



## Availability and morphological comparison between Native and Broiler chicken in Bangladesh

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### ABSTRACT

A comparative study between native and broiler chicken was conducted to determine, assess and compare the availability, live weight, sale price, morphology and meat yield in the 3 selected areas; Gazipur, Savar and Mymensingh Sadar upazilla in Bangladesh. A pretested survey schedule was used, containing both open-ended and closed ended questions in collecting data by the author himself through visit in the study area. The study was concerned about the availability, live weight, sale price, morphology and meat yield. The proportionate availability of Broiler (Br) was higher (190 times) than Naked Neck (Na) and seven times than Indigenous Full-feathered (na). However, the availability is about 28 times higher than that of Na. The bodyweight of Na and na chicken was lower in comparison to Br. The price of Na and na chicken stood almost doubled than that of Br chicken. The Br chicken is sold in specifically organized shops along with other commodities. Whereas Na and na were sold by owners or middle men in temporary places. There were huge variations among the morphological characters of Na and na considering live weight, length of shank, body, shank, wattle and comb type, color of comb, skin, beak, shank, wattle, plumage, feather, egg shell and egg weight. Among the meat yield characteristics live weight was found significantly higher in Br followed by na and Na. It was concluded that the proportion of Br population exceeded both Na and na chicken indicating the invasion of Br to Na and na chicken. These phenomena of invasion may be a serious side back in the population of valuable genomic extinction among the local germplasm.

### INTRODUCTION

The poultry industry is becoming a leading industry in Bangladesh. This sector has been growing an annual rate of around 20 per cent for the last two decades. Since 1995, significant annual growth in commercial poultry is being achieved. At present, there are about 0.15 million poultry farmers in Bangladesh, and 6 million livelihoods directly depend on poultry rearing (Ajah et al., 2005). The total population of chicken in Bangladesh is 282.145million (DLS 2017-18). However, from another sense, it was found that 12.89% poultry come from non-farm source; 51.95% from small farms, 27.43% from medium farms and 7.73% from large farms (STATISTICS, 2013). Commercial poultry production is now

growing at a significant rate. In the last two decades, the poultry industry has grown from a handful of medium-sized operation to large industry. About 84% of the households kept chicken for family consumption, whereas 91.5% kept chicken as a source of income. The average number of chicken per household was 9.5, while the average TLU per household was 0.06. Among the indigenous chicken rearing households, 9.3% kept dwarf desi, 3.4% kept Naked neck, and 88.3% kept non-descriptive chicken (Islam et al., 2012). The average production of a rural household may therefore, not more than 200 eggs per year. In Bangladesh, high yielding commercial strains of broiler and layer chickens are seldom produced in a number of less than 100 poultry (Chowdhury, 2013).

About 89% of the rural households keep poultry with an average of 6.8 poultry per household (Haque et al., 2001), most of which are non-descriptive indigenous chicken. Local non-descriptive colored chicken is an important source of meat and egg, which are more acceptable to the rural people in comparison with broilers (Barua et al., 1998). Rearing of both Naked Neck (Na) and Indigenous Full-feathered (na) chicken is low input and low output but Na and na chicken thrive-ability seemed to be better than that of broilers. Local non-descriptive coloured chicken rearing can meet up the deficiency and built up social income. Native rural breeds are valuable genetic resources for each country due to their adaptability to harsh conditions and their resistance against local diseases (Khawaja et al., 2012).

Among indigenous chickens, a little research has been done on the production potentiality of Naked neck chicken (Na) compared with normal plumage indigenous chicken (na) reared in rural households in scavenging and semi-scavenging system. Considerable research results are available on Naked neck and normal plumage indigenous chicken. To research's knowledge, little works have been done to compare information on the production status of Na and na chicken reared under scavenging and semi-scavenging system in rural condition. So, this is a preliminary study to estimate the availability, live weight and sale Price per kg live weight of Naked Neck chicken (Na), Full feathered chicken (na) and Broiler chicken in selected areas and to compare the Morphological and Meat Yield characteristics of Males and Females of the individuals of Na, na and Broilers.

