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Comparison of meat quality attributes of improved native chicken varieties Vanaraja and Indbro with Commercial broiler chicken

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ABSTRACT

There is great demand for native chicken meat due to its unique strong flavour, firm and hard texture and lower fat content and fetches almost thrice the price of broiler meat. During the last few years, improved native chicken varieties are being introduced to meet the demand and the market share is steadily increasing. The present study was conducted to compare the carcass characteristics and meat quality attributes of improved native chicken varieties viz., Vanaraja (dual purpose chicken) and Indbro (slow growing coloured broiler) with Commercial broilers. In this study, total of 30 birds, comprising 10 birds each from Vanaraja (56 days old), Indbro (49 days old), and Commercial broilers (38 days old) at their respective marketable age were selected for evaluation. Analysis of carcass traits revealed significantly ($P<0.05$) higher live wt, dressed carcass wt, and breast yield (% of live wt) for Commercial broilers compared to Indbro and Vanaraja birds, whereas the yield of legs, wings, and neck (% of live wt) were higher for Vanaraja birds compared to other groups of birds. The results of meat quality parameters like proximate composition revealed significantly ($P<0.05$) higher % of moisture, protein, and ash for meat of Vanaraja birds compared to other groups, whereas fat % was significantly ($P<0.05$) higher in Commercial broilers. Significantly ($P<0.05$) higher redness (a^*) values, lower lightness (L^*) values, higher muscle fibre diameter and hydroxyproline content was noticed in Vanaraja birds compared to other groups. Commercial broiler chicken meat showed significantly ($P<0.05$) higher pH, TBARS and water holding capacity (%) values compared to other groups. Sensory evaluation scores for cooked breast meat samples revealed comparatively higher appearance, flavour, juiciness, texture, and overall acceptability scores for Vanaraja and Indbro birds than Commercial broilers. Shear force values were significantly ($P<0.05$) higher for Vanaraja followed by Indbro and then Commercial broilers. Microbial analysis indicated lower total plate count (TPC), yeast and mould and psychrotrophic counts for Commercial broilers. The results of study indicated that though the Commercial broilers have better carcass traits compared to Vanaraja and Indbro birds, these improved native chicken varieties have better meat quality attributes and have potential to form a significant source of chicken with better sensory attributes.

INTRODUCTION

Over the years, broiler chicken has become the major source of affordable and readily digestible high quality protein rich white meat and immensely contributes to the food and nutrition security of Indian population. Consumer demand for chicken as a primary source of animal protein has led to the growth of the poultry industry around the world. In the last decades, advances in genetics and breeding, improved nutrition and managemental practices have made modern broilers grow at a faster rate and birds now reach market weight (2Kg) as early as 5 to 6 weeks of age. However, studies reported that intensive selection for muscle growth in fast growing broilers led to increased muscle abnormalities like woody breast and white striping having undesirable sensory attributes (Petracci *et al.,* 2013 and Soglia *et al.,* 2016). In woody breast condition, chicken breast meat is very hard to touch and often pale in colour with poor quality texture (Kuttappan *et al.,* 2016).

The requirements for meat with guaranteed sensory attributes especially firm texture and juiciness, led to the development of improved native chicken varieties like Vanaraja, Giriraja, Gramapriya, Kalinga brown, Krishi bro, etc. by various organizations/agencies. These birds resemble to indigenous desi birds in their physical characteristics, hardness and colourful plumage. However, with higher genetic potential, they perform better than indigenous poultry in attaining higher body weight under low input systems. The market for improved native chicken varieties is steadily increasing, new strains of birds are being introduced to meet the demand and as an alternative to commercial fast growing broilers. However, there is little information available on the quality attributes of improved native chicken. Hence, the major objective of this study was to compare the diversity and quality of meat of improved native chicken varieties viz., Vanaraja (dual purpose chicken), Indbro (slow growing coloured broiler chicken) and Commercial fast growing broilers.

