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PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF QUAIL AT EIGHT GENERATION

S. Faruque[1*], A.K.F.H. Bhuiyan[2], H. Khatun[1], M.T. Hossain[1] M.M.R. Manu[1] and M.Z. Ali[3]

[1]Poultry Production Research Division, Bangladesh Livestock Research Institute, Savar
[2]Animal Breeding and Genetics, Bangladesh Agricultural University, Mymensingh
[3]Animal Health Research Division, Bangladesh Livestock Research Institute, Savar

ABSTRACT

Four genotypes of quail Dhakai (D), White (W), Brown (Br) and Black (Bl) quail are being maintained at BLRI with the objectives of increasing the sixth-week body weight through selective breeding and selecting parental birds and breeding them in an assortative plan for the production of 8th generation birds. The parent males and females were maintained in cages for single-pair mating through selective breeding system for producing each generation. A total of 1118-day-old quail chicks comprising 4 types were hatched in one batch to produce eighth generation (G8). The expected genetic progress due to selection for 5th-week body weight was estimated for G8. The genotype had significant ($p<0.001$) effect on the body weight of quails at 5th week of age. The 5th-week body weight was 132.34±0.88, 123.91±0.52, 104.29±0.76 and 105.36±0.68g, respectively for D, W, Br, and Bl genotypes. The hatchability rate was significantly ($p<0.001$) higher in D (78.47%) compared to other three genotypes. The egg production percentage up to 24th week of age was 85.27±1.0, 80.22±1.61, 81.07±1.2 and 96.12±1.1, respectively for D, W, Br, and Bl and significantly ($p<0.001$) differed among all genotypes. Mortality percent among genotypes was statistically non-significant ($p>0.05$). Sixth-week body weight of males of D, W, Br, and Bl quails were expected to increase by 4.06, 6.36, 2.39, and 3.12g, respectively. While in females of D, W, Br, and Bl quails, the responses were 5.60, 3.61, 4.17, and 3.91g, respectively. Taken together, it may be concluded that Dhakai quail was superior for body weight and Black quail for egg production performance. These findings suggested continuing the quail breeding research for producing a suitable meat-type quail genotype in our country.

Keywords: Breeding value, Improvement, Generation, Genotype, Quail.

[*] Corresponding author: shakila_blri@yahoo.com

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INTRODUCTION

Quail farming in Bangladesh began in 1992 and remained static for almost ten years (1992-2003), following which it progressively climbed until 2009 (reaching its peak in 2009), and then gradually decreased (Nasar et al., 2016). Quail farming is less popular in Bangladesh for a variety of reasons, including improved productivity genetics, epidemic outbreaks, poor management practices, and increased feed costs (Das et al., 2008; Siddiqui et al., 1996). Therefore, it is crucial to take the necessary action to go around the obstacle and motivate quail farmers to meet the need for protein.

At this moment, meat type quail production is much popular than egg type quail production in Bangladesh. Based on overall performance of the 4 newly isolated color mutations showed that BB white (BB=BLRI-BAU; Bangladesh Livestock Research Institute, Bangladesh Agricultural University) and Dhakai quail can be explored for their potential to develop broiler quail (Nasar et al., 2016; Rahman et al., 2018). Growth can be enhanced by improving its genotyping value with selection and/or crossbreeding (Parks, 1971; Ali, 2020). It is a well-known fact that selection for higher body weight is negatively correlated with production performance, leading to relatively poor egg production (Ali, 2018; Nath et al., 2011, Ali and Islam, 2021). Selection for higher 6-week body weight in Japanese quail reduces the average egg number (10 week) per bird from 64.3 to 57.1 which may be consequent effect of increased body weight (Hassan et al., 2008; Ali et al., 2019; Ali et al., 2020; Ali et al., 2021). Though a number of researchers have worked on the effect of selection for higher body weight on egg production in chickens, yet such systematic genetic studies on quail are still lacking. Line breeding will be continued up to 15th generations (Bhuiyan et al., 2017; Paul et al., 2017). After that all possible combination among the lines will be produced and the best genotype will be selected for producing meat type quail. This research is a part of long-term selection program being undertaken with the objectives to increase the sixth week body weight of Dhakai and BB-white quail through selective breeding and to select parental birds (males and females) and bred them in an assortative plan for the production of 8th generation birds.