## MATERIALS AND METHODS

Data for this study were collected during January and February 2012. This study was based on the availability, morphology and meat yield characteristics of three different types of chicken (Naked neck: Na, full feathered: na and broiler: br) obtained in different markets; Gazipur, Savar and Mymensingh Sadar upazilla in Bangladesh (Figure 1 to 10).

A pretested schedule was prepared considering a number of chicken in selected areas, live weight of chicken and sale price. The selection of parameters

included study areas, market within the selected areas, techniques of data collection, study period, survey criteria and selection of morphological characters. A representative of three genotypes were selected to have the meat yield (Figure 11 to 16) of three genotypes were determined and compared.

Different phenotypic variant such as live weight, length of body, shank, and wattle, comb type and color, skin color, beak, shank, wattle, plumage, feather, egg shell and egg weight were observed. Also, the meat yield characters were noted by slaughtering and eviscerating the parts of the dressed meat of the chicken of three genotypes.

All recorded data of this experiment was analyzed by Analysis of Variance for Completely Randomized Design (CRD) using a GENSTAT statistical package to compare the effect of genotype, location and genotype-location interaction on the availability of Na, na and Br chicken and effect of genotypes on the meat yield characters. Standard Errors of Difference (SED) and LSD Least Significant Difference (LSD) were used to find out the significant differences.

## RESULT AND DISCUSSION

Descriptive statistics of the availability, live weight and prices of three chicken genotypes in a different region of Bangladesh were given below (Table 1). The proportion of the availability, live weight and price of three chicken genotypes were presented in Table 2.

The numbers of genotypes were highest for Br, intermediate in na and lowest in Na. Such a distribution of the available number of chicken to genotypes indicates a clear-cut invasion of exotic breeds on the local chicken genotypes indiscriminately giving a serious example of genetic material among the unselected local population leading to monotype. The bodyweight of broiler chicken was higher than that of Na and na chicken in three selected areas. Such superiority in weight among Br, Na and na chicken is very much excepted.

The heavier Na than that of na recorded has been supported by a previous study (Barua, 1991).

While the na had higher weight than Na chicken in selected areas. The price of Na and na chicken stood almost doubled than that of Br chicken.

However, the price of Na chicken is slightly higher than that of na chicken.