MATERIALS AND METHODS

Procurement and slaughter, dressing of birds

Vanaraja (56 days), Indbro (49 days) and Commercial fast growing broiler (38 days) birds were procured at their respective market age from Directorate of Poultry Research, Private Farm and retail markets, respectively. Before slaughter, birds were adequately rested, and ante-mortem examination was carried out. After taking the live weight of individual bird, hygienic slaughtering and dressing of poultry were carried out at primary poultry processing plant of ICAR-NRCM. Exsanguination was done by manual severing of carotid arteries. After scalding (55 to 58°C for 90 seconds), the carcasses were defeathered and eviscerated and the meat inspection was conducted.

Calculation of dressed carcass weight and yield of major cut-up parts

Dressed carcass weight was recorded after dressing of carcass. The carcass was then cut into major cut-up parts and weight of each cut-up part was recorded and expressed in percentage of live weight.

Sampling for meat quality evaluation

After recording the weight of major retail cut up-parts of dressed birds, sampling for meat quality studies was carried out. Breast and thigh portions were used for determining different parameters like pH, TBARS, water holding capacity, shear force value, muscle fibre diameter, proximate composition, hydroxyproline, instrumental color, microbial quality and sensory evaluation.

Proximate analysis

Moisture, protein, fat and total ash content of meat sample were determined according to AOAC (2005). The moisture content was determined by weight loss after 12 hours of drying at 100^0C in a hot air oven (Memmert type, VTS Equipments). Protein was determined by block digestion using an auto analyser (Kel Plus, Model KES6L, Pelican Equipments, Chennai) and the fat content was estimated by an ether extraction procedure in an automatic Soxlet Apparatus (Sox Plus, Model SCS6, Pelican Equipments, Chennai). Total ash was estimated by keeping the weighed sample in muffle furnace at 600^0C per 24 hrs.

Instrumental color

The color measurement (Hunter L^*, a^* and b^*) was performed using a X-Rite RM200QC Imaging Spectrocolorimeter (Lovibond, China) with a 8 mm aperture set for illumination D 65, 10° standard observer angle. Color measurement was done on the surface of meat from the randomly chosen spots (Hunter and Harold, 1987). The values obtained for L^*(lightness), a^*(redness) and b^*(yellowness) were recorded.

Muscle fibre diameter

Meat samples (approximately 1x 2 cm size) were fixed in 10% formal saline for 48 h, sliced and then homogenized with Ultra Turrax Tissue Homogenizer (IKA digital Ultra-Turrax, Model T- 25, Germany) at a low speed for 30s. Few drops of homogenized tissue samples were poured onto a clean glass slide, and a cover slip was placed and observed through a simple microscope at x100 magnification. The width of 15 randomly selected fibres per bird was recorded using ocular micrometer (Tuma *et al.,* 1962).

Hydroxyproline content

Hydroxyproline content was estimated by taking six grams of meat sample which was cut into small pieces and kept in 20ml of water in a 50ml glass beaker before being heat treated for 2 h in a water bath at 90^0C. The pieces were cooled to room temperature and homogenized in a tissue homogenizer (IKA Digital Ultra-Turrax, Model T- 25, Germany) for one minute at 10000 rpm, which was flushed with 10ml distilled water. The homogenate was filtered through Whatman No. 1 filter paper, and 30ml of 6N HCL was added to the filtrate, whereas 50ml of 6N HCL was added to the residue. Both were then hydrolyzed overnight in an oven at 105^0C, and the concentration of hydroxyproline (HP) was determined (Newman and Lohan 1950).

pH

The pH of meat sample was estimated following the method of Trout *et al.* (1992). Five grams of sample was blended with 45 ml of distilled water using Ultra Turrax Tissue Homogenizer (IKA Digital ULTRA-TURRAX, Model T- 25, Germany) for one minute. The pH was recorded by immersing the glass electrode of digital pH meter (Eutech Instrument, Cyberscan, Singapore Model) into the homogenate. The pH of the sample was measured with the pH meter, which was calibrated with buffer solutions of pH 4, 7 and 14 as per user manual instructions to avoid errors.

