INHERITANCE OF AGE AT SEXUAL MATURITY AND ITS RELATIONSHIPS WITH SOME PRODUCTION TRAITS OF JAPANES QUAILS

By

M . Bahie El-Deen ; W. S. El Tahawy*; Y. A. Attia*and M. A. Meky*

Poultry Prod. Dept., Fac. of Agric. Alex. Univ., Egypt.

* Animal and Poultry Prod. Dept., Fac. of Agric. (Damanhour), Alex. Univ., Egypt.

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The aim of this study was to investigate the relationship between the age at sexual maturity (ASM) and some performance traits of Japanese quail and also to estimate the phenotypic and genetic parameter for egg production traits. Data of the first egg laid was recorded of each female of seven hundreds and forty five of caged-housed female Japanese quail. The females were classified according to their age at sexual maturity (X±l SD); into three category groups being early age at sexual maturity (ESM) averaged (42.98d±0.19), medium age at sexual maturity (MSM) (50.05d±0.13) and late age at sexual maturity (LSM) (61.89d±0.23). The main results and conclusions could be summarized in the following points:-

1. *The mean body weights at sexual maturity were 169.56, 183.11 and 199.03g for ESM, MSM and LSM-group respectively with significant differences between them.*
2. *Egg number was significantly higher in ESM-group than the other two groups, and it was in medium than the late sexual maturity group.*
3. *The overall mean for egg production (EP) was 83.11%. The differences among three studied groups were significant and early sexual mature group had the highest laying rate.*
4. *Egg weights (EW) during the first 45 d of laying period were 11.90, 11.06 and 10.63g. for ESM, MSM and LSM-groups respectively.*
5. *Female matured early had better feed conversion ratio (FCR). The records of (FCR) were 2.47, 2.86 and 3.09 for ESM, MSM and LSM-group respectively.*

6. Small body weight (151.7 g at 6- wk of age) delayed age at sexual maturity (61.89 d). On the other hand, early sexual maturity group (42.98 d) had heavies' body weight at 6 wk of age.

7. Heritability estimates of age at sexual maturity for three selected groups (ESM, MSM and LSM-groups) were 0.76, 0.08 and 0.06 respectively.

8. Heritability estimates for BW at sexual maturity were 0.41, 0.39 and 0.94 for ESM, MSM and LSM-groups respectively.

9. Heritability estimates of (FCR) were 0.31, 0.23 and 0.44 for ESM, MSM and LSM-groups respectively.

10. The estimations of phenotypic correlations between ASM and other studied traits for ESM-group ranged from a low and negative phenotypic correlations (-0.01) with egg number (EN or EP) to a positive correlation (+0.14) with EW.

11. Generally, ASM was negatively correlated with studied traits except FCR across the three selected groups.

In conclusion, growth traits (body weight at 6 week of age, (BWG) and (GR) at different studied periods) were correlated with early ASM. In Japanese quail, early sexual maturity increased EW without any negative change for EP. On the other hand, late sexual maturity caused decreased growth and total EP.

INTRODUCTION

Quail industry has been developed in recent years in many countries such as Japan, France and Italy, for both meat and EP. Quails are the smallest avian species kept for meat and egg. **Panda and Singh(1990)** had also assumed that Japanese quail is worldwide importance as a laboratory animal. Early sexual maturity has been considered an important fecundity and hereditary traits. **Hutt (1949)** reported that, the ASM is one of the easiest characters to establish in a flock through selective breeding especially if attention is given to the selection of maturity used of males from early maturity dams pullets started to lay at an earlier age were smaller than those of late sexual maturity. **El-Tahawy (2000)** in the same strain after two generations of selection for ASM, found that realized response was -5.6 d. In Quail, after 4 generations of selection for ASM **Tawefuek (2001)** reported that the ASM was highly significant decreased. Also, **Bahie El-Deen *et al* (2005)** decreased investigated the direct response to selection for ASM in selected line of Japanese quail. After 4 generations, the ASM decreased significantly by 10.3 d. **Wilhelmson (1979)** conducted an experiment with Japanese quail consisted of four selected lines and the control one. The first line was selected for an index combining EN and albumen height. The second line was a replicate of the first line. The third line selected for EN from first egg until 84 d of age. The fourth line selected for albumen height measured on the first egg after 56 d of age, and the last one was the control line. In general, the third line selected for EN had higher rate of laying over all lines throughout the studied five generations studied, but there was a tendency to backlash against control in last generation. **Nestor *et al*. (1996)** reported the direct response to selection for increasing EP for 84-d production period that the EP line exhibited gains in EP until the fifth generation and then appeared to lose EP relative to the random breed control line from generation 5 through generation 10. A similar result was apparent when EP was measured for a 180-d production period. **Shalan (2002)** studied the effect of selection index for improving EP traits in Japanese quail. The genetic progress achieved was 3.2 eggs for EN, - 0.5 g for BW at sexual maturity, - 0.11 units for feed efficiency after one cycle of selection. Early sexual maturity has long been considered an important fecundity and heredity trait. The aim of the present study was to determinate the relationship between the age at sexual maturity (ASM) and some performance traits in Japanese quail and also to estimate the phenotypic and genetic parameters (e.g. heritability and phenotypic and genetic correlations growth and EP traits).

