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# Effects of genotype, generation and slaughter age on carcass characteristics of indigenous chickens of Bangladesh under intensive system

S.Faruque[1]*, A.K.F.H. Bhuiyan[2] and M.M. Rana[1]
[1]Poultry Production Research Division, Bangladesh Livestock Research Institute, Savar, Dhaka-1341
[2]Department of Animal Breeding and Genetics, Bangladesh Agricultural University, Mymensingh-2202

## Abstract

The aim of this study was to compare the carcass characteristics of three improved indigenous chicken genotypes at Bangladesh Livestock Research Institute (BLRI), Bangladesh according to genotype, generation, slaughter age and their interactions. The name of chicken genotypes was Non-descript Deshi (ND), Hilly (H) and Naked-neck (NN). A total of 1585 day-old chicks (918 ND, 378 H and 289 NN) were produced to form foundation stocks for their improvement both egg production and growth rate by selection in generations (foundation stock $G_0$; generation $G_1$; generation $G_2$). Selection was practiced firstly at 8 weeks of age (based on breeding value) and secondly, at 40-weeks of age (based on index value). Data on growth traits, egg production and reproductive traits, fertility and egg shell quality of birds were kept and analyzed in a non-orthogonal factorial experiment using the general linear model procedure of SPSS 11.5, 1998. However, this study was carried out on a total of 99 male birds of three chicken genotypes, having 5, 10 and 18 birds of ND, H and NN genotype from each generation, respectively. The close mean body weight of birds were selected according to age at 8, 10 and 12 weeks and sacrificed. Results showed that the dressing percentage was varied ($p<0.001$) in among the genotypes and slaughter age of birds. Breast meat and thigh plus drumstick meat weight was influenced ($p<0.001$) genotype, generation, and slaughter age of birds. Wing meat weight was shown differ ($p<0.001$) for generation of birds. However, carcass traits were observed greater percentage in NN genotype followed by other two genotypes. With increasing of age from 8 to 12 weeks there was a significant ($p<0.001$) increase proportion of pre-slaughter weight (60.95%) and thigh plus drumstick weight (6.28%). Overall mean of pre-slaughter weight, percent weight of dressing, breast meat, thigh plus drumstick and wing meat of indigenous chicken were 756.9±6.4 g, 66.5±0.1%, 13.4±0.0%, 19.8±0.0% and 6.6±0.0%, respectively. Present results indicate that the carcass characteristics of indigenous chickens can be influenced by genotype, generation and slaughter age under intensive system.

**Key words:** chicken genotype, Generation, Slaughter age, Carcass traits

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## Introduction

Indigenous chickens are playing a major role for the development of rural economics mostly in developing and underdeveloped

* Correspondence: shakila_blri@yahoo.com

countries throughout the world. They play an immense role for the rural poor, and marginalized section of the people particularly women with respect to their subsidiary income and also provide them source of animal protein in the form of meat and egg for their own consumption (Magothe *et al.*, 2012; Barua and Yoshimura, 1997). Genetic improvement of indigenous chickens either through selective breeding or crossbreeding program is being significantly carried out in developing countries for the advancement of present types of rural chickens (Duah *et al.*, 2020). Bangladesh also possesses a wide variety of indigenous chickens mostly of non-descript in nature and do not belong to any breed or variety. These are widespread across the country (Bhuiyan *et al.*, 2005) and genetically diluted in about 60% cases depending on phenotype (Bhuyian *et al.*, 2009). However, the improvement of indigenous chickens via selective breeding with good husbandry practice was a significant demanding point in the progress of poultry industry, fostering agricultural growth and malnutrition for the people. Consequently, based on the above point of view, since 2010, the Bangladesh Livestock Research Institute (BLRI), Bangladesh had collected three distinct varieties of indigenous chicken hatching eggs according to the basis of phenotypic characteristics of birds from all over the country, hatched and established the foundation stock (G0). Birds were given name as Hilly (H), Naked-neck (NN), Non-descriptive Deshi (ND) respectively, as to the plenty of chicken genotypes availability from the areas of the country. These genotypes are being conserved under intensive system with selective breeding program and good husbandry practices owing to the advancement of genetic potentiality and improvement.

