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Production Performances of Japanese Quail Parent Stock under Open Housing System

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ABSTRACT

The study was carried out to assess the production performances of Japanese quail parent stock raised under open housing system and the study was conducted in a local farm with 2000 Japanese parent stock quail birds (*Coturnix coturnix japonica*). Observed body weight gain was recorded in each weekend up to 7 weeks of their age; birds gained weight 15.73, 31.45, 47.20, 90.80, 125.27, 153.14 and 175.20 grams, respectively. There have been observed sharp decline of fertility and hatchability of birds with increase of their age. Optimum fertility was recorded at third week and optimum hatchability at fifth week of their age. Average flock uniformity was found 83.68%. The hen day egg production of the flock was recorded 81, 83, 85, 86, 89, 89, 89, 89 and 88% in each weekend, respectively. It may therefore be concluded that Japanese quail parent stock performs well under open housing system in Bangladesh and future study can be taken to better understand their production performances.

(Key words : Japanese quail, body weight, uniformity, egg production, mortality, hatchability)

INTRODUCTION

Quail farming in Bangladesh is a newly introduced sector of livestock. It is a rapid maturing bird that matures sexually within 114 to 120 days and lay eggs. In a developing country, this is a new venture of diversification for fulfilling human protein demands(Ali *et al.*, 2012), also has been popularized in developing countries because of rapid economic return from commercial farming (Minvielle *et al.*, 1999). There are several welfare problems in intensive quail housing systems such as head injuries caused by aggressive pecking, wounds on the back of females due to frequent mounting, head-banging as a consequence of escape responses, feather damage, leg weakness and foot problems (Schmid and Wechsler, 1997).

Japanese quail, the smallest farmed avian species, is becoming popular in commercial poultry sector for meat and egg production. Distinct include rapid growth enabling quail to be marketed for consumption at 5~6 wks of age, early sexual maturity resulting in short generation interval, high rate of egg laying and much lower feed and space requirements than domestic fowl. Bangladesh is situated in south Asia and its economy is mainly based upon agriculture especially one of its major wing livestock. The livestock sector occupies a significant position both as a source of providing animal protein, poverty alleviation through solving unemployment problem and earning foreign exchange.

In Bangladesh, Japanese quail had been introduced as an economic avian species suited for meat and egg under intensive management for their faster growth rate, higher egg production rate, shorter generation interval, shorter incubation period and fitness for high density rearing resulted consistent increase its farming trends. Besides these, quail meat is widely acceptable to all classes of people for its taste, high biological value except some strict vegetarian and vegans throughout the world. It is not only provides protein for human but also it generates employment directly and indirectly. It has also an important role in poverty alleviation, very quick return with small investment because agriculture labors and landless people can take it as a side or supportive business. Though quail farming is considered a growing and promising industry for Bangladesh,

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little is known about its parent stock production performance and husbandry. So the study was aimed to assess the production performance of the parent stock of the Japanese quail in context of Bangladesh.

MATERIALS AND METHODS

The study was conducted in a Japanese quail parent stock farm (Shah Amin Hashami quail farm), Chittagong. Web based data published from Bangladesh Meteorological Department were obtained during the study period, humidity (85% in August and 83% in September), rainfall (530.6 mm in August and 259 mm in September) and temperature (26.2～30.6℃ in August 2009 and 26.0～31.5℃ in September 2009) of Chittagong (Department, 2014). Data was collected from the record book of the farm after obtaining consent from the farm owner. Information regarding body weight, fertility, hatchability, hen-day egg production, feed conversion ratio, mortality rate were calculated (Dauda *et al.*, 2014; North, 1984) from the records maintained in the farm during the study period using the following formula.

1. Body Weight

Body weight was recorded at hatch and then at weekly intervals after wards for the first 49 days using sensitive electronic scale.

Body weight gain: Using the formula (Dauda *et al.*, 2014) body weight gain was calculated:

$$\text{Body weight gain} = \frac{W_2 - W_1}{N}$$

Where W_2 is the final weight
W_1 is the initial weight
N is the number of days taken from initial weight to the present weight.