Thiobarbituric Acid Reactive Substances (TBARS)

Lipid oxidation in terms of thiobarbituric acid reactive substances (TBARS) value of chicken meat sample was estimated as per the procedure outlined by Strange *et al.* (1977) with slight modification. Four gram of meat sample was blended for 3 min with 20 ml of 20% trichloroacetic acid. The blended sample was kept for centrifugation at 5000 rpm for 15 minutes. The supernatant content was filtered through Whatman No.1 filter paper (18.5 cm diameter) and the filtrate was collected. The filtrate termed TCA extract was used in the estimation of thiobarbituric acid number (TBA).

The test solution was prepared by mixing 3 ml of 0.1% thiobarbituric acid to the 3 ml of TCA filtrate. After mixing the contents, tubes were kept in a boiling water bath (100˚C) for 30 min along with blank. Blank was prepared by mixing 5 ml of 20% trichloroacetic acid with an equal amount of 0.1% thiobarbituric acid reagent and was run simultaneously to check the experimental error. After cooling the tubes, optical density (O.D) was measured in a UV- VIS spectrophotometer (SHIMADZU, UV-1700, Japan) at 532 nm. TBARS was calculated as mg malonaldehyde per kg of sample.

Water Holding Capacity (WHC)

The water holding capacity (WHC) of meat was estimated according to the method described by Wardlaw *et al.* (1973). Ten grams of minced meat sample was stirred with 15ml of 0.6M sodium chloride (NaCl) in a centrifuge tube. The tube was then kept at 4±1˚C for 15 minutes, the sample stirred again and centrifuged at 5000 rpm for 25 minutes. The supernatant was measured and the difference between initial volume (15ml NaCl) and the supernatant was expressed in percentage of meat weight to calculate WHC.

Shear force value (SFV)

For estimating the Warner Bratzler shear force value, the meat sample was first packed in low density polyethylene bags and sealed properly so as to avoid entry of water and then the packed sample was cooked in water bath for 20 minutes at 80˚C. After cooking, the meat samples were made into cores and the cores from each sample were sheared across the length of the meat sample. These sample cores were placed under the V- notched shear blade of the Texture analyzer (Tinius Olsen, HIKF, United Kingdom). Cores were sheared perpendicular to the fibre orientation to measure the shear force. The peak shear force was recorded in newtons (N) and the average value from the three cores was recorded.

Microbial analysis

The microbial quality of products was evaluated by estimating the total plate count (TPC), psychrotrophic bacterial count (PBC), and yeast and mould counts (YMC) following the spread plating technique as per the procedure of ICMSF (1980).

Preparation of serial dilutions: For microbiological analysis, 5g of representative meat sample was homogenized with 45ml of 0.1 % sterile peptone water in a laboratory blender, and tenfold serial dilutions were made from each sample by using 0.1% peptone water as diluent.

Total plate count: About 20 ml of sterilized plate count agar (Himedia, Mumbai) at 44-46°C was poured into petri plates gently and then rotated well for even distribution of the agar without air bubbles and plates were allowed for some time to solidification of agar. The plates were then incubated in inverted positions at 37°C for 24 hrs for checking the sterility of the prepared plates. Before inoculation of the sample, the agar plates are again incubated in inverted positions at 37°C for 24 hrs for sterility check. These sterile petri plates were inoculated aseptically with 0.1ml sample from appropriate dilution in duplicates by the spread plate method using the sterilized L spreader. The plates were then incubated in inverted positions at 37°C for 24 hrs. Plates having 40 - 300 colonies were selected and the colonies were counted. The results were expressed as log units per gram of the sample.

