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## Influence of breed and sex on carcass characteristics and meat quality in three different breeds of chicken

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### Abstract

The influence of breed and sex on carcass characteristics, cut up parts, and percentage yield of meat, bone and skin was studied in three breeds of chicken. A total of 20 birds each of Australorp, Naked neck and White cornish were maintained under deep litter system for 64 weeks. The randomly selected bird's carcasses were cut into different parts and deboned manually. The parameters studied were live, bled, picked, eviscerated and dressed weight, head and shank weight, giblet weight, cut up parts (Neck, wings, breast, back, thigh and drumstick) and meat, bone, skin yield. The resulting weight of the cut-up parts showed that male birds were significantly higher than that of female birds ( $p < 0.01$ ). Regarding all the parameters studied, male was found to be significantly ( $p < 0.01$ ) differed from female for carcass characteristics, cut up parts and meat, bone, skin yield. Among the three different poultry breeds the White cornish male had recorded the highest carcass characteristics than Naked neck and Australorp.

**Keywords:** Breed, White cornish, Naked neck and Australorp, sex, carcass characteristics and cut up parts

### Introduction

Over the last two decades, India has attained drastic change in poultry production particularly, chicken meat production (Fuzhu and Zhuye, 2008) [2]. Moreover, poultry meat is gaining popularity over red meat due to its low fat and cholesterol content, relatively low price, typically convenient portions and lack of religious restriction (Jaturashitta, 2004) [4]. This trend has made poultry producers to focus more on carcass yield and composition mainly to improve the quality of the poultry.

Nowadays, chickens are selected and bred to produce either large numbers of high quality eggs or vigorous rapid growing off-spring with desirable carcass characteristics viz., thick chunky breasts and meaty thighs and drumsticks (Parkhurst and Mountney, 1997) [14]. Hence, maintenance of male and female lines of purebreds plays a vital role for the sustenance and growth of poultry meat sector, since it affects the carcass characteristics and quality genetically. Quantitative carcass characteristics are also important from economics point of view. Proportions of major basic carcass parts (breast, drumstick and thigh) as well as the presence of certain tissues in those parts are regarded as vital parameters in determining broiler meat quality (Suto *et al.*, 1998) [20], and these are applicable for spent chicken too. Several reports have been made on broiler's carcass characteristics and its cut up parts in different strains but literature on spent chicken studies in different breeds is scanty (Marcu *et al.* 2013; Horniakova and Abas, 2009; Kenny and Kemp, 2006, Nikolova and Pavlovski, 2009) [9, 3, 6, 11]. Comparative evaluation of different breeds with respect to meat yield allows redefined interpretation of high meat yield commercial birds that has been produced through genetic methods. Considering the aforementioned, the current investigation was taken up with the objectives of studying the carcass characteristics, cut up parts and percentage yield of meat, bone, skin and fat in three different breeds and evaluating the effect of sex on these meat quality traits obtained from three different breeds.

### Materials and methods

The study was conducted at Poultry farm complex and Department of Livestock Products Technology of Rajiv Gandhi College of Veterinary and Animal Sciences, Kurumbapet,

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Pondicherry, India. Pondicherry is located at an altitude of 15m above MSL with the co-ordinates of 11.9310° N latitude and 79.7852° E longitude. Different breeds of chicken viz. Australorp, Naked neck and White cornish were chosen as research material which were maintained at the poultry farm complex of college were selected randomly for this study. All the birds were reared in deep litter system under standard managemental conditions with proper vaccinations like (Marek's disease, Ranikhet disease, Infectious bursal disease, Fowl pox) and deworming with piperazine. A total of twenty birds (n=20) were randomly selected from each breed which includes ten males and ten females (n=10) with approximate age of 64 weeks old.

The birds were starved of feed for overnight and weighed individually to obtain starved live body weight. The birds were stunned and bled in a bleeding cone by severing the jugular vein as well as carotid artery with a sticking knife. A total of 2 min were allowed to ensure complete bleeding and weighed to obtain bled weight. Thereafter birds were scalded at 55 °C for 1-2 min followed by de-feathering in an automatic de-featherer and weighed to obtain picked weight. Evisceration was done manually by making a slit between the end of keel bone and rectum and the carcass was washed with potable water followed by chilling in walking cooler (4 °C) for 3-4 h and weighed to obtain eviscerated weight. Giblets were collected from each bird and weighed after proper cleaning (heart without pericardium, gizzard without kiolin and liver without gall bladder).