**Fig 1 Availability in Open Side**



**Fig 2 Availability in Restricted Side**



**Fig 3 Single Comb Type**



**Fig 4 Rose Comb Type**



**Fig 5 Naked Neck (Male)**



**Fig 6 Naked Neck (Female)**



**Fig 7 Full Feathered (Male)**



**Fig 8 Full Feathered (Female)**



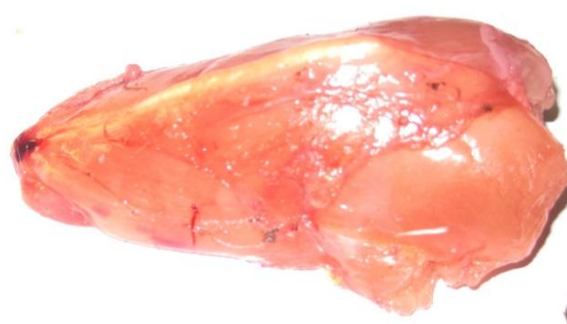
**Fig 9 Broiler (Male)**



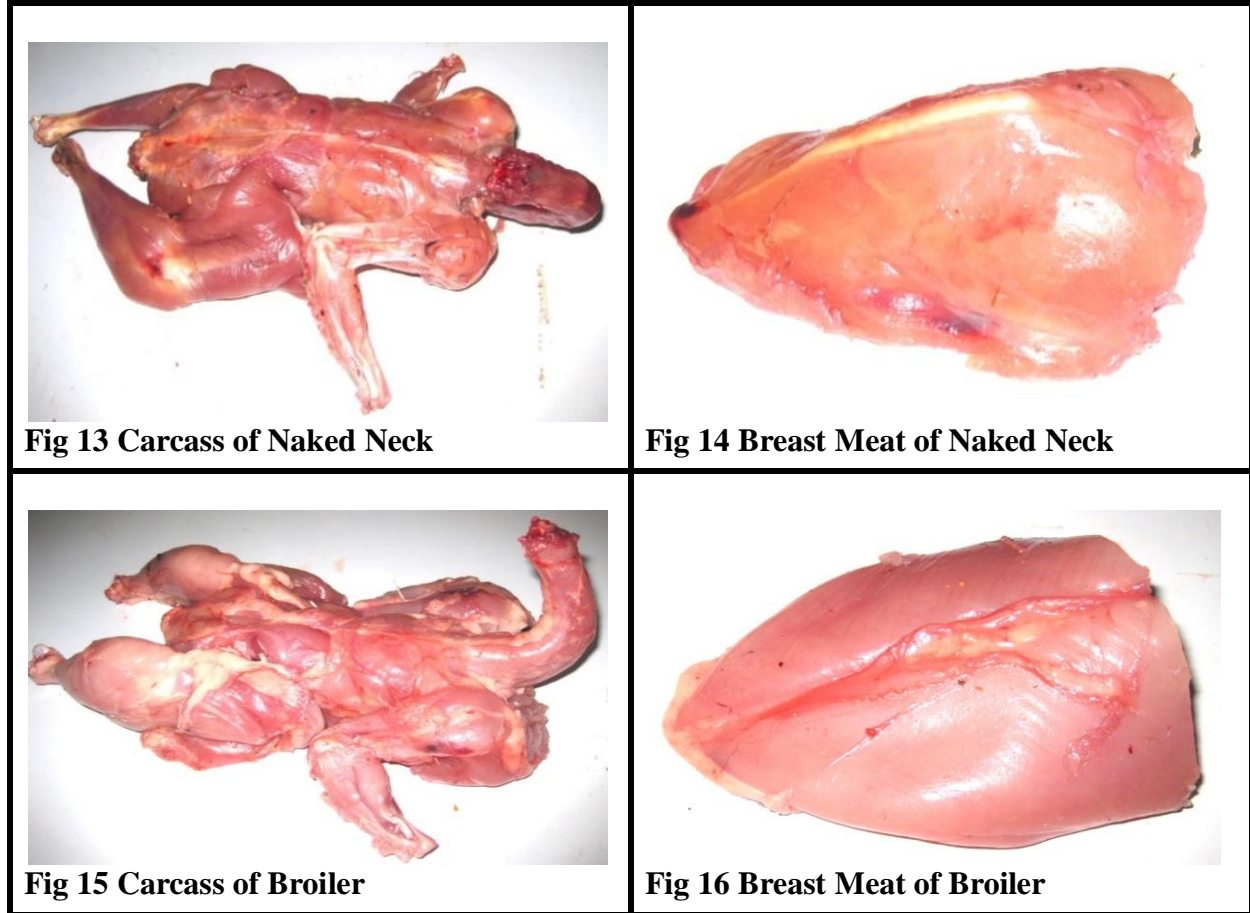
**Fig 10 Broiler (Female)**



**Fig 11 Carcass of Full Feathered**



**Fig 12 Breast Meat of Full Feathered**



**Table 1:** Availability, Live weight and Price of Na, na and Br chicken in Gazipur, Savar and Mymensingh Upazilla

Variables	Genotype (G)	Location (L)			Mean	SED and Significance+		
		Gazipur	Savar	MymensinghSadar		G	L	G x L
Number of Chicken	Nana	4(13)	4(10)	2(3)	4	120.2**	140.6 <sup>NS</sup>	353.8*
	nana	197(22)	42(21)	55(8)	111	in LSD		
	Broiler	541(28)	919(27)	1004(8)	762	(237.8	278.1	700)
	Mean	316	432	462	384			
Weight of Chicken(g)	Nana	1066.2(13)	926(10)	1133(3)	1020	30.25**	35.39**	89.06*
	nana	1092(22)	972(21)	1043(8)	1035.5	in LSD		
	Broiler	563(28)	1550(27)	1587(8)	1560.8	(59.84	70	176.17)
	Mean	1299.7	1224.9	1301	1269			
Price of Chicken (tk/kg)	Nana	258.46(13)	278(10)	220(3)	261.54	2.592**	3.032**	7.630**
	nana	258.18(22)	275.48(21)	226.88(8)	260.39	in LSD		
	Broiler	131.07(28)	149.26(27)	133.75(8)	139.21	(5.127	5.998	15.094)
	Mean	201.05	219.05	183.10	206.07			

Note: Age of chicken was not considered in this study. The values in parenthesis indicate the number of observations or markets where the specific genotype was present in selected areas. NS-  $P > 0.05$ ; \*  $P < 0.05$ ; \*\*  $P < 0.01$ ; All SED's are against 139 degrees of freedom.

**Table 2:** The proportion of the availability, live weight and price of three chicken genotypes

Genotype	Proportion of availability	Proportion of live weight	Proportion of price
Na : Br	1 : 190.5	1 : 1.53	1.88 : 1
Na : Br	1 : 6.86	1 : 1.51	1.87 : 1
Na : na	1 : 27.75	1 : 1.02	1.004 : 1

Naked neck: Na, full feathered: na and broiler: Br