MATERIAL AND METHODS

The present experiment was conducted at the Poultry Research Center, Poultry Production Department, Faculty of Agriculture, Alexandria University. The flock under study was obtained by two ways of crossing between two lines of quail; L2 (selected for egg number, which was done through 17 generations of selection), and L5 (selected for body weight at 6- wk of age which was done through 17 generations of selection). After establishing the base population, the selection program by selection index was continued for 4 generations of selection **(Bahie EL-Deen 2002)** After hatching 1800 unsexed chicks produced from 75 sires and 150 dams kept in a brooder for 5 wk of age then, seven hundreds and forty five of females were transferred to individual cages. The data of the first egg was recorded for each female. Females were classified according to age at sexual maturity (X± l SD); into three categories as early sexual maturity (ESM) averaged 42.98 d, medium sexual maturity (MSM) averaged 50. 05 d and late sexual maturity (LSM) averaged 61. 89 d; respectively.

Average age at sexual maturity of Japanese quail females (days).

Sexual maturity	N	Range		Mean
		Low	High	
Early	125	35	45	42.98
Medium	483	46	56	50.05
Late	130	57	69	61.89
Overall mean	738			50.94

Flock management

The chicks were marked by wing bands at day of hatch and brooded in floor brooders at a starting temperature of 38^0 C for the first wk after hatching, and then temperature was decreased by $2\text{-}3^0$ C each wk thereafter. At four wk of age all birds were sexed according to color and pattern of plumage. At five wk of age, the females were housed individually in cages. The date of the first egg was recorded for each female. Eggs were recorded daily and weighted throughout the first 90 days of age. Feed and water were provided ad libitum. Diet contained 24.20% crude protein with 2900 ME kcal. /kg was fed until 35 days of age. Then 19.23% crude protein with 2771 ME kcal./Kg ration was fed during the production period (25 gm diet / female / day). No significant changes had been made in feed or management practices throughout the experimental period.

Studied traits.

The following traits studied in each group were :

1. Body weight at 6 wk and at sexual maturity in grams.
2. Age at the first egg in days.
3. Egg number during 45 days after sexual maturity.
4. Egg production (%) during 45 days after sexual maturity.
5. Egg weight: average egg weight (g) during 45 days after sexual maturity for each hen.
6. Egg mass: average egg weight (g) through 45 days after sexual maturity for each hen multiplied by the egg number.

7- Feed conversion ratio as (g) feed / (g) egg mass was calculated

Statistical analysis.

Data were analyzed using two different models (SAS, 1988). The significant tests for the differences between each two means for any studied trait were done according to Duncan's multiple range test (**Duncan,1955**)

Heritability estimates were calculated according to the following formula.

$$h^2 = 4 \text{ Var (s) / [Var (S) + Var (E)]}$$

Where:

h^2: is the heritability estimate, Var (S): are the sire variance components, multiplied by 4, and Var (E): is the error variance component. Also the coefficients of phenotypic and genetic correlations between different traits were calculated.

