



ISSN (E): 2277- 7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2021; SP-10(11): 2772-2777  
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[www.thepharmajournal.com](http://www.thepharmajournal.com)

Received: 10-09-2021  
Accepted: 12-10-2021

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## Characterization of carcass traits in Indigenous and Punjab Broiler-2 chicken of Karnataka

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#### Abstract

The present investigation was carried out to characterize carcass traits in Indigenous and line Punjab Broiler 2 (PB2) birds. The Indigenous and synthetic colored broiler dam PB2 chicken groups, each consisting of two hundred birds, reared and maintained under standard management procedures at AICRP on Poultry Meat, Veterinary College, Bengaluru formed the experimental birds of this study and these birds were subjected for recording carcass traits. Carcass traits such as weights of carcass, wing, thigh, drumstick, neck, breast, back, abdominal fat, heart, liver and gizzard were recorded in both Indigenous and PB2 bird by sacrificing the birds at the age of 12<sup>th</sup> and 6<sup>th</sup> week, respectively. The carcass traits such as average weight (g) of carcass, wing, thigh, drumstick, neck, breast, back, abdominal fat, heart, liver and gizzard in Indigenous and PB2 birds were 633.07±9.73 and 867.50±10.49; 83.93±1.31 and 110.33±1.35; 87.86±1.81 and 130.68±1.93; 90.61±1.59 and 117.27±1.80; 52.07±1.19 and 66.80±1.38; 150.06±2.61 and 183.97±3.00; 115.73±1.87 and 145.07±2.81; 3.97±0.21 and 25.32±0.68; 4.52±0.13 and 8.82±0.30; 20.32±0.33 and 42.30±0.63 and 24.03±0.35 and 35.61±0.47, respectively. When these weights of different parts of carcass were expressed as percentage of live weights, the respective values in Indigenous and PB2 birds were 79.51±1.74 and 74.95±1.34; 10.56±0.24 and 9.49±0.13; 10.98±0.27 and 11.24±0.19; 11.40±0.29 and 10.01±0.14; 6.47±0.15 and 5.73±0.13; 18.86±0.43 and 15.84±0.28; 14.55±0.32 and 12.59±0.28; 0.49±0.03 and 2.19±0.06; 0.56±0.02 and 0.76±0.03; 2.75±0.07 and 3.66±0.07 and 3.07±0.10 and 3.09±0.06, respectively. Values of carcass traits as percentage of live weight were higher in PB2 than Indigenous birds for weights of thigh, abdominal fat, heart, liver and gizzard. Interestingly, dressing percentage, wing weight, drumstick weight, neck weight, breast weight and back weight were lower in PB2 than Indigenous birds. The genetic variabilities in the carcass traits of Indigenous and PB2 chicken of present investigation may be utilized for designing appropriate genetic improvement programs.

**Keywords:** chicken, indigenous, PB2, carcass, traits

#### Introduction

The contribution of Indian Poultry sector with 851.81 million birds (Anon., 2019) <sup>[1]</sup> to fulfill the want of ever growing human population for nutritional security through egg and meat production is admirable. The egg production is steadily increasing over the years and it was 103.32 billion which ensured the annual per-capita availability of 79 eggs (BAHS, 2019) <sup>[2]</sup>. To this total egg production, contribution of commercial poultry is 82.18 per cent with production of 84.90 billion eggs from 299.10 million layers and that of backyard poultry is 17.81 per cent with the production of 18.40 billion eggs from 142.47 million birds (BAHS, 2019) <sup>[2]</sup>. Similarly, meat production from poultry is 4.06 million tonnes which is about 50.06 per cent of country's total meat production (8.11 million tonnes). These production data evinces the poor productivity of Indigenous birds. Hence, there exists a scope for improvement of these chickens by recording and characterizing the economic traits.

Interestingly, contribution of Indigenous chickens in availability of poultry produces particularly in rural and tribal areas of the country is enormous, due to their adaptability to different agro-climatic conditions (Khan, 2008) <sup>[10]</sup>. For the poor farmers with minimal or no land holdings, major issues are subsidiary income, nutritional security through supplementation in the form of valuable animal protein and women empowerment (Shukla *et al.*, 2011) <sup>[17]</sup>. These Indigenous birds in backyard poultry farming are capable of contributing profoundly to alleviate malnutrition, poverty and unemployment. Hence, backyard poultry has the most potential to be a good source of subsidiary income for landless poor farmers. Egg and meat produced from these backyard poultry are always appreciated for their taste and texture, in both rural and organized markets.