Although, the growth performance of indigenous chicken genotypes is less efficient compared to that of fast-growing exotic chicken breeds, as a result increase cost of production. Additionally, as compared to the fast-growing birds, indigenous chicken genotypes usually reach slaughter weight later as well their feed utilization efficiency, carcass yield and breast meat weight are lower (Sarica *et al.*, 2016; Fanatico *et al.*, 2008). On the other hands, indigenous chicken genotypes are more adaptable to local conditions due to naturalness, high immunity and provide good-quality meat, which is in increasing demand (Choo *et al.*, 2014; Walley *et al.*, 2015). However, todays, with the growing demand for poultry products, an opportunity arises to the importance of native chicken genotypes due to the preferred choice for consumer interest in indigenous taste-flavor despite of having relatively high price as well as their product quality and as being of animal welfare (Guan *et al.*, 2013; Castellini *et al.*, 2008; Fanatico *et al.*, 2005). Several studies have previously pointed out in most cases of fast-growing birds, there are many factors that can influence dressing percentage, carcass characteristics and meat quality such as genetics, dietary nutrient composition, sex of birds, stocking density, slaughter age of birds and rearing system. Moreover, the knowledge on variability of indigenous chicken genotypes in the traits of carcass, which is one of the paramount criteria to evaluate indigenous chicken genotypes under intensive system with an advancement of generation and age of slaughter. Therefore, the objective of this study was to evaluate the carcass characteristics of three improved indigenous chicken genotypes under intensive system.

## Materials and Methods

This study was conducted with indigenous chicken genotypes of Bangladesh, those genotypes are distributed in different parts of the country. We have presented in this study three indigenous chicken genetic resources which denoted as Non-descriptive Deshi (ND), Hilly (H) and Necked-neck (NN) respectively. These genotypes were conserved and improved by intensive selection program through pedigree recording. In this study, however, have highlighted only the carcass characteristics in each genotype, up to second generation, age of slaughter and interaction effects of genotype, slaughter age and generation.

**Collection of hatching eggs**

Eggs were collected from the representative areas of the country which included Naikongchari, Bandarban; Chockoria, Cox'bazar; Rangamati, Sherpur, Kishoreganj, Mymensingh, Manikganj, Dhaka, Sirajganj and Borguna during May to June 2010. These eggs were assigned into three distinct genotype groups on the basis of phenotypic characteristics of birds. And considered the following classified birds genotype name as called Hilly (H) from Rangamati, Naikhongchhari and Bandarban areas; Naked-neck (NN) from Dhaka, Manikganj, Kishoreganj, Mymensingh and Borguna areas; and Non-descriptive Deshi (ND) from Sirajganj, Chockoria and Sherpur areas, respectively. A total of 4688 eggs of which 1683 from NN, 1546 from H and 1459 from ND were collected from door to door of householder as to the aforementioned representative areas of the country. These eggs were carefully handled and stored at normal room temperature at village condition until five days during two times of collection. Thereafter, collected eggs of each type were carefully transported at Poultry Production Research Division of Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka; and hatched by incubator machine. Chicks were obtained from two hatches, two weeks apart on 13$^{th}$ and 26$^{th}$ June 2010. A total of 1585 day-old chicks of three genotypic groups were obtained, which is comprising of 918, 378 and 289 number ND, H and NN genotypes, respectively and established foundation stock ($G_0$) through proper husbandry management.

**Selection criteria of genotypic birds**

In case of all generations including $G_0$, selection was done at two stages. Firstly, selection was performed on the basis of breeding value at 8 weeks age of body weight; and secondly, at 40 weeks of age, on the basis of an index value of selection comprising the following traits such first egg lay (days), body weight (g) at 40 weeks of age, egg production (%) up to 40 weeks of age and egg weight (g) at 40 weeks of age. Data on growth traits, egg production and reproduction traits, fertility and egg shell quality of birds of three genotypes over three generations were collected and used for analysis (Data not shown in table).

