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Effect of Genetic Groups and Gender on Body Weight and Different Morphometric Traits in Poultry Birds

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ABSTRACT

Background: Traits of economically importance are quantitative, complex with continuous variability in chickens whereas body morphometric parameters are variable on the basis of some factors such as age, sex, nutrition, climate and status of the birds which is very important in differentiating native from exotic as well as commercial breeds.

Methods: Three genetic groups of chicken *i.e.*, Rhode Island Red (RIR), Kadaknath and Punjab Brown were classified according to gender and genetic groups. The body weight was measured from 0 day to 26th week of age and morphometric trait from 12 to 26th week of age. The fixed effect of gender and genetic groups on different fortnightly body weights (BW) and morphometric traits were estimated.

Result: Punjab Brown poultry birds had significantly higher ($p \leq 0.01$) body weight and morphometric traits *viz*. beak length (BKL), keel length (KL), wing length (WL) and body girth (BG) for most of the studied weeks. Male birds consistently had significantly ($p \leq 0.01$) higher body weight and important morphometric parameters *viz*. shank length (SL), shank width (SW), BKL, comb length (CL), KL and WL compared to females across all age groups which interprets the significance of different non-genetic factors on body weight and important morphometric parameters for further selection in different breeds of poultry birds.

Key words: Body weight, Kadaknath, Morphometric traits, Punjab brown, RIR.

INTRODUCTION

India's chicken population grew by 16.81%, hitting a huge 851.81 million in 2019. Furthermore, backyard chicken experienced amazing growth, with a staggering 45.78% rise, reaching a total population of 317.07 million by 2019 (BAHS, 2022). There is a clear trend toward fragmented and small-scale poultry farming, which is shown by the rise in backyard chickens. In comparison, the commercial poultry sector saw a more moderate growth rate of 4.5%. Even though it grew at a slower rate, the number of commercial chickens hit a huge 534.74 million by 2019. This shows how important large-scale poultry operations are for meeting the growing demand for poultry products. These numbers show that India's poultry industry is strong and flexible. They also show that the industry is growing in many different ways, from small backyard operations to bigger, more commercial poultry businesses.

Growth in poultry birds is a systematic process of developmental changes which involves protein deposition as well as increase in size and length of morphometric parts. Morphometric variations in traits could be important yardsticks of information in designing selection and genetic improvement programs for poultry birds, which primarily depends on the variations within and between breeds or populations. Moreover, body weight and body morphometric in chickens have been used in differentiating native from exotic as well as commercial breeds and in establishing phenotypic correlations among various genetic groups (Yakubu *et al*., 2009).

Body weight and morphometric traits have significant contribution to slaughter yield in poultry (Wolanski *et al*., 2006; Willemsen *et al*., 2008). Several studies have reported positive effect of these traits on marketable carcass weight (Mukhtar *et al*., 2013; Patbandha *et al*., 2017). Shank length has been reported to be significantly influencing the growth performance of poultry birds (Msoffe *et al*., 2001; Wolanski *et al*., 2006; Willemsen *et al*., 2008). Slow growing coloured birds (particularly indigenous breeds) have great demand due to their better meat quality in terms of appearance, less fat and taste as well as better performance in tropical climate (Jiang *et al*., 2007). There is need to study the effect of genetic groups and gender on morphometric traits and body weights in chickens as very scanty information is available especially in India.

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MATERIALS AND METHODS

The present investigation was carried out at Poultry Research Farm overseen by the Directorate of Livestock Farms, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana. Three genetic groups of chickens *i.e.* Kadaknath, Rhode Island Red (RIR) and one native chicken germplasm (Punjab Brown) maintained under the AICRP on Poultry Breeding Project were included in the study. The healthy chicks were regenerated from the University hatchery and wing banding was done in the chicks for identification and data collection. Standard feeding and management practices were followed. Ad libitum feeding was done at chick stage with clean drinking water followed by restricted feeding through growing and laying stages of the birds. Every group is isolated in consistent feeding and uniform environmental circumstances. All the birds were vaccinated as per standard vaccination schedule covering important diseases *viz*. Marek′s, Ranikhet/New Castle Disease (F1, R2B and Lasota strains), Infectious Bursal Disease and fowl pox. Deworming was practiced every three months of age for prevention of parasitic infestations.

