Full Length Article

CARCASS CHARACTERISTICS OF INDIGENOUS *SIRUVIDAI* CHICKEN OF TAMIL NADU RAISED UNDER FARM CONDITIONS

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ABSTRACT

The carcass characteristics of indigenous Siruvidai chicken were evaluated by sacrificing eight birds of each sex at 16 weeks of age. The results revealed that the mean pre-slaughter weight, New York dressed yield (%), eviscerated carcass yield (%) and ready to cook yield (%) in males (1006.98±10.87 g, 90.50±0.14, 65.11±0.40 and 70.83±0.42 %, respectively) were significantly (P<0.01) higher than females (825.21±5.90 g, 88.85±0.09, 62.77±0.33 and 68.41±0.34 %, respectively) and the overall mean values in the combined sex were 916.10±24.22 g, 89.67±0.23, 63.94±0.39 and 69.62±0.41 %, respectively. The mean blood loss and feather loss percentage were significantly (P<0.01) higher in females (4.28±0.05 and 6.87±0.08 %) than males (3.55±0.03 and 5.95±0.13 %) with the overall mean of 3.92±0.09 and 6.41±0.14 %, respectively. The giblets, gizzard, heart and liver yield of males (5.60±0.02, 2.33±0.01, 0.39±0.01 and 2.88±0.01 %, respectively) were significantly (P<0.05) lower than females (5.80±0.03, 2.42±0.01, 0.42±0.01 and 2.96±0.01 % respectively) with overall mean of 5.70±0.02, 2.38±0.01, 0.41±0.01and 2.92±0.01 %, respectively. The neck, back, breast, wing, thigh, drumstick yield percentage and meat-bone ratio of Siruvidai males (6.07±0.02, 22.60±0.18, 22.51±0.06, 12.16±0.21, 17.13±0.17, 15.21±0.17 % and 0.99) were significantly (P<0.01) higher than females (5.88±0.04, 19.91±0.21, 21.50±0.16, 11.53±0.18, 15.16±0.21, 13.43±0.39 % and 0.90, respectively) and the overall mean values in the combined sex were 5.98±0.03, 21.26±0.37, 22.01±0.15, 11.85±0.16, 16.15±0.28, 14.32±0.31 % and 0.95, respectively. The results of the present study provided base line information about the carcass traits of indigenous Siruvidai chicken ecotype under farm conditions.

Key words: carcass characteristics, *Siruvidai*, farm conditions

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INTRODUCTION

The chicken meat in India is generally obtained either from commercial broilers or from indigenous chicken or their crosses (Devi *et al*., 2014). The indigenous chicken though slow growers compared to commercial broilers are preferred for better flavor and for the belief that natural, less intensive management systems provide desi birds with higher welfare levels, resulting in much better product quality (Mir *et al*., 2017). The indigenous chicken production is mainly confined to backyard rearing as a low input and low output system (Wattanachant *et al*., 2004). But in recent years, there has been an increase in demand for meat from indigenous and local birds and often fetches higher prices due to consumers' preference owing to its colour, taste, leanness, and its suitability for preparation of special dishes and cultural significance. In India there are around nineteen registered indigenous chicken breeds (NBAGR, 2019) which are generally considered as slow growers and poor layers (Rajkumar *et al*., 2021). Yet, the eggs and meat from indigenous chicken is the essential food supplement and cheap source of protein for eradication of malnutrition in village children. Hence to bridge the gap between production efficiency, taste and price line attempts are made to grow these indigenous birds under intensive commercial farming system (Singh and Pathak, 2017). However, little is known about the characteristics of indigenous birds under farm conditions. Hence the present study was undertaken to provide information about carcass characteristics of *Siruvidai* chicken (one of the important indigenous chicken ecotypes of Tamil Nadu, India) grown under intensive system of management.

MATERIALS AND METHODS

The carcass characteristics were studied from 16 Siruvidai chicken comprising eight male and eight female birds of 16 weeks age, reared under intensive system of management. The birds were fasted overnight and slaughtered as per the procedure described by Mountney and Parkhurst (1995) at Post Harvest Technology Unit, Poultry Research Station, Chennai.