This is evident in the 50 to 100 per cent higher price for unit weight of Indigenous/desi birds than that of commercially produced birds (Conroy *et al.*, 2005)<sup>[4]</sup>.

In spite of these advantages and potentialities in backyard poultry production of Indigenous and non-descript chicken, major limiting factors are low egg production and slower growth rates. This may be due to the lack of proper breeding plans for improving Indigenous birds for better and efficient production, and are limited to certain pockets only. Also, there exist a diversity among Indigenous chicken with respect to body weight, plumage pigmentation, plumage distribution, comb type, shank and skin color. Hence, the demand of farmers for improved varieties of Indigenous birds with multi-colored plumage, brown eggs for better acceptability, ability to grow fast and produce fairly good number of eggs, ability to evade predators, better disease resistance and ability thrive well in free range conditions with scavenging habits, which are suitable to family production system is increasing. Therefore, the Indigenous chickens are yet to be fully explored for better growth and carcass traits. Also, there is a need to characterize Indigenous chickens as they are gold mines of major genes for improvement of high yielding germplasm with tropical adaptability and disease resistance. Considering these aspects, the present study was carried out with the objective of characterizing carcass traits in Indigenous and Punjab Broiler 2 (PB2) chicken in Karnataka.

### Materials and Methods

The Indigenous and synthetic colored broiler dam line Punjab Broiler 2 (PB2) chicken groups, each consisting of two hundred birds, reared and maintained under standard management practices at All India Coordinated Research Project (AICRP) on Poultry Meat, Veterinary College, Bengaluru formed the experimental birds of this study and these birds were subjected for recording carcass traits.

Carcass traits such as weights of carcass, wing, thigh, drumstick, neck, breast, back, abdominal fat, heart, liver and gizzard were recorded in both Indigenous and PB2 bird by sacrificing the birds at the age of 12<sup>th</sup> and 6<sup>th</sup> week, respectively. The birds were fasted for 12 hours with free access to water and pre slaughter weights were recorded. Birds were slaughtered under hygienic conditions by Halal method. After slaughter, head was removed at the atlanto-occipital joint. Birds were immersed in a water bath for scalding at a temperature more than 60 °C for 1 to 2 minutes to facilitate the release of feathers, and defeathering was carried out manually immediately after the scalding process. The foot was removed at the tarso-metatarsal joint and cut was made on the vent using a sharp knife taking care not to cut the intestine, and viscera were removed to separate edible or giblets (heart, liver and gizzard) and inedible visceral organs (gastrointestinal tract and associated organs, reproductive tract and lungs). After evisceration, the weight of carcass along with kidney and kidney fat was recorded as hot carcass weight and weights of giblets (heart, liver and gizzard) were recorded. Sticking, scalding, defeathering and evisceration were performed as per the procedure described by Sams (2005)<sup>[15]</sup>. The carcass was cut into different primal cuts *viz.*, neck, breast, thigh, drumstick, wing, back and weight of each cut was recorded. Dressing percentage was calculated on the basis of pre slaughter weight. Descriptive statistical analysis of data on carcass traits recorded in Indigenous and PB2 birds was carried out in SPSS.16 software.

### Results and Discussion

The least square means with standard error for various carcass traits (weights in grams) in Indigenous and PB2 colored broiler chickens are presented in Table 1 and carcass traits (as per cent of live weight) in Indigenous and PB2 colored broiler chickens are presented in Table 2.

#### Carcass traits in Indigenous chicken

The carcass traits in Indigenous birds such as average weight (g) of carcass, wing, thigh, drumstick, neck, breast, back, abdominal fat, heart, liver and gizzard was 633.07±9.73, 83.93±1.31, 87.86±1.81, 90.61±1.59, 52.07±1.19, 150.06±2.61, 115.73±1.87, 3.97±0.21, 4.52±0.13, 20.32±0.33 and 24.03±0.35, respectively. When these weights of different parts of carcass were expressed as percentage of live weight, the respective values were 79.51±1.74, 10.56±0.24, 10.98±0.27, 11.40±0.29, 6.47±0.15, 18.86±0.43, 14.55±0.32, 0.49±0.03, 0.56±0.02, 2.75±0.07 and 3.07±0.10, respectively. Weights of various cuts of carcass as percentage of live weights were higher in Indigenous than PB2 birds for dressing percentage, wing weight, drumstick weight, neck weight, breast weight and back weight. Interestingly, the values of thigh weight, abdominal fat weight, heart weight, liver weight and gizzard weight were lower in Indigenous than PB2 birds.

