30
Triglyceride (mmol/L)	116.32 <sup>a</sup>	116.05 <sup>a</sup>	115.11 <sup>ab</sup>	115.03 <sup>ab</sup>	2.66

a-b Means with different subscripts in the same column differ significantly (P < 0.05)

carbohydrates and proteins in the major organs would increase growth rate of these organs [26, 27]. The active principles of essential oils act as a digestibility enhancer, balancing the gut microbial ecosystem and stimulating the secretion of endogenous digestive enzymes and thus improving growth performance in poultry. The effects of *Liquorice root* extract and probiotic on blood biochemical is summarized in Table 4. According to the results, total cholesterol (Chol), triglyceride (TG) and Glucose were measured in blood samples of day 42. The amount of total cholesterol and triglyceride in the serum showed significant differences, but glucose was not significantly different among groups (P<0.05).

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