The parameters like pre-slaughter weight, processing losses (blood and feather loss percent), New York dressed yield, eviscerated carcass yield, ready-to-cook (R-to-C) yield (%) were recorded. The giblets were recovered (gizzard without inner horny epithelium, heart without pericardium and liver without gall bladder) and the organs were individually weighed to obtain the organs yield. The R-to-C carcasses were further cut into parts as per the standard procedure to obtain the cut-up parts yield (neck, back, breast, wings, thighs and drumstick). The per cent cut-up parts from each carcass were calculated as their proportion to eviscerated weight. The data collected were statistically analyzed as per standard methods (Snedecor and Cochran, 1989) and tabulated (Table 1). Independent mean 't' test was applied to test the difference in means of the two sexes.

RESULTS AND DISCUSSION

There was significant (P<0.01) sexual dimorphism in pre-slaughter weight between male (1006.98±10.87 g) and female (825.21±5.90 g) *Siruvidai* chicken with males weighing heavier than females and the sex-combined mean pre-slaughter weight was 916.10±24.22 g. The pre-slaughter weight observed in this study was lower than that reported by Behera *et al*. (2017) and Ekka *et al*. (2018) in Hansli (1211.83 g) and Kadaknath (1092.33 g). The authors also reported significantly (P<0.01) higher live weight in males than females in Hansli (1331.33 vs 1092.33 g) and Kadaknath (1249.33 vs 963.33 g). The higher pre-slaughter weight in favor of males might be attributed to their higher growth rate.

The mean blood loss per cent of *Siruvidai* males (3.55±0.03) was significantly (P<0.01) lower than that of females (4.28±0.05) with the overall mean of 3.92±0.09 %. Similar differences in blood loss per cent between males and females was reported by Nagarahalli (2013) in indigenous chicken of Bangalore (3.25 Vs 3.54 %), however the mean blood loss value (3.45 %) reported by the author was less than that of the present study. Similarly, Chatterjee *et al*. (2004) and Sunder *et al*. (2005) also reported lower values of 3.09 % and 3.08 % in Nicobari chicken than that of the present study. However, Rajkumar *et al*. (2016) reported a higher blood loss per cent (4.04) in Aseel than that recorded in the present study.

The mean feather loss per cent of *Siruvidai* males (5.95±0.13) was significantly (P<0.01) lower than females (6.87±0.08) with the overall mean value being 6.41±0.14 %. This difference in values between the sexes might be due to reduction in feather coverage of male birds due to feather pecking behavior which was noticed in the male birds on floor rearing during growing period. Rajkumar *et al*. (2016) reported a feather loss of 5.20 % in Aseel and 4.91 % in broilers and stated that presence of dense multicolor plumage and well-developed wing and flight feathers in native chicken could be the reasons for higher feather loss than broilers.

The carcass dressed weight is the main index to evaluate the meat productivity in chickens (Yin *et al*., 2013). The mean sex-combined value of New York dressed weight percentage of *Siruvidai* chicken in the present study was 89.67±0.23 and higher value than that of the present study was reported by Bhimraj *et al*. (2018) in indigenous chicken of Tamil Nadu (90.76 %). There was significant (P<0.01) difference in values between male (90.50±0.14 %) and female (88.85±0.09 %) *Siruvidai* chicken with higher yield in males compared to females.

The mean eviscerated carcass yield in *Siruvidai* males (65.11±0.40%) was significantly (P<0.01) higher than that of females (62.77±0.33 %) the overall mean being 63.94±0.39 %. The eviscerated yield obtained in the present study was lower than those reported previously by Chatterjee *et al*. (2004) and Sunder *et al*. (2005) in Nicobari

(68.20 and 68.38 %), Kalita *et al*. (2012) in indigenous chicken of Assam (70.08 %), Behera *et al*. (2017) in Hansli breed (68.53 %) and Bhimraj *et al*. (2018) in indigenous chicken of Tamil Nadu (70.58 %).

The R-to-C yield per cent was also significantly (P<0.01) higher in males (70.83±0.42) than females (68.41±0.34) with the overall average of combined sex being 69.62±0.41 %. Haunshi *et al*. (2013) reported a lower value of 66.47 % in Aseel and 64.80 % in Kadakanth.

