Article

Conservation and improvement for the production of meat type quail in Bangladesh

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Abstract: The present study was conducted with the aim to develop a meat type quail genotype for our existing farming system. A total of 1866 quails from four genotypes namely Japanese, White, Black and Brown were used in the study for this purpose. The parent males and females were maintained in cages for single pair mating through close breeding system for producing each generation. Eggs were hatched in a batch for producing third generation (G_3). Egg weight were significantly influenced ($p<0.05$) by genotype. Highest egg weight was found in White (11.60±0.42) genotype followed by Japanese (10.35±0.30), Brown (10.30±0.42) and Black (9.78±0.65) quail genotypes. The highest hatchability of incubated eggs was found in Japanese (71.01%) genotype and lowest in Black (31.03%). White genotype of quail is significantly better for egg weight, chick weight and chick: egg ratio than that of their counterparts. Significantly higher body weight was found in Black (131.90 ± 1.24) genotype followed by White (131.86 ± 0.76), Brown (128.35 ±0.78) and Japanese (112.57 ± 0.53) quail genotype at different periods of age. Egg production was found significantly ($p<0.001$) differed by genotypes. Black genotype was found highest (97.31±1.05%) while White genotype was found lowest (84.23±0.67%) performer in terms of egg production. It was concluded that the Black quail genotype can be used for meat type quail development in the country for its higher body weight and egg production.

Keywords: genotype; improvement; performance; quail

1. Introduction

Quail was first introduced in Bangladesh during late 70's mostly for non-commercial purpose. Quail farming has been gaining popularity among the common people of the country in recent years because of quick economic returns. People irrespective religion and races across the country consume quail meat and eggs that creates enormous opportunity for quail production commercially. Moreover, quail farming is more popular in Europe and Japan basically for its delicious meat and eggs Minvielle *et al.* (1998). Meat type quails are marketed at 4 weeks of age in China. Due to short generation interval and low cost per quail in the country, people prefer meat type quail production to egg type ones. Huge demand of quail meat which is considered as the cheapest protein source and low cost involvement in quail farming leads the common farmers of Bangladesh to start relatively riskless meat type commercial quail farming than that of commercial Broiler or layer farming. It is well established that eight quails can be reared with the same investment and space for a chicken. Despite glorious scope, producers have to face difficulties in meat type quail farming due to lack of meat type quail varieties and unrevealed performance of the exiting exotic quail varieties. Under such circumstances,

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Bangladesh Livestock Research Institute (BLRI) has taken a quail breeding program for reducing huge meat yield gap through commercial quail production in our country. The current study was, therefore, undertaken to conserve, maintain and multiply quail for breeding purpose; compare the performance of different quail genotypes and develop meat type quail varieties.

2. Materials and Methods
2.1. Study area
This study was conducted at the research farm under Poultry Production Research Division of BLRI, Savar, Dhaka for a period of 24 weeks.

2.2. Management of experimental birds
A total of 1866 quails belong to four genotypes namely Japanese, White, Black and Brown quail were used for the study purpose. The parent males and females were being maintained in cages for single pair mating through close breeding system for producing each generation. At least five generations of pedigree hatching will be done to homogenize their genetic characters. Hatching eggs were collected from every single pen of the selected parent quails and hatched in a batch. 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 24 weeks of age. All birds were fed on quail starter diet up to first 5 weeks of age. 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 diseases

2.3. Data recording
Pedigree records are being kept by using commercially available leg bands to identify quail of all ages. For producing third generation (G_3), parent quails of each genotype were selected from the 2nd generation (G_2) on the basis of breeding value at 5th week body weight. Data on egg weight, hatchability, body weight of chick at first day, 2nd week, 4th week, 5th week and 6th week of age, feed intake, mortality, egg production were recorded to study their productive and reproductive performances.

2.4. Statistical analysis
All collected data were analyzed by General Linear Model (GLM) Univariate Procedure in SPSS Computer Program (SPSS, 2002). The data were arranged for a Completely Randomized Design (CRD) for Analysis of Variance (ANOVA). Least significant differences (LSD) was used for mean comparison. The following general linear statistical model was used to analyze the different parameters:

$Y_{ik} = \mu + g_i + e_{ik,}$

Where, Y_{ik} is the dependent variable of the experiment; μ is the overall mean, g_i is the effect of ith genotype (i=1-4) and e_{ik} is the error term specific to each record.

3. Results and Discussion
3.1. Performance of four varieties of quail
The effect of genotype on egg weight, chick weight and chick: egg weight ratios of quail are shown in Table 1. It was found from the present study that egg weight were significantly influenced (p<0.05) by genotype. Highest egg weight was found in White (11.60±0.42) genotype followed by Japanese (10.35±0.30), Brown (10.30±0.42) and Black (9.78±0.65) quail genotypes. Chick weight and chick: egg weight ratios of four genotypes of quails also significantly (p<0.001) influenced by genotype. White genotype of quail is significantly better for egg weight, chick weight and chick: egg ratio than that of their counterparts. These findings are similar with the results of Faruque *et al.* (2013) who reported that the chick: egg weight ratio of White genotype had higher percentage than that of the chicks in Japanese, Brown and Black quail genotypes. It was determined from the present study that chick weight was increased with the increase of egg weight. Similar results were obtained by Seker and Bayraktar (2004) who opined that the chick weight significantly increased due to increase in egg weight.

