

## EFFECT OF AGE AT SEXUAL MATURITY OF QUAIL DAMS ON EGG PRODUCTION AND EGG QUALITY TRAITS OF THEIR PROGENY

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**ABSTRACT :** An experiment was conducted to determine the effect of the age at sexual maturity of Japanese quail dams in the egg production and egg quality traits of their progeny. The experimental birds consist of 100 females at 16 weeks of age, which individually recorded for the age at sexual maturity. The dams divided according to their age at sexual maturity to five groups as following, G1: 35-38 days, G2: 39-40 days, G3: 41-42 days, G4: 43-44 days and G5: 45-58 days. Males used randomly to produce the progeny of groups. The results showed significant differences among groups in the weekly number of eggs per female, egg mass and hen day egg production (%). No significant differences among groups in the number of cumulative eggs per female, cumulative egg mass and cumulative hen day egg production (H.D%). There were no significant differences among the groups in the egg shape index, shell thickness albumin height. There were significant differences among groups in yolk diameter, yolk color, yolk weight.

**Key words :** Japanese quail, sexual maturity, egg production, egg quality traits.

### INTRODUCTION

Quail is an interested bird in poultry industry due to its many unique features such as early sexual maturity, intensive egg production and low housing space requirements (Hassan and Fadhil, 2019). The age at sexual maturity affect by environmental factors (Alkan *et al*, 2009). Age at sexual maturity considered important character because it has effect on egg number, egg weight, egg mass and body weight at sexual maturity (El-Dlebhany, 2008) and this sexual maturity event associated with physiologic changes that related with the onset of sexual maturity in females (Eitan and Soller, 2001; B<sup>3</sup>aszczyk *et al*, 2006; Hassan and Ali, 2018). The egg production traits influenced by genetic factors as well as by environmental factors such as nutrition, lighting, temperature and the breeding system (Reddish *et al*, 2003; Bahie El-Deen *et al*, 2008; Hassan, 2011). Camci *et al* (2002) reported that late sexual maturity females recorded high body weight at sexual maturity and reduction in egg production, while early sexual maturity females have high egg production without change in egg weight. Hassan (2013) found the age of sexual maturity, egg weight in Japanese quails 40.63 days and 9.54 gram, respectively.

The recent study aimed to determine the effect of age at sexual maturity of Japanese quails dams (*Coturnix*

*coturnix japonica*) on the egg production traits of their progeny.

### MATERIALS AND METHODS

#### Birds and management

The experimental flock consist of 100 females of Japanese quail divided into five groups according to the age at sexual maturity as following: G1: 35-38 days, G2: 39-40 days, G3: 41-42 days, G4: 43-44 days and G5: 45-58 days. The males were distributed randomly in the groups to get fertilized eggs and produce the progeny generation. The eggs were collected for three consecutive days and marked according to their groups for four hatches, and incubated to get progeny groups (Hassan and AbdAlsattar, 2015 ). The one day chicks reared in wooden cages during 14 weeks of age, and the chicks fed a diet of 24% crude protein and metabolic energy 2775 kcal/kg.

The measurements included the egg production traits to detect the effect of the sexual maturity of the dams on the egg production performance of their progeny.

#### Statistical analysis

The data statistically analyzed according to general linear model using completely randomized design and used Duncan multiple ranges at 0.05 significant level to test the

significant differences among means (Duncan, 1955). The statistical analysis performed by SPSS software version 22.

## RESULTS

The statistical analysis appeared significant differences among experimental groups including weekly number of eggs/female, egg weight, egg mass and hen day egg production (H. D.%) (Table 1), hence G5 recorded significant reduction in weekly egg number per female and in hen day egg production percentage compared with other groups. While the G1 appeared significant superiority in egg mass compared with G5, and there were no significant differences among other groups.

The mean effect of flock age on egg production traits appeared in Table 2, which showed significant decline during the six and seven weeks of age, in all egg production traits included in the study, compared with later weeks.

There were no significant differences among groups in cumulative egg production traits including egg number, egg mass and hen day egg production, while the results recorded significant differences among groups in mean of cumulative egg weight, hence G5 showed significant heavier egg weight compared with G2 and G3 (Table 3).