**Selection objective of breeding stock**

The main objective of selection during conservation of breeding stock was to improve the egg production and growth rate of indigenous chicken depending on the genotype (ND, H and NN) of birds. Improvement target of egg weight and egg production rate were to be increased by 1g and 2.5% per generation, respectively. Additionally, in case of the mean body weight target, the mean body weight of ND, H and NN genotypes are to be increased from an initial 8 weeks body weight of 342, 375 and 331g respectively, to 500 g after

three generation selection and breeding.

**Development of generations by selection program**

Based on the selection criteria, each generation of three distinct indigenous chicken genotypes were produced. An assortive sire mating plan was followed to produce each generation after establishment of G0 to keep inbreeding as low as possible. However, at 40 weeks of age, a total of 141 dams (ND=69, H=37 and NN=35) and 29 sires (ND=14, H=8 and NN=7) were selected from G0 to produce first generation (G1). A total of 1439 chicks (ND=628, H=475 and NN=336) were hatched in three batches to produce G1. Since selection criteria could not be performed from the birds of G1 at 40 weeks of age due to the incidence of Avian Influenza outbreak during 35 weeks of age at poultry research farm. After that, to obtain second generation (G2), a total of 1643 chicks (ND=926, H=383 and NN=334) were hatched in two batches; and a total of 185 dams (ND=85, H=50 and NN=50) with 37 sires (ND=17, H=10 and NN=10) were selected from G2 to produce third generation (G3). By turn, a total of 1278 chicks (ND=655, H=303 and NN=320) were selected in two batches to get the G3 (Data not shown in table).

**Management of birds and diets**

All birds were reared during starter and grower period in a wire floor pen and spread rice husk 1.8 inch on the floor as a bedding material, and equipped with round drinkers, and round feeders. During the first ten days of post hatching, the temperature was maintained in the room at 35$^{o}$C and then gradually reduced to 23 ± 2$^{o}$C at the end of 35 days of age and thereafter it was maintained until rest of growing period from 36 to 84 days. Commercial layer starter and grower mash form diet were provided to birds to meet the nutrient requirement as to the nutrient specification of NRC, (1994) for starter (0 to 35 days) and grower (36 to 84 days). The birds were fed 20% CP and 2900 Kcal/kg ME for the starter period and 18.50% CP and 3050 Kcal/kg ME for the grower period. During the rearing of both phases, birds had offered free access to feed via round feeders and fresh drinking water served via round drinker, feeder and drinker system both were adjustable according to the size of the birds. Compact fluorescent bulb was used to provide light. Lighting was maintained 24 hours at starter period, and during grower period 12 hours day-light and 12 hours artificial light was given.

**Dressing percentage and carcass characteristics**

Birds were subjected to overnight feed withdrawal prior to sacrifice. A total of 99 male birds were considered belonging to three genetic groups (ND, H and NN) at 8, 10 and 12 weeks of age. The close mean body weight following the age of birds at 8, 10 and 12 weeks were selected before the sacrifice. All birds were sacrificed by cervical dislocation as to the described 'Halal' procedure of Singh *et al.* (2003) to know the comparative difference of dressing weight, relative weight of breast meat, thigh plus drumstick and wing meat weight among the genotypes in each generation and in different ages period. The carcass traits including weight of dressing yield, breast, thigh plus drumstick, and wing meat were measured and expressed as the percentage in relative to the live weight of the respective bird. The components of carcass were dissected according to Singh *et al.* (2003).

**Statistical analysis**

The collected data were subjected to analyze

based on fixed independent variables namely generation, genotype, age of slaughtering and their interaction effects. The number of birds varied from class to class and subclass to subclass. Hence, it fulfilled the characteristics of a non-orthogonal factorial experiment and was analyzed by Generalized Linear Model (GLM) Procedure using SPSS 11.5 for Windows (SPSS, 1998). Duncan's multiple range tests was used for mean comparisons and statistical value of $p<0.05$ was considered as a significant difference.