Yeast and mould count: The yeast and mould counts were determined by spread plate method using potato dextrose agar (Himedia, Mumbai). Sterile agar plates were inoculated with diluted sample (0.1ml) using sterilized L spreader and were incubated at 23-25^{0}C for 5 days. Colonies were counted and expressed as log units per gram of the sample.

Psychrotrophic Count: Psychrotrophic counts were obtained by incubating the plates through spread plate method using plate count agar. Plates inoculated with the diluted sample (0.1ml), using sterilized L spreader were incubated for 7-10 days at 7±1^{o}C. The colonies were counted and results were expressed as log units per gram of the sample.

Sensory Evaluation

The sensory attributes such as appearance, flavor, texture, juiciness and overall acceptability of the meat samples were evaluated using an 8 point descriptive scale (Keeton 1983). In the 8 point scale, 8 corresponded to 'components characteristic of the highest quality', scores from 5 to 8 were considered acceptable and scores from 1 to 5 were considered unacceptable. The panel consisted of minimum of 6 trained and experienced members of the institute, who were familiar with the characteristics of the meat. The fresh meat samples were cooked in water bath for 20 minutes at 80°C by adding salt (0.5% by weight of sample). After cooking, the cooked samples were cut into small equal sized pieces (square shape). These coded samples are then served at room temperature in separate sensory evaluation booths. Water was served for cleansing the mouth between samples analysis.

Statistical analysis

The data obtained for carcass traits and different meat quality parameters were compiled and analyzed using SPSS (version 13 for Windows, SPSS, Chicago, USA). The data were subjected to analysis of variance (one-way Anova) for different groups. The least significant difference (LSD) and Duncan's multiple range tests were applied for comparing the means to find the difference among groups and storage days. The smallest difference (5%) for the two means was reported as significantly different.

RESULTS AND DISCUSSION

Live weight, dressed carcass weight and yield of cut-up parts

The average live weight dressed carcass weight and yield of cut-up parts of different varieties of birds were presented in Table 1. In present study, the average live weight of birds was significantly ($P<0.05$) different among 3 groups. The dressed carcass weight and yield of cut-up part - breast were significantly ($P<0.05$) higher in commercial broilers, whereas the other portions like legs, wings and neck were significantly ($P<0.05$) higher in Vanaraja birds. However there is no significant ($P>0.05$) difference observed in yield of cut–up part-back among the three groups. It is well established that the carcass yield and composition of chicken is affected by several factors such as diet, age, sex, live weight, genotype and slaughtering conditions (Havenstein *et al.,* 2007 and Brickett *et al.,* 2007). Generally, the broilers are fast growing birds and bred specifically for meat production compared with improved native slow growing chicken varieties. The indigenous slow growing birds generally have slower growth rate than commercial broilers when raised under same commercial conditions (Wattanachant *et al.,* 2004). Tang *et al.* (2009) has reported that the live weight, dressed carcass weight and breast weight were highest for commercial and intermediate type broilers and lowest for slow growing genetic groups in China. Several studies have also recorded the impact of genotype on the carcass traits especially yield of breast and legs (Devatkal *et al.,* 2019 and Pandey *et al.,* 2018).

Table 1. *Carcass characteristics of Vanaraja (8 weeks), Indbro (7weeks) and fast growing Commercial broilers (38 days).*

Genotypes/ Parameters	Vanaraja	Indbro	Commercial broilers
Live wt (g)	1560.9^{A}	1969.8^{B}	2138.0^{C}
Dressed carcass wt(g)	1067.8^{A}	1295.8^{B}	1555.9^{C}
Breast (%)	15.19^{A}	16.74^{B}	24.49^{C}
Legs (%)	21.63^{C}	20.97^{B}	20.20^{A}
Back (%)	11.09	10.69	10.95
Wings (%)	9.73^{B}	8.43^{A}	8.27^{A}
Neck (%)	3.22^{B}	3.15^{B}	2.48^{A}

*Cut-up parts expressed as % of live weight
^{A,B,C}Means with different superscript within rows are significantly (P<0.05) different.

