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EFFECT OF AGE AT SEXUAL MATURITY OF DAMS ON MEAT PRODUCTION PERFORMANCE OF JAPANESE QUAILS

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Abstract

Japanese quails are interested birds due to their unique traits in meat and egg production and also in scientific research. This study aimed to determine the effect of the age at sexual maturity of Japanese quail dams in the meat production performance of their progeny. The experimental flock consist of 100 females at 16 weeks of age, which individually recorded for the age of sexual maturity (the average was 41.36 days). The dams divided into five groups according to the age at sexual maturity, G1: 35-38 days, G2: 39-40 days, G3: 41-42 days, G4: 43-44 days and G5: 45-58 days. Males were randomly used for each group to produce the progeny generation. The eggs were collected for three consecutive days and numbered according to their groups. Results showed a significant difference in hatching body weight between groups, and the significant differences disappeared in the following weeks of the experiment. There were no significant differences among groups in carcass weight, dress percentage, percentage weight of the following carcass parts, including breast, thighs, back, heart, liver and intestine length. There was significant superiority of females compared with males in body weight, carcass weight and length of the intestine. There were no significant differences among groups in body weight at 6 weeks of age, cumulative weight gain, cumulative feed intake and cumulative feed conversion.

***Keywords*:** Japanese quail, sexual maturity, meat production, carcass weight.

Introduction

Japanese quail has many important features such as low feed intake cost, minimum house area requirements, and high resistance against many diseases (Narinc *et al.*, 2010). During recent years, many researchers have been made by genetic selection to increase the body weight of the Japanese quail (Fadhil and Hassan, 2018; Hassan and Fadhil, 2019; Reddish *et al.*, 2003), and to evaluate the meat and egg production performance of Japanese quails in the local environment (Hassan and Abd Alsattar, 2016). The modern breeds of quails able to produce eggs with up to 85% hen day egg production, so quail plays a significant role in the production of meat and eggs (Vali, 2008). The breeding programs focused on important traits such as high speed of growth and the early sexual maturity of females (Błaszczyk, 2006). The quail female has matured sexually when it is able to reproduce the first egg (Hassan, 2011), the age at sexual maturity is an important economic trait due to its effect on egg production, so the age at sexual maturity must be adjusted at a suitable age for production (North, 1984). Camci *et al.* (2002) reported that early age at sexual maturity in Japanese quail resulted from an increase of egg production without effect on egg weight, while delayed sexual maturity can cause the reduction of the total egg production. Al-Tikriti (2018) recorded significant superiority of late sexual maturity females in the average body weight compared with females have early sexual maturity, while early sexual maturity females recorded significant increase in egg production compared with medium and late sexual maturity females. The recent study aimed to determine the effect of age at the sexual maturity of quail dams in some production traits of meat and eggs for their progeny.

Materials and Methods

Study site

The experiment conducted at the poultry farm of Animal Production Department at the College of Agriculture, University of Diyala during the period Oct. 13, 2018 to April 6, 2019.

Birds and Management

The experimental units consist of 100 females of quail individually recorded for the age at sexual maturity (The average age at sexual maturity of the flock was 41.36 days). The females used as a dam to produce the next generation and 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 randomly used to produce the progeny generation. The eggs were collected for three consecutive days and marked according to their groups, and incubated to get progeny groups (Hassan and Abd Alsattar, 2015), and the procedure repeated for hatches (replicates). The chicks reared in wooden cages during six weeks of experiment, using *ad libitum* feeding system, and the chicks fed a diet of 24% crude protein and metabolic energy 2775 kcal / kg.

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

Statistical Analysis

The data statistically analyzed according to completely randomized design with four replicates, and the significant differences among means were tested by Duncan multiple ranges at 0.05 significant level.

Results

Means of live body weight of different age at sexual maturity groups recorded during the six weeks of study showed in Table 1. Body weight of one-day chicks in the later sexual maturity group (G5) was significantly heavier compared with other groups. Also there is significant heavier body weight in G4 compared with G2 during 2 and 4 weeks of age, and all these differences among groups disappeared in 6 weeks of age.

Table 1 : Means ± Standard error of weekly body weight (g) in groups of different age at sexual maturity in Japanese quail.

Age at sexual maturity groups (day)	One day old	Age (week)					
		1	2	3	4	5	6
35 – 38	7.50± 0.18b	21.57± 1.46	58.38± 9.55ab	98.49± 4.07	143.60± 3.79ab	177.40± 1.13	200.16± 3.11
39 – 40	7.73± 0.16b	21.98± 1.47	54.01± 2.36b	95.32± 2.87	137.15± 1.94b	173.36± 4.00	193.74± 4.09
41 – 42	7.38± 0.13b	21.79 ± 1.10	57.28± 0.27ab	99.87± 1.49	141.71± 1.84ab	175.62± 2.35	201.08± 2.33
43 – 44	7.67± 0.11b	24.83±0.64	60.98± 2.02a	105.70± 2.44	149.43± 2.25a	181.38± 3.31	206.66± 3.18
45 – 58	8.20± 0.18a	20.90± 1.92	55.08± 1.68ab	94.34± 6.62	141.38± 3.14ab	177.93± 2.63	201.64± 6.48

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

Table 2 represent the weekly feed intake in the different groups, that recorded non-significant differences among groups in all weeks of experiment except at four weeks of age which recorded significant superiority of G1 compared with G2, G3 and G5, while there was no significant differences compared with G4.