## Results

**Carcass characteristics of indigenous chicken genotypes**

The least square means (±SEM)) of carcass characteristics of ND genotype are presented in Table 1. There were significant effects for the generation and slaughter age on pre-slaughter weight, percentage of dressed, breast, thigh plus drumstick, and wing meat weight of ND genotype. Whereas, no significant difference was found in an interaction between generation and slaughter age on these traits except wing meat weight. Significantly ($p<0.001$) greater dressed weight was observed in case of generation G1 and G2 than that of G0, however, numerically higher value found in G2. Similarly, increased ($p<0.001$) breast and thigh plus drumstick meat weight in percent were observed in the G1 and G2 as that of G0. On the other hand, the wing meat percent was higher in the G1 generation than those of G0 and G2. With the increase of age from 8 to 12 weeks, the proportion of live weight (about 63.04%) and thigh plus drumstick meat weight (about 5.32%) was higher ($p<0.001$). Overall mean of live weight, percentage of dressing yield, breast, thigh plus drumstick and wing meat weight of ND genotype were 746.2±8.6g, 66.3±0.2%, 14.1±0.1%, 19.5±0.1% and 6.9±0.0%, respectively.

The least square means (±SEM)) of carcass characteristics of H chicken genotype are shown in Table 2. The pre-slaughter weight, weight percentage of breast, thigh plus drumstick and wing meat of H chicken genotype were significantly ($p<0.01$; $p<0.001$) differed in generations except dressed weight. Slaughtering age of birds influenced ($p<0.01$; $p<0.001$) the pre-slaughter weight, percent of dressed and thigh plus drumstick meat weight, while no difference was found in breast and wing meat weight in percent. In an interaction effect between generation and slaughter age, the dressing and wing meat weight percent were significantly ($p<0.05$; $p<0.01$) affected. As to the main effect of generation, significantly ($P<0.001$) higher pre-slaughter weight in G0, and percent weight of wing meat in G0 and G1 were observed. Whereas, higher breast meat percent was found ($p<0.001$) in G1 generation as compared to the generation of G0 and G2. Regarding to the advancement of age of birds from 8 to 12 weeks, significant ($p<0.001$) increase in proportion of pre-slaughter weight, percent value of dressing and thigh plus drumstick weight by 58.74%, 1.68% and 4.14% were observed, respectively. Overall means of live weight, percentage of dressing yield, breast, thigh plus drumstick and wing meat weight of H genotype were 778.4±12.5g, 65.1±0.2%, 12.2±0.1%, 19.7±0.1% and 6.6±0.0%, respectively.

In Table 3, it has been shown that significant effect on pre-slaughter live weight ($P<0.01$; $P<0.001$) between the generations of NN genotype as well observed in slaughtering age of birds. Regarding to the effect of

Table 1. Least squares means (±SEM)) of carcass characteristics of Non-descript Deshi chicken as affected by generation and slaughter age

| Factor | Pre-slaughter weight (g) | Dressed weight (%) | Breast meat Weight (%) | Thigh+Drum stick weight (%) | Wing meat weight (%) |
|---|---|---|---|---|---|
| Generation | | | | | |
| $G_0$ | $862.0^{a}$±21.4 (5) | $64.5^{b}$±0.5 (5) | $10.4^{b}$±0.4 (5) | $17.7^{b}$±0.3 (5) | $6.9^{b}$±0.1 (5) |
| $G_1$ | $697.4^{c}$±15.2 (10) | $66.4^{a}$±0.3 (10) | $15.0^{a}$±0.2 (10) | $19.9^{a}$±0.2 (10) | $7.2^{a}$±0.1 (10) |
| $G_2$ | $756.5^{b}$±11.2 (18) | $66.9^{a}$±0.2 (18) | $14.4^{a}$±0.2 (18) | $19.6^{a}$±0.2 (18) | $6.6^{b}$±0.0 (18) |
| Level of significance | ** | *** | *** | *** | *** |
| Slaughter age | | | | | |
| 8 week | $549.9^{c}$±16.9 (9) | $66.7^{a}$±0.4 (9) | $13.5^{b}$±0.3 (9) | $18.8^{b}$±0.3 (9) | $6.5^{b}$ ± 0.1 (9) |
| 10 week | $717.1^{b}$±15.4 (10) | $65.6^{b}$±0.3 (10) | $15.3^{a}$±0.3 (10) | $19.7^{a}$±0.2 (10) | $7.0^{a}$±0.1 (10) |
| 12 week | $896.6^{a}$±13.3 (14) | $66.6^{a}$±0.3 (14) | $13.6^{b}$±0.2 (14) | $19.8^{a}$±0.2 (14) | $7.0^{a}$±0.1 (14) |
| Level of significance | *** | ** | *** | *** | ** |
| Generation x slaughter age | | | | | |
| Overall mean | 746.2±8.6 (33) | 66.3±0.2 (33) | 14.1±0.1 (33) | 19.5±0.1 (33) | 6.9±0.0 (33) |
| Level of significance | NS | NS | NS | NS | *** |
| $R^2$ of the model | 0.996 | 1.00 | 0.996 | 0.998 | 0.997 |