**Table 3: Morphological characteristics of Na and na chicken in Gazipur District**

Variables	Genotype			
	Nana		nana	
	M	F	M	F
Body Weight (g)	1130.9(22)	875(10)	1311.30(54)	881.25(53)
Body Length (cm)	18.86(22)	17.4(10)	20.75(54)	18.28(53)
Comb Type and Color	Single Red (22)	Single Red (10)	Single (92.59%) Rose (7.41%) Red (54)	Single (90.57%) Rose (9.43%) Red (53)
Skin Color	White (22)	White (10)	White (54)	White (53)
Beak Color	White (77.27%) Brown (13.64%) Black (9.09%) (22)	White (90%) Brown (10%) (10)	White (55.55%) Brown (18.52%) Yellow (16.67%) Black (9.26%) (54)	White (58.49%) Brown (24.53%) Black (13.21%) Yellow (3.77%)(53)
Shank Color	White (95.46%) Yellow (4.54%) (22)	White (10)	White (75.93%) Yellow (16.67%) Brown (3.7%) Black (3.7%) (54)	White (90.57%) Black (7.54%) Yellow (1.89%) (53)
Shank Length (cm)	8.35 (22)	6.77 (10)	9.10 (54)	7.67 (53)
Wattle Color	Red (22)	Red (10)	Red (54)	Red (53)
Wattle Length (cm)	3.13 (22)	1.12 (10)	3.70 (54)	1.17 (53)
Feather Color	Brown, Black, White, Yellow, Red, White, Orange (22+10+54+53=139)			
Egg Color and weight (g)	White and 49.09 (27)			

The values in parenthesis indicate the number of observations or markets in this area. Age of chicken was not considered in this study.

### Morphological characteristics

Different morphological characteristics in selected areas for two genotypes were described in Table 3, 4 and 5.

#### Body weight

In Gazipur Upazilla, the mean bodyweight of male and female of Na are 1130.9g, and 875g,

respectively and the bodyweight of male and female of na are 1311.30g and 881.25g respectively. However, in Savar the bodyweight of male and female of Na is 983.3g and 875.71g, respectively, and the bodyweight of male and female of na are 1082.50g and 881.25g, respectively (Table 4). Besides, in Mymensingh Sadar Upazilla the bodyweight of male and female of Na and na was higher than other areas, 1250g and 1000g for Na, respectively and

1143.75g and 893.75g for na genotype (Table 5). According to the data, the live weight of male chicken of both Na and na genotypes are higher than the female in all three areas.