2. Feed Conversion Ratio (FCR)

The gain per feed intake was recorded on weekly basis using the formula (Dauda *et al.*, 2014):

$$\text{Feed conversion ratio} = \frac{Feed\ intake}{Weight\ gain}$$

3. Fertility

Fertility was calculated on the basis of total eggs set. Fertility rate, in percentage, was calculated using the formula (Dauda *et al.*, 2014):

$$\text{Fertility rate} = \frac{Number\ of\ fertile\ egg}{Total\ egg\ set} \times 100$$

4. Hatchability

Hatchability was calculated on the basis of total egg set. Hatchability, in percent, was calculated using the formula (Dauda *et al.*, 2014):

$$\text{Hatchability rate} = \frac{Hatched\ \chi cks}{Total\ egg\ set} \times 100$$

5. Hen-day Egg Production

The total numbers of eggs laid by each hen was documented daily. To calculate the percent hen-day egg lay on daily basis was calculated using the formula (North, 1984).

$$\text{Hen-day egg production} = \frac{Number\ of\ egg\ produced\ on\ daily\ basis}{Nmber\ of\ birds\ available\ in\ the\ flock\ in\ that\ day}$$

RESULTS

The weekly mean body weight, weight gain and food conversion rates (FCR) at various ages (up to 7th week) are shown in Table 1. It was evident that, the mean body weight remarkably increased as the quail advanced in age. Body weight recorded at consecutive seven weeks of age averaged 15.73, 31.45, 47.20, 90.80, 125.27, 153.14 and 175.20 gm, respectively.

Table 1. Weekly mean body weight (grams), weight gain (%) and feed conversion rate in Japanese quails

Age (day)	Body wt (gm)	Weight gain (%)	FCR
7th	15.73	64.20	1.56
14th	31.45	52.75	1.87
21th	47.20	41.58	2.40
28th	90.80	35.33	2.83
35th	125.27	28.54	3.76
42th	153.14	26.78	3.82
49th	175.20	25.13	3.97

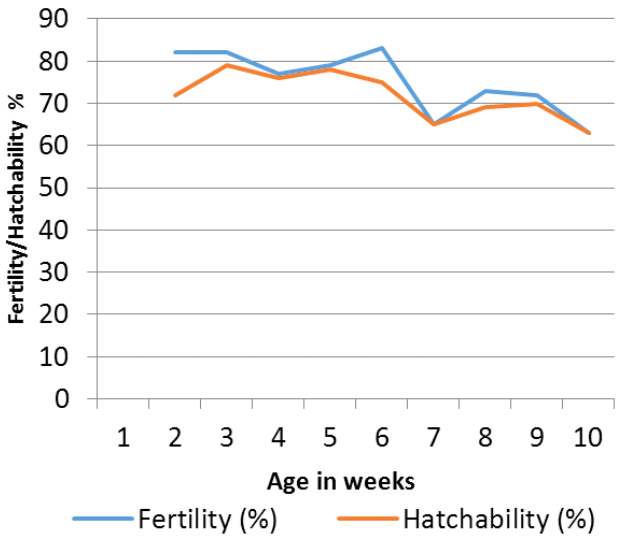

Fig. 1. Relationship of fertility and hatchability in relation to age.

The weight gain and feed conversion rate also was recorded at seven days interval and showed that the percentage of weight gain did not increased with chronological age, however feed conversion ratio increased with advancement in age and ranged from 1.87 to 3.97 at 7th week of their age.

Table 2 presents the fertility rate, hatchability rate, hen-day egg production and mortality rate of parent quail from 14th week through 52th week of their age. In fertility and hatchability rate, no such increase or decrease trend was recorded in the performance of quail parents. The highest percentage of fertility (83%) and hatchability rate (78%) were recorded at age week 30～34 and week 15～19, respectively, however, the lowest percentage of fertility (63%) and hatchability (63%) rate were recorded at age of 50～52 week. The hen-day egg production increased as week of lay increased. Hen-egg day productions were 81% at week 10～14 of age and increased to 89% at 45～49 week of age. There was an increased mortality trends was observed in the study, as the age of the quail increased, mortality was found in increased trends.

DISCUSSION

Some fairly consistent performance differences between cage and floor management systems. Caged birds handled according to commonly recommended levels of nutrition and management can be expected to lay fewer eggs of slightly more weight, attain larger adult body size, have more blood spots, utilize more feed to produce a unit of eggs and have less mortality than their counterparts on the floor (Logan, 1965). The maturity period of quails is 45 days. However it was interesting that some of the female quails started laying eggs when they become 35 days old and out of the remaining, most of them also started laying eggs from 40th day of their birth (Minaketan, 2000).