Table 4 showed the quality traits of Japanese quail eggs in different groups, there were significant

differences among groups in all yolk parameters including yolk height, yolk diameter, yolk weight and yolk color, hence there were significant decline of yolk weight in G1 compared with G2, G3 and G4.

## DISCUSSION

The results in Table 1 appeared significant decline in number of egg/ female and hen day egg production percentage in later sexually maturity group (G5) compared with other groups, these results agreed with Camci *et al* (2002), Al-Qaisi (2014) whom found that early sexual maturity in Japanese quail resulted in increased eggs production without change in egg weight, while delayed sexual maturity resulted in a reduction in total egg production. Also, Bahi El-Deen *et al* (2008), Tikriti (2010) agreed with recent study, hence recorded significant superiority of egg production in early sexual maturity group compared to middle-aged and late sexual maturity groups. In other hand, the egg weight did not differ significantly between early sexual maturity group and late sexual maturity group and this result disagree with Bahi El-Deen *et al* (2015) whom refer to significant associated between first ten egg weight and the age of sexual maturity. The egg mass in G1 appeared significant superiority compared with G5 in spite of no significant difference between the two groups in egg weights, may be the difference appeared due to significant differences

**Table 1 :** Means  $\pm$  Standard error of weekly number of eggs produced, egg weight, egg mass and weekly egg production (H.D%) in different groups of age at sexual maturity in Japanese quails.

Groups of age at sexual maturity (day)	Number of eggs Egg/bird/ week	Egg weight (g.)	Egg Mass (g.)	Hen day egg production (%)
35 – 38	5.57 $\pm$ 0.23a	11.08 $\pm$ 0.16ab	62.32 $\pm$ 2.96a	79.52 $\pm$ 3.35a
39 – 40	5.37 $\pm$ 0.23a	10.86 $\pm$ 0.16b	59.40 $\pm$ 2.93ab	76.77a $\pm$ 3.55
41 – 42	5.33 $\pm$ 0.27a	10.99 $\pm$ 0.18b	59.99 $\pm$ 3.41ab	76.13 $\pm$ 3.83a
43 – 44	5.34 $\pm$ 0.29a	11.27 $\pm$ 0.17a	60.88 $\pm$ 3.57ab	76.30 $\pm$ 4.14a
45 – 58	4.77 $\pm$ 0.27b	11.27 $\pm$ 0.14a	54.44 $\pm$ 3.26b	68.20 $\pm$ 3.86b

Means with different letters refer to significantly difference from each other at  $P \leq 0.05$  according to Duncan multiple ranges test.

**Table 2 :** Means  $\pm$  standard error of egg production traits during Japanese quail females age (week).

Female age (Week)	Number of eggs Egg/bird/ week	Egg weight (g.)	Egg Mass (g.)	Hen day egg production (%)
6	2.18 $\pm$ 0.32c	8.98 $\pm$ 0.26e	19.20 $\pm$ 2.71c	31.21 $\pm$ 4.56c
7	4.72 $\pm$ 0.18b	10.34 $\pm$ 0.12d	49.07 $\pm$ 1.80b	67.39 $\pm$ 2.56b
8	5.69 $\pm$ 0.19a	11.15 $\pm$ 0.06c	63.40 $\pm$ 2.10a	81.26 $\pm$ 2.70a
9	5.90 $\pm$ 0.22a	11.29 $\pm$ 0.08bc	66.56 $\pm$ 2.57a	84.20 $\pm$ 3.17a
10	5.79 $\pm$ 0.24a	11.37 $\pm$ 0.08abc	65.97 $\pm$ 2.87a	82.78 $\pm$ 3.50a
11	5.58 $\pm$ 0.26a	11.50 $\pm$ 0.08ab	64.25 $\pm$ 3.09a	79.68 $\pm$ 3.65a
12	5.72 $\pm$ 0.27a	11.72 $\pm$ 0.07a	67.11 $\pm$ 3.21a	81.79 $\pm$ 3.81a
13	5.85 $\pm$ 0.25a	11.70 $\pm$ 0.09a	68.18 $\pm$ 2.76a	83.50 $\pm$ 3.57a
14	6.06 $\pm$ 0.23a	11.68 $\pm$ 0.05a	70.93 $\pm$ 2.79a	86.65 $\pm$ 3.30a

Means with different letters refer to significantly difference from each other at  $P \leq 0.05$  according to Duncan multiple ranges test.