MEAT QUALITY PARAMETERS

Proximate composition

Proximate analysis data is presented in Table 2. Meat of Vanaraja birds had significantly (P<0.05) higher moisture, protein and ash content compared to Indbro and commercial broilers. However, fat content was significantly (p<0.05) higher in commercial broilers. Boskovic *et al.* (2010) opined that the breed of bird has significant impact on the variation in the composition of meat. The results obtained for proximate analysis for slow growing and commercial broilers in the present study are similar to the reports of Devatkal *et al.* (2019).

Instrumental colour

Meat colour is an important selection criterion for poultry meat and meat products (Fletcher, 2002). Significantly (p<0.05) higher lightness values and lower redness values were observed in commercial broilers compared to Indbro and Vanaraja birds (Table 2). However, there was no significant (p>0.05) difference observed in yellowness values among the three groups. This is in accordance with Rajkumar *et al.* (2016), who reported higher L* values in commercial broilers, indicating low levels of myoglobin in the muscle, whereas higher a* values in native Aseel chicken meat with high myoglobin content.

Hydroxyproline content and Muscle fibre diameter

Hydroxyproline content is directly proportional to the collagen content of the meat, and it has been used for estimating the collagen content of meat. Toughness in meat associated with high hydroxyproline content indicating high collagen content in meat. Similarly, the muscle fibre diameter is also a function of muscle texture and tenderness. Results (Table

Table 2. *Proximate composition, physico-chemical and microbial quality of meat of different genotypes of chicken*

Genotypes/parameters	Vanaraja	Indbro	Commercial broilers
Moisture (%)	74.11^{B}	72.18^{A}	72.22^{A}
Protein (%)	21.16^{C}	20.05^{B}	18.89^{A}
Fat (%)	2.21^{A}	3.51^{B}	4.39^{C}
Ash (%)	1.83^{B}	0.91^{A}	0.90^{A}
L* (Lightness)	34.30^{A}	46.44^{B}	54.58^{C}
a* (Redness)	6.29^{C}	5.60^{B}	4.91^{A}
b* (Yellowness)	16.96	16.66	16.55
Hydroxyproline content (μg/g)	192.52^{C}	135.21^{B}	93.14^{A}
Muscle fibre diameter (μm)	62.13^{C}	57.49^{B}	53.08^{A}
p^{HHH}	6.09^{A}	6.14^{B}	6.23^{C}
TBARS (mg MDA/kg)	0.01^{A}	0.01^{A}	0.02^{B}
Water holding capacity (%)	37.66^{A}	40.41^{B}	44.50^{C}
Shear force value (SFV)(N)	12.08^{C}	10.71^{B}	8.02^{A}
Total plate count (cfu/g)	3.02^{B}	2.99^{A}	2.98^{A}
Psychrotrophic count (cfu/g)	2.90	2.92	2.87
Yeast and mould count (cfu/g)	2.74	2.69	2.67

*^{A,B,C} Means with different superscript within rows are significantly (p<0.05) different.

2) revealed significantly ($p<0.05$) higher hydroxyproline content in the meat of Vanaraja followed by Indbro then commercial broilers. Similarly, the meat of Vanaraja birds showed significantly ($p<0.05$) higher muscle fibre diameter compared to other groups (Table 2). This might be because of higher age of Vanaraja (56 days) birds compared to Indbro (49 days) and commercial broilers (38 days). This is in accordance with the observation made by Rajkumar *et al.* (2016), who found higher hydroxyproline content in Aseel chicken meat (26 & 56 weeks age) compared to commercial broilers (38 days). Further, Devatkal *et al.* (2018) also reported that meat of Aseel chicken (27 weeks) had higher muscle fibre diameter than commercial broiler (5 ½ weeks). Muthukumar *et al.* (2011) also observed significant ($p<0.05$) increase in fibre diameter with increased body weight.