RESULTS AND DISCUSION

Six weeks body weight:-

Least squares means of 6 wk BW of female Japanese quail of the three selected groups are presented in Table (1). ESM group had heavier 165 g. BW than the MSM and LSM-groups. Also, the MSM group was heavier than the LSM-group (Table 1). The values of BW obtained in the present study were similar to the values reported by **Shalan(1998), Tawefuek(2001), Debes (2004), Bahie El-Deen *et al*.(2005) and Abd El-Fatah *et al*(2005).** In conclusion the results indicated that selection for ESM and MSM increased growth of Japanese quail from 1 to 6 wk of age.

Age at sexual maturity:-

Least squares means of age at sexual maturity for the three categories of bird were 42.98, 50.05 and 61.94 d for ESM, MSM and LSM groups; respectively (Table 1).Group of early maturity age matured earlier ($P \leq 0.01$) than those of MSM and LSM groups. The overall mean of age at sexual maturity was 50.94 d. This result agree with those of **Bahie El-Deen (1991; 1994), Kocak *et al*. (1995), Debes (2004) and Abou El-Ghar *et al.* (2007).** But was different than those of **Inal *et al*. (1996), ŐCamci *et al*. (2002) and Nofal (2006)**.

Body weight at sexual maturity (BWSM):-

The results of the effect of ASM on BW at sexual maturity for the three studied groups are shown in (Table 1).The means of BW at ASM were 169.56, 183.11 and 199.03g. for ESM, MSM and LSM groups of ASM; respectively. BW was heavier ($p \leq 0.01$) of Japanese quail reached sexual maturity later. According to this, the minimum BW value was 169.56 g. for ESM group, and latest value 199.03 g for LSM group. The differences in BWSM were statistically significant among the three groups and increased with increasing ASM. The values of BWSM obtained in the present study were around the corresponding values reported by **Bahie El-Deen (1994), Kosba *et al*(2002), ŐCamci *et al* (2002), and Abou El–Ghar *et al*(2007).**

Egg number:-

Least squares means of EN during the first 45 days after maturity of the three experimental groups are presented in (Table 2). The results showed an increase in EN of ESM-group than the MSM-and LSM groups. Similar results were obtained by **Bahie El-Deen (1994), Kosba *et al.*(2003), Debes (2004) and Bahie El-Deen and Shalan(2005**). The later auther reported that, the selected line matured earlier than the control line, and the selection for the earlier maturity effectively increased EN. Differences among groups were significant ($p \leq 0.05$ Table 2). The ESM-group had significantly ($p \leq 0.01$) higher EN than those of MSM- and LSM-groups. This may be due to the effect of earlier maturity on increase the length of laying cycle and/or the increase in clutch size. These results are in agreement with finding by **Shalan (1998).**

Egg production:-

Means and standard error for EP (%) of the different experimental groups are given in (Table 2). The overall average for this trait was 83.11%. The differences among the three studied groups were significant ($p \leq 0.05$). These results are in agreement with those obtained by **Younis *et al*. (2004) and Bahie El Deen *et al*. (2005)**. But disagree with those of **Kocak *et al*. (1995) and ŐCamci *et al.* (2002).**

Egg weight:-

Least squares means for EW during the first 45 days of laying by groups are shown in (Table 2). The means of EW during the first 45 d of laying were 10.90, 11.06 and 10.63g for ESM-MSM and LSM-groups respectively. Differences among the three studied groups were significant. The results indicated that EW for ESM was similar to the LSM group .However, MSM group produced heavier of LSM-group. Similar results were reported by **Shalan (1998), Tawefuek (2001), Kosba *et al.* (2002) and (2003), Debes (2004) and Abou El Ghar *et al* (2007)**. In conclusion, earlier age at sexual maturity in Japanese quail increased EP without significant change in EW.

Egg Mass :-

Table (3) shows least squares means of EM during the first 45 d after maturity of the three studied groups. Significant differences ($P \leq 0.05$) were found among the three experimental groups (Table 3). Results indicated that egg mass was linearly decreased with increasing of age at sexual maturity and this reflected the decrease in egg number. These results indicated that, Japanese quail matured at 42d age, produced heavier egg mass than the MSM- and LSM- groups. These results are in line with those of **Debes (2004) and Abou El-Ghar *et al* (2007).**

