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CASRP PUBLISHER

**International Journal of Advanced Biological
and Biomedical Research 4(2) (2016) 214–219**

doi: 10.18869/IJABBR.2016.214



Original Article

Open Access

The effect of different levels supplementation of *Glycyrrhiza glabra* extract on growth performance in male quail

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Abstract

This paper presents the results of investigations carried out in studying the relationship between the different levels *Glycyrrhiza glabra* extract and growth performance in male quail. A total of 300 one-day old unsexed male quail birds were used in the experiment. Birds were randomly distributed into 5 groups of 60 birds each, in 4 replicates containing 15 birds each. Five experimental diets (0, 0.5, 1, 1/5 and 2 g/kg) were fed between 1 and 42 days of age. Results showed that the addition of *Glycyrrhiza glabra* did significantly influence quail body weight and feed intake during both the starter (1-21 days) and grower (21-42) periods of the study ($P < 0.05$), but did not there was not any significant effect on feed conservations ratio during the experiment ($P > 0.05$). In general, *Glycyrrhiza glabra* stimulated growth rate and feed efficiency of quail when included in certain types of poultry diets.

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Keywords: Glycyrrhiza glabra, Growth, Male quail.

1. Introduction

The increase of people in the world using of animal and natural supplements stimulating growth, for nutrition it has been important to breed quail in this regard. It is well know that quail is a diversified poultry species reared

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Received 19 March 2016

iThenticate screening 22 March 2016

Accepted 18 April 2016

English editing 15 April 2016

Available online 25 April 2016

Quality control 21 April 2016

for commercial egg and meat production. It is blessed with the especial characteristics of fast growth, early sexual maturity, high rate of egg production, short generation interval and shorter incubation period that makes it suitable for diversified animal production (Sarabmeet et al., 2008).

Most of growths stimulating materials are chemicals which have bad effects and side effects such as drug resistance, carcinogens or causing diseases in human. And recently many countries tend to minimize or forbid the chemical materials for their deleterious side effects on human, animals and nature. The investigators at the previous decades have been searching for a suitable substitute for these compositions. During the last decade, using of herbal materials which are natural is a good choice suitable for poultry husbandry. Therefore, it is important to use herbal promoters.

The history of *Glycyrrhiza glabra* is as long as the story of mankind for people has used these family plants since earliest times. Previous study (Shalaby et al., 2004; Moradi et al., 2014) indications that *Glycyrrhiza glabra* the preparations are for treatment of leprosy, venereal diseases, inflammations, bacterial infections and cancers. Typical poultry feed formulations are quite variable in their composition depending on the availability of ingredients (Elangovan et al., 2004). There is, therefore, both a need and scope to improve the nutrition of poultry through enhancing nutrient availability by taking advantage of herbal materials such as *Glycyrrhiza glabra*. Hence, the present study is intended to relationship between the dietary supplementation of different levels *Glycyrrhiza glabra* and growth performance in male quail in north of Iran.

2. Materials and methods

2.1. Preparation of plant extracts

Glycyrrhiza glabra were dried at 55 °C, powdered and extracted by methods corresponding to those practiced by traditional methods. The water extract was obtained by boiling dried plant material (100 g) for 25 min in 300 ml of distilled water and then freeze-dried. For the ethanolic extracts, the plant material 100 g was percolated with 95% ethanol, then concentrated to dryness under reduced pressure. The extracts were dissolved in dimethyl sulfoxide to form stock solutions of 10 mg/ml before testing.

2.2. Animal and treatments

All experimental protocols adhered to the guidelines of, and were approved by, the Animal Ethics Committee of Islamic Azad University (Rasht, Iran). A total of 300 one-day old unsexed male quail birds were used in the experiment. Birds were randomly distributed into 5 groups of 60 birds each, in 4 replicates containing 15 birds each. Five experimental diets (0, 0.5, 1, 1/5 and 2 g/kg *Glycyrrhiza glabra*) were fed between 1 and 42 days of age.

