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Effect of Genotype and Sex on Meat Yield Characteristics of *Different Chicken Breeds* Reared at 48 Weeks of Age Under Farm and Semi Scavenging Condition

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Abstract

The aim of the study was to determine the effect of genotype and sex at 48 weeks of age on carcass traits of four breeds of chicken. A total of 48 chickens from four genotypes were used with 24 males and 24 females. Two chicken (1 male and 1 female) weighing average of flock weight from each replication of 4 genotypes were selected and slaughtered for processing individually. Meat yield characteristics of slaughtered chickens were recorded. The results revealed that the live weight of males chicken were higher than females counterpart. *D*eshi chicken had the highest value in dressing percentage, thigh meat, breast meat, dark meat and drumstick meat followed by Fayoumi, Rhode Island Red (RIR) and *Sonali* chickens. All genotypes, males had higher meat yield than female counterparts. The sex differences in all genotypes, *Deshi* and RIR male chickens were higher than female. On the other hand, *Deshi* and RIR female chickens were higher value in dressing and breast meat produced than their male counterparts. The results of giblet, gizzard, heart, liver and spleen were found higher in *Deshi* chicken except in liver weight which was higher in *Sonali* chicken. Giblet, gizzard and spleen yield were higher in females than males except in liver and heart which were higher in males than females. The above findings reveal that *De*shi chicken was better meat yield than other genotypes. Males had higher meat yield than Female counterparts.

Keyword

Carcass Yield, Breed, Male, Female

1. Introduction

Foods derived from animal are important source of nutrients in the human diet and play an increasing role in the most valuable form of animal protein for human consumption (Givens, 2005). Protein in animal tissues is also associated with some saturated fat. Poultry birds are leaner than other livestock. They contain variable amounts of protein, fat and cholesterol. Poultry production and processing technologies have become rapidly accessible and are being implemented on a worldwide basis, which will allow continued expansion and competitiveness in this meat sector (Aho, 2001). Therefore, the success of poultry meat production has been strongly related to improvements in growth and carcass yield, mainly by increasing breast proportion and reducing abdominal fat. Recently, there is a tremendous increase in poultry production in Bangladesh with consequent increase in poultry meat consumption. The production of poultry meat in Bangladesh is 11500 MT (FAO, 2003). The per capita meat consumption in Bangladesh is one of the lowest in the world. The average per capita meat requirement is 43.25 kg and the available values are only 9.12 kg per year (FAO/APHCA, 2008), whereas world per capita consumption of poultry meat is 30.14 g/d, which is 95.89 g/d for USA (Farrell, 2003). To reduce the gap between demand and

supply of animal protein, poultry can play an important role. Meat holds an important position in our daily diet. It provides palatability and is a good source of essential amino acids, vitamins and minerals (Hossen *et al*., 2012)

Many attempts have been made to improve the performance of native chicken by introducing exotic breeds for cross-breeding and to produce hybrid with high production performance. However, these animals were not accepted by all consumers, because they did not meet their expectations for meat quality and mainly taste. The native chicken continues to be the most preferred type, with firm and low-fat meat, and free of drug residues (Choprakarn *et al*., 2000).

Village chickens provide cheap, readily harvestable protein-enriched white meat and for immediate home consumption and sale for income generation (Dolberg and Petersen, 2000; Mapiye and Sibanda, 2005; Miao *et al*. 2005). Consumers eating more chicken meat with its low fat content is often preferred to beef or pig meat (Haslinger *et al*., 2007).

In Bangladesh, a higher portion of poultry meat mainly comes from *Deshi* chicken, broiler and duck. The share of commercial strain of chicken and family poultry was 60:40 in meat production in Bangladesh (Bhuiyan, 2011). Consumers also acknowledge the relatively low price, the typically convenient portions, and the lack of religious restriction against its consumption (Jaturasitha, 2004). Cholesterol content of meat is being great concern among conscious quarter of the population and must be investigated to address the suitability of meat of different poultry species to customers. The quality of the meat is mainly influenced by genotype of animals and its environment, especially either nutrients or stress undergone during growing period or before slaughter. The carcass yield, breast meat yield, thigh yield, liver and heart and abdominal fat were not influenced by the concentration of dietary energy and protein (Kamran *et al*., 2008). The study aimed to analyze the effect of breed and sex on carcass characteristics of chicken raised under farm and semi scavenging condition.