The data was collected on bodyweight and morphometric characteristics (300 birds; 100 from each breed and equally distributed among male and female). The study′s data set covered the age span of 0 days to 26 weeks taken during the year 2023. Information on body weight (BW) was collected fortnightly intervals (hatch, 2^{nd}, 4^{th}, ……26^{th} week). Phenotypic data on different morphometric traits *viz*. body length (measured from tip of beak to tip of tail excluding feathers); shank length (The distance between the hock joint and the metatarsal pad on the tarsal-metatarsus); shank width, beak length (from widest point closer to the base of the beak to the end of beak); comb length (beak to the end of the combs); keel length (The sternum's length *i.e.* distance between the vertices of the sternum); wing length (The distance between the tips of the phalanges and the shoulder joint) and breast girth (circumference of the breast around the deepest part of the breast) were measured as per guidelines of FAO (2012) and recorded biweekly from 12^{th},14^{th},…..upto 26^{th} weeks of age.

Statistical analysis

The following mathematical model was used for determining the effect of genetic groups and sex using IBM-SPSS 24.0 statistical package (IBM Corp, 2016):

$$Y_{ijk} = \mu + G_i + S_j + e_{ijk}$$

Where:

μ: The grand mean.

Y_{ijk}: The observations (of morphometric traits and body weight) on the k^{th} bird belonging to genetic group i (=1 to 3) and sex j (=1 to 2).

G_i and S_j: Fixed effects of genetic group and sex, respectively.

e_{ijk}: The error term assumed to be normally distributed (NID), assuming N~(0, 1).

RESULTS AND DISCUSSION

Least squares means along with their standard errors for different non-genetic factors affecting body weight (gm) and various morphometric traits (cm) at different ages in RIR, Kadaknath and Punjab brown poultry birds are presented in Table 1 and Table 2.

Effect of genetic groups

Significantly higher ($p \leq 0.01$) body weight at different ages during 0 day to 26^{th} week of age was observed in Punjab Brown poultry birds in comparison to other studied genetic groups. This could be attributed to better adaptability of Punjab Brown birds to local climatic conditions as compared to other two breeds and continuous evaluation and improvement through selection being carried out at the farm. In the morphometric traits, body length (BL) was significantly higher ($p \leq 0.01$) in Punjab Brown from 12 to 18 week of age, after that RIR birds shows higher value of BL from 20 to 26^{th} week of age. However, Weimer *et al*., (2020) reported that slow growing (SG) broilers had better body length than conventional (CONV) strain ($P<0.0005$) as well as different other strain×stocking density combinations ($P=0.03$). Shank length (SL) measurement was significantly higher ($p \leq 0.01$) in RIR poultry birds at all age groups except at 12^{th} week of age which was higher in Punjab Brown birds. Similar findings were reported by Fayeye *et al*. (2014) who found significant differences ($P<0.05$) in shank length and body length values between the Isa Brown and Ilorin ecotype birds. Shank width (SW) was significantly higher ($p \leq 0.01$) in Punjab Brown in initial weeks (12^{th} week to 16th week of age). In subsequent ages, RIR birds showed higher measurement for SW. Similar findings were reported by Shafiq *et al*., (2022); Ahmad *et al*. (2019); Oleforuh-Okoleh *et al*. (2017) and Liyanage *et al*. (2015) who observed significant difference ($P<0.05$) in shank width between different poultry genotypes. The measurement for beak length (BKL) was significantly higher ($p \leq 0.01$) at all age groups in Punjab Brown poultry birds. Our findings were supported by Tyasi *et al* (2021) who found Hy-line layers having better ($p<0.05$) keel length, shank circumference and beak length as compared to Potchefstroom Koekoek birds. Comb length (CL) was significantly higher ($p \leq 0.01$) in RIR birds for all age groups (14^{th} to 26^{th} week) except 12^{th} week CL was higher in Punjab Brown birds. For keel length (KL), wing length (WL) and body girth (BG); Punjab Brown birds showed significantly higher ($p \leq 0.01$) values at all different age groups from 12^{th} to 26^{th} week of age.