The chicks were housed in battery cages with identical housing and management conditions. Environmental temperature was set at 37.5 ± 0.5 °C for the first week and 34.5 ± 0.5 °C for the second week, which was further decreased to 22.5 ± 0.5 °C until the end of the experiment. During the first week, the light regimen was continuous lighting program (24 h), which was reduced to 23 hours of light afterward. During this period, food and water was provided ad-libitum for chickens. The birds were reared under similar environmental conditions.

Average initial weight of male quail chicks at the experimental start ranged between 7.47 and 7.28 ± 0.4 g. All diets were formulated to provide the nutrient requirements according to (NRC, 1994). The formulations and chemical composition of the experimental diets are given in Table (1).

At the end of experimental period i.e. 6 weeks of age, 5 birds were randomly taken from each treatment slaughtered; de feathered, evacuated and deboned for proximate chemical analysis for growth performance (data on feed intake and body weight were recorded on each weeks, whereas mortality was recorded daily throughout the experimental period. Feed intake was corrected for mortality) of the five treatments groups.

2.3. Statistics and data analysis

Results were expressed as means±SD. ANOVA was performed and mean comparisons were carried out by Duncan's multiple range tests. Differences were considered significant for $P < 0.05$. Statistical analysis was performed using SPSS 19.1 for Windows (SPSS Inc., Chicago, IL).

Table 1
Composition of basal diet.

Ingredients (Kg per Ton)	1-3 weeks	4-6 weeks
Corn seed	460	490
Soybean meal (CP 48%)	445	410
Oil	20	15
Phosphate	14	14
Oyster sell	14	17
Anzemite	14	14
Common salt	4	4
Sand	17	23
Vitamin premix ¹	2.5	2.5
Mineral premix ¹	1.4	1.5
DL-Methionine	1.2	2
L-Lysine HCL	0.5	0.6
Bicarbonate	1	1
Vitamin A	1	1
Vitamin B	1	1
Vitamin D3	1	1
Vitamin K3	1	1
Vitamin E	1	1
Flavo phospholipol	0.4	0.4
Total	1000 Kg	1000 Kg
Energy	2750	2634
Protein	24	22/1

¹Mineral-vitamin premix provided the following per kilogram of diet: vitamin A, 9,000 IU; vitamin D3, 2,100 IU; vitamin E, 30 mg; nicotinic acid, 30 mg; vitamin B12, 0.12 mg; calcium pantothenate, 10 mg; vitamin K3, 5 mg; thiamin, 1.1 mg; riboflavin, 4.5 mg; vitamin B6, 2.0 mg; folic acid, 0.5 mg; biotin, 0.5 mg; Fe, 50 mg; Cu, 10 mg; Mn, 70 mg; Zn, 50 mg; Co, 0.2 mg; I, 1.0 mg; Se, 0.3 mg; butylated hydroxytoluene (BHT),150 mg.

3. Results and discussion

As shown in Table 2, 3 and 4, the addition of *Glycyrrhiza glabra* did significantly influence quail body weight and feed intake during both the starter (1-21 days) and grower (21-42) periods of the study ($P<0.05$), but did not any significant effect on feed conservations ratio ($P>0.05$).

Table 2
Effect of dietary supplementation different levels *Glycyrrhiza glabra* on body weight of male quail.

Body weight (g)	Glycyrrhiza glabra extract (g/kg)					
	Week	0 (Control)	0.5	1	1.5	2
1		15.5	15.75	16.25	16	16.75
2		39.5	42.75	42.5	41.75	42.25
3		47.5	44.25	45	47.25	47
4		33.5	34	32.75	31.5	30.5
5		37.75	36.5	36.75	36.75	38.75
6		19.5 ^b	19.75 ^b	19.25 ^b	19.75 ^b	23.5 ^a
End of experiment		193.25 ^b	193 ^b	192.5 ^b	193 ^b	198.75 ^a

Values with different superscripts in the same row differ significantly ($P<0.05$).

Table 3

Effect of dietary supplementation different levels *Glycyrrhiza glabra* on feed intake of male quail.