The dressing percentage in Indigenous bird was 79.51±1.74 in the present investigation. Similarly, the average dressing percentage of 79.97±0.61, 81.81±0.52 and 82.19±0.58 was recorded respectively in the Indigenous chicken of Chamarajanagar, Mysore and Mandya districts (Gopinath, 2013)<sup>[7]</sup>. Also, the average dressing percentage recorded in the Indigenous chicken of Bangalore rural, Chikkaballapur and Ramanagara districts was 82.71±0.35, 83.65±0.49 and 81.55±1.20 with an average of 82.74±0.45 for Bangalore division (Rajakumar, 2013)<sup>[11]</sup>. The average dressing percentage reported was 70.82±0.28, 69.48±0.31, 71.75±1.02 and 70.69±0.20 in Indigenous chicken of Bidar, Gulbarga, Koppala districts and entire Gulbarga division, respectively (Sudhir, 2021)<sup>[18]</sup>. The average dressing percentage of 74.38±1.51 in Miri birds (Roy *et al.*, 2003)<sup>[14]</sup>, 65-74 in Miri chicken (Vijh *et al.*, 2005)<sup>[20]</sup>, 89.88 in Kadaknath (Sharma and Khedkar, 2005)<sup>[16]</sup>, 62.44 in Ankaleshwar (Tantia *et al.*, 2005)<sup>[19]</sup>, 68.13±0.31 in Indigenous chicken of northeastern states (Doley *et al.*, 2009)<sup>[6]</sup> and 78.90 in 16 weeks old Indigenous chicken of Uttar Pradesh (Yadav *et al.*, 2009)<sup>[21]</sup> were recorded previously. These discrepancies in the dressing percentage recorded by various studies as detailed above in comparison to the present investigation in Indigenous birds may be credited to the existence of genetic differences in the investigated birds, different geographical conditions and managerial practices.

The wing weight as percentage of live weight (%) in Indigenous chicken of the present study was 10.56±0.24. Likewise, the percent wing weight of 9.61±0.19, 9.23±0.33 and 10.57±0.72 was recorded in Indigenous chicken of Chamarajanagar, Mysore and Mandya districts, respectively (Gopinath, 2013)<sup>[7]</sup>. Also, the values of same trait recorded in Indigenous chicken of Bangalore rural, Chikkaballapur and Ramanagara districts was 11.63±0.43, 10.41±0.19 and 10.28±0.22 with an overall average of 10.77±0.19 for Bangalore division (Rajakumar, 2013)<sup>[11]</sup>. The per cent wing weight reported was 11.44±0.17, 10.78±0.18, 11.52±0.18 and 11.25 ±0.11 in Indigenous chicken of Bidar, Gulbarga, Koppala districts and entire Gulbarga division, respectively

(Sudhir, 2021) <sup>[18]</sup>. Similarly, the average wing weight as percentage of live weight recorded was 14.47 in Aseel kagar and 14.25 in Aseel peela (Mahapatra *et al.*, 1982) <sup>[13]</sup>, 14.81 in Mizoram chicken (Deepak, 1995) <sup>[5]</sup>, 14.64 in Thai native chicken (Jaturasitha *et al.*, 2002) <sup>[9]</sup>, 11.58±0.18 in Miri birds (Roy *et al.*, 2003) <sup>[14]</sup>, 11.6 in Miri chicken (Vijh *et al.*, 2005) <sup>[20]</sup>, 9.54 in Ankaleshwar birds (Tantia *et al.*, 2005) <sup>[19]</sup> and 9.78±0.20 in Indigenous chicken of Kashmir (Iqbal *et al.*, 2009) <sup>[8]</sup>. These variations in the wings weight recorded by earlier studies as detailed above in comparison to the present investigation in Indigenous birds may be ascribed to the genetic differences in the birds employed, diverse environmental conditions and managerial practices.

