

Effect of Adding *Lycium barbarum* L. Extract to Drinking Water on Some Productive Traits of Japanese Quail (*Coturnix japonica*)

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Abstract: This study was conducted to investigate the effect of adding *Lycium barbarum* extract to drinking water on some productive traits of Japanese quail. A total of 270 one-week-old Japanese quails were used in this study. The birds were divided into six treatments (45 for each). Each litre of drinking water (RO) was treated with 400 mg of *L. barbarum* extract add from (leaves, fruits, stems, and roots) for T2, T3, T4, and T5 respectively. 400 mg of mixed extract from leaves, stems, fruits and roots of *L. barbarum* were added to drinking water (T6). The control treatment (T1) was free of *L. barbarum* drinking water. The results showed no significant differences in the body weight, body weight gain, feed consumption and feed conversion ratio. A significant decrease in the age of sexual puberty and sexual maturity for males and females were recorded in the second and third treatments compared to the other treatments. On the other hand, the results showed no significant differences between the experimental treatments for the weight at sexual puberty and maturity for males and females. It can be concluded that the leaves and fruits of *L. barbarum* extract decreased the sexual puberty age for males and females of Japanese quail. On the other hand, it has no effect on body weight, body weight gain, feed consumption and feed conversion ratios.

Keywords: *Lycium barbarum*, Productive Traits, Quail.

Introduction

Lycium barbarum L., a member of the Solanaceae plants family, is a functional food (Zhang *et al.*, 2013). In China, Tibet, and other Asian Nations, *L. barbarum* has been commonly grown and its commonly used as a plant and supplement in traditional Chinese medicine for more than 2000 years for the benefit of anti-aging, vision, kidney and liver function (Cheng *et al.*, 2015). Recent studies have shown that extracts from *L. barbarum* are used to support these traditional characteristics. *L. barbarum* has a wide

variety of biological activities, including effects on aging, neuroprotection, anti-fatigue/endurance, enhanced metabolism, glucose control in diabetics, glaucoma, anti-oxidant characteristics, immunomodulation, antitumor activity and cytoprotection (Potterat, 2010). Researchers are currently working to enhance the growth rate of livestock using helpful herbs (Banyaphrathatsara, 2007). *L. barbarum* has been used in China for over 1000 years as herbal medicine to promote fertility (Luo *et*

al., 2006). A little published data is concerning the use of *L. barbarum*, as a natural feed additive in poultry drinking water. This plant has been recorded for multiple activities such as antibacterial, anti-inflammatory, anti-oxidant, blood sugar and cholesterol-reducing characteristics and immunomodulatory characteristics. The advantages of these medicinal plants are significant in animals health status (Javed *et al.*, 2009). The aim at this study is to investigate the effect of adding *L. barbarum* extract from drinking water on some productive traits of Japanese quail.

Material & Methods

This study was conducted at the Quail farm, College of Agriculture, University of Basrah for the period from 18 December 2018 to 25 January 2019. A total of 270 Japanese quail (*Coturnix japonica*) one week old with an average initial body weight of 27.96 g were used in this study. Chicks were randomly distributed to six treatments with three replicates each. Each litre of drinking water (RO) was supplemented with 400 mg of *L. barbarum* extract of leaves, fruits, stems and root for T2, T3, T4, and T5 respectively, while T6 added 400 mg of *L. barbarum* extract from the mixture of leaves, fruits, stems and roots (100 mg each) per litre of drinking water. First treatment (T1): the control group without any drinking water supplement. Chicks were housed in quail's cages under the same condition and rearing system. All chicks were kept under uniform management conditions throughout the experiment period. Chicks were fed approximately 24% crude protein; 2900kcal/kg metabolizable energy until three weeks of age, after which they received commercial quail diet 20% crude protein; 2900 kcal.kg⁻¹ metabolizable energy (NRC,

1994; Al-Salhie, & Al- Waeli, 2019). Water and feed were *ad libitum* till the end of the study.

Extract Preparation

The plant parts include leaves, fruits, stems, and root washed carefully to remove dirt and dried under ambient temperature. The dried parts were ground by using laboratory blenders to a coarse powder form. 50g of the powder was mixed into 250 ml of ethanol in a clean glass beaker. The beaker was sealed and allow for 24hrs in a water bath (37°C). After 24 hours, the mixture was mixed using magnetic stirrer for an hour. The mixture was filtered using a gauze. The filtrate was then spread to the centrifuge pipes at a velocity of 3000 rpm for 15 minutes. Take the present, disregard the precipitate and position the glass of Petri dishes inside a 37°C drying oven. After drying, scrape the product and store it in the refrigerator for future use (Anessiny & Perez, 1993).

