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Research Paper

Comparative Study on Carcass Characteristics of Vanaraja and Srinidhi Chicken Reared under Conventional Management System

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ABSTRACT

The present experiment was conducted to compare growth and carcass characteristics of Vanaraja and Srinidhi chicken. There was significant ($p \leq 0.05$) difference between body weights of Vanaraja and Srinidhi at day old (39.48±0.32 Vs 33.88±0.33), 4 weeks (341.87±6.50 Vs 277.93±5.91), 8 weeks (1053.26±20.43 Vs 925.03±19.11), 12 weeks (1591.39±18.11 Vs 1405.73±17.78), 16 weeks (2051.83±79 Vs 1869.87±90), 20 weeks (2271.39±94 Vs 2104.61±84) and 24 weeks (2713.55±196 Vs 2357.16±91 g) of age. Dressing percentage in female birds was significantly ($p \leq 0.05$) different among Vanaraja and Srinidhi at 16 (66.34±5.81 Vs 65.52±4.52), 20 (72.13±1.12 Vs 71.62±19) and 24 weeks of age (70.27±1.13 Vs 69.33±0.24). Percent giblet weight was significantly ($p \leq 0.05$) different in the two varieties at the age of 16 weeks both in males and females. In addition inedible offals weight also showed significant ($p \leq 0.05$) difference in both varieties. The weights of cut-up parts differed significantly ($p \leq 0.05$) among Vanaraja and Srinidhi varieties. Srinidhi recorded higher meat to bone ratio than Vanaraja at all ages studied. When compared proximate composition of two varieties, it was observed that there were significant ($p \leq 0.05$) difference in moisture, protein, fat, ash and cholesterol content between two varieties within same age group and within same sex. Thus, difference in germplasm significantly affects the growth, carcass characteristics and proximate composition of chicken. In general, Srinidhi chicken, with higher growth rate and comparable carcass characteristics to Vanaraja chicken is the best substitute for poultry production.

Keywords : *Srinidhi, Backyard chicken, Cut-up-parts, Dressing percentage*

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INTRODUCTION

Chicken has the distinction of the most liked meat in Indian subcontinent (Mendiratta *et al*. 2012). Poultry meat is considered as a white meat and has many unique desirable properties compared to red meats (Kondaiah and Naveena 2008). Some of the merits of chicken are excellent flavor, easy to digest, low fat content, high ratio of polyunsaturated fatty acids to saturated fatty acids, excellent source of protein and fair source of vitamins and minerals, more tender due to less connective tissue and shorter muscle fibers, requires less cooking and retains more nutrients. Poultry population of India stands at 729.21 millions (19th Livestock census, 2012) of this, about 45% (328.14 million) are in the backyard sector which includes both desi and improved varieties. Backyard poultry contributes significantly to the National egg (21%) and poultry meat (8.47%) production. In rural areas, chicken reared in backyard are generally *desi* type which has low productivity. However, in some areas, local breeds and cross-breeds derived from them are also reared. Specific improved varieties of chicken are now available for rearing for meat and/or eggs (Rath *et al.* 2015). Rural poultry farming is advantageous as it provides gainful employment, additional income and nutritional security to rural poor. It has also been noticed that demand for rural backyard poultry is quite high in tribal areas and other backward areas. Understanding the magnitude of backyard rural poultry farming in India, a number of research organizations have developed different backyard chicken varieties which have successfully been reared by farmers across the country. Vanaraja and Srinidhi are improved dual purpose chicken varieties developed by Directorate on Poultry Research, Hyderabad. Vanaraja is an example of superior stock, a choice dual purpose colored bird which has significantly contributed to the rural poultry in terms of eggs and meat (Bhattacharya *et al.* 2005). Srinidhi is another improved backyard chicken variety developed from selected six test crosses for optimum body weight and better egg production.