The average thigh weight as percentage of live weight (%) in Indigenous chicken of the present study was 10.98±0.27. In the same way, thigh weight as percentage of live weight reported in Indigenous chicken of Chamarajanagar, Mysore and Mandya districts was 10.22±0.29, 11.44±0.29 and 11.43±0.21, respectively (Gopinath, 2013) <sup>[7]</sup>. The same values in the Indigenous chicken of Bangalore Rural, Chikkaballapur and Ramanagara districts was 11.71±0.23, 11.55±0.19 and 11.43±0.27, respectively, with an overall mean of 11.58±0.13 for Bangalore division (Rajakumar, 2013) <sup>[11]</sup>. The per cent thigh weight reported was 12.81±0.21, 11.02±0.17, 13.01±0.16 and 12.28 ±0.15 in Indigenous chicken of Bidar, Gulbarga, Koppala districts and entire Gulbarga division, respectively (Sudhir, 2021) <sup>[18]</sup>. Similarly, the average thigh weight as percentage of live weight recorded respectively in Aseel kagar (Mahapatra *et al.*, 1982) <sup>[13]</sup>, Aseel peela (Mahapatra *et al.*, 1982) <sup>[13]</sup>, native chicken of Mizoram (Deepak, 1995) <sup>[5]</sup>, Thai native chicken (Jaturasitha *et al.*, 2002) <sup>[9]</sup>, Miri Indigenous chicken (Roy *et al.*, 2003) <sup>[14]</sup>, in Miri chicken (Vijh *et al.*, 2005) <sup>[20]</sup>, Ankaleshwar (Tantia *et al.*, 2005) <sup>[19]</sup> and in Indigenous chicken of Kashmir (Iqbal *et al.*, 2009) <sup>[8]</sup> was 15.57, 16.36, 16.62, 16.04, 16.02±0.32, 16.0, 16.31 and 19.96±0.22, respectively. These variations in the thighs weight reported in different investigations as detailed above in Indigenous birds may be attributed to the differences in genetic makeup of the birds studied, varied geographical conditions and managerial activities.

In the present investigation, average drumstick weight as percentage of live weight (%) in Indigenous chicken was 11.40±0.29. Similarly, drumstick weight as percentage of live weight recorded was 10.22±0.29, 11.44±0.29 and 11.43±0.21 in Indigenous chicken of Chamarajanagar, Mysore and Mandya districts, respectively (Gopinath, 2013) <sup>[7]</sup>. Likewise, the drumstick weight recorded in Indigenous chicken of Bangalore Rural, Chikkaballapur and Ramanagara districts was 11.04±0.24, 11.66±0.29 and 10.88±0.28, respectively, with an overall average of 11.19±0.16 for Bangalore division (Rajakumar, 2013) <sup>[11]</sup>. The per cent drumstick weight was 12.33±0.11, 11.24±0.14 and 13.51±0.51 in Indigenous chicken of Bidar, Gulbarga and Koppala districts, respectively (Sudhir, 2021) <sup>[18]</sup>. In a same way, the drumstick weight as percentage of live weight recorded was 14.54 in Aseel kagar and 15.45 in Aseel peela (Mahapatra *et al.*, 1982) <sup>[13]</sup>, 15.06 in Mizoram chicken (Deepak, 1995) <sup>[5]</sup>, 16.33 in Thai native chicken (Jaturasitha *et al.*, 2002) <sup>[9]</sup>, 14.87±0.32 in Miri Indigenous chicken (Roy *et al.*, 2003) <sup>[14]</sup>, 16.0 in Miri (Vijh *et al.*, 2005) <sup>[20]</sup>, 16.59 in Ankaleshwar (Tantia *et al.*, 2005) <sup>[19]</sup> and 14.53±0.14 in Indigenous chicken of Kashmir (Iqbal *et al.*, 2009) <sup>[8]</sup>. These discrepancies in the drumstick weight reported by different studies as detailed above on the Indigenous birds may be ascribed to genetic differences in the

birds studied, varied environmental conditions and managerial practices.

The neck weight as percentage of live weight (%) in Indigenous chicken in the present study was 6.47±0.15. Likewise, Gopinath (2013) <sup>[7]</sup> has recorded the neck weight of 5.11±0.12, 5.62±0.13 and 5.22±0.17 in Indigenous chicken of Chamarajanagar, Mysore and Mandya districts, respectively. Also, Rajakumar (2013) <sup>[11]</sup> has reported the neck weight of 5.33±0.04, 5.26±0.10 and 5.60±0.18 respectively in Indigenous chicken of Bangalore rural, Chikkaballapur and Ramanagara districts with an overall mean of 5.39±0.07 for Bangalore division. The per cent neck weight was 6.58±0.20, 5.62±0.15, 6.94±0.20 and 6.38±0.13 in Indigenous chicken of Bidar, Gulbarga, Koppala districts and entire Gulbarga division, respectively (Sudhir, 2021) <sup>[18]</sup>. In a same way, the neck weight of 7.11, 7.02, 6.67, 16.33, 6.43±0.14, 6.4, 6.69 and 9.78±0.20 was reported respectively in Aseel kagar (Mahapatra *et al.*, 1982) <sup>[13]</sup>, Aseel peela (Mahapatra *et al.*, 1982) <sup>[13]</sup>, Mizoram chicken (Deepak, 1995) <sup>[5]</sup>, Thai native chicken (Jaturasitha *et al.*, 2002) <sup>[9]</sup>, Miri Indigenous chicken (Roy *et al.*, 2003) <sup>[14]</sup>, Miri (Vijh *et al.*, 2005) <sup>[20]</sup>, Ankaleshwar (Tantia *et al.*, 2005) <sup>[19]</sup> and Indigenous chicken of Kashmir (Iqbal *et al.*, 2009) <sup>[8]</sup>. These differences in the average neck weight reported by different studies as detailed above in Indigenous birds compared to that of present study may be attributed to the differences in genetic makeup of birds investigated, different geographical conditions and managerial practices.