Then the carcass was separated into different cut up parts viz., thigh, drumstick, breast, back, wings, neck and each cut up part was subjected to manual deboning at the meat processing unit (temperature maintained at 10 °C). All weights were taken individually for each bird by using electronic digital balance (Essae-Teraoka, Japan) and expressed in grams. Percentage yield of meat, bone and skin was also arrived.

### Statistical analysis

The means and standard errors of different carcass characteristics traits were estimated as per standard statistical procedure described by Snedecor and Cochran (1994) [16]. Comparison was made between the breeds by using the statistical package SPSS 14.0 version (SPSS Inc., Chicago, USA 2005) [18].

### Results and discussion

Results pertaining to the effect of breed and sex on the carcass characteristics viz., starved live, bled, picked and carcass, edible and inedible by-product weight of three poultry breeds are summarized in Table 1. Regardless of sex, at the age of 64 weeks old, White Cornish breed had recorded highly

significant ( $p<0.01$ ) mean starved live weight (3.45 kg) compared to Naked neck (2.59 kg), and Australorp (2.31 kg), but no such significant difference exist between the Naked neck and Australorp. Similar trends were also observed in the case of bled, picked and carcass weight. This is in support with the observations made by Ojedepo *et al.* (2008) who reported highly significant ( $p<0.01$ ) differences in live, bled, picked and carcass weight of different broiler breeds. These differences in the carcass characteristics might be due to breed variation.

In contrary to other carcass characteristics, White cornish breed had recorded significantly ( $p<0.05$ ) lower edible and inedible by-product weight than other two breeds. In general, male birds tend to produce higher gizzard weight than female ones in all the breeds. Similar findings were reported by Karima and Fathy (2005) [5] who found that differences in gizzard weight were higher in male strains than female strains. Moreover, birds belonging to heavy breeds tend to produce higher carcass weight and lower inedible offal's. Pal *et al.* (2003) [13] reported higher live weight (3.62 kg), dressing percentage (17.13%) and low inedible offal's in adult Vanaraja birds. Similarly, Mandal *et al.* (2004) [8] recorded low live weight, carcass weight, dressing percentage and higher inedible offal's in adult White cornish, which were almost similar to the observations recorded in the present study.

Among the various cut up parts (presented in Table 2) White cornish breed had produced comparatively higher proportion of breast (25.31%), thigh (19.42%) and lower proportion of back (21.73%) than that of other breeds (20.73 to 22.64% breast, 17.05 to 18.02% thigh and 24.32 to 22.09% back). The mean proportion of drumstick was similar in all the three breeds. Trends in the yield of cut up parts recorded in the White cornish birds were almost similar to the observation reported by Pal *et al.* (2003) [13] in vanaraja birds and Stadelman *et al.* (1988) [17] in broilers.

Table 3 shows meat, bone and skin yield of the different poultry breed. The effect of breed had shown significant difference ( $p<0.05$ ) in the production of meat, bone and skin. White cornish breeds yielded highest amount of deboned meat and bone followed by Naked neck and Australorp. However, Naked neck and Australorp had produced significantly lower amount of skin yield compared to White cornish breeds which might be due to differences in the body size and live weight among the breeds. No fat could be separated from the carcass during deboning operation. Studies reported that sexes influence the growth rates; females show higher breast proportion than males, but lower leg and thigh proportion (Sola-oja and Ayorinda, 2009) [19].

**Table 1:** Effect of breed and sex on carcass characteristics in three different chicken breeds (Mean ± SE)

Parameters (Grams)	Name of the Breeds					
	Australorp		Nacked neck		White cornish	
	Male	Female	Male	Female	Male	Female
Live weight	2312±63.85 <sup>A</sup>	1922±118.01 <sup>**</sup>	2597±150.53 <sup>A</sup>	1934±63.06 <sup>**</sup>	3455±132.62 <sup>B</sup>	2014±79.48 <sup>**</sup>
Wt. after Bleeding	2200±68.15 <sup>A</sup>	1884±108.68 <sup>*</sup>	2455±140.26 <sup>A</sup>	1879±59.32 <sup>**</sup>	3231±124.21 <sup>B</sup>	1924±78.2 <sup>**</sup>
Wt. after de-feathering	1855±53.23 <sup>A</sup>	1677±135.30	2210±126.67 <sup>B</sup>	1749±49.34 <sup>**</sup>	2938±123.95 <sup>C</sup>	1822±59.07 <sup>**</sup>
Wt. of head & shank	204.5±22.1 <sup>B</sup>	176.0±4.76	187.5±22.17 <sup>C</sup>	156.0±4.76	218.4±83.58 <sup>A</sup>	189.4±4.76
Dressed weight	1606±42.22 <sup>A</sup>	1341±83.95 <sup>*</sup>	1841±113.12 <sup>A</sup>	1331±46.34 <sup>**</sup>	2492±100.8 <sup>B</sup>	1385±63.78 <sup>**</sup>
Giblet						
Heart	22.6±1.05	14.6±0.56 <sup>**</sup>	23.6±0.82	14.8±0.39 <sup>**</sup>	23.2±0.39	16.0±0.77 <sup>**</sup>
Liver	37.5±3.10	26.0±1.13 <sup>**</sup>	40.7±2.74	25.4±0.56 <sup>**</sup>	39.1±3.09	27.5±1.46 <sup>**</sup>
Gizzard	33.2±2.71	25.5±1.25 <sup>b*</sup>	28.7±1.15	25.1±0.98 <sup>b*</sup>	30.9±1.72	21.5±1.05 <sup>a**</sup>

