Comparative study on production performances of the Japanese, White, Black and Brown quail at fifth generation

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Abstract

Four quail genotypes namely Japanese (J), White (W), Black (Bl) and Brown (Br) quail are being maintaining at Bangladesh Livestock Research Institute to develop meat type quail genotype. Studied fifth generation (G5) quails were hatched from 4th generation (G4) parents based on estimated breeding value for 5th week body weight. Standard management practices were followed during study period. Hatching eggs were collected from every single pen of the selected parent quails. A total of 1750 day-old chick comprising of J, W, Br and Bl were hatched in one batch. Collected data were analyzed in a CRD by General Linear Model (GLM) Univariate Procedure in SPSS Computer Program. Body weight of quails at 3rd, 4th, and 6th week of age were ($p<0.001$) influenced by genotype. The 6th week body weight was 126.51, 133.19, 130.80 and 115.40g, respectively for J, W, Br and Bl genotypes. Body weight was higher ($p<0.001$) in W and Br followed by Bl and J quail genotypes at different age. The hatchability rate was ($p<0.001$) higher in J (58.38%) compared to other three genotypes of W (50.30%), Br (47.79%) and Bl (46.45%), respectively. Chick mortality during 0 to 5 week age did not varied ($\chi 2 = 2.19$; $p>0.05$) among Bl (8.78%), J (6.66%), Br (6.31%) and W (5.36%) genotypes. Comparing the performances, W quail was superior for body weight and Bl quail for egg production.

(**Key words:** Genotype, generation, quail, body weight)

Introduction

In a developing country, quail is a fangled enterprise of diversification for fulfilling human protein demands (Ali *et al.*, 2012). It is also has been famous in developing countries because of rapid economic return from commercial farming (Minvielle *et al*., 1999). This bird is used among others for genetic, physiological, biomedical, behavioral, and embryological studies (Huss *et al*., 2008).

Selection is a great way for genetic up gradation of poultry meat and egg production. Individual selection is particularly essential in selection experiments for body weight in quail. Individual selection is applied based on breeding value for body weight at 5 weeks of age as the selection criterion. The continued selection for 11 generations based on 4th week body weight was increased from 48.9 to 49.7% in the selected lines of Japanese quail compared to their counterparts reported by Darden and Marks (1988). However, quail breeding work maintaining accurate pedigree records for developing meat type quail genotype is scanty in Bangladesh. Therefore, the present study was undertaken to increase the fifth week body weight of different quail varieties through selective breeding.

Materials and Methods

This study was conducted with four genotypes of quail namely Japanese (J), White (W), Black (Bl) and Brown (Br)

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maintained in Poultry Production Research Division (PPRD), Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka during the year 2014 to 2015. Males and females quail are maintaining in cages for single pair mating through close breeding system for producing each generation. Pedigree records are kept. Each bird was marked by using commercially available leg bands. For producing 5th generation (G5), parent quails of each genotype were selected from the 4th generation (G4) on the basis of breeding value according to their 5th week's body weight. Hatching eggs were collected from every single pen of the selected parent quails. The chicks were housed and reared in brooder house in litter system up to 5 weeks of age. Then birds were shifted to individual cages in laying house and reared up to 30 weeks of age. All birds were fed on quail starter diet (27% crude protein and 3200 kcal ME/kg) up to 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. Data on egg weight, hatchability, body weight of chick at first day, 2nd weeks, 4th weeks, 5th weeks and 6th weeks of age, feed intake, mortality, egg production were recorded for the study of their productive and reproductive performances.

Statistical Model

The following general linear statistical model was used to analyze the different parameters:

$Yik = \mu + gi + eik,$

Where, Yik is the dependent variable of the experiment;

μ is the overall mean;

gi is the effect of ith genotype (i=1-4);

eik is the error term specific to each record.

Statistical Analysis

All Collected data were analyzed by General Linear Model (GLM) Univariate Procedure in SPSS Computer Program (SPSS, 1998; version 11.5). The data were arranged for a Completely Randomized Design (CRD) for the Analysis of Variance (ANOVA). Least significant differences (LSD) were used for mean comparison.

Results and Discussion

Body weights of four genotypes of quail at 3rd, 4th and 6th weeks of age are shown in Table 1. Body weight of quails at 3rd, 4th and 6th of age were influenced ($p<0.001$) by genotypes. The 6th week body weight was 126.51±1.23, 133.19±0.99, 130.80±1.11 and 115.40±1.21g, respectively for Japanese, White, Brown and Black genotypes.