Figures in the parentheses indicate the number of observations; $G_0$, Foundation stock; $G_1$, First generation; $G_2$, Second generation;
** Significant at $p<0.01$; *** Significant at $p<0.001$; NS, Non-significant ($p>0.05$); Least squares means without a common superscript along the column within a factor differed significantly ($p<0.05$).

generations of NN genotype, the percentage of dressing, breast and thigh plus drumstick meat weight were significantly ($p<0.05$; $p<0.001$) affected by the generation whereas wing meat weight percent didn't alter. However, pre-slaughter weight and dressing percent had shown higher in G0 as compared to the G1 and G2 generation. Conversely, greater ($p<0.001$) value of breast and thigh plus drumstick weight were noticed in G1 generation than those of other generations. In case of increasing age of birds at 8 to 12 weeks, significant ($p<0.001$) increase in proportion of pre-slaughter live weight, and thigh plus drumstick meat weight by about 61.30%, and 9.42% were observed, respectively. Overall means of live weight, percentage of dressing yield, breast, thigh plus drumstick and wing meat weight of NN genotype were 746.2±11.9g, 68.0±0.2%, 13.8±0.1%, 20.3±0.1% and 6.4±0.2%, respectively.

Table 2. Least squares means (±SEM)) of carcass characteristics of Hilly chicken as affected by generation and slaughter age

| Factor | Pre-slaughter weight (g) | Dressed weight (%) | Breast meat Weight (%) | Thigh+Drum stick weight (%) | Wing meat weight (%) |
|---|---|---|---|---|---|
| Generation | | | | | |
| $G_0$ | 869.8$^{a}$±30.8 (5) | 65.9±0.7 (5) | 9.3$^{c}$±0.4 (5) | 19.1$^{b}$±0.3 (5) | 7.1$^{a}$±0.1 (5) |
| $G_1$ | 728.1$^{c}$±22.0 (10) | 64.5±0.5 (10) | 13.3$^{a}$±0.2 (10) | 19.4$^{b}$±0.2 (10) | 6.9$^{a}$±0.1 (10) |
| $G_2$ | 798.3$^{b}$±16.2 (18) | 65.4±0.3 (18) | 12.1$^{b}$±0.2 (18) | 20.2$^{a}$±0.1 (18) | 6.0$^{b}$±0.0 (18) |
| Level of significance | ** | NS | *** | *** | *** |
| Slaughter age | | | | | |
| 8 week | 587.8$^{c}$±24.4 (9) | 65.1$^{a}$±0.5 (9) | 12.5±0.3 (9) | 19.3$^{b}$±0.2 (9) | 6.4±0.1 (9) |
| 10 week | 737.0$^{b}$±22.2 (10) | 63.2$^{b}$±0.5 (10) | 12.3±0.2 (10) | 19.6$^{ab}$±0.2 (10) | 6.3±0.1 (10) |
| 12 week | 933.1$^{a}$±19.2 (14) | 66.2$^{a}$±0.4 (14) | 12.0±0.2 (14) | 20.1$^{a}$±0.2 (14) | 6.8±0.1 (14) |
| Level of significance | *** | *** | NS | ** | NS |
| Generation x slaughter age | | | | | |
| Overall mean | 778.4±12.5 (33) | 65.1±0.2 (33) | 12.2±0.1 (33) | 19.7±0.1 (33) | 6.6±0.0 (33) |
| Level of significance | NS | * | NS | NS | ** |
| $R^2$ of the model | 0.993 | 0.999 | 0.995 | 0.999 | 0.996 |

Figures in the parentheses indicate the number of observations; $G_0$, Foundation stock; $G_1$, First generation; $G_2$, Second generation; * Significant at $p<0.05$; ** Significant at $p<0.01$; *** Significant at $p<0.001$; NS, Non-significant ($p>0.05$); Least squares means without a common superscript along the column within a factor differed significantly ($p<0.05$).

