ISSN 2320-1355

JOURNAL OF GLOBAL BIOSCIENCES

Volume 3, Number 7, 2014

Website: www.mutagens.co.in
E-mail: submit@mutagens.co.in
researchsubmission@hotmail.com

Journal of Global Biosciences
ISSN 2320-1355
Volume 3, Number 7, 2014, pp. 1111-1115
Website: www.mutagens.co.in
E-mail: submit@mutagens.co.in
researchsubmission@hotmail.com

Research Paper

SEXUAL MATURITY IN CROSS BRED JAPANESE QUAIL BREEDERS UNDER CAGE AND DEEP LITTER SYSTEMS OF REARING

Arumugam, R., R. Prabakaran and T. Sivakumar

Department of Livestock Production and Management,
Madras Veterinary College,
Tamil Nadu Veterinary and Animal Sciences University,
Chennai - 600 007.

Abstract

A study was conducted to assess the sexual maturity in cross bred Japanese quail parent breeders under deep litter and cage systems of management. Cage reared cross bred parents attained age at maturity and 50 per cent egg production significantly (P≤0.01) earlier (56.00 ± 0.00 and 67.25 ± 0.48 days) compared to those reared on deep litter (63.25 ± 0.48 and 75.00 ± 0.41 days). Bodyweight at sexual maturity was significantly (P≤0.01) lower for cage reared female breeders compared to deep litter reared breeders (310.17 ± 1.34 *vs* 322.28 ± 1.23 g).

Key words: Japanese quail breeders, Age at sexual maturity, Bodyweight at sexual maturity.

INTRODUCTION

The quail belongs to class Aves, order Galiformes, family Phasianidae and the Kingdom Animalia like chickens (Thear, 1998; Mizutani, 2003). Quails are agile and warm blooded animal and sensitive to external environment. Worldwide, almost 33 quail species are being bred from which officially recognized breeds are: Japanese, British black, white English, Smoking, Marmara, Manchurian Gold and Pharaoh (Tülöbaev et al., 2012). Among different breeds, Japanese quail had a great impact on research field due to its unique properties of easy maintenance (Shanaway, 1994), low generation interval (3-4 generation / year) (Tarhyela et al., 2012), fast growth rate and better egg production (Minvielle, 1998). Due to its unique properties, many countries developed quail farming into an industry accompanied by a strong interest in scientific research. In developing countries, Japanese quail farming offers a viable and practical solution to the problem of animal protein shortage. Literatures regarding growth performance of different quail breeds are numerous (Marks, 1993; Minvielle et al., 2000; Oguz and Minvielle, 2001; Vali et al., 2005) whereas only few reports are available on egg production (Nestor et al., 1983; Bacon et al., 1986; Minvielle et al., 1997; Minvielle and Oguz, 2002). Age at sexual maturity in female chicken has considerable economic importance for poultry industry since the onset of lay affects reproductive capabilities and egg production ability for market of chicken. Studies have shown that age of sexual inaturity in Japanese quail has a medium heritability (Marks and Kinney, 1964). Chambers (1990) observed that in long term selection studies, onset of sexual maturity in low weight line pullets may be inhibited because of the failure to attain the necessary body weight or composition. Reddy and Siege1 (1976) observed that selection for increased &week body weight resulted in changes in ovulation and oviposition

patterns and the pullets of high line attained sexual maturity earlier than those of low line. The significant role of housing system (cage *vs* deep litter) is well documented in chicken, whereas similar information is meager in the emerging area of Japanese quail production. Therefore, an experiment was designed to evaluate the effect of cage and deep litter systems of housing management on sexual maturity in Japanese quail breeders under field conditions.