Vanaraja and Shrinidhi dual purpose breeds have been developed with an aim to increase in the egg and poultry meat production at rural level which in turn will help to improve the financial returns to the weaker section of the society as well as improve the availability of extra egg and meat for nutritional security. From this view points, the study is important to ascertain the optimum age of marketing/

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slaughter of culled birds available for disposal to gain maximum economic advantage. Many reports are accounted on Vanaraja performance and carcass characteristics but information on carcass characteristics of Srinidhi is meager. Therefore, a study was aimed at evaluation and comparison weight gain and carcass characteristics of Srinidhi with Vanaraja.

MATERIALS AND METHODS

A total of 310 day old chicks of Vanaraja and Srinidhi were procured from Directorate on Poultry Research, Hyderabad. Chicks were then reared in deep litter system under standard management practices. Birds were fed *ad libitum* on layer chick diet (20% CP, 2700 ME) up to 9 weeks and layer grower diet (16% CP, 2700 ME) from 10 to 24 weeks. Body weights were recorded on the birds at birth, 4, 8, 12, 16, 20 and 24 weeks of age. Further, six male and six female birds of each variety were fasted overnight and slaughtered at 16, 20 and 24 weeks of age following standard procedures. Carcasses were chilled for 12 h and the carcasses were cut in to primal cuts the next day followed by deboning. Likewise four trials were conducted. Various carcass traits etc. were recorded. Proximate composition analyzed following AOAC (1980) methods and pooled breast and thigh meat samples were used for analysis. The data were subjected to one way ANOVA by using SPSS software version, 15.

RESULTS AND DISCUSSION

The mean body weights of Vanaraja and Srinidhi birds recorded in the present study at different ages is presented in Table 1. The body weights of Vanaraja were significantly ($p \leq 0.01$) higher than the corresponding body weights of Srinidhi chicken, which might be due to difference in variety and germplasm used for the development of these varieties. Almost similar body weights in Vanaraja chicken have been reported (combined sexes) at 20, 24 and 40 weeks of age under intensive system (Debata *et al.* 2012; Kalita *et al.* 2012; Ramana *et al.* 2010). In contrast to the present findings, Islam *et al.* (2014) recorded lesser body weights in Vanaraja chicken at the age of 16 weeks under backyard system of rearing. The lesser body weight could be due to the difference in system of rearing and diet.

Table 1: Body weights of Vanaraja and Srinidhi chicken (g)

	Age						
Variety	**0 Day**	**4 weeks**	**8 weeks**	**12 weeks**	**16 weeks**	**20 weeks**	**24 weeks**
Vanaraja	39.48±0.32^a	341.87± 6.50^a	1053.26±20.43^a	1591.39±18.11^a	2051.83±79^a	2271.39±94^a	2713.55±196^a
Srinidhi	33.88±0.33^b	277.93±5.91^b	925.33±19.11^b	1405.73±17.78^b	1869.87±90^b	2104.61±84^b	2357.16±91^b
Sig	**	**	**	**	**	*	*

Significant ($p \leq 0.01$): *Significant ($p \leq 0.05$); Means with different superscript in each column differ significantly

The carcass characteristics of Vanaraja and Srinidhi at the three ages studied (16, 20 and 24 weeks) are presented in Table 2. Similar to the live body weight, carcass weight was also found to be significantly ($p \leq 0.05$) higher in Vanaraja chicken at all the ages studied. This is due to higher body weight which results in higher carcass weight. The dressing percentage was also higher in Vanaraja chicken than Srinidhi and difference was significant ($p \leq 0.05$). However, Vanaraja female birds recorded significantly ($p \leq 0.05$) heavier carcasses than Srinidhi female. Percent weight of giblet differ significantly ($p \leq 0.05$) among the varieties at 16 and 20 weeks age studied wherein Srinidhi birds recorded heavier giblets. Present findings are in agreement with the findings of Pragati *et al.* (2007) in broilers where higher weight broiler observed lesser giblet weight than lower weight broilers. Live weight, carcass weight, dressing percentage and giblet percentage observed both in male and female of Vanaraja in this study are comparable to the results obtained by Debata *et al.* (2012) in Vanaraja. The mean weights of various inedible parts and percent inedible offals expressed as percent of live weight namely blood, feather, head, shank and viscera are presented in Table 2. There was significant ($p \leq 0.05$) difference between two varieties in three age groups. Similar per cent shank weight, blood weight, feather weight and head weight was also reported by Pal *et al.* (2011) and Kumar *et al.* (2012) in Vanaraja chicken of over 72 weeks of age. These results are superior compared to the reports of Rajakumar *et al.* (2013).