The least square means (±SEM) of carcass characteristics comparison of ND, H and NN chicken genotypes are shown in Table 4. Data in table showed that pre-slaughter weight was differed ($p<0.001$) among the generations as well to the slaughter age but was not affected by genotypes. Dressing percent was differed statistically ($p<0.001$) among the genotypes and slaughter age of birds while no difference was seen in among the generations. In addition, the breast and thigh plus drumstick meat weight percent were influenced ($p<0.001$) for the effect of genotype, generation, and slaughtering age of birds. The percentage of wing meat weight was influenced ($p<0.001$) only by the generation of birds. Greater percentage of dressing (68.0 %), breast meat (14.3 %) and thigh plus drumstick meat (20.3 %) were found in NN genotype followed by other two genotypes, when it compared between the genotypes. With increasing of age from 8 to 12 weeks there was a significant ($p<0.001$) increase proportion of pre-slaughter weight (60.95%) and thigh plus drumstick weight (6.28%). Overall means of live weight, percentage of dressing yield, breast meat, thigh plus drumstick, wing meat of these indigenous chicken genotypes were 756.9±6.4g, 66.5±0.1%, 13.4±0.0%,

Table 3. Least squares means (±SEM)) of carcass characteristics Naked-neck chicken as affected by generation and slaughter age

| Factor | Pre-slaughter weight (g) | Dressed weight (%) | Breast meat Weight (%) | Thigh+Drum stick weight (%) | Wing meat weight (g) |
|---|---|---|---|---|---|
| Generation | | | | | |
| $G_0$ | 848.4$^{a}$±29.3 (5) | 69.2$^{a}$±0.5 (5) | 10.6$^{c}$±0.3 (5) | 19.6$^{b}$±0.3 (5) | 6.8±0.5 (5) |
| $G_1$ | 695.2$^{c}$±20.9 (10) | 68.4$^{ab}$±0.4 (10) | 15.0$^{a}$±0.2 (10) | 20.6$^{a}$±0.2 (10) | 6.7±0.4 (10) |
| $G_2$ | 763.1$^{b}$±15.4 (18) | 67.2$^{b}$±0.3 (18) | 13.6$^{b}$±0.2 (18) | 20.3$^{ab}$±0.1 (18) | 6.9±0.3 (18) |
| Level of significance | ** | * | *** | *** | NS |
| Slaughter age | | | | | |
| 8 week | 553.5$^{c}$±23.2 (9) | 68.2±0.4 (9) | 14.2±0.3 (9) | 19.1$^{b}$±0.2 (9) | 6.4±0.4 (9) |
| 10 week | 719.5$^{b}$±21.2 (10) | 66.9±0.4 (10) | 14.2±0.2 (10) | 20.6$^{a}$±0.2 (10) | 6.1±0.4 (10) |
| 12 week | 892.4$^{a}$±18.3 (14) | 68.7±0.3 (14) | 13.3±0.2 (14) | 20.9$^{a}$±0.2 (14) | 6.6±0.3 (14) |
| Level of significance | *** | NS | NS | *** | NS |
| Generation x slaughter age | | | | | |
| Overall mean | 746.2±11.9 (33) | 68.0±0.2 (33) | 13.8±0.1 (33) | 20.3±0.1 (33) | 6.4±0.2 (33) |
| Level of significance | NS | NS | NS | NS | NS |
| $R^2$ of the model | 0.993 | 1.00 | 0.996 | 0.998 | 0.958 |

Figures in the parentheses indicate the number of observations; G0, Foundation stock, G1, First generation, G2, Second generation, * Significant at $p<0.05$; ** Significant at $p<0.01$; *** Significant at $p<0.001$; NS, Non-significant ($p>0.05$); Least squares means without a common superscript along the column within a factor differed significantly ($p<0.05$).

19.8±0.0% and 6.6±0.0%, respectively.