Feed Conversion Ratio :-

Average FCR for EP of different experimental groups of Japanese quail during the first 45 d after sexual maturity are shown in (Table 3). Feed consumption was fixed as 25g feed/female /day for all studied groups The records of FCR were 2.47, 2.86 and 3.09 for ESM-, MSM- and LSM- groups respectively. Statistical analysis of FCR in (Table 3) indicated that there were highly significant differences among the three groups. Also, the data revealed that ESM female had better FCR than the other groups and it was better in the MSM-group than the LSM-group. The presented results are in partial agreement with those reported by **Kosba *et al* (2002) and Abd El-Azeem *et al* (2005).**

Genetic Parameters:-

Heritability Estimates:-

Heritability estimates were calculated in the present study based on sire half-sib components of variance. The same numbers of progeny for each sire were generally small and unequal; therefore the results were variable and had large standard errors in some estimates. Heritability estimates of ASM and BW, BWSM, EN and EP during the first 45day after maturity, EW and EM and FCR at the same period by three groups studied are presented in (Table 4).Heritability estimates of ASM for the three studied groups' e.g.: ESM; MSM and LSM-groups were 0.76, 0.08 and 0.06 respectively. These results are in agreement with the corresponding values reported by **Shalan(1998), Enab and Bahie El-Deen (2001), Kosba *et al* (2002) and Debes(2004).**Early estimates of heritability of ASM were reported by (**Aboul-Hassan, 2001) and (Aboul –Ghar *et al*2007).**Heritability estimates from sire component of variance for BWSM were 0.41, 0.39 and 0.94 for ESM-, MSM-and LSM-groups respectively). Similar heritability for this trait were reported by **Bahie El-Deen (1994) and Kosba *et al.*(2002)** and **Abo El-Ghar *et al* (2007).**Heritability estimates from sire component of variance for the three selected groups for EN and EP are presented in (Table4). Generally, h^2s estimates for these traits were higher of ESM-group than the other groups. These estimates are within the range of heritability for egg number and production traits estimated by **Shalan(1998), Kosba *et al.*(2002) and Bahie El-Deen and Shalan (2005).** Earlier values had been reported by **Abo El-Ghar *et al* (2007).**

Heritability estimates from sire component of variance for EW were 0.36 and 0.50 for ESM and LSM-groups. On the other hand, the estimated value for MSM was not possible. **Enab (1991)** stated that the estimated heritability of some traits was equal to or more than one or less than zero (negative estimate) maybe due to sampling error or population size. The estimate of heritability of EW in the present study were around the corresponding values reported by **Bahie El-Deen(1994 and 2002) and Enab and Bahie El- Deen(2001).** Heritability estimate for EM of the three selected groups of Japanese quail ranged from 0.20 to 0.45. These estimates were in a good agreement with those estimated in quail by **Bahie El-Deen *et al*(2005),** Lower estimates for heritability of EM (0.13) were reported by **Aboul-Hassan(2001).**

Heritability estimates of FCR (Table 4) based on sire component were 0.31, 0.23 and 0.44 for ESM, MSM and LSM-groups respectively. These results confirmed those reported by **Bahie El-Deen(1994)** in Japanese quail. The results of heritability estimates of FCR reported in the present study are in line with the corresponding values reported on chicken, which ranged from 0.14 to 0.56.

Generally most of these heritability estimates were in the biological limits, while few of these estimates were out of these limits to sampling error or the effect selection of on population.

Phenotypic and Genetic Correlations:-

The estimates of phenotypic and genetic correlation based on sire components among ASM and different studied traits of EP(e.g. BWSM, EN, EP, EW, EM and FCR for ESM, MSM, LSM and BW6) in Japanese quail are presented in Tables (5 and 6), respectively.ASM had a wide range of phenotypic correlation with the other studied traits. The estimations of phenotypic correlations between ASM and other studied traits for ESM-group ranged from a small negative phenotypic correlations (-0.01) with EN or EP to a positive correlation (+0.14) with EW.

In MSM-group the estimates of phenotypic correlations of ASM with the other studied traits were negative and also with all trait except with

FCR (+0.18). The same trend was observed in LSM-group. Generally, ASM had negative phenotypic correlations with BWSM in the three selected groups.