Table 2 : Means ± Standard error of weekly feed intake (g) in groups of different age at sexual maturity in Japanese quail.

Age at sexual maturity groups (day)	Age (week)					
	1	2	3	4	5	6
35 – 38	62.43± 19.22	101.28±29.26	125.31±14.77	187.72±18.25a	214.17± 24.50	344.82±111.36
39 – 40	53.07± 8.26	90.76± 21.17	105.93±10.65	140.92± 8.76b	186.52± 4.10	266.25± 25.16
41 – 42	51.25± 8.25	82.86± 11.62	110.18± 6.98	139.38±12.63b	186.67± 20.05	210.65± 19.65
43 – 44	61.04± 7.57	101.70±12.17	118.54± 8.36	158.82±6.70ab	227.45± 15.64	248.82± 4.39
45 – 58	50.95± 3.45	80.78± 11.90	94.28± 6.85	145.04±5.21b	186.50± 10.60	216.43± 26.66

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

There were no significant differences among groups in the weekly weight gain during the weeks of the study period (Table 3).

Table 3 : Means ± Standard error of the weekly weight gain (g) in groups of different age at sexual maturity in Japanese quail.

Age at sexual maturity groups (day)	Age (week)					
	1	2	3	4	5	6
35 – 38	14.07± 1.57	36.18± 2.42	40.11± 1.62	45.11± 0.38	33.81± 3.03	22.41± 2.68
39 – 40	14.25± 1.54	32.04± 1.59	41.31± 1.08	41.83± 1.01	36.21± 3.38	20.94± 1.75
41 – 42	14.42± 1.17	35.49± 0.95	42.59± 1.22	41.84± 2.16	33.91± 1.83	27.08± 4.44
43 – 44	17.16± 0.55	36.15± 1.45	44.72± 0.96	43.73± 0.67	31.96± 1.91	24.79± 3.44
45 – 58	12.71± 2.08	34.18±1.04	39.26± 5.38	47.05± 3.56	36.55± 0.99	25.56± 4.11

The means of feed conversion in different groups appear in Table 4, and the statistical analysis recorded significant difference between early sexual maturity group (4.17) and late sexual maturity group (3.14) during the four week of age, while there were no significant differences among other groups in all weeks.

Table 4 : Means ± Standard error of weekly feed conversion in groups of different age at sexual maturity in Japanese quail.

Age at sexual maturity groups (day)	Age (week)					
	1	2	3	4	5	6
35 – 38	4.76±1.68	2.64±0.56	3.12±0.32	4.17±0.45 b	6.60±1.18	14.94±3.49
39 – 40	3.78±0.50	2.80±0.55	2.58±0.30	3.39±0.28 ab	5.27±0.43	13.07±2.19
41 – 42	3.66±0.70	2.34±0.32	2.59±0.18	3.32±0.18 ab	5.50±0.52	8.36±1.83
43 – 44	3.61±0.57	2.80±0.24	2.67±0.23	3.63±0.14 ab	7.21±0.68	10.37±1.22
45 – 58	4.39±0.89	2.35±0.30	2.57±0.44	3.14±0.26 a	5.10±0.21	9.21±2.29

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

There were no significant differences among groups in cumulative meat production traits including live body weight at 6 weeks of age, total weight gain, total feed intake and cumulative feed conversion (Table 5).

Table 5 : Means ± Standard error of cumulative meat production traits for six weeks period in age groups at sexual maturity in Japanese quail.

Age groups at sexual maturity (day)	Body weight at 6 weeks of age (g.)	Cumulative weight gain (g.)	Cumulative feed intake (g.)	Cumulative feed conversion
35 – 38	200.16± 3.11	192.67± 2.92	1073.59± 246.41	5.54± 1.18
39 – 40	193.74± 4.09	185.89± 3.96	860.65± 84.74	4.63± 0.42
41 – 42	201.08± 2.33	193.62± 2.25	776.12± 61.00	4.01± 0.33
43 – 44	206.66± 3.18	198.95± 3.05	930.46± 16.69	4.68± 0.14
45 – 58	201.64± 6.48	193.27± 6.53	770.21± 42.90	3.99± 0.23

Discussion

The results recorded significant heavier body weight at one day old in the later sexual maturity group (G5) which may be due to the higher egg weight that produced from dams in this group compared with other groups, the result of study agreed with El-Full (2001) who recorded significant positive correlation between egg weight and one day old chick in Japanese quail, as well as agreed with Hassan (2013) who reported significant positive regression of one day-old quail chick on egg weight as 0.88 g., on another hand the result of study disagreed with Camci *et al.* (2002); Bahi El-Deen *et al.* (2008) in their study on Japanese quail, they reported significant reduction in adult body weight in the group of the early sexual maturity group compared to the median and late age of sexual maturity.