2. Materials and Methods

A total of 48 chickens (24 males and 24 females) at 48 weeks of age were reared in farm and semi scavenging systems. A completely randomized experimental design was applied and males and females were allocated equally in the two rearing systems. At the end of the experiment, 2 chickens (1 male and 1 female) weighing average of flock weight from each replication of 4 genotypes were selected. Selected chicken were fasted for 12 hours and slaughtered. After complete bleeding, the slaughtered birds were immersed in pre-warmed water at 70°C for 30 to 60 seconds in order to loosen the feathers of the carcasses, then weighed, eviscerated, dressed, dissected, and the meat stripped from carcass following the method of Jones (1984).

2.1. Data Recorded

The recorded data of each chicken were live weight, dressed carcass weight, dark meat, thigh meat, breast meat, drumstick meat, giblets, heart, liver, spleen and gizzard weight. Meat yield traits were converted into percentages of individual live weight prior to statistical analysis.

Dressing percentage of the birds was determined by dividing the carcass weight with its live weight and multiplied by 100 and expressed as percentage.

$$\text{Dressing \%} = \frac{\text{carcass weight}}{\text{live weight}} \times 100$$

Dark meat was measured as:

Dark meat= thigh meat + drumstick meat + wing meat + trimming meat.

Breast: dark meat ratio was calculated as:

$$\text{Breast: dark meat ratio} = \frac{breastmeat}{\text{dark meat}}$$

2.2. Statistical Analyses

The meat yield data were subjected to a factorial experiment in a CRD. Four genotypes and two sexes were considered as factor in computing ANOVA for comparison among genotypes and interaction of genotype and sex. Significant differences among the treatments were identified using Least Significant Differences (LSD).

3. Results and Discussion

Live weight of both male and female chickens belonging to four genotypes showed that males were significantly heavier than females (Table 1). Live weight of the chicken varied significantly due to genotype. Interaction between genotypes and sexes ($P<0.01$) was found to exist for this characteristic. It is evident from results that live weight of RIR (1440) was the highest and the lowest was *Deshi* (920 g). Azharul *et al.* (2005) reported the final body weight of *Sonali* and Fayoumiwere 1001g and 959g respectively. Their results appeared to be lower than the present study. Marchi *et al.* (2005) and Iqbal *et al.* (2009) stated live weight of males had significant heavier than females which supported by the present study. Islam and Nishibori (2010) found live weight of RIR, Fayoumi and D. nana were 1147g, 970 g and 970g respectively which were lower than the present research. The dressing percentage were significantly differed among the breeds ($P<0.01$) (Table 1). This character did not differ showing sex differences and interaction between genotype and gender of the chicken ($P>0.05$). The results of the present study indicate the dressing yield of *Deshi* was the highest (66.80%) and lowest (58.50%) in *Sonali* (Table 1). Azharul *et al.* (2005) reported dressing yield of *Sonali* and Fayoumi were 62.5% and 62.3% respectively which partially agreed with the current study. Jaturasitha *et al.* (2008) found that dressing of yield between the indigenous and exotic chicken breeds did not differ which disagreed with the present findings. Iqbal *et al.* (2009) reported that of cock and hen

were 70.11 and 63.80% respective that appeared higher than the present results (male 61.60%, female 61.20%). Dressing yield of male and female was not significantly different. The dark meat yield in *Deshi* chicken had the highest value followed by Fayoumi, RIR and *Sonali* (Table 1). Irrespective of all genetic groups males had higher yield dark meat compared to females. Interaction between genotypes and sexes was found to exist for this characteristic.

