



The Effect of Using Different Levels of Red Ginseng Roots Powder on some Physiological Characteristics of Japanese Quail Males (*Coturnix japonica*)

Khalid C.K. Al-Salhi* & Abdulkarim M. Al- Waeli

Department of Animal Production, College of Agriculture, University of Basrah, Iraq

*Corresponding author e-mail: knnz1977@yahoo.com

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Abstract: The current study was conducted to investigate the effect of adding different levels of ginseng roots to the diet on some physiological characteristics of Japanese quail males. A total of 120 Japanese quail males aged one week were used in this study. The males were randomly distributed into four experimental treatments (n=30). Each treatment was replicated three times (10 individual each). Males were fed experimental diets that were formulated to contain the same components as the control diet which contained red ginseng roots powder at levels 250, 500 and 750 mg/ kg feed in other three experimental diets respectively. The results showed that the males of the fourth treatment recorded the lowest mean of the age of sexual puberty. While the highest average of sexual puberty age was recorded by the males of first treatment. On the other hand, the fourth treatment recorded the highest relative weight of testes compared with the other treatments at the age of 30 and 60 days. The results indicated that the males of the fourth treatment recorded highest Testosterone, FSH and LH levels compared with the other treatments at the age of 60 days. We can conclude from this study that the highest concentration of powder ginseng roots (750mg/kg feed) can promote the development of testes and increase testosterone, FSH and LH hormones in the serum of Japanese quail males.

Keywords: Ginseng, Physiological characteristics, Quail.

Introduction

Recent studies have sought to find modern methods for improving the productive efficiency of birds using non-conventional feedstuff and avoiding the use of antibiotics (Wenk, 2000). One of these methods is the use of herbs and medicinal plants as food additives because of their positive effects in raising performance, sexual characteristics, digestive system and enhancing immunity (Hashemi & Davoodi, 2010). One of the most

important medicinal plants is ginseng, which is a perennial plant can be used in some practices. However, the main part is the root because it contains many nutrients such as important vitamins and minerals to the human and animal (Lee *et al.*, 2013). Ginseng has many medicinal effects and is used as a stimulant for most physiological traits as an antioxidant (Kim *et al.*, 2011). It plays a great role in activating the immune system (Ao *et*

al., 2011). Affecting sexual effectiveness and increasing fertility through its effect on sex hormones and their receptors (Park *et al.*, 2017). Hong *et al.* (2002) showed that red ginseng plays an important role in enhancing the function of sex hormones necessary to testicular activities by enhancing the receptors of these hormones within the seminal tubules of the testicle. In addition to enhancing and increasing the production of proteins in testicular tissue, many recent studies have confirmed that ginseng plays an important role in increasing the number and motility of sperm, which increase fertility and thus increase male sexual effectiveness (Azazi *et al.*, 2011). This study aimed to investigate the effect of adding different levels of red ginseng roots to the diet on some physiological characteristics of Japanese quail males.

Materials and Methods

A total of 120 males of Japanese quail aged one week were raised with cages. The cage area was 71 x 71 x 50 cm. The males were randomly distributed into four experimental treatments (30 each). Each treatment had three replicates (10 each). The males fed in the first treatment (control) starter diet (24% Crude protein; 2900kcal/kg Metabolizable energy) until three weeks of age, after which they received a quail breeder diet (20% Crude protein; 2900 kcal/kg Metabolizable energy) and water ad libitum to the end of the study. The second, third and fourth treatment birds fed the control treatment diet with red ginseng roots powder was added at levels 250, 500 and 750 mg / kg feed respectively.

The age of sexual puberty for males was determined after confirming the production of foam from cloacal gland (Quinn Jr *et al.*; 2008; Al-Salhie, 2012). The weights of both testes were recorded at the 30th and the 60th days of age using a sensitive balance after slaughtering 3 males of each treatment. A part of blood sample was prepared to measure the serum testosterone, follicle stimulating hormone (FSH) and luteinizing hormone (LH) was also assayed by ELISA procedure at

the 60 day of age. Data were subjected to one way analysis of variance (ANOVA) and differences were considered to be significant if $P < 0.05$ according to SPSS (2009).

Results & Discussion

The results of Table (1) showed a significant differences ($P < 0.05$) between sexual puberty in males. Males of the fourth treatment recorded the lowest mean at the age of sexual puberty, while the highest average of sexual puberty was recorded by the first treatment, which did not differ significantly with males of the second treatment. These results may be due to the role of high concentration of ginseng in enhancing the receptors of sex hormones such as testosterone and thus increasing their release from the testes (Table 2). These findings confirm the increase of testosterone hormones in the fourth and third treatments. These hormones play an active role in increasing the activity of sexual cells and sexual behavior of birds and thus early puberty (Al-Salhie, 2018). The present results agree with those of Park *et al.*, (2007) who indicated the role of ginseng in promoting sex hormone receptors and sexual activity for birds. The relative weight of the testes in males showed a significant differences ($P < 0.05$) among the study treatments.