In the present study, breast weight as percentage of live weight (%) recorded in Indigenous chicken was 18.86±0.43. Likewise, the average breast weight of 15.75±0.38, 14.88±0.53 and 15.97±0.45 was reported in Indigenous chicken of Chamarajanagar, Mysore and Mandya districts, respectively (Gopinath, 2013) <sup>[7]</sup>. In a same way, the breast weight of 15.78±0.52, 16.45±0.47, 15.41±0.39 and 15.88±0.27 was recorded in the Indigenous chicken of Bangalore rural district, Chikkaballapur district, Ramanagara district and entire Bangalore division, respectively (Rajakumar, 2013) <sup>[11]</sup>. The per cent breast weight reported was 15.14±0.65, 15.25±0.21, 16.77±0.31 and 15.72±0.26 in Indigenous chicken of Bidar, Gulbarga, Koppala districts and entire Gulbarga division, respectively (Sudhir, 2021) <sup>[18]</sup>. Also, the value of same trait reported respectively in Aseel kagar (Mahapatra *et al.*, 1982) <sup>[13]</sup>, Aseel peela (Mahapatra *et al.*, 1982) <sup>[13]</sup>, Mizoram chicken (Deepak, 1995) <sup>[5]</sup>, Miri Indigenous chicken (Roy *et al.*, 2003) <sup>[14]</sup>, Miri (Vijh *et al.*, 2005) <sup>[20]</sup>, Ankaleshwar (Tantia *et al.*, 2005) <sup>[19]</sup> and in Indigenous chicken of Kashmir (Iqbal *et al.*, 2009) <sup>[8]</sup> was 23.24, 21.37, 24.33, 21.50±0.27, 21.5, 22.76 and 28.68±0.40. These discrepancies in the average breast weight recorded by various researches as detailed above on the Indigenous birds compared to that of present study may be attributed to the variation in genome of birds investigated, diverse environmental conditions and managerial practices.

The back weight as percentage of live weight (%) in Indigenous chicken reported in the present study was 14.55±0.32. In a same way, back weight recorded in the Indigenous chicken of Chamarajanagar, Mysore and Mandya districts was 15.55±0.22, 15.74±0.21 and 16.56±0.73, respectively (Gopinath, 2013) <sup>[7]</sup>. Also, the value of back weight reported in the Indigenous chicken of Bangalore rural, Chikkaballapur and Ramanagara districts was 15.94±0.31, 15.64±0.22 and 15.70±0.37, respectively and an overall average of 15.76±0.17 for entire Bangalore division

(Rajakumar, 2013) [11]. The per cent back weight was  $16.18 \pm 0.18$ ,  $15.16 \pm 0.17$ ,  $16.80 \pm 0.22$  and  $16.05 \pm 0.14$  in Indigenous chicken of Bidar, Gulbarga, Koppala districts and entire Gulbarga division, respectively (Sudhir, 2021) [18]. Similarly, the back weight of  $22.17$ ,  $24.24$ ,  $22.51$ ,  $21.03 \pm 0.27$ ,  $21$ ,  $20.94$  and  $17.44 \pm 0.26$  was reported in Aseel kagar (Mahapatra *et al.*, 1982) [13], Aseel peela (Mahapatra *et al.*, 1982) [13], Mizoram chicken (Sharma, 1995) [5], Miri Indigenous chicken (Roy *et al.*, 2003) [14], Miri (Vijh *et al.*, 2005) [20], Ankaleshwar (Tantia *et al.*, 2005) [19] and in Indigenous chicken of Kashmir (Iqbal *et al.*, 2009) [8], respectively. These differences in the breast weight reported in various studies as detailed above on Indigenous birds compared to that of present study may be attributed to the distinction in genetic makeup of birds analyzed, varied geographical conditions and managerial practices.