MATERIALS AND METHODS

Study area

The present experiment was planned to study the effect of selection for higher 6th week body weight on overall productive and reproductive performances in 8th generation of quail at Bangladesh Livestock Research Institute, Savar, Dhaka, Bangladesh.

Management of experimental birds

A total of 2000 day-old quail chicks comprising of 4 types of quail namely Dhakai (D), White (W), Black (Bl) and Brown (Br) were hatched into two batches to produce 8th generation (G_8**)**. Progenies were reared separately marked using leg and wing banded according to genotypes. The adult birds were reared in a cage individually. All the

birds were reared in a natural-ventilated poultry house and a 16 hours photoperiod with 12 hours sunlight/natural light and 4 h artificial lights. Concentrate mixtures feed that contain 27% Crude Protein and 3000 Kcal ME/kg DM; 24% Crude Protein & 3000 Kcal ME/kg DM were provided twice daily in the morning and in evening during brooding and laying period, respectively. Water was also provided *ad-libitum* twice daily in the morning and in evening. Drinkers were cleaned everyday where feeders were cleaned twice in a week. Refusals feed were measured every day in the morning. Farm biosecurity and hygienic measures were maintained strictly to prevent outbreak of diseases.

Selection and mating plan of 8th generation (G8)

The study's selection criteria required that quail body weight increase from its initial sixth-week body weight of 110 g to 150 g at six weeks of age. In each generation selection was practiced at 6 weeks of age on the basis of breeding value according to their 6th week body weight. After 6 weeks, birds were weighed individually and sexed separately. Mass selection for body weight was carried out at 42 days, separately for each sex. The higher body weight birds were selected as the parents of next generation. The proportion kept was 25-35% for both males and females. The expected genetic progress due to selection for 6th week body weight was estimated for G_8 using the following equation (Falconer, 1981).

$R = h^2 \times S$; where, R = Expected response, h^2 = heritability for 6thweek body weight and S = Selection differential for the selected males and females. The breeder males and females were maintained in cages for single pair mating.

Data recording

Pedigree records are being kept by using commercially available leg bands to identify quail of all ages. Data on hatching egg weight, chick weight, body weight at 5th and 6th week, hatchability, egg production, feed intake, mortality were recorded.

Statistical analysis

All recorded data were analyzed in a CRD by General linear Model (GLM) Univariate Procedure using SPSS 11.5 for Windows (SPSS, 1998) computer program. For all statistical purposes the theory of Snedecor and Cochran (1989) was followed.

RESULTS AND DISCUSSION

The effect of genotype on 5th week body weight, hatchability on setting eggs, feed intake and egg production are shown in Table 1. It was found from the present study that 5th week body weight was significantly affected by genotype. The highest body weight was found in Dhakai (132.34±0.88g) followed by White (123.91±0.52g), Brown (104.29±0.76g) and Black (105.36±0.68g) quail genotypes. These values are more or less similar to the findings reported by Ali et al. (2016) 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 quail. Hatchability on setting eggs was

also significantly influenced by genotype. The highest hatchability was found in Dhakai genotype (78.47%) compared to other three genotypes. Faruque et al. (2018) and Ali et al. (2016) observed that the different genotypes of quail had the significant effect on the hatchability performance. No significant different was found in feed intake among the four genotypes. It is observed that feed intake of Dhakai quail increased due to increase in body weight. Egg production was 85.27, 80.22, 81.07 and 96.12%, respectively for Dhakai, White, Brown and Black genotypes of quail and highly significant different was observed among four genotypes. Significantly ($p<0.001$) more egg production was obtained in Black (96.12%) followed by Dhakai (85.27%), White (80.22%) and Brown (81.07); respectively. The present findings were mostly supported by Faruque et al. (2018) who opined that egg production was significantly influenced by different genotypes of quail and they also observed that Black genotype was highest while White genotype was lowest performer in terms of egg production. Mortality percentage during 0-5 weeks of age was non-significant ($p>0.05$) among the genotypes. Faruque et al. (2018) also reported that genotype had no significant effect on mortality of chick during 0-5 weeks of age.