Pathak *et al*. (2015) studied two chicken breeds (Aseel and Kadaknath) from 0 day to 7th week of age and found significantly ($P<0.05$) higher body weight in Aseel than Kadaknath in all age groups. However, in the present study Kadaknath poultry birds had significantly lower body weight in comparison to RIR and Punjab Brown birds in different age groups. Ahmad *et al* (2019) analyzed morphometric traits of three chicken genotypes: Naked Neck and two crossbreeds (Rhode Island Red×Naked Neck=RNN, Black Australorp×Naked Neck=BNN). RNN had significantly ($P=0.0009$) higher body weight (1491.12±64.10 g) and keel length (10.66±0.15 cm). Pawankar *et al*. (2022) found that

Table 1: Least squares means along with their standard errors for non-genetic factors affecting body weight (gm) at different ages in RIR, Kadaknath and Punjab brown poultry birds.

Body weight	N	0 D		2 wk		4 wk		6 wk		8 wk		10 wk		12 wk	
		Mean	S.E.	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E
Overall	300	37.49	0.38	111.09	1.53	207.72	2.00	336.58	2.74	499.25	3.32	647.44	4.19	847.81	5.68
Genetic group															
RIR	100	34.45^{b}	0.66	94.44^{b}	2.66	183.09^{b}	3.47	278.93^{b}	4.75	454.66^{b}	5.75	634.53^{b}	7.26	866.43^{b}	9.84
Kadaknath	100	32.89^{c}	0.66	55.47^{c}	2.66	116.03^{c}	3.47	291.65^{b}	4.75	431.65^{c}	5.75	534.52^{c}	7.26	764.45^{c}	9.84
Punjab brown	100	44.12^{a}	0.66	183.37^{a}	2.66	324.06^{a}	3.47	439.17^{a}	4.75	611.46^{a}	5.75	773.26^{a}	7.26	912.56^{a}	9.84
Sex															
Male	150	38.52*	0.54	113.27	2.18	213.45**	2.84	367.63**	3.89	554.70**	4.71	708.42**	5.95	909.50**	8.06
Female	150	36.45*	0.53	108.92	2.16	202.00**	2.83	305.54**	3.87	443.81**	4.68	586.46**	5.91	786.12**	8.01
Body weight	**N**	**14 wk**		**16 wk**		**18 wk**		**20 wk**		**22 wk**		**24 wk**		**26 wk**	
		Mean	**S.E.**	**Mean**	**S.E**	**Mean**	**S.E**	**Mean**	**S.E**	**Mean**	**S.E**	**Mean**	**S.E**	**Mean**	**S.E**
Overall	**300**	**996.15**	**6.21**	**1163.22**	**5.82**	**1294.80**	**6.72**	**1437.391**	**7.423**	**1593.64**	**8.750**	**1765.39**	**9.26**	**1906.32**	**9.27**
Genetic group															
RIR	100	1015.38^{b}	10.75	1240.59^{b}	10.09	1375.30^{a}	11.63	1576.18^{b}	12.85	1752.72^{b}	15.15	1903.58^{b}	16.03	1982.78^{b}	16.06
Kadaknath	100	883.31^{c}	10.75	965.28^{c}	10.09	1076.01^{b}	11.64	1110.19^{c}	12.85	1139.29^{c}	15.15	1151.70^{c}	16.04	1169.20^{c}	16.06
Punjab brown	100	1089.78^{a}	10.75	1283.79^{a}	10.09	1433.10^{a}	11.63	1625.80^{a}	12.85	1888.90^{a}	15.15	2240.90^{a}	16.03	2567.00^{a}	16.06
Sex															
Male	150	1056.41**	8.81	1230.05**	8.26	1381.58**	9.53	1524.74**	10.53	1690.49**	12.41	1876.92**	13.13	2030.85**	13.15
Female	150	935.90**	8.75	1096.39**	8.21	1208.02**	9.47	1350.04**	10.46	1496.79**	12.33	1653.87**	13.05	1781.80**	13.07

