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Comparative Production Performances of Different Types of Quail (*Coturnix coturnix japonica*)

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Abstract

A study was conducted with four types of quail named Japanese (J), White (W), Black (BL) and Brown (Br) quail in BLRI, Savar, Dhaka to understand their productive and reproductive performances. A total of 1953 day-old chicks of quails were produced in successive two hatches. The highest fertility and hatchability were observed in White (98.13%) and Japanese (73.20%) types compared to their counterparts. White quail was significantly better for egg weight and chick weight than other the three types. The 5th week body weights were 117.94 ± 10.70, 114.71 ± 11.13, 98.28±9.69 and 107.24±8.98 g, respectively for W, Br, J and Bl. Significantly higher body weight was found in W and Br followed by Bl and J quail at different ages. The total number of eggs upto 24th week of age was 81.23 ± 0.67, 83.05 ± 0.69, 90.52± 0.56, and 93.31 ± 1.05 respectively, for W, Br, J and Bl and these significantly ($p<0.001$) differed among all genotypes. It may be concluded from the present findings that the performances of W and Bl quail were superior for body weight and egg number, respectively to the others. These findings give us more impetus for continuing the quail breeding research for producing a suitable meat type quail or egg type quail in the country.

Keywords: genotype, hatchability, body weight, egg production

1. Introduction

Quails (*Coturnix coturnix japonica*) are popularly known as a game bird since its domestication in the world. Presently, quail rearing has been popularized because of rapid economic return from commercial quail production. Meat and eggs of quail are highly accepted by people in many countries. Commercial quail production is established mainly for meat in Europe and for eggs in Japan (Minvielle, 1999). Meat type quails are marketed at about 4 weeks of age in China (Minvielle, 1999). Meat type quails are more popular than egg type quail production in Bangladesh (Rahman *et al*., 2010). The demand of commercial quail production is increasing day by day in the country.

Many people are interested to rear quail on commercial basis due to lower initial investment and risk rather than commercial broiler farming. Eight quails could be reared with the same investment and space for a chicken. But it was observed that most producers were facing problem to get high quality parents for producing good quality chicks for commercial production. Bangladesh Livestock Research Institute (BLRI)

has taken a quail breeding program for improving eggs and meat yield of the available quails in the country. By this time, BLRI has developed four quail types namely Japanese (J), Brown (Br), White (W) and Black (Bl). All these types of quails are being maintained in BLRI for producing a meat type quail as well as egg type quail for our existing farming system. This study was undertaken to assess the productive and reproductive performances of four types of quail.

2. Materials and Methods

This study was conducted with previously developed four types of quail named Japanese (J), White (W), Black (BL) and Brown (Br) quail maintained in the Poultry Production Research Division, Bangladesh Livestock Research Institute, Savar, Dhaka during 2013 to 2014. At 5^{th} week age, male and female quails of first generation (G1) were selected as parent quails to produce second generation (G2) on the basis of their breeding value at 5^{th} week body weight. Mean body weight of four types of quail was110 g in foundation stock at 5^{th} week of age to be increased 150 g after five generations. Pedigree records were kept by using commercially available leg bands to identify quails of all ages. The parent males and females were being maintained in cages for single pair mating through close breeding system for producing each generation.

Hatching eggs were collected from every single pen of the selected parent quails. A total of 1953-day-old chicks comprising of 4 types of quail were produced in successive two hatches for second generation. The chicks were housed and reared in litter system upto 5 weeks of age. Then birds were shifted to individual cages in laying house and reared upto 24 weeks of age. All birds were fed on quail starter and grower diet upto first 5 weeks of age. Then, laying diet containing 24% crude protein and 3000 kcal ME/kg were provided to the birds till to the end of study period. Farm bio-security and hygienic measures were maintained strictly to prevent outbreak of any disease. Data on egg weight, hatchability, and body weight of chick at first day, 2^{nd} week, 4^{th} week, and 5^{th} week of age, feed intake, mortality, age at sexual maturity, weight at maturity, egg production were recorded to study their productive and reproductive performances.

Expected selection response in four types of quails for body weight at 5 weeks was estimated using the following equation (Falconer, 1981).

$R=h^2 \times S$

Where, R = Expected response in mass selection;
h^2 = heritability for body weight at 5 weeks of age;
S = Selection differential.

Collected data were arranged for a Completely Randomized Design (CRD) for Analysis of Variance (ANOVA). Least significant differences (LSD) for a parameter were used to calculate the significant difference among four genotypes of quail.

3. Results and Discussion

Hatchability performances of four types of quails are shown in Table 1. Higher fertility and hatchability were observed in W (98.13%) and J (73.20%) genotypes than other two genotypes. The lowest culled chicks were found in W type of quail. The egg weight and chick weight were significantly ($p<0.05$) higher in W type than that of other three types. The chick: egg ratio data show that day old chicks of the J quail had lower percentage (64.54%) than chicks in the W (65.24%), Br (65.30%) and Bl (65.19%) with no significant difference ($0.05 >p$).

The present study suggest that chick weight increases with the increase in egg weight. This result is similar to the findings of Seker and Bayraktar (2004) who reported that the chick weight had shown a significant increase due to increasing egg weight. White genotype of quail is significantly better for fertility, culled chicks, egg weight, chick weight and chick: egg ratio than that of their counterparts. These findings are similar to that of Faruque *et al*. (2013) who

reported that the W genotype quail was superior to the other three genotypes.