Means bearing different superscript in a row differ between male (<sup>ABC</sup>); between female (<sup>abc</sup>); between male and female (<sup>\*</sup> ( $P<0.05$ ) significant, <sup>\*\*</sup> highly significant ( $p<0.01$ ) respectively.

**Table 2:** Effect of breed and sex on cut-up parts in three different chicken breeds

Parameters (Grams)	Name of the Breeds					
	Australorp		Nacked neck		White cornish	
	Male	Female	Male	Female	Male	Female
Thigh	330.3±26.62 <sup>A</sup>	277.4±24.08 <sup>**</sup>	310.6±23.35 <sup>A</sup>	217.4±9.07 <sup>**</sup>	413.7±11.26 <sup>B</sup>	194.7±13.82 <sup>**</sup>
Drumstick	259.3±9.33 <sup>A</sup>	177.2±16.58 <sup>a**</sup>	274.2±25.78 <sup>A</sup>	182.2±6.54 <sup>b**</sup>	393.2±18.62 <sup>B</sup>	184.8±15.97 <sup>b**</sup>
Breast	394.6±15.6 <sup>A</sup>	319.4±24.79 <sup>a*</sup>	396.3±23.63 <sup>A</sup>	355±25.02 <sup>b</sup>	678.9±33.24 <sup>B</sup>	360.7±16.9 <sup>b**</sup>
Back	299.3±10.7 <sup>A</sup>	375.5±23.52 <sup>b**</sup>	461.1±29.41 <sup>B</sup>	298.8±11.9 <sup>a*</sup>	550.2±33.25 <sup>C</sup>	318.3±8.7 <sup>a**</sup>
Wings	220.4±6.59 <sup>A</sup>	296.6±9.74	194.2±14.51 <sup>A</sup>	143.7±5.83 <sup>**</sup>	277.2±13.98 <sup>B</sup>	224.2±73.72
Neck	120.4±3.24 <sup>A</sup>	67.4±10.43 <sup>**</sup>	126.8±8.94 <sup>A</sup>	70.5±5.39 <sup>**</sup>	180.4±18.68 <sup>B</sup>	70.9±7.67 <sup>**</sup>

Means bearing different superscript in a row differ between male (<sup>ABC</sup>); between female (<sup>abc</sup>); between male and female \* ( $p < 0.05$ ) significant, \*\* highly significant ( $p < 0.01$ ) respectively

**Table 3:** Effect of breed and sex on meat, bone and skin yield in three different chicken breeds (Mean ± SE)

Parameters (Grams)	Name of the Breeds					
	Australorp		Naked neck		White cornish	
	Male	Female	Male	Female	Male	Female
Meat	806.6±26.91 <sup>A</sup>	571.8±46.91 <sup>**a</sup>	900.5±55.13 <sup>A</sup>	574.3±20.47 <sup>**a</sup>	1253.5±59.68 <sup>B</sup>	618.8±30.55 <sup>**a</sup>
Bone	555.6±21.75 <sup>A</sup>	419.8±24.33 <sup>**a</sup>	581.3±49.25 <sup>A</sup>	375.0±13.59 <sup>**a</sup>	806.4±28.37 <sup>B</sup>	429.1±21.03 <sup>**a</sup>
Skin	170.5±9.36 <sup>A</sup>	198.1±19.45 <sup>a</sup>	227.7±11.45 <sup>B</sup>	233.3±18.26 <sup>a</sup>	281.8±19.41 <sup>C</sup>	180.6±17.68 <sup>**a</sup>

Means bearing different superscript in a row differ between male (<sup>ABC</sup>); between female (<sup>abc</sup>); between male and female \* ( $P < 0.05$ ) significant, \*\* highly significant ( $P < 0.01$ ) respectively

### Concluding remarks

The results obtained in the current study clearly shows that a breed and sex had a significant effect on carcass characteristics, cut up parts and percentage yield meat, bone and skin in chicken. White cornish breed produced better carcass characteristics and higher meat, bone, skin and cut up parts yield, but had lower yield of inedible by-products followed by Nacked neck, and Australop breeds respectively. At 64 weeks age, male birds yielded the maximum dressing percentage and that age did not influence the dressing percentage in female. Percentage yield of breast, thigh and wings was higher in males than females. Sex had an influence on the yield of giblets both in male and female. Studies on separable meat: bone percentage showed that there was an abundance of meat and diminution of bone in breast and thigh. These observations will pave the way for genetic improvement of chicken breeds in relation to carcass traits.