**Highly significant ($p \leq 0.01$) *Significant ($p \leq 0.05$); Means with different superscript within a column differ significantly.

Table 2: Least squares means along with their standard errors for non-genetic factors affecting morphometric traits (cm) at different ages in RIR, Kadaknath and Punjab brown poultry birds.

Body length	N	BL-12 wk		BL-14 wk		BL-16 wk		BL-18 wk		BL-20 wk		BL-22 wk		BL-24 wk		BL-26 wk	
		Mean	S.E.	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E
Overall	300	32.87	0.18	34.75	0.16	35.71	0.13	37.39	0.15	39.22	0.14	40.45	0.14	40.97	0.13	41.63	0.13
Genetic group																	
RIR	100	31.30^{b}	0.31	32.66^{c}	0.29	34.49^{b}	0.23	38.82^{a}	0.26	40.90^{a}	0.25	42.12^{a}	0.24	42.97^{a}	0.23	43.60^{a}	0.23
Kadaknath	100	30.68^{b}	0.31	33.90^{b}	0.29	34.50^{b}	0.23	34.65^{b}	0.26	36.90^{c}	0.25	38.93^{c}	0.24	39.03^{c}	0.23	39.13^{b}	0.23
Punjab brown	100	36.64^{a}	0.31	37.69^{a}	0.29	38.14^{a}	0.23	38.69^{a}	0.26	39.86^{b}	0.25	40.31^{b}	0.24	40.91^{b}	0.23	42.16^{b}	0.23
Sex																	
Male	150	33.97**	0.25	35.68**	0.24	36.52**	0.19	38.37**	0.22	40.04**	0.21	41.27**	0.19	41.81**	0.19	42.47*	0.19
Female	150	31.78**	0.25	33.82**	0.23	34.90**	0.19	36.40**	0.21	38.39**	0.20	39.63**	0.19	40.13**	0.18	40.78*	0.19
Shank length	N	SL-12 wk		SL-14 wk		SL-16 wk		SL-18 wk		SL-20 wk		SL-22 wk		SL-24 wk		SL-26 wk	
		Mean	S.E.	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E
Overall	300	7.11	0.03	7.99	0.02	8.29	0.02	8.56	0.04	8.78	0.02	9.02	0.03	9.16	0.03	9.32	0.03
Genetic group																	
RIR	100	7.19^{b}	0.06	8.69^{a}	0.04	8.96^{a}	0.04	9.17^{a}	0.07	9.33^{a}	0.05	9.67^{a}	0.06	9.75^{a}	0.06	9.99^{a}	0.06
Kadaknath	100	6.27^{c}	0.06	7.14^{c}	0.04	7.58^{c}	0.04	7.97^{c}	0.07	8.35^{c}	0.05	8.59^{c}	0.06	8.79^{b}	0.06	8.81^{c}	0.06
Punjab brown	100	7.88^{a}	0.06	8.14^{b}	0.04	8.33^{b}	0.04	8.53^{b}	0.07	8.65^{b}	0.05	8.79^{b}	0.06	8.94^{b}	0.06	9.14^{b}	0.06
Sex																	
Male	150	7.59**	0.05	8.42**	0.03	8.65**	0.03	8.83**	0.05	9.03**	0.04	9.24**	0.04	9.44**	0.05	9.65**	0.05
Female	150	6.63**	0.05	7.56**	0.03	7.94**	0.03	8.28**	0.05	8.53**	0.04	8.80**	0.04	8.88**	0.05	8.98**	0.05
Shank width	N	SW-12 wk		SW-14 wk		SW-16 wk		SW-18 wk		SW-20 wk		SW-22 wk		SW-24 wk		SW-26 wk	
		Mean	S.E.	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E
Overall	300	3.51	0.02	3.72	0.02	3.92	0.02	4.23	0.01	4.38	0.01	4.51	0.01	4.61	0.01	4.69	0.02
Genetic group																	
RIR	100	3.57^{b}	0.03	3.78^{b}	0.04	4.06^{b}	0.03	4.36^{a}	0.03	4.57^{a}	0.03	4.68^{a}	0.03	4.74^{a}	0.03	4.94^{a}	0.03
Kadaknath	100	3.17^{c}	0.03	3.38^{c}	0.04	3.55^{c}	0.03	4.16^{b}	0.03	4.39^{b}	0.03	4.45^{b}	0.03	4.55^{b}	0.03	4.58^{b}	0.03
Punjab brown	100	3.79^{a}	0.03	4.00^{a}	0.04	4.16^{a}	0.03	4.16^{b}	0.03	4.19^{c}	0.03	4.39^{b}	0.03	4.53^{b}	0.03	4.56^{b}	0.03
Sex																	
Male	150	3.73**	0.02	3.89**	0.03	4.06**	0.02	4.36**	0.02	4.56**	0.02	4.68**	0.02	4.79**	0.02	4.88**	0.02
Female	150	3.29**	0.02	3.55**	0.03	3.78**	0.02	4.09**	0.02	4.21**	0.02	4.33**	0.02	4.43**	0.02	4.51**	0.02