We found most of the birds laid eggs in morning, this findings support another study where researchers reported that approximately 75% of all chicken eggs are laid in the morning, whereas coturnix laid 75% of all eggs between 3 and 6 pm. About 20% of coturnix eggs are laid in darkness (Wilson and

Table 2. Production performance of Japanese quail in parent stock

Age (wk)	Total egg set	Total fertile egg	No. of hatched egg	Fertility (%)	Hatchability (%)	No. of bird observed	No. of eggs (wk)	Hen-day egg production (%)	No. of dead quail	
									Female	Male
10～14	7,500	6,158	5,415	82	72	1,975	11,154	81	12	7
15～19	7,500	6,118	5,938	82	79	1,956	11,448	83	8	9
20～24	7,500	5,771	5,711	77	76	1,938	11,654	85	12	5
25～29	7,500	5,922	5,817	79	78	1,919	11,799	86	8	10
30～34	7,500	6,245	5,645	83	75	1,902	12,186	89	16	25
35～39	7,500	4,907	4,907	65	65	1,885	12,204	89	12	16
40～44	7,500	5,488	5,188	73	69	1,869	12,156	89	15	22
45～49	7,500	5,402	5,252	72	70	1,851	12,095	89	11	18
50～52	4,500	2,827	2,827	63	63	1,839	12,017	88	8	10

Huang, 1962). Our study farm used 1:3 mating ratio of male and female birds and the fertility was found almost consistent and peaked at thirtieth weeks of age. Our finding supports another paper where optimum fertility comes from a mating ratio of 1 male to 2 females. Lower fertility with higher mating ratios may be due to preferential mating behaviors (Woodard and Abplanalp, 1967). Fertility of the eggs was 93.3, 92.0, 62.0 and 94.5% in groups 1 to 4 respectively. Hatchability of the eggs was 76, 80, 60 and 88% (as first stage) and 64, 54, 49 and 62% (as second stage) in groups 1 to 4 respectively. The fertility and hatchability of different sex ratios were not significantly different except for group 3 (P<0.05) (Asasi and Jaafar, 2000).

We did not analyzed with male birds reproductive performance with lighting period provided to the farm. Some study found post-natal testicular development in the coturnix subjected to 16 hours of light and 8 hours of darkness per day (Mather and Wilson, 1964). Since our study period was in cooler months, we are unable to measure any association between temperature and egg production performance, some studies found that sudden excessive heat or cold lowered the egg production (Ahmed, 2008). We also did not measure the crude protein percentage of the ration, smaller birds require a higher percentage of crude protein in the diet than layer birds, for the same degree of production (Byerly, 1941). More eggs are produced when some animal protein is included in the ration, as compared with rations containing only vegetable protein (Stout, 1926).

Feeding practices of parent stock quail was not assessed in our study, in one study found that there are wide variations in feeding methods are possible as long as they do not make it impossible to get sufficient daily food consumption, or interfere with the building of a ration complete in all essential nutritive factors. With these limitations in mind, there is no one best way of feeding poultry (Heuser, 1946). Level of 2.5% calcium increases egg weight and shell thickness, while 2.75% increases body weight and shell weight and 3% increases egg production and shell percentage (Sultana *et al.*, 2007). Though in our country scientific management was not substantially habituated by the farmers, we observed efficient farming with their conventional management. Scientific breeding, feeding, management and disease control are the key points of success in poultry improvement farming (Rahman, 2003).

Our study farm was in open housing system which is widely practiced in Bangladesh rather caging system, and as far as farmer concern, they are satisfied with that. Health of the birds and housing conditions influence fertility of the quails. Good fertility cannot be expected unless the birds are vigorous and active (Winter and Funk, 1960).

CONCLUSION

The main features found from this study were Japanese quail parent stock birds could be reared successfully in open house system in our climate condition. The body weight gain, feed consumption, hen day and hatching egg production, hatchability of the eggs were good. The rearing period of (0～4th weeks) brooding and grower stage is very important to get maximum production performances from the birds. The main point of rearing period is the weight gain and it should maintain carefully according to the standard for better production performances. During brooding period temperature was maintained through proper light supply and birds were reared on litter floored shed. Rice husk was used as litter material. Uniformity of the flock was satisfactory and was about 80% throughout the rearing period. Hatchability percentage is significantly lower. In fine, from this study it could be said that if the management of breeder farm is performed on the right way then the farm can achieve their goal of optimum production.

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