## Discussion

In the present study, it has been shown that the dressed weight was significantly different between genotypes of indigenous chicken. However, higher dressing percentage was found in NN genotype which was 2.56% and 4.45% greater as that of ND and H genotype, respectively; that may be associated due to lack of feather in NN genotype resulting of feather weight loss was low than full feathered birds. Islam and Nishibori, (2009) also observed that the NN genotype of Bangladesh had superior dressing yield over indigenous full feathered chickens. Similarly, our finding was also complemented with the study of Reddy *et al.* (2015) and Rajkumar *et al.* (2011), who reported that the dressing percent was more in NN genotype than full feathered birds, which can be attributed to higher live weight and less losses due to lack of feather in NN chicken genotype. According to the study of Hossain *et al.* (1991) found that NN genotype of chicken had 1.5% higher dressing yield as well 2.3%

Table 4. Least squares means (±SEM)) of carcass characteristics indigenous chickens as affected by genotype, generation and slaughter age

| Factor | Pre-slaughter weight (g) | Dressed Weight (%) | Breast meat Weight (%) | Thigh+Drum stick weight (%) | Wing meat weight (%) |
|---|---|---|---|---|---|
| Genotype | | | | | |
| ND | 746.2±11.1 (33) | 66.3$^{b}$±0.2 (33) | 14.1$^{a}$±0.1 (33) | 19.5$^{b}$±0.1 (33) | 6.9±0.1 (33) |
| H | 778.4±11.1 (33) | 65.1$^{c}$±0.2 (33) | 12.2$^{b}$±0.1 (33) | 19.7$^{b}$±0.1 (33) | 6.6±0.1 (33) |
| NN | 746.2±11.1 (33) | 68.0$^{a}$±0.2 (33) | 14.3$^{a}$±0.1 (33) | 20.3$^{a}$±0.1 (33) | 6.4±0.1 (33) |
| Level of significance | NS | *** | *** | *** | NS |
| Generation | | | | | |
| $G_0$ | 860.0$^{a}$±15.8 (15) | 66.6±0.3 (15) | 10.1$^{c}$±0.2 (15) | 18.8$^{b}$±0.2 (15) | 6.9$^{a}$±0.2 (15) |
| $G_1$ | 706.9$^{c}$±11.3 (30) | 66.4±0.2 (30) | 14.4$^{a}$±0.1 (30) | 20.0$^{a}$±0.1 (30) | 7.0$^{a}$±0.1 (30) |
| $G_2$ | 772.6$^{b}$±8.3 (54) | 66.5±0.2 (54) | 13.4$^{b}$±0.1 (54) | 20.1$^{a}$±0.1 (54) | 6.1$^{b}$±0.1 (54) |
| | *** | NS | *** | *** | *** |
| Slaughter age | | | | | |
| 8 week | 563.7$^{c}$±12.5 (27) | 66.7$^{a}$±0.2 (27) | 13.4$^{b}$±0.1 (27) | 19.1$^{b}$±0.1 (27) | 6.4±0.1 (27) |
| 10 week | 724.5$^{b}$±11.4 (30) | 65.3$^{b}$±0.2 (30) | 13.9$^{a}$±0.1 (30) | 20.0$^{a}$±0.1 (30) | 6.5±0.1 (30) |
| 12 week | 907.3$^{a}$±9.9 (42) | 67.2$^{a}$±0.2 (42) | 13.0$^{c}$±0.1 (42) | 20.3$^{a}$±0.1 (42) | 6.8±0.1 (42) |
| Level of significance | *** | *** | *** | *** | NS |
| Genotype x generation | NS | *** | NS | * | NS |
| Genotype x slaughter age | NS | NS | ** | NS | NS |
| Generation x slaughter age | * | *** | * | * | * |
| Genotype x generation x slaughter age | | | | | |
| Overall mean | 756.9±6.4 (99) | 66.5±0.1 (99) | 13.4±0.0 (99) | 19.8±0.0 (99) | 6.6±0.0 (99) |
| Level of significance | NS | NS | NS | NS | NS |
| $R^2$ of the model | 0.994 | 1.00 | 0.996 | 0.998 | 0.985 |