### **Body length**

In Gazipur, the body length of male and female of Na was 18.86cm and 17.4cm respectively, while, the body length for male and female of na was 20.75cm and 18.28cm respectively. However, In Savar the body length of male and female of Na were 19.8cm and 18.5cm respectively, and for na, the body length of male and female were 20.19cm and 18.46cm respectively. On the contrary, in Mymensingh the body length was slightly higher than other areas, 21.3cm and 19cm for male and female of Na respectively and 20.62cm and 18.37cm for male and female of na respectively.

### **Comb Type and Color**

The color of comb of chicken was red in both Na and na genotypes in all three selected areas. The comb type of Na chicken is a single type and the comb-type of na chicken was both single and rose type as the percentage in male is 92.59 and 7.41 and in female was 90.57 and 9.43 in Gazipur. In Savar, the comb-type of Na chicken was the single type, and the comb-type of a male of na chicken was both single and rose type at the percentage of 87.5 and 12.5, and in female, the type was a single type. However, in Mymensingh, both Na and na chicken the comb-type was found single type for both male and female.

### **Skin color**

The skin color of both Na and na chicken was white in all three areas.

### **Beak color**

Beak color varies in different sexes and genotypes. In Gazipur, the beak color of a male of Na chicken was white, brown and black at the percentage of 77.27, 13.64 and 9.09 respectively and in a female of Na chicken is white and brown at the percentage of 90 and 10 respectively. In Savar, the beak color of male of Na chicken was white and brown at the percentage of 83.33 and 16.67 respectively and in female of Na chicken is

white and brown at the percentage of 85.71 and 14.29 respectively. In comparison, the beak color of male and female of Na chicken was white in Mymensingh area.

On the other hand, the beak color of a male of na chicken was white, brown, yellow and black at the percentage of 55.55, 18.52, 16.67 and 9.26 respectively and in female of na chicken was white, brown, black and yellow at the percentage of 58.49, 24.53, 13.21 and 3.77 respectively in Gazipur. In savar, the beak color of a male of na chicken was white, yellow and brown at the percentage of 50, 25 and 25 respectively and in female of na chicken was white, brown and black at the percentage of 66.66, 16.67 and 16.67 respectively. On the other hand, in Mymensingh, the beak color of a male of na chicken is white, yellow and brown at the percentage of 50, 37.5 and 12.5 respectively and in female of na chicken is white, brown and black at the percentage of 50, 25 and 25 respectively.

### **Shank color**

In Gazipur, the shank color of a male of Na chicken is white and yellow at the percentage of 95.46 and 4.54 respectively and in the female of Na chicken was white. In comparison, the shank color for Na genotype in Savar and Mymensingh was white only.

However, the shank color of the male of na chicken was white, yellow, brown and black at the percentage of 75.93, 16.67, 3.7 and 3.7 respectively and in female of na chicken is white, black and yellow at the percentage of 90.57, 7.54, 13.21 and 1.89 respectively in Gazipur. While, in Savar, the shank color of the male of na chicken is white and yellow at the percentage of 70.83 and 29.17 respectively and in female of na chicken is white and black at the percentage of 83.33 and 16.67 respectively. However, in Mymensingh, the shank color of the male of na chicken is white and yellow at the percentage of 75 and 25 respectively and in female of na chicken is white and black at the percentage of 87.5 and 12.5 respectively.

### **Shank Length**

The shank length of male and female of Na and na chicken was higher in Mymensingh area in

comparison to other areas, for Na and na chicken was 8.47cm, 8cm and 8.28 cm, 7.54cm respectively. However, in Savar, the shank length slightly lower, for male and female of Na and na chicken was 7.47cm, 7.31cm and 8.23cm, 7.37cm respectively. The least shank length was found in Gazipur, 8.35cm, 6.77cm and 9.10cm, 7.67cm respectively.

#### **Wattle color and length**

The wattle color of both Na and na genotypes of chicken in three selected areas were red. The wattle length of male and female of Na and na chicken was 3.13cm, 1.12cm and 3.70cm, 1.17cm respectively in Gazipur. However, in Savar, 3.31cm, 1.11cm and 3.68cm, 1.12cm respectively

and 3.5cm, 1.3cm and 3.46cm, 1.13cm respectively in Mymensingh.