Table 2: Means of carcass characteristics of Vanaraja and Srinidhi chicken

		Age					
		16 weeks		20 weeks		24 weeks	
Parameters	**Sex**	**Vanaraja**	**Srinidhi**	**Vanaraja**	**Srinidhi**	**Vanaraja**	**Srinidhi**
Live wt (g)	Male	1927.25 ±97[a]	1719.86 ± 130[b]	2514.17±81[a]	2283.00±230[b]	3061.10±78[a]	2484.70±141[b]
	Female	1590.76 ± 65[a]	1455.68 ±142[b]	1991.71±60[a]	2014.23 ±78[b]	2308.67±93.71[a]	2206.43±138[b]
Carcass wt (g)	Male	1438.08±98[a]	1354.56±107[b]	1845.67±43[a]	1581.27±127[b]	2267.75±124[a]	1756.99±113[b]
	Female	1176.71±80[a]	1025.20±70[b]	1502.50±75[a]	1425.63±89[b]	1712.03±123[a]	1690.74±105[b]
Dressing %	Male	75.29±7.80[a]	70.39 ± 3.99[b]	73.41±1.76[a]	69.28±2.13[b]	74.09±0.77[a]	70.71±1.78[b]
	Female	73.66 ±5.81[a]	70.56± 4.52[b]	75.31± 1.12[a]	71.63±19[b]	74.16±1.13[a]	73.30±0.24[b]
Giblet wt (g)	Male	110.13±5.76[a]	91.85±3.66[b]	116.38±8.68[a]	99.13±2.44[b]	127.80±8.78[a]	113.58±2.65[b]
	Female	73.86±9.87[a]	62.23±0.32[b]	90.71±1.82[a]	77.50±3.78[b]	99.75±6.56[a]	84.50±3.78[b]
Giblet %	Male	6.70±0.05[b]	6.88± 0.16[a]	5.33±1.10[b]	6.43±0.26[a]	4.25±0.53[b]	5.43±0.25[a]
	Female	6.30±1.12[b]	6.56±1.82[a]	4.59±5.60[b]	5.63±1.96[a]	4.12±0.36[b]	5.29±0.46[a]
Blood wt (g)	Male	70.34±1.11[a]	82.16±2.43[b]	77.49±3.54[a]	92.63±2.42[b]	94.12±6.54[a]	123.11±3.14[b]
	Female	72.91±9.09[a]	63.71±3.12[b]	74.96±2.76[a]	70.34±6.38[b]	85.26±3.45[a]	77.49±8.08[b]
Blood %	Male	4.94± 0.11[a]	4.96±2.14[b]	4.07±1.36[a]	4.12±0.53[b]	4.59±1.34[a]	5.03±1.34[b]
	Female	4.59±2.72[a]	4.44±1.93[b]	3.77± 1.12[a]	3.51±2.13[b]	3.71±0.84[a]	3.55±1.98[b]
Feather wt (g)	Male	140.43±18.24[a]	105.67±9.41[b]	177.70±13.23[a]	110.43±1.75[b]	203.50±6.32[a]	162.94±8.23[b]
	Female	179.09±11.57[a]	119.17±8.00[b]	209.27±11.09[a]	136.15±9.54[b]	226.30±3.24[a]	219.26±9.54[b]
Feather (%)	Male	4.57±3.24[a]	5.51±1.12[b]	6.45±0.83[a]	6.98±0.21[b]	7.26±0.98[a]	7.26±0.57[b]
	Female	5.51±5.00[a]	5.56±1.82b	5.70±0.15[a]	5.59±0.62[b]	6.54±0.33[a]	6.70±0.56[b]
Head wt (g)	Male	72.98±1.47[a]	62.58±4.77b	88.21±1.47[a]	86.28±0.94[b]	112.03±1.98[a]	98.82±3.80[b]
	Female	46.90±2.34[a]	41.87±2.45b	64.37±4.77[a]	60.51±1.43[b]	70.64±2.45[a]	64.37±4.56[b]
Head %	Male	3.83±0.06[a]	3.73± 26 b	3.47±1.18[a]	3.83± 1.77[b]	3.65±0.22[a]	3.99±0.08[b]
	Female	2.96±1.67[a]	2.93±2.19b	3.24±0.80[a]	2.99± 2.54[b]	3.06±0.09[a]	2.96±0.24[b]
Shank wt (g)	Male	115.29±3.45[a]	96.36±2.16b	118.86±5.13[a]	101.23±3.24[b]	125.55±7.43[a]	110.46±1.00[b]
	Female	80.35±2.67[a]	60.03±6.57b	87.64±0.67[a]	67.39±3.01[b]	108.11±8.43[a]	80.42±0.67[b]
Shank (%)	Male	4.61±1.89[a]	4.24±4.00b	4.67±1.24[a]	4.39±1.16[b]	4.06±0.06[a]	4.45±0.19[b]
	Female	3.69±3.33[a]	3.37±1.33b	3.94±1.12[a]	3.44± 2.34[b]	4.90±0.32[a]	3.67±0.11[b]
Viscera wt (g)	Male	280.93±9.72[a]	249.63±9.62[b]	305.00±7.31[a]	278.70±1.64[b]	318.83±7.85[a]	285.60±4.67[b]
	Female	197.64±1.86a	182.00±2.97[b]	208.90±6.59[a]	256.17±2.36[b]	238.51±6.59[a]	288.12±5.68[b]
Viscera (%)	Male	14.78±3.54[a]	14.85±1.91[b]	11.99±0.92[a]	12.34±2.41[b]	10.43±1.14[a]	11.65±0.08[b]
	Female	12.63±1.12[a]	13.59±2.24[b]	10.50±1.01[a]	12.78± 1.92[b]	10.33±1.17[a]	11.23±0.49[b]