The weight of abdominal fat as percentage of live weight (%) recorded in the present investigation on Indigenous chicken was  $0.49 \pm 0.03$ . This value could not be compared due to the lack of previous investigation on weight of abdominal fat in Indigenous chickens.

In the present study, the heart weight as percentage of live weight (%) in Indigenous chicken was  $0.56 \pm 0.02$ . Similarly, heart weight reported in the Indigenous chicken of Chamarajanagar, Mysore and Mandya districts was  $0.41 \pm 0.06$ ,  $0.39 \pm 0.08$  and  $0.27 \pm 0.11$ , respectively (Gopinath, 2013) [7]. Likewise, the heart weight of  $0.46 \pm 0.06$ ,  $0.43 \pm 0.02$  and  $0.43 \pm 0.02$  was recorded respectively in Indigenous chicken of Bangalore Rural, Chikkaballapur and Ramanagara districts with an overall mean of  $0.44 \pm 0.02$  for Bangalore division (Rajakumar, 2013) [11]. The per cent heart weight was  $0.43 \pm 0.01$ ,  $0.42 \pm 0.01$ ,  $0.41 \pm 0.01$  and  $0.42 \pm 0.00$  in Indigenous chicken of Bidar, Gulbarga, Koppala districts and entire Gulbarga division, respectively (Sudhir, 2021) [18]. In a same way, value of the same trait in Thai native chicken (Jaturasitha *et al.*, 2002) [9], Miri Indigenous chicken (Roy *et al.*, 2003) [14], Kadaknath (Sharma and Khedkar, 2005) [16], Miri (Vijh *et al.*, 2005) [20], Ankaleshwar (Tantia *et al.*, 2005) [19] and in Nicobari (Chatterjee and Yadav, 2008) [3] was  $0.44$ ,  $0.70$ ,  $0.31$ ,  $0.70$ ,  $1.12$  and  $0.43$  to  $0.52$ , respectively. These discrepancies in the average heart weight reported in different investigations as detailed above on Indigenous birds compared to that of present study may be ascribed to the dissimilarities in genetic makeup of birds analyzed, diverse environmental conditions and managerial practices.

The liver weight as percentage of live weight (%) recorded in the present investigation on Indigenous chicken was  $2.57 \pm 0.07$ . The values of the same trait in Indigenous chicken of Chamarajanagar, Mysore and Mandya districts was  $1.97 \pm 0.04$ ,  $1.97 \pm 0.16$  and  $1.76 \pm 0.06$ , respectively (Gopinath, 2013) [7] and in Indigenous chicken of Bangalore Rural, Chikkaballapur, Ramanagara and entire Bangalore division was  $1.90 \pm 0.08$ ,  $2.20 \pm 0.14$ ,  $2.04 \pm 0.05$  and  $2.04 \pm 0.06$ , respectively (Rajakumar, 2013) [11]. The per cent heart weight was  $1.75 \pm 0.02$ ,  $1.96 \pm 0.04$ ,  $1.82 \pm 0.03$  and  $1.84 \pm 0.02$  in Indigenous chicken of Bidar, Gulbarga, Koppala districts and entire Gulbarga division, respectively (Sudhir, 2021) [18]. Similarly, the liver weight of  $2.17$ ,  $2.94$ ,  $2.9$ ,  $1.77$ ,  $2.91$  and  $1.71$  to  $1.75$  was recorded in Thai native chicken (Jaturasitha *et al.*, 2002) [9], Miri Indigenous chicken (Roy *et al.*, 2003) [14], Kadaknath (Sharma and Khedkar, 2005) [16], Miri (Vijh *et al.*, 2005) [20], Ankaleshwar (Tantia *et al.*, 2005) [19], and in Nicobari chicken (Chatterjee and Yadav, 2008) [3], respectively. These differences in the average liver weight

recorded in various studies as detailed above on Indigenous birds compared to that of present study may be attributed to the distinctness of birds analyzed for their genetic makeup, varied geographical conditions and managerial practices.