On other word, ESM correlated with heavy BWSM in Japanese quail. The same trend was reported by **Bahie El-Deen (1994).** He found that, the phenotypic correlations between ASM and BWM were (-0.36). **Bahie El-Deen (1991 and 1994)** indicated that the phenotypic correlations between ASM and EN were negative. On the other hand, **Ö Camci *et al* (2002)** reported that the correlation between ASM with EN was -0.27. **Inal *et al* (1996)** reported that the Japanese quail selected for their BW reached sexual maturity at 39.8 to 51.1 days of life, while their EW were 10.9 to 13.2 g.

The estimates of genetic correlations based one sire covariance components between different studied traits(e.g. ASM, BWSM, EN, EP, EW, EM and FCR for ESM, MSM and LSM-groups) are presented in Table (6). The results in Table (6) showed that there was a wide range of genetic correlation estimates between the different studied traits for the three selected groups of Japanese quail and they were in a good agreement with those found in Japanese quail by **Shalan (1998), Aboul-Hassan (2001),**

Ö Camci (2002) and Debes (2004). On the other hand, some of genetic relationship coefficients did not estimates, while other estimates of genetic correlations were beyond comprehensible magnitude. These unexpected estimates of genetic correlations between the studied traits may be due to negative variance, sampling errors and some missing observations. Generally, ASM was negatively correlated with the studied traits except FCR across the three studied groups. **Bahie El-Deen (1994) and Shalan (1998)** found that the genetic correlation between ASM and EN were negative. The fluctuation in values or directions between the three selected groups could be due to the interaction between the genetic and environmental patterns of traits.

The genetic correlation between ASM and EN had different directions. **Aboul-Hassan (2001), Enab and Bahie El-Deen (2001) and Shalan (2002)** obtained a positive genetic correlation between ASM and EN. The genetic correlations between ASM and EM were negative and a wide range of the genetic correlations between ASM and EM was reported by **Debes (2004)**.The genetic correlations between ASM and BWSM were similar in ESM and MSM-groups. However, this value was lower than that of LSM-group (-0.40). Similar results were reported by **Bahie El-Deen (1991) and Kosba *et al*. (2002)**.

The application of these finding on the breeding (genetics), and adaptation of the Japanese quail were compared to the domestic fowl. In Japanese quail LSM-hens decreased BW and EP traits. On the other hand, ESM increased EP.

In conclusion, selection for ESM in Japanese quail increased EP and EM. It should be pointed out that the same estimates of genetic correlations were large and over unity and some others could not be calculated because of the negative variance components.

Table (1): Least Squares means ±SE and analysis of variance for BW at 6 wk of age (BW6), age at sexual maturity (ASM) and body weigh at sexual maturity (BWSM) in three groups of Japanese quail females.

Groups	Traits					
	BW6		ASM		BWSM	
Early	165.02^{a}±2.62		42.98^{a}±0.19		169.56^{c}±2.28	
Medium	158.90^{a}±1.3		50.05^{b}±0.13		183.11^{b}±0.93	
Late	151.74^{c}±2.47		61.89^{c}±0.23		199.03^{a}±2.22	
Overall mean	158.07		50.94		183.55	
S.O.V	df	Ms	df	Ms	df	Ms
Between groups	2	6635.83**	2	1950.68**	2	6362.68
Within groups	735	804.84	735	8.67	735	496.53

a,b and c Means with different superscripts are significantly different (p≤0.05)
** Significant at p≤0.01

Table (2): Least Squares means ±SE and analysis of variance for egg number (EN),egg production (EP) and egg weight(EW)in three groups of Japanese quail females.

Groups	Traits					
	EN		EP		EW	
Early	41.87^{a}±0.39		93.32^{a}±0.86		10.90^{ab}±0.07	
Medium	37.62^{b}±0.29		83.40^{b}±0.63		11.06^{a}±0.17	
Late	32.47^{c}±0.65		72.16^{c}±1.43		10.63^{b}±0.07	
Overall mean	37.46		83.11		10.96	
S.O.V	df	Ms	df	Ms	df	Ms
Between groups	2	180.52**	2	937.23**	2	9.91**
Within groups	735	38.65	735	186.61	735	0.41

a,b and c Means with different superscripts are significantly different (p≤0.05)
** Significant at p≤0.01

Table (3): Least Squares means ±SE and analysis of variance for egg mass (EM)and feed conversion ratio (FCR) in three groups of Japanese quail females.