#### **Feather color**

The feather color of Na and na chicken is brown, black, white, yellow, red, orange. Whereas, in Savar and Mymensingh, only brown, black, white, yellow and red color were found in chicken.

#### **Eggshell color and weight**

The color of egg shell of Na and na chicken was white in all three area. However, the average egg weight were 49.09g, 43.60g and 45.70g, respectively in Gazipur, Savar and Mymensingh.

**Table 4:** Morphological characteristics of Na and na chicken in Savar Upazilla

Variables	Genotype			
	Nana		nana	
	M	F	M	F
Body Weight (g)	983.3 (12)	875.71 (7)	1082.5 (24)	881.25 (24)
Body Length (cm)	19.8 (12)	18.5 (7)	20.19 (24)	18.46 (24)
Comb Type and Color	Single Red (12)	Single Red (7)	Single (87.5%) Rose (12.5%) Red (24)	Single Red (24)
Skin Color	White(12)	White(7)	White(24)	White(24)
Beak Color	White (83.33%) Brown (16.67%) (12)	White (85.71%) Brown (14.29%) (7)	White (50%) Yellow (25%) Brown (25%) (24)	White (66.66%) Brown (16.67%) Black (16.67%) (24)
Shank Color	White(12)	White(7)	White (70.83%) Yellow (29.17%)(24)	White (83.33%) Black (16.67%)(24)
Shank Length (cm)	7.47 (12)	7.31 (7)	8.23 (24)	7.37 (24)
Wattle Color	Red (12)	Red (7)	Red (24)	Red (24)
Wattle Length (cm)	3.31 (12)	1.11 (7)	3.68 (24)	1.12 (24)
Feather Color	Brown, Black, White, Yellow, Red (12+7+24+24=67)			
Egg Color and weight (g)	White and 43.6g (22)			

The values in parenthesis indicate the number of observations or markets in this area. Age of chicken was not considered in this study.



**Table 5:** Morphological characteristics of Na and na chicken in Savar Upazilla

Variables	Genotype			
	Nana		nana	
	M	F	M	F
Body Weight (g)	983.3(12)	875.71(7)	1082.5(24)	881.25(24)
Body Length (cm)	19.8(12)	18.5(7)	20.19(24)	18.46(24)
Comb Type and Color	Single Red(12)	Single Red(7)	Single (87.5%) Rose (12.5%) Red(24)	Single Red (24)
Skin Color	White(12)	White(7)	White(24)	White(24)
Beak Color	White (83.33%) Brown (16.67%) (12)	White (85.71%) Brown (14.29%) (7)	White (50%) Yellow (25%) Brown (25%) (24)	White (66.66%) Brown (16.67%) Black (16.67%) (24)
Shank Color	White (12)	White (7)	White (70.83%) Yellow (29.17%) (24)	White (83.33%) Black (16.67%) (24)
Shank Length (cm)	7.47 (12)	7.31 (7)	8.23 (24)	7.37 (24)
Wattle Color	Red (12)	Red (7)	Red (24)	Red (24)
Wattle Length (cm)	3.31 (12)	1.11 (7)	3.68 (24)	1.12 (24)
Feather Color	Brown, Black, White, Yellow, Red (12+7+24+24=67)			
Egg Color and weight (g)	White and 43.6g (22)			

The values in parenthesis indicate the number of observations or markets in this area. Age of chicken was not considered in this study.