Table 1. *Interaction of genotypes and sex on edible meat yield characteristics of chickens reared at 48 weeks of age under farm and semi scavenging.*

Variables	Gen(G)	Sex (S)		Mean	SED and Significant		
		M	F		G	S	G×S
Live weight(g/b)	*Deshi*	0.973	0.87	0.92	0.034**	0.024**	0.048**
	Fayoumi	1.41	1.11	1.26			
	RIR	1.64	1.23	1.44			
	Sonali	1.49	1.35	1.42			
	Mean	1.38	1.14	1.26			
Dressing yield (%)	*Deshi*	66.40	67.30	66.80	3.23**	2.28NS	4.81NS
	Fayoumi	64.10	61.40	62.70			
	RIR	65.20	57.60	61.40			
	Sonali	50.70	58.50	54.60			
	Mean	61.60	61.20	61.40			
Dark meat (%)	*Deshi*	29.14	23.20	26.17	0.320**	0.226**	0.452**
	Fayoumi	25.45	25.89	25.67			
	RIR	25.45	19.77	22.61			
	Sonali	23.65	22.01	22.83			
	Mean	25.92	22.72	24.32			
Breast:Dark meat	*Deshi*	0.50	0.58	0.54	0.007**	0.005**	0.00**
	Fayoumi	0.50	0.50	0.50			
	RIR	0.41	0.56	0.49			
	Sonali	0.45	0.51	0.48			
	Mean	0.47	0.54	0.50			
Thigh meat (%)	*Deshi*	13.65	10.87	12.26	0.161**	0.114**	0.228**
	Fayoumi	11.81	11.36	11.55			
	RIR	12.16	9.56	10.86			
	Sonali	11.16	10.21	10.65			
	Mean	12.20	10.50	11.35			
Breast meat (%)	*Deshi*	14.48	13.32	13.90	0.169**	0.120*	0.240**
	Fayoumi	12.76	12.92	12.84			
	RIR	10.63	10.97	10.80			
	Sonali	10.54	11.11	10.83			
	Mean	12.10	12.08	12.09			
Drumstick meat (%)	*Deshi*	9.08	6.31	7.70	0.154**	0.109**	0.218**
	Fayoumi	8.21	7.75	7.98			
	RIR	8.15	6.05	7.10			
	Sonali	7.25	6.72	6.99			
	Mean	8.18	6.71	7.44			

M = Male, F = Female, G = Genotype, S = Sex
NS, P>0.05, ** P< 0.01
NS = Not-significant

The breast meat: dark meat of four genotypes (Table 1) indicate *Deshi* chicken was the highest followed by Fayoumi, RIR and *Sonali* (P<0.01). The breast meat: dark meat of Females were found better than in their male counterparts and interaction between genotypes and sexes (P<0.01) was found to exist for this characteristic. Among four genotypes thigh meat of chicken breeds differed significantly (P<0.01) in the order of *Deshi*>Fayoumi>RIR>*Sonali* (Table 1) as corroborated by Nielsen et al. (2003). They found the local breeds the highest thigh meat yield than improved breeds. Males yielded 1.7% higher thigh meat than females (P<0.01). Interaction between genotypes and sexes were found.

Breast meat of both males and females belonging to four genotypes showed that the breast meat of *Deshi* chicken attained the highest (P<0.01) value, followed by Fayoumi, RIR and *Sonali* partially agreed by Bhatti *et al.* (2003).They found the breast meat was the highest in Fayoumi followed by *Deshi* and *Sonali*. Sex had little effect on breast meat yield. The drumstick meat had differed significantly among the genotypes. Of all genotypes males had 1.47% higher drumstick meat yield than females. The sex difference was higher in *Deshi* followed by RIR, *Sonali* and Fayoumi, as agreed by Nielsen et al. (2003). They found drumstick meat of local breeds were higher than exotic breeds. But the findings contradicted with the findings of Azharul *et al.* (2005) found the drumstick meat of *Sonali* and Fayoumi were 37.5 and 36.1 respectively.