Table 2: Continue...

Table 2: Continue...

Comb length	N	CL-12 wk		CL-14 wk		CL-16 wk		CL-18 wk		CL-20 wk		CL-22 wk		CL-24 wk		CL-26 wk	
		Mean	S.E.	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E
Overall	300	3.31	0.03	3.47	0.03	3.67	0.03	3.95	0.03	4.25	0.03	4.51	0.03	4.65	0.03	4.73	0.03
Genetic group																	
RIR	100	3.36^{b}	0.05	3.72^{a}	0.06	3.91^{a}	0.05	4.55^{a}	0.06	5.01^{a}	0.05	5.39^{a}	0.05	5.60^{a}	0.05	5.70^{a}	0.05
Kadaknath	100	3.16^{c}	0.05	3.24^{c}	0.06	3.52^{b}	0.05	3.66^{b}	0.06	4.07^{b}	0.05	4.32^{b}	0.05	4.47^{b}	0.05	4.59^{b}	0.05
Punjab brown	100	3.39^{a}	0.05	3.44^{b}	0.06	3.60^{b}	0.05	3.63^{b}	0.06	3.68^{c}	0.05	3.81^{c}	0.05	3.88^{c}	0.05	3.89^{c}	0.05
Sex																	
Male	150	3.71**	0.04	3.83**	0.05	4.03**	0.04	4.39**	0.05	4.76**	0.04	5.06**	0.04	5.19**	0.04	5.28**	0.04
Female	150	2.91**	0.04	3.11**	0.05	3.32**	0.04	3.50**	0.05	3.75**	0.04	3.96**	0.04	4.11**	0.04	4.17**	0.04
Wing length	N	WL-12 wk		WL-14 wk		WL-16 wk		WL-18 wk		WL-20 wk		WL-22 wk		WL-24 wk		WL-26 wk	
		Mean	S.E.	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E
Overall	300	11.41	0.05	12.25	0.05	12.97	0.05	13.07	0.05	13.18	0.05	13.64	0.33	13.67	0.07	13.79	0.07
Genetic group																	
RIR	100	11.35^{b}	0.08	11.71^{b}	0.09	11.94^{b}	0.09	12.03^{b}	0.10	12.24^{b}	0.09	12.38^{b}	0.58	12.50^{b}	0.12	12.80^{b}	0.12
Kadaknath	100	11.18^{b}	0.08	11.49^{b}	0.09	11.96^{b}	0.09	12.11^{b}	0.10	12.18^{b}	0.09	12.24^{b}	0.58	12.26^{b}	0.12	12.40^{c}	0.12
Punjab brown	100	11.70^{a}	0.08	13.54^{a}	0.09	14.99^{a}	0.09	15.06^{a}	0.10	15.12^{a}	0.09	16.40^{a}	0.58	16.17^{a}	0.12	16.18^{a}	0.124
Sex																	
Male	150	11.82**	0.07	12.64**	0.07	13.52**	0.07	13.56**	0.08	13.63**	0.07	14.50*	0.47	14.16**	0.10	14.30**	0.10
Female	150	11.00**	0.07	11.85**	0.07	12.41**	0.07	12.57**	0.08	12.73**	0.07	12.85*	0.47	13.13**	0.10	13.28**	0.10
Beak length	N	BKL-12 wk		BKL-14 wk		BKL-16 wk		BKL-18 wk		BKL-20 wk		BKL-22 wk		BKL-24 wk		BKL-26 wk	
		Mean	S.E.	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E	Mean	S.E
Overall	300	3.29	0.01	3.46	0.01	3.72	0.02	3.86	0.02	3.93	0.017	4.02	0.01	4.11	0.01	4.19	0.01
Genetic group																	
RIR	100	3.14^{b}	0.03	3.27^{b}	0.03	3.47^{b}	0.03	3.78^{b}9	0.03	3.90^{b}	0.029	4.02^{b}	0.03	4.09^{b}	0.02	4.19^{b}	0.03
Kadaknath	100	3.09^{b}	0.03	3.26^{b}	0.03	3.29^{c}	0.03	3.37^{c}	0.03	3.45^{c}	0.029	3.54^{c}	0.03	3.74^{c}	0.02	3.85^{c}	0.03