Feed intake (g/chick/day)	Glycyrrhiza glabra extract (g/kg)					
	Week	0 (Control)	0.5	1	1.5	2
1		40.25 ^b	40.75 ^{ab}	41 ^{ab}	40.75 ^{ab}	41.5 ^a
2		63.5	64	64.25	64	64.5
3		82	82	84.5	83.5	85.25
4		100 ^a	101.25 ^{ab}	101.5 ^{ab}	101.25 ^{ab}	102.5 ^a
5		190.75	191	191.75	191	191.75
6		219 ^a	220 ^{ab}	221.25 ^{ab}	220.25 ^{ab}	222.25 ^a
End of experiment		695.5	699	704.25	700.75	707.75

Values with different superscripts in the same row differ significantly (P<0.05).

Table 4

Effect of dietary supplementation different levels *Glycyrrhiza glabra* on feed conversion ratio of male quail.

Feed conversion ratio (g/g)	Glycyrrhiza glabra extract (g/kg)					
	Week	0 (Control)	0.5	1	1.5	2
1		2.62	2.59	2.52	2.52	2.48
2		1.61	1.54	1.51	1.51	1.50
3		1.92	1.90	1.75	1.75	1.74
4		3.42	3.26	3.11	3	2.95
5		5.25	5.21	5.19	5.06	4.97
6		11.91	11.47	11.27	11.11	11.00
End of experiment		3.64	3.63	3.64	3.63	3.61

Growth is one of the main attributes of living organisms and is such an obvious process that it hardly seems to justify any particular formal or informal definition. To ensure more net return and to minimize high expenditure on feed are the main challenges, for which many research strategies have been practiced such as introducing feed supplements and feed additives (Khan et al., 2009). Huang et al. (1992) concluded that the Chinese medical herbs have stimulating effect on growth of broilers. In this respect, vegetable, herbs, spices and edible plants were suggested a non-traditional feed additive or growth promoters in broiler diets to improve the growth feed conversion efficiency and reduce the cost of feed (Dickens et al., 2000; Abaza, 2001; Al-Harhi, 2002; Hassan et al., 2004). Several reports revealed that adding animal fats or vegetable oil to growing chick quail diet lower feed intake but improve weight gain and efficiency of feed utilization (El-Yamany et al., 2008; Monfaredi et al., 2011). Above mention results a line with the results of present study. In contrary, in a previous study, Sedghi et al. (2010) found that supplementation of *Glycyrrhiza glabra* (0.5, 1, or 2 g/kg) in broilers diets had no significant effect on body weights and feed efficiency of birds, whereas the addition of *Glycyrrhiza glabra* to broiler diets reduced abdominal fat content and serum concentrations of cholesterol and low density lipoprotein-cholesterol as compared to the control. And also, in research done by Myandoab et al. (2012) was found that *Glycyrrhiza glabra* supplementation has been shown numerous times to not influence body weight of chickens.

4. Conclusion

Based on the results of the present study we suppose that the enhancement of biosynthesis of fatty acids conclude to increase growth performance. In conclusion *Glycyrrhiza glabra* stimulated growth rate and feed efficiency of quail when included in certain types of poultry diets. Based on these observations we can offer supplementation of *Glycyrrhiza glabra* extract for poultry management and further studies must be done, especially with large numbers of animals, such as those found in actual production.

Acknowledgments

The authors would like to acknowledge Department of Animal Science, Faculty of Agriculture, Rasht Branch, Islamic Azad University, Rasht, Iran, for providing research opportunities, financial support and for their help and collaborations in this work. And also, the authors would like to have special thanks to Dr. Ali Olfati (from University of Tabriz, A.olfati65@gmail.com) for helping, criticism reading, editing of the manuscript and providing a friendly environment.

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How to cite this article: Safari, A., Zahedi, A., 2016. The effect of different levels supplementation of *Glycyrrhiza glabra* extract on growth performance in male quail. International journal of Advanced Biological and Biomedical Research, 4(2), 214-219.

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