Table 2. *Interaction of genotypes and sex on voluntary meat yield characteristics of chickens reared at 48 weeks of age under farm and semi scavenging.*

Variable	Gen(G)	Sex (S)		Mean	SED and Significant		
		M	F		G	S	GXS
Giblet (%)	*Deshi*	5.16	6.03	5.60	0.184**	0.130**	0.260**
	Fayoumi	4.75	5.53	5.14			
	RIR	4.27	4.71	4.50			
	Sonali	4.99	4.51	4.57			
	Mean	4.79	5.19	4.99			
Gizzard (%)	*Deshi*	1.65	2.51	2.08	0.047**	0.033**	0.066**
	Fayoumi	1.59	2.21	1.90			
	RIR	1.52	2.35	1.94			
	Sonali	1.58	1.53	1.55			
	Mean	1.58	2.15	1.87			
Heart (%)	*Deshi*	0.65	0.73	0.70	0.039**	0.027**	0.054**
	Fayoumi	0.86	0.53	0.69			
	RIR	0.71	0.52	0.61			
	Sonali	0.53	0.42	0.47			
	Mean	0.69	0.55	0.62			
Liver (%)	*Deshi*	2.73	2.66	2.70	0.047**	0.033NS	0.067**
	Fayoumi	2.22	2.69	2.45			
	RIR	1.98	2.09	2.03			
	Sonali	3.01	2.45	2.73			
	Mean	2.48	2.47	2.48			
Spleen (%)	*Deshi*	0.09	0.12	0.11	0.008**	0.005NS	0.011**
	Fayoumi	0.09	0.09	0.09			
	RIR	0.06	0.08	0.07			
	Sonali	0.09	0.12	0.11			
	Mean	0.09	0.10	0.09			

M = Male, F = Female, G = Genotype, S = Sex
NS, P>0.05, ** P< 0.01
NS = Not-significant

The giblet yield was significantly (P<0.01) differed from genotype to genotype and the highest giblet yield was found in *Deshi* chicken and lowest in Sonali. Overall giblet was higher in females in comparison with males except *Sonali*. Gizzard yield of both males and females among four genotypes *Deshi* chicken was the highest value than other three breeds. Sex had little effect on gizzard yield. Gizzard weights were found higher in females than males, whereas *Sonali* male had higher yield than female counterpart (Table 2). Gizzard and Crop develop more on restrictive feeding than *ad libitum* feeding. In this study *Deshi* chicken adapted to semi scavenging condition had higher giblet yield than other breeds which may result from their superior adaptability to semi scavenging condition where birds were frequently exposure to feed restrictions. Birds habituated to restricted feeding store feed in their elementary tract, especially in crop and gizzard to meet up nutritional requirement during lean period of feeding. Whereas, in *ad libitum* feeding crop and gizzard are less developed for their tendency not to store feed in their elementary tract. Heart yield was significantly different (P<0.01) among four breeds. Males chicken yielded 0.14% higher heart than females except *Deshi* females had higher heart yield than male. Liver yield were higher in Sonali chicken followed by *Deshi,* Fayoumi and RIR. Sex did not have effect on liver yield. *Deshi* and *Sonali* males were higher liver yielding than that of female counterpart. On the other hand, Fayoumi and RIR females were higher liver yielding than male counterpart. Spleen yielding was observed that higher in *Deshi* and *Sonali* chickens, intermediate in Fayoumi and lower in RIR chicken. Sex did not have influence on spleen yielding. Spleen yielding of male chicken was found higher than that of female, but Fayoumi male and female did not differ on spleen yielding.

4. Conclusions

This study revealed that carcass characteristics are genotype and sex dependent. Male chickens were heavier than their female counterparts. *Deshi* chicken ranked highest in all meat yield traits considered for evaluation. In most variables, males were higher meat yielding than females but females performed better than males for yielding giblet, gizzard and spleen.

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