**Table 6:** Meat yield characteristics of Na, na and Br chicken

Variables	Genotypes (G)			Mean	SED and Significances
	Na	na	Br		
Live Weight (g)	810(3)	1017(3)	1257(3)	1028	123.3*
Dressed Yield (%)	62.69(3)	63.07(3)	63.47(3)	63.07	1.222 <sup>NS</sup>
Total Meat (%)	29.35(3)	29.65(3)	30.07(3)	29.69	1.161 <sup>NS</sup>
Breast Meat (%)	11.67(3)	11.42(3)	12.37(3)	11.82	0.608 <sup>NS</sup>
Dark Meat (%)	17.68(3)	18.23(3)	17.70(3)	17.87	0.59 <sup>NS</sup>
Drum-stick Meat (%)	5.49(3)	5.95(3)	6.03(3)	5.72	0.590 <sup>NS</sup>
Thigh Meat (%)	7.91(3)	7.81(3)	8.33(3)	8.02	0.626 <sup>NS</sup>
Wing Meat (%)	2.423(3)	2.16(3)	2.297(3)	2.29	0.158 <sup>NS</sup>
Giblet Wt (%)	10.83(3)	10.82(3)	10.86(3)	10.83	0.566 <sup>NS</sup>
Edible Portion (%)	73.51(3)	73.88(3)	74.33(3)	73.91	1.73 <sup>NS</sup>
Breast : Dark meat	0.66(3)	0.697(3)	0.63(3)	0.6611	0.019*

Age of chicken was not considered in this study.

The values in parenthesis indicate the number of observations or markets in the selected areas.

<sup>NS</sup>, P>0.05; \*, P<0.05; All SED's are against 8 degrees of freedom.

### **Meat yield characteristics**

The chicken was collected from 3 selected areas in consideration of sex and slaughtered for meat yield traits. The data was analyzed and shown in Table 6, and the description of the individual parameters is given below:

#### ***Live weight***

The data showed that the average live weight of was higher in broiler, followed by na chicken. There was a notification that the weight of Na and na was varies place to place or owner to owner in the market.

#### ***The proportion of Breast and Dark Meat***

The proportion of Breast and Dark meat is an important topic in the meat yield experiment. In this study, the proportion of breast meat and dark meat of na chicken was higher than Na and Br, and the proportionate value of Na was higher than Br chicken.

#### ***Dressed yield***

The dressed yield percentage of Na, na and Br chicken was more or less similar and had no significant effect on these yields.

#### ***Total meat***

The total meat yield percentage of Br chicken was slightly higher than Na and na chicken. On the other hand, the meat yield percentage of Na and na chicken was more or less similar.

#### ***Breast meat***

Br chicken had slightly higher breast meat percentage than Na and na chicken. However, the breast meat percentage of Na and na chicken was more or less similar.

#### ***Dark meat***

The dark meat percentage of na chicken was slightly higher than Na and Br chicken. On the contrary, the dark meat percentage of Na and Br chicken was more or less similar.

#### ***Drumstick meat***

The drumstick meat percentage of Br chicken was higher than Na and na chicken.

#### ***Thigh meat***

The thigh meat percentage of Br chicken was highest followed by Na and na chicken.

#### ***Wing meat***

The wing meat percentage of Na chicken was higher than na and Br chicken.

#### ***Giblet weight***

The percentage of giblet weight of Na, na and Br chicken was more or less similar.

#### ***Edible portion***

The edible percentage of Br chicken was highest followed by na and Na chicken.

### **CONCLUSION**

The study was concerned with the availability, live weight, sale price, morphology and meat yield. The proportionate availability was highest (190 times than Na and seven times than na) in Broiler (Br). However, the availability is high (28 times) than that of Na. However, the bodyweight of Na and na chicken was lower in comparison with Br. The most important scenario was that the price of Na and na chicken stood almost doubled than that of Br chicken. The Br chicken is sold in specifically organized shops along with other commodities, while Na and na were sold in temporary places by owners or middlemen. In case of the morphology of Na and na chicken, there were huge variations among chickens considering live weight, length of shank, body, shank, wattle and comb type, color of comb, skin, beak, shank, wattle, plumage, feather, eggshell and egg weight. It was concluded that the proportion of Br population exceeded both Na and na chicken indicating the invasion of Br to Na and na chicken. These phenomena of invasion may be a serious side back in the population of valuable genomic extinction among the local germplasm.

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