Figures in the parentheses indicate the number of observations; ND, Non-descript deshi; H, Hilly; NN, Naked-neck; G0, Foundation stock, G1, First generation; G2, Second generation; * Significant at $p<0.05$, ** Significant at $p<0.01$; *** Significant at $p<0.001$; NS, Non-significant ($p>0.05$); least squares means without a common superscript along the column within a factor differed significantly ($p<0.05$).

more total meat than that of exotic broiler breeds. Authors suggested NN chicken genotype was more heat tolerable with moderate growth rate which might be an alternative to broilers under extreme hot-humid environment. Breast meat and thigh plus drumstick meat weight had showed greater in NN genotype in this current study when compared with other two chicken genotypes. This difference may possibly be associated due to the variation of genetic make-up among the genotype of birds.

As already noted, the exotic birds can be performed better on most economically important traits due to their fast-growing rate, high feed efficiency and high meat yield. While the locally available indigenous chickens in rural and semi-urban areas has also genetically potentiality with proper husbandry practices to improve in most maintenance organs such as liver weight, internal organ weight and wing meat weight (Adebambo *et al.*, 2010), due to more adaptable to the natural system (Dogan *et al.*, 2019) as well as meat have become the preferred choice for consumers resulting of product quality and animal welfare (Castellini *et al.*, 2008; Fanatico *et al.*, 2005). Additionally, the locally available chickens that are usually more prefer by consumers over fast-growing birds like broilers because of its chewy, taste and flavor. This preference for the local chicken has been acknowledged by Kondombo *et al.* (2003). Another study of Jaturasitha *et al.* (2008) stated that poultry meat contains low cholesterol and fat that is an alternative for health conscious consumers. They also pointed out consumers generally prefer indigenous chicken meat as to the meat of commercial poultry breeds due to chewier, taste, flavor and qualities of the meat.

No consistent difference was found in dressing percent among the generations, however, numerically higher in $G_0$ (66.6%), intermediate in $G_2$ (66.4%) and lower in $G_1$ (66.5%) were observed in this study. On the other hand, with the advancement of generation establishment from $G_0$ to $G_2$ there was improved proportion of thigh plus drumstick meat weight in G1 (6.38%) and in $G_2$ (6.91%) as compared that of G0. It might be due to the reflection of selection effect of indigenous chicken genotypes in generations. As to the study of Fanatico *et al.* (2007) reported that genotype is an important factor in the production system of any indigenous chicken since it influences carcass and meat quality characteristics. Similarly, several studies have also illustrated that the dressing percentage, carcass and meat quality traits of indigenous chicken, may be affected by genotype, age, gender, type of production system, stocking density, temperature as well as composition of ingredients in diet (Asan, 2015, Uhlirova *et al.*, 2018; Ebeid *et al.*, 2019; Lim *et al.*, 2019) . However, the results of carcass characteristic for generation effect in the present study, it was difficult to compare with the earlier studies because in this case we could not find relevant literature for the generation effect on carcass.

In the present study, it has been shown that the dressing percent of chicken genotypes were significantly influenced by age but not by the influence of generations. The results partly correspond with the finding of Pandey and Shyamsunder (1990), who found the dressing percent was differed due to the slaughter age of birds. The author measured the same trait at 80 days on exotic chicken breed (White Leghorn male) with higher live weight. On the other hand, present study was conducted with indigenous chicken

genotypes that were slow-growth bird and sacrificed male birds at 56, 70 and 84 days of age. Another study of Faruque *et al.* (2007), who found no consistent difference in dressing percentage regarding the effect of age of birds genotype (BV 300, Hyline brown, Star cross, Hisex brown Cockerels), which was opposite to the present finding. Therefore, this disproportion result between the studies is assumed to be related to the genotypes, age of slaughter, hormonal control, difference management as well as nutrient content and composition of ingredient in diet.

## Conclusion

According to the present results, it indicated that the carcass characteristics of indigenous chicken can be influenced by genotype, generation and slaughter age of birds under intensive system in selective breeding program. Comparing the carcass traits between the chicken genotypes, NN genotype had showed better results in all case of factors. Further selection program should be continued to obtain sustainable improvement of indigenous chicken genetic resources of Bangladesh to find their genetic potentiality to meet up national demand of animal protein source.

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