



## Assessment of body conformation and feed efficiency characteristics in CARI-Debendra crossbred grower chicken

ANANTA KUMAR DAS<sup>1</sup>, SANJEEV KUMAR<sup>2</sup>, ABDUL RAHIM<sup>3</sup>, LAXMIKANT SAMBHAJI KOKATE<sup>4</sup> and ANIL KUMAR MISHRA<sup>5</sup>

ICAR-Central Avian Research Institute, Izatnagar, Uttar Pradesh 243 122 India

Received: 12 February 2016; Accepted: 3 June 2016

**Key words:** Breast angle, CARI-Debendra chicken, FCR, Shank and keel lengths, Weight gain

CARI-Debendra, a multicoloured plump-breasted dual purpose chicken, was developed by mating RIR females with coloured synthetic male line of broilers at this institute. Consumers prefer a plump-breasted bird and its body dimensions can be used to predict either the carcass conformation or percentage of meat yield if suitable correlations can be demonstrated (Das *et al.* 2014). Feed efficiency is an utmost concern when the poultry is promoted at farmers' field. Hence, this study aimed to assess body conformation and feed utilization efficiency characteristics in grower CARI-Debendra chicken.

For this study, single hatched out 112 numbers of day-old CARI-Debendra chicks were investigated at this institute. The wing banded chicks were subjected to standard battery brooding shelves and litter brooding. Standard floor space and brooding temperature were provided. After attaining the 4 weeks of age at the battery brooder, the chicks were shifted into new brooder house for 16 weeks of age. Freshwater and the institute-formulated feed (Das *et al.* 2014, 2015a,b, 2016) were provided *ad lib.* twice daily with all possible measures adopted to reduce wastage of feed. The birds were vaccinated following a standard vaccination schedule (Das *et al.* 2014, 2015b). The feeding trials (*ad lib.*) were conducted from day-1 to 16th week of age maintaining 2 feeding groups each of 56 chicks. The birds were provided with weighed quantity of the feed also weighing the feed residue after each recording period and inspecting mortality, if any, along with its date-wise weight record. The chick weights (g) were taken and the body conformation traits i.e. live body weight (g), shank length

(cm), keel length (cm) and breast angle (°) were measured at 4, 6, 8, 12 and 16th week of age. Feed efficiency was expressed as feed intake (g), live body weight gain (g) and feed conversion ratio in different periods of age. The data were analyzed by the least squares analysis of variance (Harvey 1990) taking sex and feeding groups as fixed effects (Das *et al.* 2014, 2015a,b, 2016).

The estimated least square means of different body conformation traits and feed efficiency characteristics are presented in Tables 1 and 2, respectively. The present estimates of chick weight and body weights were comparable to the reports in RIR crosses (Das *et al.* 2016, Mohammed *et al.* 2005, Singh and Jilani 2005). The present estimates of body conformation indices were far better as evident when compared to the earlier reports in CARI-Debendra (Singh and Jilani 2005), CARI-Sonali (Das *et al.* 2016), RIR selected line (Das *et al.* 2015a), RIR control line (Das *et al.* 2015b), RIR-White strain (Das *et al.* 2014b), Libyan native chicken (El-Safty 2012), Ardennaise chicken (Lariviere *et al.* 2009), Giriraja and WLH chicken (Adebambo *et al.* 2006). The attributed better performance of the present cross was due to its genetic potentiality through its sire (broiler male line) inheritance. The present chicken flock had also more weight gain with moderate FCR throughout the age even better than CARI-Sonali layers (Das *et al.* 2016) and RIR chickens (Das *et al.* 2014, 2015a,b). Although the present FCR estimates were higher than the available reports in Ardennaise chicken (Lariviere *et al.* 2009) indicating poor FCR in the present chicken flock. Whatsoever discrepancy might be attributed due to the genetic background or difference in breed and different facets of management practices as well as rearing system.