Highly significant differences ($p<0.001$) in ages at first egg and body weight at first lay were observed in four quail genotypes. The total number of eggs upto 24th week of age were 81.23 ± 0.67, 83.05 ± 0.69, 90.52± 0.56, and 93.31 ± 1.05, respectively for W, Br, J and Bl type of quail and they significantly ($p<0.001$) differed among all types. Significantly more number of eggs was obtained in Bl (93.31) followed by J, Br and W, respectively. The present findings were mostly supported by Rahman *et al*. (2010), Sakunthala *et al.* (2010), Marks and Lepore (1968), Homna *et al.* (1985) and Soliman *et al.* (2000) who reported that egg production differed significantly for the different types of quail.

Table 2 shows the body weight of four genotypes of quail at day old, 2nd week, 4th week, and 5th week of age, cumulative feed intake and FCR. Body weight of quails at day old, 2nd week, 4th week, and 5th week of age significantly differed among four quail types. The average initial body weight of day-old chicks of W, Br, J and Bl was 7.36±0.70, 7.12±0.72, 6.66±0.69, and 6.93±0.64g respectively and the difference was significant (Table 2). The five week body weight was 117.94±10.70, 114.71±11.13, 98.28±9.69 and 107.24±8.98 g, respectively for W, Br, J and Bl type.

Significantly higher body weight was found in W and Br followed by Bl and J quail type at different age. These values are in agreement with those reported by Uddin *et al*. (1994), Rahman *et al.* (2010) and Islam *et al*. (2011) who reported that body weights at different ages were significantly influenced by different types of color mutants or varieties of quails. There was significant differences ($p<0.05$) in feed intake (g) and feed conversion ratio (FCR) upto five weeks of age among four different quail genotypes. The better FCR was obtained in W type (4.68±0.06) rather than three genotypes of quails.

Genotype wise expected response to selection for 5 week body weight is shown in Table 3. As a result of selection, body weight at 5 weeks of age was expected to improve by 1.21 vs. 4.33, 1.68 vs. 3.77, 4.34 vs. 6.51, and 1.02 vs. 2.40 g; respectively for Japanese, White, Brown and Black males and females (Table 3).

Table 1. Reproductive performance of four types of quail

Parameter	Types of quails				Level of significance
	White	Brown	Japanese	Black	
Fertility (%)	98.13^{a}±0.24	97.42^{b}±0.09	97.75^{ab}±1.25	95.16^{c}±0.06	**
Hatchability (%)	65.75^{b}±9.98	58.81^{c}±2.93	73.20^{a}±3.09	58.48^{c}±8.12	***
Culled Chicks (%)	2.44^{a}±8.82	3.36^{b}±2.68	3.63^{b}±1.74	3.52^{b}±00	*
Egg weight (g)	11.54^{a}±1.08	11.25^{ab}±1.23	10.33^{c}±0.87	10.60^{c}±0.85	*
Chick weight (as % of egg weight)	65.24^{a}±2.52	65.30^{a}±3.18	64.54^{a}±3.12	65.19^{a}±2.85	NS
Age at first egg (day)	49.78^{c}±0.59	47.63^{b}±0.45	43.49^{a}±0.38	52.56^{d}±0.59	***
Body weight at first lay (g)	127.11^{a}±11.03	125.56^{b}±11.83	113.68^{c}±10.83	110.7^{d}±9.34	***
Egg production (no.) upto 24 weeks of age	81.23^{d} ± 0.67	83.05^{c} ± 0.69	90.52^{b} ± 0.56	93.31^{a} ± 1.05	***

Data are Mean ± Standard Deviation. Means with different superscripts in the same row differ significantly;
* = significant ($p<0.05$); ** = significant ($p<0.01$) *** = highly significant ($p<0.001$); NS = Non-significant

Table 2. Productive performances of four types of quails up to 5 weeks of age

Parameters	Types of quails				Level of significance
	White	Brown	Japanese	Black	
Chick weight (g)	7.36^{a}±0.70	7.12^{b}±0.72	6.66^{d}±0.69	6.93^{c}±0.64	**
2nd week weight	42.94^{b}±5.78	43.77^{ab}±5.01	39.39^{d}±4.83	40.62^{c}±6.13	**
4th week weight (g)	98.05^{a}±9.67	92.84^{b}±8.53	83.95^{d}±7.24	85.37^{c}±12.20	***
5th week weight (g)	117.94^{a}±10.70	114.71^{b}±11.13	98.28^{d}±9.69	107.24^{c}±8.98	***
Cumulative feed intake (g) upto 5 weeks	558.44^{a}±1.39	545.65^{b}±1.55	529.34^{d}±1.90	536.21^{c}±1.88	*
FCR (Feed intake/live weight) upto 5 weeks	4.68^{a}±0.06	5.12^{bc}±0.09	5.08^{c}±0.07	5.32^{bc}±0.11	*

Data are Mean ± Standard Deviation. Means with different superscripts in the same row differ significantly; ** = significant ($p<0.01$); *** = highly significant ($p<0.001$)

Table 3. Expected responses to selection for 5 weeks body weight of four types of quails

Genotypes	Sex	Population tested		Population selected		Expected response to selection (R)
		Number	Aver.	Number	Aver.	
White	M	230	113.68	140	115.63	1.21
	F	257	118.07	140	125.06	4.33
Brown	M	240	106.51	140	109.22	1.68
	F	246	114.75	140	120.83	3.77
Japanese	M	310	104.00	140	111.00	4.34
	F	323	113.76	140	124.26	6.51
Black	M	91	108.78	60	110.43	1.02
	F	99	111.33	60	115.20	2.40

4. Conclusions

It may be concluded from the present experiment that the performance of W and Bl quail were superior for body weight and for egg production, respectively. So these findings give us more impetus for continuing quail breeding research for producing a suitable meat or egg type quail genotype for boosting up commercial quail production in the country.

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