Groups	Trails			
	EM		FCR	
Early	456.46[a]±5.04		2.47[a]±0.04	
Medium	415.88[b]±7.48		2.86[b]±0.03	
Late	398.54[c]±7.64		3.09[c]±0.08	
Overall mean	406.65		2.89	
S.O.V	df	Ms	df	Ms
Between groups	2	38865,36*	2	3.6**
Within groups	735	9594.36	735	0.49

a,b and c Means with different superscripts are significantly different (p≤0.05)
** Significant at p≤0.01

Table (4): Heritability estimates (h^2±SE) for reproductive traits in three groups of Japanese quails

Traits	ESM	MSM	LSM
AM	0.76 ± 0.38	0.08 ± 0.09	0.06 ± 0.31
EN	0.73 ± 0.38	0.23 ± 0.11	0.48 ± 0.36
BWM	0.41 ± 0.35	0.39 ± 0.12	0.94 ± 0.38
EW	0.36 ± 0.35	Ns	0.50 ± 0.36
EP	0.77 ± 0.38	0.23 ± 0.11	0.48 ± 0.36
EM	0.20 ± 0.33	0.23 ± 0.11	0.45 ± 0.35
FC	0.31 ± 0.34	0.23 ± 0.11	0.44 ± 0.35
BW6	0.91 ± 0.39	0.23 ± 0.11	0.15 ± 0.32

Ns : Not estimated values.

Table (5): Phenotypic correlation (rp) between age at sexual maturity and productive traits in three groups of Japanese quails.

Traits	ESM	MSM	LSM
EN	-0.01	-0.17	-0.38
BWM	-0.19	-0.09	-0.01
EW	0.14	-0.04	-0.15
EP	-0.01	-0.16	-0.38
EM	0.06	-0.16	-0.38
FC	-0.08	0.18	0.33
BW_6	-0.07	0.04	0.09

Table (6). Genetic correlation between age at sexual maturity and productive traits in three groups of Japanese quails.

Traits	ESM	MSM	LSM
EN	0.07	-0.73	-0.42
BWM	-0.28	-0.30	-0.40
EW	-0.86	Ns	0.12
EP	0.06	-0.78	-0.60
EM	-0.51	-0.93	-0.61
FC	0.13	0.63	0.10
BW_6	-0.52	0.33	0.08

Ns : Not estimated values

REFERENCES

Abd El-Azeem, F, Nematallah; G.M. Ali and Faten, A.A. Ibrahim. (2005). *Effect of dietary protein level with some natural biological feed additives supplementation on productive and physiological performance of Japanese quail. Egypt. Poult. Sci. vol. 25 (II): 497-525.*

Abd El-Fattah M.H; E.A. El-Fuu; G.S Farahat; N.A. Hatba and M.A. Khalifa, (2005). *Inheritance of body weight, growth rate and fitness traits in Japanese quail. Egypt. Poult. Sci Vol (26) III: 1195-1215.*

Abou El-Ghar, R-Sh, El-Dlebshany, Amira E; Shalan, Hedaia. M (2007). *Heterosis from line crosses of two selected lines of Japanese quail: II- Components of Heterosis 4th world poultry conference 27-30 March 2007, Sharm El-Sheikh, Egypt P: 113-123.*

Aboul-Hassan, M. A; (2001). *Selection for high egg production in Japanese quail 1- Direct and correlated responses. Al-Azhar J. Agric. Res; 34:25-40.*

Bahie El-Deen, M; (1991). *Selection and correlated response for dressing percentage in Japanese quail. M. Sc. Thesis, Fac. of. Agric, Alexandria. Univ, Egypt.*

Bahie El-Deen, M; (1994). *Selection indices and crossing as a tool for improvement meat and egg production in Japanese quail. Ph. D. Thesis, Fac. of Agric. Alexandria. Univ; Egypt.*

Bahie El-Deen, M; (2002). *Genetically nutritional studies on Japanese quail: Calcium and phosphorus requirement and heritability of some egg traits. Egypt. Poult. Sci. 22(IV):1127-1141.*

Bahie. El–Deen, M. and Hedaia, M. shalan, (2005). *Response to selection for egg number in Japanese quail: 3rd International Poultry conference 4-7 Apr.: 2005. Hurjhata, Egypt.*

Bahie El–Deen, M. Shebl M.K. Abd Allah G.A. and Debes A.B, (2005). *Using selection index to improve some performance traits in Japanese quail females Egypt Poult. Sci. Vol. (25) II: 449-460.*