The least squares analysis of variance elucidates that sex of the chicks had a significant ( $P < 0.05$ ) effect on the body conformation traits at 6 week of age onwards except the breast angle at 6 week ( $P < 0.08$ ). Significant sex-differentiation in body conformation traits and males being heavier than females were also reported earlier (Das *et al.* 2014, 2015a,b, 2016, El-Safty 2012, Lariviere *et al.* 2009, Adebambo *et al.* 2006, Singh and Jilani 2005) and these

Present address: <sup>1</sup>Assistant Professor (dasugenvet@gmail.com), Department of Animal Genetics and Breeding, Faculty of Veterinary and Animal Sciences, WB University of Animal and Fishery Sciences, Kolkata. <sup>2</sup>Principal Scientist (skgicar@gmail.com). <sup>3</sup>Research Associate (choudhary633@gmail.com), Artificial Breeding Research Centre, NDRI, Karnal. <sup>4</sup>Assistant Director (kokatels@gmail.com), MAFSU Sub-Centre, Latur. <sup>5</sup>Principal Scientist (anilmishra65@yahoo.co.in), Animal Genetics Resources Division, NBAGR, Karnal.

Table 1. The estimated least squares means of different body conformation traits in CARI-Debendra grower chicken

Factors	Least squares means ± standard errors																				
	CW (g)	BW4 (g)	SL4 (cm)	KL4 (cm)	BA4 (°)	BW6 (g)	SL6 (cm)	KL6 (cm)	BA6 (°)	BW8 (g)	SL8 (cm)	KL8 (cm)	BA8 (°)	BW12 (g)	SL12 (cm)	KL12 (cm)	BA12 (°)	BW16 (g)	SL16 (cm)	KL16 (cm)	BA16 (°)
Overall	38.20± 0.31 (98)	307.34± 5.75 (50)	5.27± 0.04 (50)	5.64± 0.04 (50)	47.07± 0.30 (50)	582.85± 10.25 (98)	6.85± 0.05 (98)	7.27± 0.05 (98)	50.41± 0.29 (98)	967.92± 18.38 (92)	8.17± 0.06 (92)	8.81± 0.07 (92)	58.12± 0.44 (92)	1908.75± 25.96 (89)	10.78± 0.06 (89)	11.46± 0.05 (89)	67.19± 0.39 (89)	2547.82± 37.60 (89)	11.36± 0.08 (89)	12.70± 0.08 (89)	71.82± 0.39 (89)
Sex Male	38.62± 0.42 (52)	313.39± 8.61 (22)	5.35± 0.06 (22)	5.71± 0.06 (22)	47.11± 0.45 (22)	613.35± 14.05 (52)	7.01± 0.07 (52)	7.40± 0.07 (52)	50.92± 0.40 (52)	1027.28± 25.12 (49)	8.37± 0.09 (49)	9.02± 0.09 (49)	59.08± 0.60 (49)	2102.83± 35.67 (47)	11.37± 0.08 (47)	11.83± 0.07 (47)	69.52± 0.53 (47)	2876.60± 51.66 (47)	12.32± 0.10 (47)	13.25± 0.11 (47)	75.06± 0.54 (47)
Female	37.79± 0.45 (46)	301.30± 7.63 (28)	5.19± 0.06 (28)	5.56± 0.06 (28)	47.04± 0.40 (28)	552.36± 14.93 (46)	6.69± 0.07 (46)	7.13± 0.08 (46)	49.90± 0.42 (46)	908.57± 26.82 (43)	7.98± 0.09 (43)	8.60± 0.10 (43)	57.15± 0.64 (43)	1714.67± 37.73 (42)	10.19± 0.09 (42)	11.10± 0.08 (42)	64.86± 0.56 (42)	2219.05± 54.65 (42)	10.40± 0.11 (42)	12.15± 0.12 (42)	68.57± 0.57 (42)

Figures within parenthesis denote number of observations, means within a factor having different superscripts differ significantly (P<0.05).