In the present investigation, the gizzard weight as percentage of live weight (%) in Indigenous chicken was  $3.07 \pm 0.10$ . The weight of gizzard recorded in Indigenous chicken of Chamarajanagar, Mysore and Mandya districts was  $2.92 \pm 0.10$ ,  $2.93 \pm 0.24$  and  $2.28 \pm 0.24$ , respectively (Gopinath, 2013) [7] and in Indigenous chicken of Bangalore Rural, Chikkaballapur, Ramanagara and entire Bangalore division was  $2.74 \pm 0.14$ ,  $2.57 \pm 0.16$ ,  $2.68 \pm 0.11$  and  $2.66 \pm 0.08$ , respectively (Rajakumar, 2013) [11]. The per cent gizzard weight reported was  $2.64 \pm 0.11$ ,  $2.79 \pm 0.07$ ,  $2.93 \pm 0.04$  and  $2.79 \pm 0.04$  in Indigenous chicken of Bidar, Gulbarga, Koppala districts and entire Gulbarga division, respectively (Sudhir, 2021) [18]. Similarly, the gizzard weight recorded in Miri Indigenous chicken (Roy *et al.*, 2003) [14], Miri (Vijh *et al.*, 2005) [20], Kadaknath (Sharma and Khedkar, 2005) [16], Ankaleshwar (Tantia *et al.*, 2005) [19] and Nicobari (Chatterjee and Yadav, 2008) [3] was  $4.93$ ,  $4.9$ ,  $1.61$ ,  $3.14$  and  $1.58$  to  $1.75$ , respectively. These differences in gizzard weight reported in a range of studies as detailed above on Indigenous birds compared to that of present study may be ascribed to distinctness of birds analyzed for their genetic makeup, different environmental conditions and managerial practices.

#### Carcass traits in PB2 chicken

The average weight of carcass, wing, thigh, drumstick, neck, breast, back, abdominal fat, heart, liver and gizzard in PB2 birds was  $867.50 \pm 10.49$ ,  $110.33 \pm 1.35$ ,  $130.68 \pm 1.93$ ,  $117.27 \pm 1.80$ ,  $66.80 \pm 1.38$ ,  $183.97 \pm 3.00$ ,  $145.07 \pm 2.81$ ,  $25.32 \pm 0.68$ ,  $8.82 \pm 0.30$ ,  $42.30 \pm 0.63$  and  $35.61 \pm 0.47$ , respectively. When these weights were expressed as percentage of live weights, the respective values were  $74.95 \pm 1.34$ ,  $9.49 \pm 0.13$ ,  $11.24 \pm 0.19$ ,  $10.01 \pm 0.14$ ,  $5.73 \pm 0.13$ ,  $15.84 \pm 0.28$ ,  $12.59 \pm 0.28$ ,  $2.19 \pm 0.06$ ,  $0.76 \pm 0.03$ ,  $3.66 \pm 0.07$  and  $3.09 \pm 0.06$ . Values of carcass traits as percentage of live weight were higher in PB2 than Indigenous birds for thigh weight, abdominal fat weight, heart weight, liver weight and gizzard weight. Interestingly, the values of dressing percentage, wings weight, drumstick weight, neck weight, breast weight and back weight were lower in PB2 than Indigenous birds.

In a same way, Rajkumar *et al.* (2011) [12] has recorded the weights of breast, back, legs, wing, giblet and abdominal fat as percentage of live weight in crosses of Punjab Broiler-2 (PB-2) chicken with different colored broiler chicken strains viz., Necked neck (NN), Dwarf (D) and Punjab Broiler (PB-1). The average breast weight of  $16.26$ ,  $20.36$ ,  $19.76$ ,  $19.48$ ,  $18.75$ ,  $19.83$  and  $19.27$ , respectively, was recorded in Necked Neck x PB-2 (NB<sub>2</sub>), Dwarf x PB-2 (DB<sub>2</sub>), PB-1 x PB-2 (B<sub>1</sub>B<sub>2</sub>), PB-2 x Necked Neck (B<sub>2</sub>N), PB-2 x Dwarf (B<sub>2</sub>D), PB-2 x PB-1 (B<sub>2</sub>B<sub>1</sub>) and PB-2 x PB-2 (B<sub>2</sub>B<sub>2</sub>) crosses. Similarly, The average back weight (which include both back and neck) recorded respectively in NB<sub>2</sub>, DB<sub>2</sub>, B<sub>1</sub>B<sub>2</sub>, B<sub>2</sub>N, B<sub>2</sub>D, B<sub>2</sub>B<sub>1</sub> and B<sub>2</sub>B<sub>2</sub> crosses was  $19.91$ ,  $23.88$ ,  $24.51$ ,  $23.22$ ,  $20.68$ ,  $23.11$  and  $22.57$ . Likewise, the average leg weight (which include both thigh and drumstick) reported respectively in NB<sub>2</sub>, DB<sub>2</sub>, B<sub>1</sub>B<sub>2</sub>, B<sub>2</sub>N, B<sub>2</sub>D, B<sub>2</sub>B<sub>1</sub> and B<sub>2</sub>B<sub>2</sub> crosses was  $19.22$ ,  $24.37$ ,  $24.98$ ,  $23.64$ ,  $23.31$ ,  $22.52$  and  $23.21$ , respectively. The average wing weight of  $8.55$ ,  $10.09$ ,  $10.45$ ,  $10.22$ ,  $9.77$ ,  $9.63$  and  $9.74$  was recorded in NB<sub>2</sub>, DB<sub>2</sub>,