Debes, A.A.H, (2004). *Selection indices for improving economic traits in Japanese quail Ph. D. Thesis, Fac. Of Agric, Alex. Univ, Egypt.*

Duncan, D,B. (1955). *Multiple range and multiple F-test Biometrics, 11:1-42.*

El-Tahawy. W.S.A. (2000). *Genetically improvement of some productive and reproductive traits in local chicken M. Sc, Thesis, Fac of Agric. Alex. Univ. Egypt.*

Enab, A.A, (1991). *The use of different selection indices for the improvement of some economic traits in laying hen. Ph. D. Thesis, Fac of Agric Minufyia univ, shebien El Kom, Egypt.*

Enab, A. A; and M. Bahie EL-Deen, (2001). *Genetic effect of single versus Multisource selection indices on overall economic gain in quail breeding programs. Egypt, Poult. Sci. 21(ll):363-379.*

Hutt, F.B., (1949). *Genetic of the fowl. M.C. Grow-Hull Booco, Inc. New York.*

Inal, S., Dere, S., Kirikci, Tepeli, C., (1996). *Japon Bildirein-larinda (coturnix. Coturnix japonica) earli. Agirliga. Core Yaplan seleksiyonum yumurta verimi, Yumurta Agirlig. Fertilite, Kulucka Randman ve yasama cucune Etkileri veteriner Bilimleri Dergisi 12(2), 13-22.*

Kocak, C; O. Altan and Y. Akbas. (1995). *An investigation of different production traits of Japanese quail. Turk. J. Vet. Anim. Sci. 19: 65-71.*

Kosba, M. A., M. Bahie El –Deen, and H. M. Shalan (2002). *Selection by independent culling levels for some egg production traits in Japanese quail. J. of Agric. Res. 80 (lV):1777-1788.*

Kosba, M. A., M. Bahie El-Deen, and H. M. Shalan (2003). *Long-Term selection for body weight in Japanese quail under Egyptian conditions 3- Correlated response of some egg production traits. Egypt. Poult. Sci 23 (lV):961-975.*

Nestor, K. E; W. L. Bacon; N. B. Anthony and D. O. Noble, (1996). *Divergent selection for body weight and yolk precursor in Coturnix Coturnix Japonica 11- Correlated responses over three generations. Poult. Sci., 75:472-477.*

Nofal, Reiad. Y. (2006). *Cross breeding parameters of females in two lines of Japanese quail for some growth and sexual maturity traits. Egypt. Poult. Sci. Vol. (26) (I): 69-85.*

Ö-Camci, C. Erensayin and S. Aktan, (2002). *Relations between age at sexual maturity and some production characteristic in quails.*

Panda, B and Singh, R.P. (1990). *Developments in processing quails word's Poultry Science Journal, 46: 219-243..*

SAS, Institute, (1988). *SAS, user's Guide: statistics SAS, Institute Inc.Cary,NS, USA.*

Shalan, H. M., (1998). *Independent culling levels selection and crossing for improving meat and egg. Production in Japanese quail. Ph. D. Thesis, Fac. oF Agric., Alexandria. Univ., Egypt.*

Shalan, H. M., (2002). *Construction of selection index and sub indices to improve some egg production traits in Japanese quail. Egypt. Poult. Sci. 22 (ll):547-558.*

Tawefuek, F. A., (2001). *Using selection index for the improvement of growth and egg production in Japanese quail. Ph. D. Thesis, Fac. of Agric., Tanta Univ., Kafr EL-Sheikh, Egypt.*

Wilhelmson, M., (1979). *Breeding experiments with Japanese quail. ll. Comparison between index selection and specialized selection followed by crossing. Report 39, Swedish University of Agric. Sci.*

Younis,H., K.M, Saleh, R.Y., Nofal and Abd El-Ghany, A.M. (2004). *Effect of crossing two Japanese quail lines selected seven generation for meat and egg production on growth traits Agricultural Research. Journal, Suez Canal University, 3 (I): 1-14 Ismailia, Egypt.*