The fourth treatment recorded the highest relative weight of testes compared with the other treatments at the age of 30 and 60 days. Whereas, the third and the second treatment recorded highest relative weight of testes compared with the control treatment at the age of 60 days. These results may be due to ginsenosides, the active substance in ginseng, which is similar in nature to the nature of steroid hormones (Choi *et al.*, 2011). Therefore, these hormones play an important role in increasing sexual activity and provide support and protection of the testicle tissue from free radicals (Solakidi *et al.*, 2005). Also, the increase in the concentration of the Testosterone, FSH and LH hormones (Table 2) promote testes growth and development (Sturkie, 1986; Al-Salhie *et al.*, 2017).

Table (1): Effect of different levels of red ginseng roots powder on the age of sexual puberty and relative weight of testes at the 30th and 60th days in Japanese quail males (Mean \pm SE).

Treatment traits	T1	T2	T3	T4	Sig.
The age of sexual puberty	35.60 a \pm 0.40	34.90 a \pm 0.31	33.80 b \pm 0.29	30.40 c \pm 0.45	*
Relative weight of testes at 30 days	0.363 c \pm 0.003	0.370 c \pm 0.005	0.406 b \pm 0.012	0.810 a \pm 0.010	*
Relative weight of testes at 60 days	2.103 c \pm 0.184	3.346 b \pm 0.211	3.710 b \pm 0.196	4.496 a \pm 0.105	*

T1 control, T2 adding 250mg from red ginseng roots powder for kg. feed, T3 adding 500mg from red ginseng roots powder for kg. feed, T4 adding 750mg from red ginseng roots powder for kg. feed.

abc Means without common superscript are different at $p < 0.05$

Hormones concentration

The results of table (2) showed a significant differences ($P < 0.05$) among the study treatments in the concentrations of Testosterone, FSH and LH at the 60 day. The fourth treatment recorded highest levels compared with the other treatments, while the third and the second treatment recorded highest levels compared with the control treatment. This may be due to the important role of ginsenosides in the roots of ginseng on the relaxation of the walls of the blood vessels, which improves the flow of blood correctly and regularly (Buettner *et al.*, 2006). On the other hand, the males of the ginseng root powder did not get any stress. This may be due to the role of the roots of ginseng in the resistance and overcome stress and fatigue

because of its content of active substances and compounds (Choi *et al.*, 2011). In addition, ginseng is a natural regulator for metabolic processes in the body that increase the ability of the body to adapt to the stressful factors (Kim *et al.*, 2011; Jang *et al.*, 2007). On the other hand, the development testes in the males of these treatments (table 1) have an important role in the secretion of reproductive hormones under the influence of the hypothalamus-pituitary gland, which affects the testes in the secretion of sexual hormones (Sturkie, 1986). The findings of this study agree with Hong *et al.* (2002) who indicated that red ginseng has an important role in promoting the sex hormones necessary to perform the functions of the sexual organs by enhancing the receptors of these hormones.

Table (2): Effect of different levels of red ginseng roots powder on some hormones concentration at 60 days for Japanese quail males (Mean \pm SE).

Treatment traits	T1	T2	T3	T4	Sig.
Testosterone(ng/ml) concentration at 60 days	1.12 c \pm 0.10	2.10 b \pm 0.15	2.87 ab \pm 0.22	3.50 a \pm 0.11	*
FSH (IU/L) concentration at 60 days	1.29 c \pm 0.13	1.42 b \pm 0.25	1.85 b \pm 0.32	2.82 a \pm 0.30	*
LH(IU/L) concentration at 60 days	1.17 c \pm 0.21	1.40 b \pm 0.26	1.57 b \pm 0.26	2.47 a \pm 0.19	*

T1 control, T2 adding 250mg from red ginseng roots powder for kg. feed, T3 adding 500mg from red ginseng roots powder for kg. feed, T4 adding 750mg from red ginseng roots powder for kg. feed.
abc Means without common superscript are different at $p < 0.05$.

Conclusions:

We can concluded from this study that the highest concentration of powder ginseng roots (750mg/kg feed) can promote the development of testes and increase serum testosterone, FSH and LH hormones of Japanese quail males.

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