The superiority of feed intake of early sexual maturity (G1) compared with G2, G3 and G5 (Table 2) may be the result due to large developmental requirements to meet early sexual maturity and egg production while other groups have more time to reach this point. The results agreed with (Jassim, 2011).

Table 4 showed significant differences between G1 and G2 in feed conversion at four weeks of age, and this situation may be referred to different kinds of growth and production, hence in G1 the growth and development related with requirements that meet the early sexual maturity, while in G2, there was continuous growth in body weight that reflex good feed conversion for meat production in this group.

The cumulative traits of meat production at market age (6 weeks) recorded no significant differences among groups of sexual maturity. This result gives the opportunity to use the early sexually maturity group to produce chicks for meat production to get benefits from both high egg productions of dams without loss of meat production in their progeny.

Conclusion

The results of this study recorded the ability of using early sexual maturity of quail dams to produce chicks for meat production, and this situation provides benefits to producers from high egg production of early sexual maturity dams without losing in meat production of their progeny.

References

Al-Tikriti S.S.A. (2018). The effect of the selection for the age trait at sexual maturity of two generations in the productive performance of black Japanese quail bird. Adv. Anim. Vet. Sci. 6(12): 548-555.

Jassim, A.M. (2011). Effect of genetic group and level of diet protein in some of the productive and blood traits of quails. M.Sc. degree. College of Agriculture and Forest. University of Mosul.

Bahie El-Deen, M.; El-Tahawy, W.S.; Attia, Y.A. and Meky, A. (2008). Inheritance Of Age At Sexual Maturity And Its Relationships With Some Production Traits Of Japanese Quails. Egypt Poult. Sci., (28) IV: 1217-1232.

Błaszczyk, B.Z.T.; Jan, U.; Dariusz, G.; Tomasz, S.; Danuta, S.; Krystyna, R. and Joanna, J. (2006). Changes in the blood plasma testosterone and cholesterol concentrations during sexual maturation of Pharaoh quails. Animal Science Papers and Reports, 24(3): 259-266.

Camci , Ö.; Erensayin, C. and Aktan, S. (2002). Relations between age at sexual maturity and some production characteristic in quails Arch. Geflügelk. 66(6): 280-282.

El-Full, E.A. (2001). Genetic Analysis of Hatched Egg Weight, Body Weight At Different Ages And Reproductive Performance With Their Relationships In Japanese Quail. Egypt Poult. Sci., 21 : 291-304.

Fadhil, M.A. and Hassan, K.H. (2018). Divergent Genetic Selection for Body Weight at Four Weeks Age in Japanese Quail. Journal of Global Pharma. Technology. 10(11): 612-616.

Hassan, K.H. and Fadhil, M.A. (2019). Genetic selection for body weight in Japanese quail (*Coturnix coturnix japonica*) under different nutritional environments. Adv. Anim. Vet. Sci., 7(7): 526-529.

Hassan, K.H. and Abd–Alsattar, A. (2015). Effect of egg storage temperature and storage period pre-incubation on hatchability of eggs in three varieties of Japanese quail. Anim. Vet. Sci., 3: 5-8.

Hassan, K.H. and Ali, R.A.A. (2016). Effect of Genotype and Genotype Environment Interaction on Productive Performance of Japanese quail Varieties. American Journal of Bioscience, 4: 49-52.

Hassan, K.H. (2013). Evaluation of productive performance of Japanese quail in summer of Iraq. Diyala Agricultural Sciences Journal, 5: 69-80.

Hassan, K.H. (2011). Poultry Breeding. Univ. of Diyala Press. Iraq.

Narinc, D.; Aksoy, T. and Karaman, E. (2010). Genetic parameters of growth curve parameters and weekly body weights in Japanese quails (*Coturnix coturnix japonica*). J. Anim. Vet. Adv. 9(3): 501-507.

North, O.M. (1984). Commercial Chicken Production Manual. 3rd Ed. Avi. Publishing Company. Inc. West Port, Connecticut.

Reddish, J.M.; Nestor, K.E. and Lilburn (2003). Effect of Selection for Growth on Onset of Sexual Maturaty In Random Bred And Growth-Selected Lines of Japanese Quail. Poult. Sci., 82: 187-19.

Vali, N. (2008). The Japanese quail : A review. International Journal of Poultry Science, 7(9): 925-931.