الملخص العربي

وراثة عمر البلوغ الجنسي وعلاقته ببعض الصفات الإنتاجية فى السمان اليابانى

محمد بهى الدين محمد، وليد صلاح الطحاوى*، يوسف عبد الوهاب عطية*، محمد احمد مكى*

قسم إنتاج الدواجن- كلية الزراعة- الشاطبى- جامعة الاسكندرية

***قسم الإنتاج الحيواني و الداجنى- كلية الزراعة- فرع دمنهور- جامعة الاسكندرية**

أجريت هذه الدراسة بمركز بحوث الدواجن - قسم إنتاج الدواجن كلية الزراعة - جامعة الإسكندرية وذلك لحساب العلاقة بين عمر البلوغ الجنسي وبعض الصفات الإنتاجية في السمان الياباني وكذلك حساب المعايير الوراثية والظاهرية لصفات إنتاج البيض. تم تسجيل بيانات إنتاج البيض فردياً لعدد 738 أنثي و تم حساب عمر البلوغ الجنسي لهن حيث قسمت الإناث إلي 3مجموعات المجموعة مبكرة البلوغ الجنسي بمتوسط 42.98 يوم، والمجموعة متوسطة البلوغ الجنسي بمتوسط 50.05 يوم، والمجموعة متأخرة البلوغ الجنسي 61.89بمتوسط يوم، و يمكن تلخيص النتائج فيما يلي:

1- نتائج تحليل التباين أظهرت وجود فروق معنوية بين أوزان الجسم للمجاميع الثلاثة وكان متوسط وزن الجسم عند البلوغ الجنسي بلغ 169.56 ، 183.11 ، 199.03 للمجاميع الثلاثة المبكرة والمتوسطة والمتأخرة علي الترتيب .

2- أوضحت النتائج زيادة إنتاج البيض في المجموعة المبكرة البلوغ الجنسي عن باقي المجموعتين الأخريين.

3- المتوسط العام لإنتاج البيض بلغ 83.11% وكانت الفروق بين المجاميع الثلاثة معنوية حيث سجلت المجاميع المبكرة والمتوسطة والمتأخرة93.3، 83.4و 71.2% علي الترتيب .

4- متوسط وزن البيض خلال الـ 45 يوم الأولي للإنتاج بلغ 11.90 ، 11.06 ، 10.63 للمجاميع الثلاثة المبكرة والمتوسطة والمتأخرة في النضج الجنسي علي الترتيب.

5- أتضح أن المجموعة المبكرة البلوغ الجنسي كانت ذات معامل تحويل غذائي أفضل من المجاميع الأخرى وبلغ معامل التحويل الغذائي 2.47 ، 2.86 ، 3.09 ، للمجاميع الثلاثة على الترتيب .

6-بلغت قيم المكافئ الوراثي لعمر البلوغ الجنسي للمجاميع الثلاثة المبكرة والمتوسطة والمتأخرة في البلوغ الجنسي 0.76 ، 0.08 ، 0.06 علي الترتيب.

7- كانت قيم المكافئ الوراثي لوزن الجسم عند البلوغ الجنسي أفضل حيث بلغت 0.41 للمجموعة المبكرة 0.39 للمجموعة المتوسطة، 0.94 للمجموعة المتأخرة البلوغ الجنسي علي الترتيب.

8- قيم المكافئ الوراثي لمعدل التحويل الغذائي كانت 0.31 للمجموعة مبكرة، 0.23 للمجموعة متوسطة ، 0.44 للمجموعة متأخرة البلوغ الجنسي علي الترتيب.

9- التلازم الظاهري بين عمر البلوغ الجنسي ومعظم الصفات في المجموعة مبكرة البلوغ الجنسي تراوح بين المنخفض والسالب (- 0.01) مع عدد البيض وإنتاج البيض وموجبا (+ 0.14) مع وزن البيض.

10- بصفة عامة عمر البلوغ الجنسي كان ذو ارتباط سالب مع الصفات المدروسة في المجاميع الثلاثة ما عدا الكفاءة الغذائية.

و خلاصة القول أن التبكير في عمر البلوغ الجنسي للسمان الياباني يزيد من معدل إنتاج البيض دون تغير يذكر في وزن البيض ومن جهة أخرى تأخير عمر البلوغ الجنسي يسبب تأخر وزن النضج الجنسي ونقص إنتاج البيض الكلى (اجمالى إنتاج البيض).