B<sub>1</sub>B<sub>2</sub>, B<sub>2</sub>N, B<sub>2</sub>D, B<sub>2</sub>B<sub>1</sub> and B<sub>2</sub>B<sub>2</sub>, crosses, respectively. In a same way, average weight of abdominal fat was 1.55, 2.03, 2.11, 1.46, 1.32, 1.19 and 1.80 respectively in NB<sub>2</sub>, DB<sub>2</sub>, B<sub>1</sub>B<sub>2</sub>, B<sub>2</sub>N, B<sub>2</sub>D, B<sub>2</sub>B<sub>1</sub>, and B<sub>2</sub>B<sub>2</sub> crosses. These varied average weights of all the studied carcass traits as detailed

above in PB2 birds compared to that of present study may be attributed to the genetic uniqueness of birds analyzed, diverse geographical/environmental conditions and managerial practices.

**Table 1:** Least square means with standard error for various carcass traits (weights in grams) in Indigenous and PB2 colored broiler chickens

Traits	Indigenous (200)	PB2 (200)	Overall (400)
Carcass weight	633.07±9.73	867.50±10.49	750.28±9.24
Wing weight	83.93±1.31	110.33±1.35	97.13±1.15
Thigh weight	87.86±1.81	130.68±1.93	109.27±1.70
Drumstick weight	90.61±1.59	117.27±1.80	103.94±1.37
Neck weight	52.07±1.19	66.80±1.38	59.44±0.98
Breast weight	150.06±2.61	183.97±3.00	167.01±2.16
Back weight	115.73±1.87	145.07±2.81	130.40±1.84
Abdominal fat weight	3.97±0.21	25.32±0.68	14.64±0.64
Heart weight	4.52±0.13	8.82±0.30	6.67±0.20
Liver weight	20.32±0.33	42.30±0.63	31.31±0.66
Gizzard weight	24.03±0.35	35.61±0.47	29.82±0.41

Values in parenthesis are number of observations in each group.

**Table 2:** Least square means with standard error for various carcass traits (as per cent of live weight) in Indigenous and PB2 colored broiler chickens

Traits	Indigenous (200)	PB2 (200)	Overall (400)
Dressing percentage	79.51±1.74	74.95±1.34	77.23±1.10
Wing weight	10.56±0.24	9.49±0.13	10.02±0.14
Thigh weight	10.98±0.27	11.24±0.19	11.11±0.16
Drumstick weight	11.40±0.29	10.01±0.14	10.71±0.17
Neck weight	6.47±0.15	5.73±0.13	6.10±0.10
Breast weight	18.86±0.43	15.84±0.28	17.35±0.27
Back weight	14.55±0.32	12.59±0.28	13.57±0.22
Abdominal fat weight	0.49±0.03	2.19±0.06	1.34±0.05
Heart weight	0.56±0.02	0.76±0.03	0.66±0.02
Liver weight	2.57±0.07	3.66±0.07	3.12±0.05
Gizzard weight	3.07±0.10	3.09±0.06	3.08±0.06

Values in parenthesis are number of observations in each group.

## Conclusion

Carcass traits were characterized in both Indigenous and PB2 chickens. The PB2 birds had higher values for weights of thigh, abdominal fat, heart, liver and gizzard than Indigenous birds. Interestingly, Indigenous birds had higher values for dressing percentage, wing weight, drumstick weight, neck weight, breast weight and back weight than PB2 birds. The disparities in the carcass traits of Indigenous and PB2 chicken of present investigation may be exploited for designing appropriate genetic improvement programs. However, prior to that the results of the present investigation must be validated in a larger population.

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