MATERIALS AND METHODS

The study was undertaken in a Japanese quail breeder farm in Palladam broiler belt in Coimbatore district, Tamil Nadu to assess the comparative performance on sexual maturity in Commercial parent breeders of meat type Japanese quail breeders under cage and deep litter systems of rearing. A total of 1848 adult Japanese quail birds (1344 females and 504 males) were selected at the age of 4 weeks and randomly divided into two treatment groups of equal numbers. Birds under each treatment were further allotted randomly into 4 replicate groups in equal numbers with a breeding ratio of 8 females to 3 males and were housed in either deep litter or in multi-tier Japanese quail breeder cages, located in a well ventilated open sided poultry house. A floor space of 225 cm^2 per bird was provided under deep litter system and under cage system, 8 females and 3 males were housed in a breeder cage unit of 2025 cm^2 each, offering a floor space of 184 cm^2 per bird. Adequate feeder and waterer space were made available. All the birds were fed with the same quail breeder ration containing 18.70 % C.P. and 10.83 MJ/ kg of ME *ad libitum* and had free access to wholesome water during the experimental period. Data on age at sexual maturity (5% egg production), body weight at sexual maturity and age at 50% egg production were collected and subjected to statistical analysis as per Snedecor and Cochran (1989).

RESULTS AND DISCUSSION

Age at sexual maturity

Cage system of rearing was found to result in significantly ($P \leq 0.01$) early age at sexual maturity compared to deep litter rearing (56.00 ± 0.00 *vs* 63.25 ± 0.48 days). The results are in conformity with the findings of Kundu *et al.* (2003) and Biswas *et al.* (2005) that cage rearing favoured early maturity. Easy access to feed and water, lack of competition and social order issues and proximity to source of light might have contributed to better nutrition and early initiation of physiological processes leading to attainment of early maturity in cage rearing.

Table 1: Age and body weight at sexual maturity and age at 50% egg production in cross bred Japanese quail breeders under deep litter and cage system

Parameter	Deep Litter	Cage	't' value
Age at sexual maturity (days)	63.25^b ± 0.48 (4)	56.00^a ± 0.00 (4)	15.145**
Age at 50% egg production (days)	75.00^b ± 0.41 (4)	67.25^a ± 0.48 (4)	12.318**
Body weight at sexual maturity (g)	322.28^a ± 1.23 (647)	310.17^b ± 1.34 (632)	6.673**

*** Highly Significant (P ≤ 0.01).*
Means bearing different superscripts differ significantly (P ≤ 0.01) among columns within each row.
Figures in parentheses indicate respective number of observations.

The age at sexual maturity observed were higher than the earlier reports of 45.3 (Nagarajan *et al.,* 1990), 45.72 (Cerit and Altinel, 1998) and 41 (Aktan *et al.,* 2003). As the basic stock used were of meat type Japanese quail breeders, selection for body weight and consequent higher growth rate might have evoked a correlated response in age at maturity. Marks (1996), and Kosba *et al.* (2003) observed that long term selection for bodyweight negatively impaired sexual maturation. Gunes and Cerit (2001) too remarked that sexual maturity was delayed in high bodyweight group.Sachdev and Ahuja (1986) and Drbohlav and Metodiev (1996)

reported age at sexual maturity in Japanese quail breeders to be 73.10 and 63.30 days which were above the values observed in this study

Age at 50% production

Deep litter reared birds attained age at 50% production significantly (P≤0.01) later than cage reared birds and hence, the attainment of early maturity under cage rearing hastened the age at 50% production also (Table 1). Moreover, the number of days to reach 50% production after maturity was also found to be prolonged for deep litter rearing compared to cage rearing (11.75 *vs* 11.25 days). Reasons cited earlier like easy access to feed and water, lack of competition to such access and proximity to source of light might have contributed to lower age at 50% production under cage rearing. Age at 50% production observed in this study were relatively higher and delayed compared to earlier reports of 49 (Gildersleeve *et al.,* 1987) and 47 days (Aktan *et al.,* 2003). As described earlier, the genetic differences might have contributed to the delay as meat type Japanese quail breeders selected for high 4-week bodyweight were involved in this study.