Punjab brown	100	3.65^{a}	0.03	3.84^{a}	0.03	4.41^{a}	0.03	4.42^{a}	0.03	4.45^{a}	0.029	4.49^{a}	0.03	4.51^{a}	0.02	4.52^{a}	0.03
Sex																	
Male	150	3.38**	0.02	3.59**	0.02	3.87**	0.03	3.99**	0.03	4.09**	0.024	4.15**	0.02	4.26**	0.02	4.34**	0.02
Female	150	3.21**	0.02	3.33**	0.02	3.58**	0.03	3.73**	0.03	3.77**	0.024	3.88**	0.02	3.97**	0.02	4.03**	0.02

**Highly Significant ($p \leq 0.01$) *Significant ($p \leq 0.05$); Means with different superscript within a column differ significantly.

Giriraja birds showed significantly higher ($p<0.01$) biweekly body weight gain up to 16th weeks of age followed by Black Astrolorp and Kadaknath birds. However, in our study native (Punjab Brown) birds had significantly higher body weight in comparison to RIR and Kadaknath. Shafiq *et al*. (2022) examined the morphometric traits of four naked neck chicken phenotypes at 8 weeks of age. They found significant ($P<0.05$) differences in keel length and shank circumference among different phenotypes. However, no significant difference was observed for body length and shank length among the different phenotypes. In our study, Punjab Brown birds had significantly higher values for different studied morphometric traits except shank length, width and comb length which had higher values in RIR poultry birds. Fadare (2014) found significant differences ($P<0.05$) in KL at 12 weeks of age among Naked Neck, Frizzled Feathered and Normal Feathered Crosses with Exotic Giriraja Chickens.

Effect of gender

Male birds had significant ($p\leq0.01$) higher body weight as compared to female birds from 4th to 26th week of age. Significant ($p\leq0.05$) difference was observed in day old chicks which could be due to difference in egg weight of different breeds; whereas the difference was non-significant at 2nd week of age which may be due to poultry birds of different genetic groups taking some time to express their full genetic potential. Male chickens consistently exhibit significantly ($p\leq0.01$) higher body lengths(BL),Shank length (SL), shank width (SW), beak length (BKL), comb length (CL), keel Length (KL), wing length (WL) than females across all age groups except body girth (BG) which was non-significantly at 26th week of the age and female had better average of 26th week BG which may be due to birds reaching the age of egg production at that age.