pH and TBARS value

pH or hydrogen ion concentration in muscle is the indication of pre-slaughter care of the birds, stress undergone before slaughter and also the time of recording pH after slaughter. A normal resting bird shows muscle pH of about 6.8 (Lawrie, 2014). In this study, pH values showed significant ($p<0.05$) difference among the 3 groups (Table 2). Commercial broilers showed significantly ($p<0.05$) higher pH values compared to other 2 groups. Similarly, Fanatico *et al.* (2007) reported lower ultimate pH for slow growing genotypes compared to the fast-growing birds. Stress induced higher wing flapping during ante mortem shackling could be the reason for accelerating the initial rate of pH decline in fast growing birds compared to slow growing birds (Debut *et al.,* 2005; Huang *et al.,* 2014 and Derelifidan *et al.,* 2015). TBARS value is an indicator of lipid oxidation in meat and meat products, and it reflects the presence of secondary lipid oxidation products, mainly aldehydes, which can contribute to an undesirable flavour of meat and meat products (Teets *et al.,* 2008). Due to high content of unsaturated fatty acids, chicken meat is particularly susceptible to oxidation (Wang *et al.,* 2004). As the lipid oxidation increase with storage time, in the present study fresh meat of all groups showed lower TBARS values. Among all the groups meat of Commercial broilers showed significantly ($p<0.05$) higher TBARS values (Table 2). Karpinska-Tymoszczyk *et al.* (2020) observed a TBARS value of 0.29 MDA milligram per kilogram in raw chicken meat which is higher when compared with present study.

Water holding capacity (WHC)

Water holding capacity is the ability of meat to retain moisture during various stages of processing and it is one of the most important traits of meat quality. Significantly ($p<0.05$) higher values for WHC observed in meat of commercial broilers compared to other 2 groups (Table 2). Santos *et al.* (2005) also observed low WHC values in slow growing genotypes compared to fast growing genotypes. Fanatico *et al.* (2007) stated that the lower water holding capacity in slow growing birds might be due to their thinner and smaller fillet dimension, as a result more surface area in relation to muscle mass exposed to air, which resulted in more water loss indicating lower WHC compared to fast growing genotypes.

Shear force value (SFV)

Shear force strength determines the tenderness of meat, which is an important factor related to meat palatability and quality (An *et al.* 2010). Among the groups, the shear force value was significantly ($p<0.05$) higher in meat of Vanaraja birds (Table 2). The higher SFV observed in the Vanaraja chicken could be related to the increase in the intramuscular connective tissue with the age (Nakamura *et al.* 2004) and the thermal and mechanical stability of the connective tissue in older birds (Purslow, 2005), which increases the toughness of meat. Similarly, Devatkal *et al.* (2019) reported significantly ($p<0.05$) higher SFV in slow growing indbro birds compared to commercial broilers.

Microbial analysis

The first indication of spoilage in fresh chicken meat is the production of off-odors, which turn out to be obvious when bacterial numbers reach around 10^7 CFU/g (Obrein *et al.,* 1996). At this point, the microorganisms have exhausted levels of glucose and amino acids in the meat as a growth substrate. In the present study (Table 2), the total plate count (TPC) and yeast and mould count values for meat of Vanaraja birds were significantly ($p<0.05$) higher than other 2 groups. However, no significant ($p>0.05$) difference was observed among all the three groups for psychrotrophic counts and yeast and mould counts. According to Greco *et al.* (2014), the chicken samples contaminated by microbes, which are ubiquitous in water, air, soil, feeds and processing materials. The yeast and mould counts in present study (2.67-2.74 $\log_{10}$cfu/g) were higher when compared with studies done by Santosh *et al.* (2012) who recoded yeast and mould count of 1.87 to 2.5 $\log_{10}$cfu/g in fresh chicken meat sample. The total plate count in present study varied between 2.98 and 3.02 $\log_{10}$cfu/g, which is lower when compared with the studies done by Rathod *et al.* (2017) who observed a total plate count of 4.40±0.25 $\log_{10}$cfu/gin fresh chicken breast fillets.