Body weight at sexual maturity

Body weight at sexual maturity (g) was significantly (P≤0.01) lower for cage reared birds than deep litter reared birds (310.17 ± 1.34 *vs* 322.28 ± 1.23 g). As maturity was attained by deep litter birds a week later than cage reared birds, they would have gained in body weight during the period leading to the difference. Body weight at sexual maturity of Japanese quail breeders involved in this study was much higher than the earlier reports of 203.9 g (Gunes and Cerit, 2001) and 255.35 g for females (Aktan *et al.,* 2003). The observations indicated that the lines were in fact selected for high growth rate and genetically superior to the lines reported so far.

CONCLUSIONS

Comparative performance of sexual maturity in Commercial parent breeders of meat type Japanese quail birds under cage and deep litter systems of rearing was studied in a private commercial Japanese quail breeder farm-cum-hatchery. A floor space allowance of 225 cm^2 per bird was allowed on deep litter and 184 cm^2 per bird in cages. A total of 1848 Japanese quail breeders were selected at the age of 4 weeks and randomly divided into two treatment groups of equal numbers with a breeding ratio of 8 females to 3 males and were reared under cage and deep litter systems of rearing. Data on age at sexual maturity (5% egg production), body weight at sexual maturity and age at 50% egg production were collected and subjected to statistical analysis. Cage system of rearing was found to result in significantly (P≤0.01) early age at sexual maturity compared to deep litter rearing. Deep litter reared birds attained age at 50% production significantly (P≤0.01) later than cage reared birds. The number of days to reach 50% production after maturity was also found to be prolonged for deep litter rearing compared to cage rearing (11.75 *vs* 11.25 days). Body weight at sexual maturity was significantly (P≤0.01) lower for cage reared birds than deep litter reared birds (310.17 ± 1.34 *vs* 322.28 ± 1.23 g). Body weight at sexual maturity of Japanese quail breeders involved in this study was much higher than the earlier reports and the observations indicated that the lines were in fact selected for high growth rate and genetically superior to the lines reported so far.

ACKNOWLEDGEMENT

The authors thank the Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu for the facilities provided.

REFERENCES

1. Aktan, S., Koskan, Ö., Özsoy, A.N. and Akcadag, H.I. 2003. Some egg production characteristics and phenotypic correlations in Japanese quail. *Hayvancilik Arastirma Dergisi*, 13(½): 57-59.
2. Bacon, W., Nestor, K. and Long, D. 1986. Divergent selection for body weight and yolk precursor in coturnix coturnix japonica.6. Correlated response in plasma calcium and egg shell traits. *Poult. Sci*., 65: 355-359.