Fayeye *et al*. (2014) studied equal no of male and female of Isa brown and Ilorin-ecotype chicken and found male chicken had significantly higher ($p<0.05$) matured body weight than female birds. Fadare (2014) studied naked neck, Frizzled Feathered and Normal Feathered Crosses with Exotic Giriraja Chickens and observed males have significantly ($p<0.01$) higher body weight, breast girth and keel length values compared to female birds at 12 week of age. In agreement to our findings, Desha *et al* (2016) studied indigenous chicken under village condition of Bangladesh from 1st week to 15th week of age and found body weight was significantly ($p<0.05$) higher in male birds compared to female across all age groups. Melesse *et al*. (2021) studied adult indigenous chickens of both sexes and observed male had significantly ($p<0.005$) higher values for Live weight (LW),body length (BL),keel length (KL) and wing length WL than female. Usman *et al*. (2021) studied two genotypes RNN (Rhode Island Red×Naked Neck) and BNN (Black Australorp×Naked Neck) obtained by two self-crosses (RNN ×RNN = RR and BNN×BNN = BB) and two reciprocal crosses (RNN×BNN = RB and BNN×RNN=BR) RB and BR, males showed higher ($p<0.01$) drumstick length and drumstick circumference for both RB and BR genotypes compared to females of both genotype. Our study also certifies that males had higher values for body weight and morphometric traits in different age groups.

CONCLUSION

We conclude that Punjab Brown poultry birds had significantly higher ($p\leq0.01$) body weight in different ages in comparison to Rhode Island Red (RIR) and Kadaknath poultry birds. For most of the morphometric traits also native poultry birds had higher values. So, it can be propagated further as a preferred indigenous breed for meat production particularly in the local climatic conditions.

Conflict of interest

There is no conflict of interest.

REFERENCES

Ahmad, S., Mahmud, A., Hussain, J. and Javed, K. (2019). Morphological and carcass traits of three chicken genotypes under free-range, semiintensive and intensive housing systems. Turkish Journal of Veterinary and Animal Sciences. 43(3): 342-352.

Basic Animal Husbandry Statistics. (2022). https://dahd.nic.in/schemes/programmes/animal-husbandry-statistics. Desha, N.H., Bhuiyan, M.S.A., Islam, F. and Bhuiyan, A.K.F.H. (2016). Non-genetic factors affecting growth performance of indigenous chicken in rural villages. Journal of Tropical Resources and Sustainable Science. 4(2): 122-127.

Fadare, A.O. (2014). Morphometric and growth performance variations of naked neck, frizzled feathered and normal feathered crosses with exotic Giri-Raja chickens. Jordan Journal of Agricultural Sciences. 10(4): 811-820.

FAO (2012). Phenotypic characterization of animal genetic resources. In FAO Animal Production and Health Guidelines No. 11, FAO, Rome, Italy.

Fayeye, T. R., Hagan, J.K. and Obadare, A.R. (2014). Morphometric traits and correlation between body weight and body size traits in isa brown and iiorin ecotype chickens. Iranian Journal of Applied Animal Science. 4(3): 609-614.

IBM Corp. Released (2016). IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.

Jiang, R.S. and Yang, N. (2007). Effect of day-old body weight on subsequent growth, carcass performances and levels of growth-related hormones in quality meat-type chicken. Archiv fur Geflugelkunde. 71(2): 93-96.

Liyanage, R.P., Dematawewa, C.M.B. and Silva, G.L.L.P. (2015) Comparative study on morphological and morphometric features of village chicken in Sri Lanka. Tropical Agricultural Research. 26: 261-273.