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### References

- Becker WA, Spencer JV and Verstrate JA. Abdominal and carcass fat in five broiler strains. *Poult. Sci.* 1981;60:693-697.
- Fuzhu, Zhuye. Asian network for scientific information. *Int. J. Poult. Sci.* 2008;7(4):319-322.
- Horniakova E, Abas KA. Influence of Low levels of protein and sex on carcass traits and nutrient content in broiler meats. *Slovak Journal of Animal Science.* 2009;42:75-78.
- Jaturashitta S. Meat management. Mingnuang press, Chiang Mai. Thailand, 2004.
- Karima AS, Fathy AE. Effects of breed, sex and diet and their interaction on carcass composition and tissue weight distribution of broiler chickens. *Arch. Trierz. Dummerstorf.* 2005;48:612-626.
- Kenny M, Kemp C. What protein level will maximize your profits, *Asian Poultry Magazine.* 2006;4:22-25.
- Leeson S, Summers JD. Commercial poultry nutrition, Nottingham Univ. Press., England. 2005, p. 230-295.
- Mandal PK, Pal UK, Das CD, Rao VK, Umamaheshwari D, Venugopal S. Effect of sex of White Leghorn birds on carcass characteristics and products quality. *J of Meat Sci.* 2004;2:35-38.
- Marcu A, Vacaru-Opris I, Marcu A, Danaila L, Dronca D, Kelciov B. The influence of genotype and sex on carcass characteristics at broiler chickens. *Lucrari Stiintifice-Serii zootehnie.* 2013;59:16-21.
- Moran ET, Orr HL, Larmond E. Influence of strain on the yield of commercial parts from the chicken broiler carcass. *Poult. Sci.* 1970;49:725-729.
- Nikolova N, Pavlovski Z. Major carcass parts of broiler chicken from different genotype, sex, age and nutrition system, *Biotechnology & Animal Husbandry.* 2009;25:1045-1054.
- Ojedapo LO, Akinokun O, Adedeji TA, Olayeni TB, Ameen SA, Amao, SR. Effect of Strain and Sex on Carcass Characteristics of Three Commercial Broilers Reared in Deep Litter System in the Derived Savannah Area of Nigeria. *World Journal of Agricultural Sciences.* 2008;4(4):487-491.
- Pal UK, Das CD, Rao VK, Mandal PK, Venugopal S. Carcass characteristics, meat and sausage quality of Vanaraja Birds. *J Sci.* 2003;1:16-19.
- Parkhurst CR, Mountney GJ. Poultry Meat and Egg Production. First Indian edition, CBS Publishers & Distributors, New Delhi. 1997.
- Seigel PB, Dunnington, EA, Jones DE, Ubsi CO, Gross WB, Cherry JA. Phenotypic profiles of broiler stocks fed two levels of methionine and lysine. *Poult. Sci.* 1984;63:855-862.
- Snedecor GW, Cochran WG. Statistical methods. 8<sup>th</sup> Edn. The Iowa State University Press, Ames, Iowa, USA. 1994, p. 564.
- Stadelman WJ, Olson VM, Shemwell GA, Pasch S. Egg and Poultry Meat Processing. Ellis Hardwood Ltd. And VCH, New York. 1988.
- Statistical Package for the Social Sciences (SPSS). SPSS for windows 14.0 User's guide. Chicago, IL:SPSS Inc., 2005.
- Sola-oja FE, Ayorinda KL. Effect of sex on carcass characteristics of the Fulani Ectotype chicken (FEC). *Proceeding of 14<sup>th</sup> Annual Conference of Animal Science*

Association of Nigeria (ASAN) Sep 14-17<sup>th</sup> 2009, LAUTECH, Ogbomosa, Nigeria, 2009.

20. Suto Z, Horn P, Jensen J, Sorensen P, Sapo J. Carcass traits, abdominal fat deposition and chemical composition of commercial meat type chicken during a twenty week growing period. Arch. Geflugeik. 1998;62:21-25.