3. Biswas, P.K., Roy, S.P., Goswami, A., and Mondal, M.K. 2005. Studies on performances of Japanese quail under different system of rearing. Proceedings, 23rd Indian Poultry Science Association Conference, Hyderabad, India, 2-4 February, 2005, 2: 215.
4. Cerit, H. and Altinel, A. 1998. Genetic and phenotypic parameters of various traits in the Japanese quail. *Veteriner Fakűltesi Dergisi (Istanbul)*, 24(1): 111-136.
5. Drbohlav, V. and Metodiev, S. 1996, Possibility of selection on laying intensity in Japanese quail. *Bulgarian Journal of Agricultural Science*, 2(4): 497-500.
6. Gildersleeve, R.P., Sugg, D. and McRee, D.I. 1987. Egg production in four generations of paired Japanese quail. *Poult. Sci.*, 66: 227-230.
7. Gunes, H. and Cerit, H. 2001. Interrelationships between age of sexual maturity, body weight and egg production in the Japanese quail. *Veteriner Fakültesi Dergisi (Istanbul)*, 27(1): 191-198.
8. Kosba, M.A., EI-Deen, M.B. and Hedaia, M.S. 2003. Long-term selection for body weight in Japanese quail under Egyptian conditions. 3. Correlated response in some egg production traits. *Egyptian Poultry Science Journal*, 23(4): 961-975.
9. Kundu, A., Senani, S., Ahlawat, S.P.S., Rai, R.B., Yadav, S.P., Chatterjee, R.N., Saha, S.K., Kumar, S.J. and Jai Sunder, 2003. Performance of Japanese quail under cage and deep litter system of rearing in Andaman and Nicobar Islands. *Indian J. Poult. Sci*., 38(1): 63-66.
10. Marks, H. 1993. Carcass composition, feed intake and feed efficiency following long-term selection four week body weight in Japanese quail. *Poult. Sci*., 72: 1005-1011.
11. Marks, H. L. and Kmney, T.B. Jr. 1964. Estimates of some genetic parameters in Coturnix quail. *Poult. Sci*., 43: 1338.
12. Marks, H.L., 1996. Long-term selection for body weight in Japanese quail under different environments. *Poult. Sci*., 75(10): 1198 – 1203.
13. Minvielle, F. 1998. Genetic and breeding of Japanese quail for production around the world, 6th Asian Pacific poultry congress Nagoya, Japan.
14. Minvielle, F. and Oguz, Y. 2002. Effect of genetic and breeding on egg quality of Japanese quail. *World's Poultry Sci*., 58: 291-295.
15. Minvielle, F., Gandemer, G., Maeda, Y., Leborgoyen, G. and Boulay, M. 2000. Carcass characteristics of a heavy Japnese quail line under introgressios with the roux gene. *Br. Poult. Sci.,* 42: 41-45.
16. Minvielle, F., Monvoisin, J., Costa, J. and Frenot, A. 1997. Quail lines selected on egg number either pure line or on crossbred performance, 12th International symposium, Pruhonice near Prague, Czech Republic.
17. Mizutani, M. 2003. The Japanese quail. Lab. Anim. Res. Stat, Nippon Institute for Biological Science, Kobuchizawa, Yamanashi, Japan, 408-441.
18. Nagarajan, S., Narahari, D. and Alfred Jayaprasad, I. 1990. Laying performance of Japanese quail hens under different stocking densities. *Indian J. Anim. Sci*., 60(12): 1467-1470.
19. Nestor, K., Bacon, W. and Lambio, A. 1983. Divergent selection for egg production in Coturnix coturnix japonica. *Poult. Sci*., 62: 1548-1552.
20. Oguz, I. and Minvielle, F. 2001. Effects of genetics and breeding on carcass and meat quality of Japanese quail: A review, XV European symposium on the quality of poultry meat, WPSA, Kusadasi-Turkey
21. Reddy, P. R. K. and Siegel, P. B. 1976. Selection for body weight at eight weeks of age. *Poult. Sci*., 55: 1518-1530.
22. Sachdev, A.K. and Ahuja, S.D. 1986. Studies on the influence of bodyweight at sexual maturity on production traits in Japanese quail. *Indian J. Poult. Sci*., 21(1): 66-68.
23. Shanaway, M.M. 1994. Quail production systems: a review, *Food. Agr. Organ*. the. Unit. Nations. Rome. p. 73-79.
24. Snedecor, G.W. and Cochran, W.G. 1989. Statistical Methods. 8th ed. Oxford and IBH publishing Co., Calcutta.
25. Tarhyela, R., Henab, S. and Tanimomo, B. 2012. Effects of age on organ weight and carcass characteristics of Japanese quail (Coturnix Japonica). *Scient. J. Agri*. 1: 21-26.

26. Thear, K. 1998. Keeping quail. A guide to domestic and commercial management. Broad Leys publishing company, London.
27. Tülöbaev, A., Alpak, H., Bektemirova, D. and Turdubaeva, A. 2012. Morphometric development and changes in the growth and development dynamics of Japanese quail populations bred in Kyrgyzstan. *Turk. J. Vet. Anim. Sci*. 36.
28. Vali, N., Edriss, M.A. and Rahmani, H.R. 2005. Genetic parameters of body and some carcass traits in two quail strains. *Int. J. Poultry. Sci*. 4: 296-300.