Melesse, A., Tadele, A., Assefa, H., Taye, K., Kebede, T., Taye, M. and Betsha, S. (2021). Assessing the morphological diversity of Ethiopian indigenous chickens using multivariate discriminant analysis of morphometric traits for sustainable utilization and conservation. Poultry Science Journal. 9(1): 61-72.

Msoffe, P.L.M., Minga, U.M., Olsen, J.E., Yongolo, M.G.S., JuulMadsen, H.R., Gwakisa, P.S. *et al.* (2001). Phenotypes including immunocompetence in scavenging local chicken ecotypes in Tanzania. Tropical Animal Health Production. 33(7): 341-354.

Mukhtar, N., Khan, S.H., Anjum, M.S. (2013). Hatchling length is a potential chick quality parameter in meat type chickens. World's Poultry Science Journal. 69(4): 889-896.

Oleforuh-Okoleh, V.U., Kurutsi, R.F. and Ideozu, H.M. (2017). Phenotypic evaluation of growth traits in two nigerian local chicken genotypes. Animal Research International. 14: 2611-2618.

Patbandha, T.K., Garg, D.D., Marandi, S., Vaghamashi, D.G., Patil, S.S. and Savsani, H.H. (2017). Effect of chick weight and morphometric traits on growth performance of coloured broiler chicken. Journal of Entomology and Zoology Studies. 5(6): 1278-1281.

Pathak, P., Dubey, P.P., Dash, S.K. and Chaudhary, M.L. (2015). Studies on growth and carcass traits of Aseel and Kadaknath chicken. Indian Journal of Poultry Science. 50(3): 327-328.

Pawankar, K.N., Samanta, R., Ghosh, N., Bera, S., Biswas, S., Mandal, G.P. and Ramteke, S.S. (2022). Comparative production performance traits of Kadaknath, Giriraja and Black Australorp breeds of poultry under intensive system of management in Maharashtra State of India. International Journal of Veterinary Sciences and Animal Husbandry. 7(6): 59-63.

Shafiq, M., Khan, M.T., Rehman, M.S., Raziq, F., Bughio, E., Farooq, Z. and Shakir, M. (2022). Assessing growth performance, morphometric traits, meat chemical composition and cholesterol content in four phenotypes of naked neck chicken. Poultry Science. 101(3): 101667. doi: 10.1016/j.psj.2021.101667.

Tyasi, T.L., Mashiloane, K. and Mokoena, K. (2021). Comparison of some linear body measurement traits of local and commercial chicken breeds of South Africa. Siberian Journal of Life Sciences and Agriculture. 13(1): 134-143.

Usman, M., Ishaq, H.M., Mahmud, A., Bughio, E., Azhar, M., Saleem, M.M. and Ahmad, S. (2021). Morphometric measurements and carcass characteristics of black australorp, naked neck and rhode island red crossbreds under alternative production systems. Brazilian Journal of Biology. 83: e252594. doi: 10.1590/1519-6984.252594.

Weimer, S.L., Mauromoustakos, A., Karcher, D.M. and Erasmus, M.A. (2020). Differences in performance, body conformation and welfare of conventional and slow-growing broiler chickens raised at 2 stocking densities. Poultry Science. 99(9): 4398-4407.

Willemsen, H., Everaert, N., Witters, A., Smit, L.D., Debonne, M., Verschuere F *et al.* (2008). Critical assessment of chick quality measurements as an indicator of post-hatch performance. Poultry Science. 87(11): 2358-2366.

Wolanski, N.J., Renema, R.A., Robinson, F.E., Carney, V.L., Fancher, B.I. (2006). Relationship between chick conformation and quality measures with early growth traits in males of eight selected pure or commercial broiler breeder strains. Poultry Science. 85(8): 1490-1497.

Yakubu, A., Kuje, D. and Okpeku, M. (2009). Principal components as measures of size and shape in Nigerian indigenous chickens. Thai Journal of Agricultural Science. 42(3): 167-176.