Table 1. Least squares means (LSM) and standard error of means (SEM) of different weight traits as affected by genotype

Genotype	3rd wk body weight	4th wk body weight	6th wk body weight
Japanese	$66.82^{c} \pm 0.63$ (756)	$91.09^{b} \pm 0.80$ (742)	$126.51^{b} \pm 1.23$(728)
White	$77.03^{a} \pm 0.69$ (400)	$103.01^{a} \pm 0.55$ (394)	$133.19^{a} \pm 0.99$(388)
Brown	$72.67^{b} \pm 0.65$ (398)	$90.90^{b} \pm 0.84$ (391)	$130.80^{a} \pm 1.11$(386)
Black	$66.21^{c} \pm 0.59$ (141)	$87.45^{c} \pm 0.74$ (138)	$115.40^{c} \pm 1.21$(135)
LS	p<0.001	p<0.001	p<0.001

Figure in the parenthesis indicate the number of observations. Least squares means without a common superscript along the column differed significantly ((p<0.05). LS= Level of Significance

Significantly higher body weight was found in White followed by Brown, Japanese and Black quail genotypes at different periods of age. These values are agreed with the results presented by Rahman *et al*. (2010) and Islam *et al*. (2011). They also reported that body weights at different ages were influenced by quail genotypes.

The production and reproduction performance of four studied quail genotypes are presented in Table 2. Hatchability is one of the important reproductive traits which is influenced significantly by the genotypic effect. The hatchability of incubated eggs was 58.38%, 47.79%, 46.45% and 50.30% for Japanese, Brown, Black and White quail, respectively.

difference was observed among four genotypes. Significantly more production of eggs was obtained in Black (69.15%) followed by Japanese, White and Brown; respectively. The present findings were mostly supported by Rahman *et al*. (2010) and Homna *et al*. (1985) who opined that egg production was significantly influenced by different types of quail genotype.

The mortality percentage during 0-5 weeks of age were significantly ($p<0.01$) influenced by the genotype (Table 3). The highest value was observed (8.78%) in Black genotype followed by Japanese (6.66%), Brown (6.31%) and White (5.36%), respectively.

Table 2. Productive and reproductive performance of four quail genotypes

Parameter	Quail varieties (Mean ±SE)				Level of Significance
	Japanese	Brown	Black	White	
Hatchability on setting eggs (%)	58.38^{a} ±3.21	47.79^{b}±2.56	46.45^{b}±3.54	50.30^{b}±2.67	p<0.001
Feed Intake(g/b/d)	11.32±0.84	10.68±0.84	10.21±0.84	10.66±0.84	NS
HDEP (%)	57.38^{b}±3.5	48.14^{b}±3.3	69.15^{a}±3.4	54.80^{b}±3.5	p<0.001

HDEP - Hen day egg production, Least squares means without a common superscript along the row differed significantly ((p<0.05)

The highest hatchability was found in Japanese genotype, although no significant differences were found among Brown, White and Black genotypes. No significant difference was found in feed intake among the four genotypes. Hen-day egg production (HDEP) was 57.38%, 48.14%, 69.15% and 54.80%, respectively, for Japanese, Brown, Black, white genotypes of quail and significant

Selection differential varied from 4.3g body weight in White quail male to 8.7g body weight in Japanese quail female (Table 4). Phenotypic standard deviation varied from 7.4g in Japanese male to 11.3g in White female. The intensity of selection varied from 0.47 to 0.93 in this population.

Table 3. Effect of genotype on chick mortality (%) during 0-5 weeks of age

Parameter	Genotype				χ^2 (df=3)	P- value
	Japanese	White	Black	Brown		
Mortality (%)	6.66	5.36	8.78	6.31	2.19	p>0.05

Table 4. Selection differential, selection intensity for 5 weeks body weight (g) in fifth generation (G_5) of quail

Genotype	Sex	Before selection		After selection		Selection Differential (S) (g)	Selection Intensity (i)
		No.	Avg bwt	No.	Avg bwt		
Japanese	M	328	103.2	150	109.3	6.1	0.83
	F	352	109.9	150	118.6	8.7	0.93
White	M	171	119.4	120	123.7	4.3	0.47
	F	208	125.4	120	133.0	7.6	0.67
Brown	M	185	110.8	120	115.4	4.6	0.57
	F	186	111.6	120	118.1	6.5	0.58
Black	M	68	99.9	30	107.2	7.3	0.92
	F	62	103.2	30	111.0	7.8	0.82

Avg, Average; bwt, Body Weight

Conclusion

Comparing the performances, white quail was superior for body weight and black quail for egg production.

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