Table 1. Productive and reproductive performance of four quail genotypes.

Parameter	Genotype (Mean ± SE)				Level of Sig.
	Dhakai	White	Brown	Black	
5th week body weight (g)	132.34^{a}±0.88	123.91^{b}±0.52	104.29^{c}±0.76	105.36^{c}±0.68	p<0.001
Hatchability on setting eggs (%)	78.47^{a}±1.3	77.32^{a}±1.0	69.21^{b}±1.3	75.15^{a}±1.2	p<0.001
Feed Intake (g/b/d)	19.11±1.05	18.54±1.1.09	17.31±1.04	18.05±1.11	NS
Egg production (%) (6-24 wks)	85.27^{b}±1.0	80.22^{c}±1.61	81.07^{c}±1.2	96.12^{a}±1.1	p<0.001
Mortality (%) (0-5 weeks)	3.28±0.16	2.58±0.23	3.11±0.11	2.41±0.13	NS

Least squares mean without a common superscript along the row within a factor differed significantly ($p<0.001$), NS=Non-significance

Selection, heritability and expected response to selection

The 6th week body weights of the unselected and selected population in eighth generation (G8) were 165.98, 152.9, 135.7, 136.8 and 180.3, 160.5, 144.9, 145.4g, respectively for Dhakai, White, Brown and Black female quails (Table 2).

Table 2. Selection response for 6 weeks body weight (g) in eighth generation (G8).

Genotype	Sex	Before selection		After selection		Selection Differential (S) (g)	Heritability (h^2)	Expected response to selection (R)
		No.	Aver.	No.	Aver.			
Dhakai	M	240	152.9	84	162.3	9.40	0.432	4.06
	F	240	165.9	84	180.3	14.40	0.391	5.63
White	M	240	135.6	84	148.8	13.20	0.482	6.36
	F	240	152.9	84	160.5	7.60	0.476	3.61
Brown	M	240	130.5	84	135.8	5.30	0.451	2.39
	F	240	135.7	84	144.9	9.20	0.454	4.17
Black	M	240	128.9	84	136.7	7.80	0.401	3.12
	F	240	136.8	84	145.4	8.60	0.455	3.91

On the other hand, the body weights at 6 weeks of age in eighth generation of the unselected and selected population were 152.9, 135.6, 130.5, 128.9 and 162.3, 148.8, 135.8, 136.7g, respectively for Dhakai, White, Brown and Black male quails. Selection differential varied from 5.3g body weight in White quail male to 14.4g body weight in Dhakai quail female. The selection differentials for the males were 9.40, 13.20, 5.30 and 7.80g, respectively for D, W, Br and Bl quails. For the females, the corresponding values were 14.40, 7.60, 9.20 and 8.60g. The heritability of 6^{th} week body weight varied from 0.391 in Dhakai quail female to 0.482 in White quail male. 6^{th} week body weight of males of D, W, Br and Bl quails were expected to increase by 4.06, 6.36, 2.39 and 3.12 g, respectively. While in females of D, W, Br and Bl quails, the expected responses were 5.60, 3.61, 4.17 and 3.91g, respectively. The heritability of 6^{th} week body weight varied from 0.391 in Dhakai quail female to 0.482 in White quail male.

CONCLUSION

The results obtained for this study revealed that the Dhakai genotype of quail is superior for body weight and Black genotype for egg production. The present study also showed that the body weight at 6^{th} week can be enhanced through selection and appropriate breeding.

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