Table 2. The estimated least squares means of different feed efficiency traits in CARI-Debendra grower chicken

Factors	Obs	Least squares means ± standard errors															
		WG4(g)	FC4(g)	FCR4	WG6(g)	FC6(g)	FCR6	WG8(g)	FC8(g)	FCR8	WG12(g)	FC12(g)	FCR12	WG16(g)	FC16(g)	FCR16	
Overall	97	266.98± 4.90	742.59± 4.32	2.89± 0.08	282.26± 7.17	713.73± 32.81	3.74± 0.16	379.84± 10.50	1851.23± 4.06	5.41± 0.20	940.87± 19.97	3456.06± 4.34	3.96± 0.11	648.82± 21.08	3397.36± 3.86	6.12± 0.21	
Sex Male	55	269.23± 6.48	744.84± 5.71	2.90± 0.10	296.62± 9.47	699.98± 43.38	3.68± 0.22	414.31± 13.88	1855.03± 5.37	4.87± 0.27	1082.03± 26.40	3459.01± 5.74	3.36± 0.15	762.69± 27.87	3399.29± 5.10	4.87± 0.28	
Female	42	264.73± 7.39	740.33± 6.52	2.88± 0.12	267.89± 10.81	727.48± 49.51	3.80± 0.25	345.38± 15.84	1847.44± 6.13	5.94± 0.31	799.70± 30.13	3453.11± 6.55	4.56± 0.17	534.94± 31.81	3395.43± 5.83	7.36± 0.32	
Feeding Group 1	50	265.84± 6.87	746.66± 6.06	2.97± 0.11	274.27± 10.04	975.80± 45.97	3.84± 0.23	369.20± 14.71	1860.92± 5.69	5.64± 0.28	956.46± 27.98	3466.50± 6.08	3.87± 0.16	705.95± 29.54	3407.37± 5.41	5.51± 0.30	
Group 2	47	268.11± 6.98	738.52± 6.15	2.80± 0.11	290.24± 10.20	451.66± 46.71	3.65± 0.23	390.49± 14.95	1841.55± 5.78	5.17± 0.29	925.27± 28.43	3445.62± 6.18	4.05± 0.16	591.68± 30.02	3387.35± 5.50	6.72± 0.30	

WG, FC and FCR denote live body weight gain in grams, feed intake in grams and feed conversion ratio at different periods of age (weeks), respectively. Means within a factor having different superscripts differ significantly (P<0.05).

Table 3. The estimated phenotypic correlations among various intra-week body conformation traits in CARI-Debendra grower chicken

Traits	BW4	SL4	KL4	Traits	BW6	SL6	KL6
SL4	0.6435 (50)			SL6	0.8041 (98)		
KL4	0.7103 (50)	0.8943 (50)		KL6	0.7971 (98)	0.8469 (98)	
BA4	0.8351 (50)	0.6197 (50)	0.6726 (50)	BA6	0.8581 (98)	0.6819 (98)	0.7084 (98)
Traits	BW8	SL8	KL8	Traits	BW12	SL12	KL12
SL8	0.8298 (92)			SL12	0.8188 (89)		
KL8	0.8299 (92)	0.8997 (92)		KL12	0.8230 (89)	0.8609 (89)	
BA8	0.8610 (92)	0.6922 (92)	0.6609 (92)	BA12	0.9404 (89)	0.7394 (89)	0.7694 (89)
Traits	BW16	SL16	KL16				
SL16	0.7722 (89)						
KL16	0.6945 (89)	0.7197 (89)					
BA16	0.9441 (89)	0.7226 (89)	0.6331 (89)				

Figures within parenthesis denote number of observations.

available literatures could evidence that males being heavier with body weights and conformation characteristics than the females might be a sex-driven biological phenomena. The male birds had also more weight gains and better FCR than the females throughout the age with significantly ( $P < 0.05$ ) more weight gains at 6-week onwards and better FCR at 8-week onwards in agreement to the earlier reports (Das *et al.* 2014, 2015a, 2016). Feed intake could not be affected by sex at any age as reported earlier (Das *et al.* 2014, 2015a,b, 2016) though the feed intake significantly ( $P < 0.05$ ) varied among the feeding groups at 6 week onwards. Body weight gain and FCR estimates also varied ( $P < 0.05$ ) among the feeding groups at 16th week in accordance to the earlier reports (Das *et al.* 2014, 2015a,b, 2016) where weight gain, FCR and also feed intake were significantly affected by feeding groups but in different age groups. The management of the poultry keepers might affect the feed intake and the affected feed intake might also affect FCR and thus weight gain.