Study Parameters

A quail body weight (BW) was recorded from the beginning to the end of the study (1-6 weeks of age). Body weight gains (BWG) was calculated as the changes in the body weight between 1-6 weeks of age. Feed consumption (FC) and feed conversion ratio (FCR) was calculated during 1-6 weeks of age. The age of sexual puberty for males was determined after confirming the production foam from the cloacal gland (Al-Salhie & Al-Swdani, 2013). The age of females sexual maturity is determined after egg production was reached 50% (Quinn Jr *et al.*, 2008; Al-Salhie, 2012). Body weight at puberty and sexual maturity of both males and females were recorded by sensitive balance.

Statistical analysis

All data were subjected to one-way variance analysis (ANOVA) and variations were deemed to be significant if P was < 0.05 according to SPSS Statistics (SPSS, 2009).

Results & Discussion:

The results in the table (1) showed no significant differences between the experimental treatments in body weight, body

weight gain, feed consumption and feed conversion ratio. These findings were consistent with those of Nidaullah *et al.* (2010), they showed that the adding aqueous extract from different medicinal plants including *L. barbarum* at different levels of 3, 4, 6 and 10 g.l⁻¹ to drinking water of broilers did not significantly affect the body weight, feed consumption and feed conversion ratio.

Table (1): Effect of adding *L. barbarum* extracts to drinking water on some productive traits of Japanese quail at 1-6 weeks of age (Mean± SE).

Parameters	Treatments					
	T1	T2	T3	T4	T5	T6
Final body weight (g)	241.61 ± 6.14	237.87 ± 4.95	247.20 ± 3.52	243.75 ± 3.26	246.59 ± 5.49	240.86 ± 5.22
Bodyweight gain (g)	213.65 ± 10.65	209.91 ± 8.58	219.24 ± 6.10	215.79 ± 5.64	218.63 ± 9.52	212.91 ± 9.04
Feed consumption (g)	775.93 ± 12.82	778.43 ± 29.31	764.85 ± 28.12	746.67 ± 14.57	772.39 ± 33.54	760.06 ± 31.83
feed conversion ratio (g/g)	3.64 ± 0.24	3.71 ± 0.28	3.49 ± 0.08	3.46 ± 0.02	3.54 ± 0.31	3.57 ± 0.21

Table (2): Effect of adding *L. barbarum* extracts from drinking water on age and weight of sexual puberty for males and females (Mean± SE).

Parameters	Treatments					
	T1	T2	T3	T4	T5	T6
Age of sexual puberty for males (day)	32.88a ± 0.51	31.22b ± 0.36	31.22b ± 0.27	32.22ab ± 0.22	32.33ab ± 0.50	33a ± 0.40
The weight at puberty sexual of males (gm)	168.77 ± 2.59	171.44 ± 4.52	176.88 ± 5.01	174.22 ± 4.85	178.77 ± 8.08	181.88 ± 4.78
Age of sexual maturity for females (day)	42.66a ± 0.88	39.66b ± 0.34	40b ± 0.57	42a ± 0.34	42a ± 0.34	42.67a ± 0.67
The weight at sexual maturity of females (gm)	246.16 ± 11.37	239.10 ± 1.18	244.71 ± 2.99	239.25 ± 6.18	238.77 ± 5.34	244.80 ± 7.33

^{a,b} Means in the same row with different letters show significant differences (p<0.05)

The results in the table (2) revealed significant differences ($P < 0.05$) among the studied treatments in the case of the age of sexual puberty and maturity of males and females. Quail males and females in the treatments (T2 and T3) recorded the lowest values compared to the control treatment (T1). These results may be due to the positive impacts on *L. barbarum* on sexual output and fertility. Also, the findings suggest that *L. barbarum* may be improve the copulatory performance and the reproductive function by mechanism: firstly, through regulation of the secretion of sexual hormones including the gonadotropin which promotes the hypophysis secretion of gonadal hormone and regulate the hypothalamic-pituitary-gonadal axis in a multiple manner. Secondly, *L. barbarum* may be increase the performance of spermatogenic cells through supporting the process of lipid peroxidation and other peroxide radicals on DNA, That lead to improve the sperm quantity, quality, improve fertility, decrease abnormalities of sperms, increase weight and coefficients of testes (Abdulrasool *et al.*, 2014). These outcomes came in agreement with the finding of Zhang *et al.* (2013). *L. barbarum* which regulates the synthesis and the secretion of FSH and LH of the pituitary gonadotropic cells (Shi *et al.*, 2017). These hormones play an active part in growing sexual cell activity and the sexual behaviour of birds and therefore early puberty (Al-Salhie, 2018). The results of the present study showed no significant differences between the experimental treatments for the weight at sexual puberty and maturity for males and females of Japanese quail.

Conclusions

We can conclude that the leaves and fruits of *L. barbarum* extract decreased the age of sexual puberty for males and females of Japanese quail. On the other hand, it has no

effect on body weight, body weight gain, feed consumption and feed conversion ratio.

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Conflict of interest: The authors declare that they have no conflict of interest.

Ethical approval: all applicable national and international guidelines for the care and use of animals were followed.

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