The mean giblet yield varied significantly (P<0.05) between male and female (5.60 and 5.80±0.02 %, respectively) *Siruvidai* chicken with the overall mean of combined sex being 5.70±0.02 %. Sunder *et al*. (2005) and Haunshi *et al*. (2013) reported the giblet yield in Aseel and Nicobari birds as 4.46 % and 4.06 %, respectively which were lower than that recorded in the present study. Differences in mean giblet yield between the sexes have also been reported by Kalita *et al*. (2021) in indigenous chicken of Daothigir breed (6.75 Vs 5.76 %).

The mean gizzard yield of *Siruvidai* males (2.33±0.01 %) was significantly (P<0.05) lower than females (2.42±0.01 %) with the overall mean of combined sex being 2.38±0.01 %. Such sexual dimorphism in gizzard yield was also recorded by Khan *et al*. (2019) in Aseel (1.41 Vs 2.01 %) and broiler breeders (1.00 Vs 1.65 %).

However, Kalita *et al*. (2021) reported higher gizzard yield in male (1.93 %) compared to females (1.35 %) in Daothigir breed. Chatterjee *et al*. (2004) reported the gizzard yield of 1.75 % in Nicobari and Haunshi *et al*. (2013) and Rajkumar *et al*. (2016) reported gizzard yield of 2.04 and 2.31 % in Aseel chicken which were lower than that recorded in the present study.

The mean heart yield of males (0.39±0.01 %) and females (0.42±0.01 %) were significantly (P<0.05) different with the overall mean value of combined sex being 0.41±0.01 % and similar such findings of sexual dimorphism in heart yield was also reported in broiler breeders (0.49 Vs 0.67 %) by Khan *et al*. (2019). But Kalita *et al*. (2021) reported higher heart yields in males than females in Daothigir breed (0.96 Vs 0.64 %). The heart yield reported by Chatterjee *et al*. (2004) in Nicobari (0.41 %) and Haunshi *et al*. (2013) in Aseel (0.42 %) were close to the values recorded in the present study. However, Rajkumar *et al*. (2016) recorded 0.64 % of heart yield in Aseel and further reported that heart yield was higher in small birds compared to larger ones.

Significant (P<0.05) difference was also seen in the liver yield of *Siruvidai* males (2.88±0.01 %) and females (2.96±0.01 %) with the overall mean being 2.92±0.01 % and such differences was reported previously by Khan *et al*. (2019) in Aseel (1.76 Vs 2.02 %) and broiler breeders (1.46 Vs 1.89 %) and Kalita *et al*. (2021) in Daothigir breed (2.14 Vs 2.74 %). Further the overall mean liver yield of the present study was higher than that reported by Chatterjee *et al*. (2004) and Rajkumar *et al*. (2016) in Nicobari (1.75 %) and Aseel (1.80 %).

The mean neck yield in males (6.08±0.02 %) was significantly (P<0.01) higher than that of females (5.88±0.02 %) with the overall mean being 5.98±0.03 %. The neck yield recorded in the present study was higher than those reported by Chatterjee *et al*. (2004), Nagarahalli (2013), and Bhimraj *et al.* (2018) in Nicobari (5.79 %), indigenous chicken of Karnataka (5.39 %) and Tamil Nadu (5.88 %), respectively.

The mean back yield of males (22.60±0.18 %) was significantly (P<0.01) higher than females (19.91±0.21%) the overall mean being 21.26±0.37 % and similar such sexual dimorphism in carcass conformation of higher back yield was observed in Daothigir breed (15.91 Vs 14.98 %) by Kalita *et al*. (2021) and in broiler breeders (18.27 Vs 17.18 %) by Khan *et al*. (2019). The back yield recorded in the present study was higher than those reported by these authors and also by Rajkumar *et al.* (2016) in Aseel (17.55) and broilers (15.65) and Bhimraj *et al.* (2018) in indigenous chicken of Tamil Nadu (19.42 %). Nielsen *et al*. (2003) reported that slow-growing chickens were characterized by higher back and neck yield compared to that of fast-growing chickens

The mean breast yield of males (22.51±0.06 %) was also significantly (P<0.01) higher than females (21.50±0.16 %) with the overall mean value of 22.01±0.15 %. Contrary to the present findings, Kalita *et al*. (2021) reported higher breast yield in females than males in Daothigir breed (23.21 Vs 27.79 %). Sunder *et al.* (2005), Behera *et al*. (2017) and Bhimraj *et al.* (2018) reported the breast yield of 22.82, 22.79 and 22.92 % respectively in Nicobari, Hansli and indigenous chicken of Tamil Nadu that were higher than the values of the present study. Fanatico *et al*. (2007) reported that fast-growing chicken showed superior breast yield than slow growing chicken.