**Table 3 :** Means  $\pm$  Standard error of cumulative egg production traits during nine weeks of production in different groups of age at sexual maturity in Japanese quails.

Groups of age at sexual maturity (day)	Number of eggs Egg/bird/ week	Egg weight (g.)	Egg Mass (g.)	Hen day egg production (%)
35 – 38	50.10 $\pm$ 5.01	11.13 $\pm$ 0.06ab	557.35 $\pm$ 54.81	79.69 $\pm$ 7.94
39 – 40	48.37 $\pm$ 1.68	10.89 $\pm$ 0.06b	526.46 $\pm$ 16.77	77.46 $\pm$ 2.97
41 – 42	47.96 $\pm$ 3.01	11.07 $\pm$ 0.12b	531.88 $\pm$ 37.72	78.21 $\pm$ 5.64
43 – 44	48.06 $\pm$ 5.68	11.36 $\pm$ 0.08a	545.62 $\pm$ 63.41	78.30 $\pm$ 9.76
45 – 58	42.97 $\pm$ 1.90	11.33 $\pm$ 0.08ab	487.13 $\pm$ 23.82	71.89 $\pm$ 3.65

Means with different letters refer to significantly difference from each other at  $P \leq 0.05$  according to Duncan multiple ranges test.

**Table 4 :** Means  $\pm$  Standard error of egg quality traits in different groups of age at sexual maturity in Japanese quails.

Groups of age at sexual maturity (day)	Egg shape index (%)	Yolk height (mm)	Albumin height (mm)	Yolk Diameter (mm)	Yolk weight (g.)	Yolk Color	Shell thickness (mm)
35 – 38	6.17 $\pm$ 0.55	3.07 $\pm$ 0.09ab	24.00 $\pm$ 1.16	5.56 $\pm$ 0.51b	10.50 $\pm$ 0.37c	1.94 $\pm$ 0.05a	11.18 $\pm$ 0.58
39 - 40	6.25 $\pm$ 0.31	3.02 $\pm$ 0.14ab	22.48 $\pm$ 0.50	8.06 $\pm$ 1.07a	12.49 $\pm$ 0.37a	1.80 $\pm$ 0.17ab	11.08 $\pm$ 0.48
41 - 42	6.17 $\pm$ 0.25	2.93 $\pm$ 0.15b	22.83 $\pm$ 0.48	4.89 $\pm$ 0.27b	11.69 $\pm$ 0.39ab	1.61 $\pm$ 0.09b	10.71 $\pm$ 0.23
43 - 44	7.02 $\pm$ 0.72	2.86 $\pm$ 0.27b	24.06 $\pm$ 0.56	5.41 $\pm$ 0.27b	11.90 $\pm$ 0.37ab	1.96 $\pm$ 0.39ab	11.83 $\pm$ 0.46
45 – 58	6.31 $\pm$ 0.48	3.65 $\pm$ 0.30a	23.84 $\pm$ 0.61	5.78 $\pm$ 0.51b	10.97 $\pm$ 0.38bc	1.84 $\pm$ 0.07ab	11.79 $\pm$ 0.42

Means with different letters refer to significantly difference from each other at  $P \leq 0.05$  according to Duncan multiple ranges test.

in egg number those groups (Table 1), the results agreed with Al-Qaisi (2014). Table 2 represented the main effect of age flock on egg production traits during the study period, and the result recorded no significant differences among age weeks during the period from nine week to 14 week, while the early period of production recorded significant poor egg production. The cumulative egg production traits (Table 3) recorded no significant differences among groups in egg number, egg mass and hen day egg production, that may be refer to the role of age on the disappear of differences, so all groups became near to each other in their potential.

The results appeared in Table 4 for the egg quality traits, there were significant differences in the yolk parameters included in the study, hence G5 significantly differ from G3 and G4 in the yolk height, while there were significant superiority of G2 compared with other groups in yolk diameter. The yolk color recorded significant decline in G3 compared with early sexual maturity group (G1).

### CONCLUSION

The late sexual maturity quail females appeared significantly decline in the weekly number of egg per hen and hen day egg production percentage compared with other groups, and the early sexual maturity females recorded significant superiority in egg mass compared with the late sexual maturity group.

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