(Note: Mean weight expressed as percentage of live weight), Mean±SE with different superscripts in each row for different parameters differ significantly ($p \leq 0.05$) within same age group within same sex

The mean weights of various cut-up parts namely neck, breast, back, legs and wings and their percentage to carcass weight are presented in Table 3. Significant ($p \leq 0.05$) differences were found in weights of cut-up parts of Vanaraja and Srinidhi at 16, 20 and 24 weeks in both male and females. The higher weight of cut-up parts of Vanaraja compared to Srinidhi is the result of higher live weight and carcass weight. Information on body weights and carcass traits on Srinidhi chicken is scanty. Pathak *et al.* (2009) studied Vanaraja chicken over 80 weeks age and reported almost similar percent cut-up parts weight. However, Muthukumar *et al*. (2011) found non-significant ($p \leq 0.05$) effect due to sex on percent yield of high valued primal cuts (thighs, breast, drumsticks, drummets) and low valued cuts (back, neck and wings).

Meat bone ratio is very important from economical point of view. The results for meat to bone ratio are presented in Table 3. The difference among the varieties for meat to bone ratio at all the ages studied was non-significant ($p \leq 0.05$). However, meat to bone ratio was found to be more in Srinidhi than in Vanaraja birds. This may be due to relatively bigger bones in Vanaraja than Srinidhi chicken. The meat to bone ratios obtained in the present study were 1.67 ± 0.94 and 1.48 ± 1.21 at 16 weeks, 1.68 ± 1.62 and 1.65 ± 0.82 at 20 weeks, 1.7 ± 1.6 and 1.66 ± 0.16 at 24 weeks, respectively, in male and female

Vanaraja birds while the corresponding ratios observed by Pathak *et al.* (2009) were meat to bone ratio of 2.03 ± 0.13 and 2.46 ± 0.16, respectively in male and female Vanaraja birds of 80 weeeks age. However, proximate composition results (Table 4) in term of percent moisture, fat, protein, ash and cholesterol between Vanaraja and Srinidhi chicken also shown significant difference within same age group and within same sex. Overall moisture, protein, fat percentage observed was higher in Vanaraja chicken than in Shrinidhi chicken meat.