Intra-week body weight, shank length, keel length and breast angle were positively correlated among themselves with a high range (0.6197 to 0.9441) of phenotypic correlation coefficients (Table 3) in accordance to the previous reports in CARI-Sonali (Das *et al.* 2016) and RIR chickens (Das *et al.* 2014, 2015a,b). The present body weight remained invariably positively correlated with shank length, keel length and breast angle throughout the age and were in consistence with the previous reports (Das *et al.* 2014, 2015a,b, 2016, Singh and Jilani 2005). Lariviere *et al.* (2009) also reported positive association of the body weight with keel length and angle in Ardennaise chicken. However, the present correlations were comparatively lower at younger age than at older age on contrary to the reports in Giriraja, WLH and Nigerian improved indigenous chicken genotypes (Adebambo *et al.* 2006).

#### SUMMARY

To assess avowed body conformation and feed efficiency characteristics, 112 CARI-Debendra chicks were

investigated at this institute. Almost all the body conformation and feed efficiency traits were significantly ( $P < 0.05$ ) sex-dependent as evidenced at sixth week of age onwards; and males demonstrating better estimates than the females throughout the age. The body conformation traits were highly correlated with phenotypic positive association and could therefore be used to predict either conformation or percentage meat yield of the carcass.

#### ACKNOWLEDGEMENT

The Head of Avian Genetics and Breeding Division, ICAR- Central Avian Research Institute is sincerely acknowledged for facilitating this investigation.

#### REFERENCES

- Adebambo A O, Ozoje M O, Adebambo F and Abiola S S. 2006. Genetic variations in growth performance of Giriraja, Indian White Leghorn and improved indigenous chicken breeds in south west Nigeria. *Nigerian Journal of Genetics* 20: 7–16.
- Das A K, Kumar S, Mishra A K, Rahim A and Kokate L S. 2016. Evaluating body conformation and feed efficiency characteristics in CARI-Sonali grower chicken. *Indian Journal of Animal Sciences* 86(2): 192–96.
- Das A K, Kumar S, Rahim A, Kokate L S and Mishra A K. 2015a. Genetic analysis of body conformation and feed efficiency characteristics in a selected line of Rhode Island Red chicken. *Asian Journal of Animal Sciences* 9(6): 434–40.
- Das A K, Kumar S and Rahim A. 2015b. Genetics of body conformation and feed efficiency characteristics in a control line of Rhode Island Red chicken. *Iranian Journal of Applied Animal Science* 5(4): 965–73.
- Das A K, Kumar S, Rahim A, Kokate L S and Mishra A K. 2014. Assessment of body conformation, feed efficiency and morphological characteristics in Rhode Island Red-white strain chicken. *Indian Journal of Animal Sciences* 84(9): 984–91.
- El-Safty S A. 2012. Determination of some quantitative and qualitative traits in Libyan native fowls. *Egyptian Poultry Science* 32(2): 247–58.
- Harvey W R. 1990. *User's guide for LSMLMW*. Mixed model least squares and maximum likelihood computer programme PC-2. Ohio State University (Mimeograph).

- Lariviere J M, Farnir F, Detilleux J, Michaux C, Verleyen V and Leroy P. 2009. Performance, breast morphological and carcass traits in the Ardennaise chicken breed. *International Journal of Poultry Science* **8**(5): 452–56.
- Mohammed M D, Abdalsalam Y I, Kheir A R M, Jin-yu W and Hussein M H. 2005. Growth performance of indigenous × exotic crosses of chicken and evaluation of general and specific combining ability under Sudan condition. *International Journal of Poultry Science* **4**(7): 468–71.
- Singh C B and Jilani M H. 2005. Inheritance of growth and confirmation traits in CARI-Devendra poultry strain. *Indian Journal of Poultry Science* **40**(1): 67–69.