Similarly, the mean wing yield of males (12.16±0.21 %) was significantly (P<0.01) higher than that of females (11.53±0.18 %), the overall mean being 11.85±0.16 %. Lower values than that recorded in the present study were also reported by Rajkumar *et al*. (2016) in Aseel (9.01 %) and Bai *et al*. (2021) in indigenous chicken of Karnataka (10.55 %). The higher wing yield in the present study might be due to well-developed wings of this ecotype due to its perching and flight behavior in deep litter system.

The overall mean thigh and drumstick yield in *Siruvidai* chicken of combined sex were 16.15±0.28 and 14.32±0.31 %, respectively. There was significant (P<0.01) difference between the sex with the mean thigh and drumstick yield of 17.13±0.17 and 15.16±0.21 % in males and 15.21±0.17and 13.43±0.39 % in females.

The meat bone ratio also varied significantly (P<0.05) between male (0.99) and female (0.90) *Siruvidai* chicken with the overall mean of combined sex being 0.95. Higher values than that of the present study were reported by Bhimraj *et al*. (2018) in indigenous chicken of Tamil Nadu (1.24) and Bai *et al*. (2021) in indigenous chicken of

Karnataka (1.16) and Rajkumar *et al*. (2016) in Aseel (1.07) and broilers (1.31). Jaturasitha *et al*. (2008) reported that bone proportion was high and lean - bone ratio was low in imported layer chickens and local chickens. Hence the lower meat bone ratio recorded in this study indicates lower meat content in the birds at 16 weeks of age of slaughter.

The findings of this study showed that male birds showed better carcass characteristics than females in terms of pre-slaughter weight and processing yields (New York dressed yield, eviscerated yield and ready to cook yield) and cut up parts yield and meat bone ratio. The processing losses (blood and feather loss), giblets, gizzard, heart and liver yield were higher in females than males. This basic information about carcass characteristics of *Siruvidai* chicken under farm conditions may aid to explore and improve critical areas of carcass performance of this ecotype.

Table 1. Carcass characteristics of indigenous *Siruvidai* chicken at 16 weeks of age (Mean±SE)

Traits	Male (n=8)	Female (n=8)	Overall (n=16)
Pre-slaughter body weight (g)	1006.98^{A}±10.87	825.21^{B}±5.90	916.10±24.22
Blood loss (%)	3.55^{B}±0.03	4.28^{A}±0.05	3.92±0.09
Feather loss (%)	5.95^{B}±0.13	6.87^{A}±0.08	6.41±0.14
New York dressed yield (%)	90.50^{A}±0.14	88.85^{B}±0.09	89.67±0.23
Eviscerated carcass yield (%)	65.11^{A}±0.40	62.77^{B}±0.33	63.94±0.39
Ready to cook yield (%).	70.83^{A}±0.42	68.41^{B}±0.34	69.62±0.41
Giblet yield (%)	5.60^{b}±0.03	5.80^{a}±0.02	5.70±0.02
Gizzard yield (%)	2.33^{b}±0.01	2.42^{a}±0.01	2.38±0.01
Heart yield (%)	0.39^{b}±0.01	0.42^{a}±0.01	0.41±0.01
Liver yield (%)	2.88^{b}±0.01	2.96^{a}±0.01	2.92±0.01
Neck yield (%)	6.07^{A}±0.02	5.88^{B}±0.04	5.98±0.03
Back yield (%)	22.60^{A}±0.18	19.91^{B}±0.21	21.26±0.37
Breast yield (%)	22.51^{A}±0.06	21.50^{B}±0.16	22.01±0.15
Wing yield (%)	12.16^{A}±0.21	11.53^{B}±0.18	11.85±0.16
Thigh yield (%)	17.13^{A}±0.17	15.16^{B}±0.21	16.15±0.28
Drumstick yield (%)	15.21^{A}±0.17	13.43^{B}±0.39	14.32±0.31
Meat: Bone	0.99^{a}±0.01	0.90^{b}±0.01	0.95±0.01

$^{A, B}$Means bearing different superscripts within each row differ significantly ($P<0.01$)

^{a,b}Means bearing different superscripts within each row differ significantly ($P<0.05$)

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