Table 3: Means of cut-up parts of Vanaraja and Srinidhi chicken

		Age					
		16 weeks		20 weeks		24 weeks	
Parameters	**Sex**	**Vanaraja**	**Srinidhi**	**Vanaraja**	**Srinidhi**	**Vanaraja**	**Srinidhi**
Neck wt (g)	Male	141.90±37^{a}	92.95±24.66^{b}	172.12±6.87^{a}	133.23±23^{b}	218.23±18.70^{a}	160.14±3.78^{b}
	Female	119.87±46^{a}	73.22±26.00^{b}	134.72±8.23^{a}	105.45±12.63^{b}	154.36±11.98^{a}	135.74±5.96^{b}
Breast wt (g)	Male	414.66±28^{a}	340.83±36^{b}	535.07± 34^{a}	378.23±58^{b}	575.64±18^{a}	395.13±14.72^{b}
	Female	346.78±27^{a}	282.50±13^{b}	387.30± 13^{a}	361.97±20.32^{b}	403.97±11.72^{a}	482.62±19^{b}
Back wt (g)	Male	312.67±90^{a}	283.17±13^{b}	372.60±33.76^{a}	306.23±49.24^{b}	448.96±19^{a}	340.50±4.61^{b}
	Female	213.23±70^{a}	226.40±19^{b}	322.17 ± 11.83^{a}	260.73±14.45^{b}	387.79±17^{a}	358.56±26^{b}
Thigh wt (g)	Male	257.62±20.03^{a}	198.60±23.01^{b}	308.20±17^{a}	223.27±24^{b}	374.94±28^{a}	241.68±20^{b}
	Female	223.13±24.32^{a}	191.59±20.22^{b}	226.95±19^{a}	230.13±27^{b}	235.75±14^{a}	249.63±23^{b}
Drumstick (g)	Male	234.75±32^{a}	225.72±32^{b}	305.17±21^{a}	255.57±33^{b}	335.87±18^{a}	283.07±24^{b}
	Female	218.93±22.13^{a}	167.11±27^{b}	260.28±24^{a}	259.17±31^{b}	327.30±20^{a}	269.70±18^{b}
Wing wt (g)	Male	253.56±616^{a}	224.05±18.25^{b}	260.93±12^{a}	240.06±20^{b}	279.22±6.34^{a}	285.48±17^{b}
	Female	223.54±11^{a}	189.80±7.97^{b}	257.53 ± 21^{a}	209.33±1.52^{b}	280.38±6.32^{a}	251.68±14.12^{b}
Neck (%)	Male	22.91±0.05^{a}	20.84±0.36^{b}	22.10±0.53^{a}	20.04±0.41^{b}	23.90±0.58^{a}	20.41±0.28^{b}
	Female	19.50±0.34^{a}	19.98±0.34^{b}	20.08±0.54^{a}	18.43±0.45^{b}	22.77±1.07^{a}	18.91±0.50^{b}
Breast (%)	Male	25.65±1.53^{a}	24.73±1.26^{b}	27.52±1.12^{a}	25.88±0.98^{b}	33.37±1.63^{a}	26.38±1.48^{b}
	Female	23.16±1.69^{a}	23.93±1.35^{b}	24.75±1.12^{a}	25.57± 1.84^{b}	26.58±2.37^{a}	26.58±1.29^{b}
Back (%)	Male	22.90±1.65^{a}	20.84±1.12^{b}	23.10±1.13^{a}	21.04±1.62^{b}	24.90±0.32^{a}	23.41±1.86^{b}
	Female	19.50±1.34^{a}	18.98±1.53^{b}	20.08±1.52^{a}	19.43± 1.73^{b}	22.77±2.02^{a}	20.91±3.31^{b}
Thigh %	Male	16.32±1.11^{a}	16.66±4.32^{b}	16.70±1.12^{a}	14.11±0.89^{b}	16.53±0.43^{a}	13.76±3.23^{b}
	Female	18.96±0.90^{a}	18.69±1.10^{b}	15.11±0.23^{a}	16.14±0.89^{b}	13.77±0.44^{a}	14.76±0.23^{b}
Drumstick (%)	Male	16.32±1.03^{a}	16.66±0.90^{b}	16.53±0.34^{a}	16.16±0.23^{b}	14.81±0.46^{a}	16.11±1.10^{b}
	Female	18.60±1.14^{a}	16.30±0.91^{b}	17.32±0.24^{a}	18.18±0.13^{b}	19.12±0.12^{a}	15.95±1.01^{b}
Wing (%)	Male	15.63±2.79^{a}	16.70±0.35^{b}	14.70±0.73^{a}	14.41±0.55^{b}	13.55±2.29^{a}	13.92±0.51^{b}
	Female	14.11±1.30^{a}	12.85±2.12^{b}	12.15±0.55^{a}	11.09±0.35^{b}	11.77±1.82^{a}	10.31±0.35^{b}
Meat : Bone Ratio	Male	1.67±0.19^{a}	1.72±0.18^{b}	1.78±0.13^{a}	1.87±0.22^{b}	1.69±0.30^{a}	1.72±0.32^{b}
	Female	1.48±0.11^{a}	1.66±0.09^{b}	1.65±0.19^{a}	1.68±0.13^{b}	1.66±0.29^{a}	1.70±0.30^{b}