3.2. Reproductive performance of four quail genotypes
The reproductive traits of quail genotypes are presented in Table 2. The percentage of dead in shell were significantly higher (p<0.001) in Black (64.07%) followed by Japanese, White and Brown quail genotypes while the highest culled chicks was observed in Japanese genotype (4.23%) followed by Brown (2.97%), White (1.97%) and Black (1.89%) genotypes. The percentage of dead in shell was the significantly highest but culled

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chicks significantly lowest in Black quail genotype. This might be influenced by different incubation factors. Significant differences were found in hatchability presentence ($p < 0.001$) among the genotypes. The highest hatchability of incubated eggs was found in Japanese genotype (71.01%) and lowest in Black (31.03%). This result is in agreement with the findings reported by Uddin *et al.* (1994) that the different varieties of quail had the significant effect on the hatchability performance.

3.3. Genotypic effect on body weight
Body weight of four genotypes of quail at second, fourth, fifth and sixth weeks of age are shown in Table 3. Body weight of quails at these ages were significantly ($p < 0.001$) influenced by genotype. Highest body weight was found in Black (131.90 ± 1.24) genotype followed by White (131.86 ± 0.76), Brown (128.35 ±0.78) and Japanese (112.57 ± 0.53) quail genotypes at different periods of age. These values are in accordance with the findings presented by Rahman *et al.* (2010) and Islam *et al.* (2011) who reported that body weight at different ages were significantly influenced by different types of color mutants or varieties of quails.

3.4. Genotypic effect on egg production
Least squares mean (LSM) and standard error of means (SEM) of egg production up to 24 weeks of age are presented in Table 4. In the current study, egg production was found significantly ($p < 0.001$) differed by genotypes. Black genotype was found highest (97.31±1.05%) while White genotype was found lowest (84.23±0.67%) performer in terms of egg production. The present findings are in agreement with the results obtained by Rahman *et al.* (2010), Homna *et al.* (1985) and Soliman *et al.* (2000) who opined that egg production significantly differed by the different types of quail.

Table 1. Least squares means (LSM) and standard error of means (SEM) for egg weight, chick weight and chick: egg weight ratio of quail as affected by genotype.

Genotype	Egg weight(g)	Chick weight (g)	Chick: egg weight ratio (%)
Japanese	10.35[ab]±0.30 (175)	6.47[a]±0.12 (175)	62.68[a]±1.25 (175)
White	11.60[a]±0.42 (107)	6.81[a]±0.15 (107)	62.85[a]±1.60 (107)
Brown	10.30[ab]±0.42 (107)	5.95[b]±0.15 (107)	58.23[a]±1.60 (107)
Black	9.78[b]±0.65 (45)	4.52[c]±0.24 (45)	46.35[b]±2.47 (45)
Level of significance	($p < 0.05$)	($p < 0.001$)	($p < 0.001$)

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

Table 2. Least squares means (LSM) and standard error of means (SEM) of different reproductive traits as affected by genotype.

Genotype	Dead in shell (%)	Culled Chick (%)	Hatchability (%)
Japanese	27.03[b]±1.83 (175)	4.23[a]±0.50 (175)	71.01[a]±1.83 (175)
White	42.44[bc]±2.35 (107)	1.97[bc]±0.64 (107)	55.01[b]±2.34 (107)
Brown	43.18[bc]±2.35 (107)	2.97[ac]±0.64 (107)	54.95[b]±2.34 (107)
Black	64.07[a]±3.62 (45)	1.89[bc]±1.00 (45)	31.03[c]±3.62 (45)
Level of significance	($p < 0.001$)	($p < 0.001$)	($p < 0.001$)

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

Table 3. Least squares means (LSM) and standard error of means (SEM) of different weight traits as affected by genotype.

Age /Genotype	Body weight (Week)			
	2nd	4th	5th	6th
Japanese	36.08[b]±0.21 (632)	80.09[d]±0.36 (628)	102.98[b]±0.34(625)	112.57[c]±0.53(619)
White	40.89[a]±0.30 (306)	90.89[a]±0.51 (301)	107.52[a]±0.50(297)	131.86[a]±0.76(294)
Brown	37.24[c]±0.31 (288)	84.52[c]±0.53 (285)	107.44[a]±0.50(281)	128.35[b]±0.78(279)
Black	40.15[a]±0.50 (114)	86.37[b]±0.86 (109)	108.84[a]±0.83(104)	131.90[a]±1.24(102)
Level of significance	($p < 0.001$)	($p < 0.001$)	($p < 0.001$)	($p < 0.001$)

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

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Table 4. Least squares means (LSM) and standard error of means (SEM) of egg production upto 24 weeks of age as affected by genotype.

Genotype	Egg production (no.)	Level of significance
Japanese	94.52[b]±0.56(168)	
White	84.23[d]±0.67(117)	
Brown	87.05[c]±0.69(110)	(p<0.001)
Black	97.31[a]±1.05(48)	

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

4. Conclusions

Egg weight, chick weight and chick: egg weight ratios, final body weight and egg production of different quail genotypes were varied at different ages. It can be concluded from the present findings that the performance of Black quail genotype is superior for body weight and egg production.

Conflict of interest

None to declare.

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