Sensory evaluation

Appearance is the most important meat quality attributes that influence consumer preference. Meat of Vanaraja and Indbro birds showed significantly ($p<0.05$) higher scores for appearance than commercial broilers (Table 3). Results differed with the findings of Rajkumar *et al.* (2016) who observed no significant ($p>0.05$) difference in appearance scores between meat of native chicken Aseel and commercial broilers. Flavour is a sensation of the mouth provoked by fats and other precursors such as sugars and amino acids in meat, which impacts upon consumer taste (Khan *et al.,* 2015). Breed variation may be due to variations in content of Inosine-5'-monophosphate (IMP) (Tang *et al.,* 2009), Arachidonic acid and docosahexaenoic acid (DHA) (Hossain *et al.,* 2012). Present study revealed significantly ($p<0.05$) higher flavour and juiciness scores for the meat of Vanaraja birds compared to commercial broilers, whereas Indbro meat showed no significant ($p>0.05$) difference with other 2 groups (Table 3).

Texture or tenderness is the most important attributes in consumer's final satisfaction with poultry meat (Fletcher, 2002). Meat of Vanaraja birds showed significantly ($p<0.05$) higher scores for texture compared to other 2 groups (Table 4). Shear force strength indicates the tenderness of meat (An *et al.,* 2010). Similarly (Rajkumar *et al.,* 2016) observed higher scores for texture for native chicken Aseel meat compared to broilers. The palatability is associated to the texture and the texture can be affected by many factors like species, genetic factors, age, nutritional status and stress (Baracho *et al.,* 2006).

Table 3. *Sensory evaluation scores of meat of Vanaraja, Indbro and Commercial broilers*

Genotypes/ parameters	Vanaraja	Indbro	Commercial broilers
Appearance	7.11 ± 0.03^{B}	7.10 ± 0.02^{B}	6.96 ± 0.01^{A}
Flavour	7.12 ± 0.08^{B}	6.99 ± 0.02^{AB}	6.90 ± 0.02^{A}
Juiciness	7.06 ± 0.04^{B}	6.98 ± 0.01^{AB}	6.91 ± 0.02^{A}
Texture	6.97 ± 0.00^{B}	6.92 ± 0.02^{A}	6.88 ± 0.00^{A}
Overall acceptibility	7.08 ± 0.02^{B}	7.02 ± 0.01^{B}	6.86 ± 0.02^{A}

^{A,B}Mean ±SE with different superscript within rows are significantly ($p<0.05$) different.

Meat of Vanaraja and Indbro birds showed significantly ($p<0.05$) higher scores for overall acceptability compared to commercial broilers (Table 4). Results correlated with Devatkal *et al.* (2019) on Indbro and commercial broilers and also with Rajkumar *et al.* (2020) who also observed significant ($p<0.05$) differences in scores among meat of Aseel crosses. The unique taste, firm texture, rich flavour and higher acceptability of native chicken meat were documented by (Wattanachant *et al.,* 2004; Jaturasitha *et al.,* 2008; Jayasena *et al.,* 2013 and Rajkumar *et al.,* 2016). The higher meat acceptability of the Vanaraja and Indbro birds might be attributable to the presence of native inheritance in these birds.

CONCLUSION

The present study recorded the variation exists in the carcass and meat quality traits among different breeds of chickens. Commercial broiler birds, which are developed with intensive selection for muscle growth had better carcass traits with higher dressed carcass weight, breast meat yield, water holding capacity, and low hydroxyproline content compared to slow growing improved native chicken varieties such as Vanaraja and Indbro birds. However, the meat from Vanaraja and Indbro birds had distinguishable sensory attributes with unique flavour, higher juiciness, texture, and overall acceptability compared to commercial broilers and they have the potential to form a significant source of chicken with better sensory attributes.

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