(Note: mean weight expressed as percentage of carcass weight), Mean±SE with different superscripts in each row for different parameters differ significantly ($p \leq 0.05$) within same age group within same sex

Thus on the basis of body weight, carcass characteristics, proximate composition of Vanaraja and Srinidhi chicken varieties, it may be concluded that genotypes significantly affects the qualities and body weight gain of chicken. However, Vanaraja and Srinidhi chicken varieties are equally good in growth and meat production and meat quality in terms of protein, fat and cholesterol.

Table 4: Proximate composition of Vanaraja and Srinidhi chicken

		Age					
		16 weeks		20 weeks		24 weeks	
Parameters	**Sex**	**Vanaraja**	**Srinidhi**	**Vanaraja**	**Srinidhi**	**Vanaraja**	**Srinidhi**
Moisture %	Male	75.07±1.21[a]	74.01±1.23[b]	72.23±1.32[a]	71.12±1.90[b]	71.01±1.90[a]	70.12±1.98[b]
	Female	74.69±1.89[a]	73.12±1.90[b]	72.13±1.54[a]	72.15±1.43[b]	71.00±1.52[a]	72.04±1.32[b]
Protein %	Male	20.87±0.12[a]	20.99±0.43[b]	21.36±0.31[a]	21.57±0.14[b]	23.65±0.09[a]	23.01±0.09[b]
	Female	21.34±0.14[a]	22.01±0.12[b]	22.03±0.21[a]	23.00±0.16[b]	22.75±0.12[a]	22.80±0.14[b]
Fat %	Male	3.78±0.09[a]	3.57±0.12[b]	3.68±0.11[a]	3.66±0.09[b]	4.06±0.08[a]	3.97±0.12[b]
	Female	2.94±0.11[a]	3.00±0.13[b]	3.78±0.09[a]	3.48±0.89[b]	3.38±1.00[a]	3.55±0.99[b]
Ash %	Male	1.01±0.09	1.03±0.16	1.12±0.08	1.09±0.11	1.14±0.12	1.19±0.90
	Female	1.04±0.13	1.05±0.19	1.08±0.09	1.11±0.09	1.17±0.14	1.20±0.09
Cholesterol %	Male	49.18±1.21[a]	42.18±1.90[b]	59.33±1.02[a]	58.87±1.08[b]	66.78±1.09[a]	70.60±1.00[b]
	Female	65.61±1.43[a]	50.55±1.98[b]	57.98±1.04[a]	50.85±1.09[b]	55.32±1.05[a]	65.44±1.09[b]

(Note: mean weight expressed as percentage of carcass weight), Mean±SE with different superscripts in each row for different parameters differ significantly ($p \leq 0.05$) within age group and within same sex

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