Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2017; 5(6): 2398-2403

Received: 19-09-2017
Accepted: 22-10-2017

B Nandi
Post Graduate Department of Poultry Science, College of Veterinary Science and Animal Husbandry, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

L Samal
Post Graduate Department of Poultry Science, College of Veterinary Science and Animal Husbandry, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

N C Behura
Post Graduate Department of Poultry Science, College of Veterinary Science and Animal Husbandry, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

GD Nayak
Department of Animal Genetics and Breeding, College of Veterinary Science and Animal Husbandry, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

DP Das
Department of Pathology, College of Veterinary Science and Animal Husbandry, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

Correspondence
L Samal
Post Graduate Department of Poultry Science, College of Veterinary Science and Animal Husbandry, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India

Growth, efficiency and body conformation traits of Hansli breed of Odisha under intensive management system

B Nandi, L Samal, N C Behura, GD Nayak and DP Das

Abstract
A study was conducted to evaluate the performance of Hansli breed of Odisha up to 20 weeks of age under intensive management system. Eight hundred forty-seven (847) birds were used for this study. Body weight was recorded bi-weekly and feed consumption was recorded daily. The body conformational traits were measured at 8th, 12th, 16th and 20th week of age. The 8th, 16th and 20th week body weight of male and female birds were 499.55g and 396.42g, 1249.56g and 979.57g and 1788.26g and 1280.41g, respectively. Heritability for 12th, 16th and 20th week body weights were 0.990, 0.493 and 0.229, respectively. The production efficiency factors at 8th, 16th and 20th weeks were 14.83, 13.16 and 12.85, respectively. The cumulative feed conversion ratios at 8th, 16th and 20th weeks were 4.52, 6.59 and 7.38, respectively. All recorded linear body measurements were higher in male birds than the female birds.

Keywords: Growth performance; heritability; linear body measurements; Hansli breed

1. Introduction
The recent development of environmentally rural relations and consumer requests for food safety might encourage use of native fowl in a gastronomical niche market [9]. Indigenous/native Hansli breed chickens are playing a pivotal role in the rural economy of Mayurbhanj and Keonjhar districts of Odisha [24]. They play a major role for economic upliftment of the rural poor and marginalised section of the people besides providing them with nutritious egg and meat for consumption. Hansli birds are well adapted to harsh environment of free range and produce eggs and meat at least possible cost. The birds are priced very high due to their fighting ability. These scavenging village chickens have cultural, social, nutritional, economic and sanitary functions in daily life. Hansli chickens convert kitchen leftovers and wastes into valuable and high quality protein. These chickens are well adapted to the hot and humid tropical climates of Odisha and have been traditionally reared for meat, egg as well as for game purpose. Hansli resembles to another breed Aseel to a large extent, but phylogenetic tree analysis indicated the difference between these two breeds [28]. Although few literatures are available on the characteristics of Hansli birds in rural backyard conditions [2, 24], their genetic potential needs to be exploited in intensive system of management. In the backdrop of the above facts, the present study was undertaken to evaluate the performance of Hansli breed under intensive system.

2. Materials and methods
2.1 Experimental birds, feeding and management
Eight hundred forty-seven (847) day-old chicks were used in the experiment. All the chicks were wing banded and day-old body weights were recorded. Birds were housed in deep litter system of management. Proper floor space, feeder space and waterer space was given according to their body weight and age. Routine medication and vaccination procedures were followed for all the experimental birds. All the birds were immunized against Marek's disease on 1st day, Ranikhet disease (RD) on 5th and 28th day using LaSota strain, infectious bursal disease (IBD) on 14th and 35th day, fowl pox on 42nd day and 12th week, RD using R_2B strain at 8th and 16th week, ND-IBD killed vaccine at 18th week. Experimental diets were prepared and fed to the chicks *ad libitum*. Clean and fresh water was made available to the birds all the time. The gross and proximate compositions of the experimental diets have been presented in

Table 1 The experimental diets were analyzed for proximate composition as per AOAC [1].

Table 1: Gross and Proximate composition of experimental diets

Ingredient	Starter	Grower
	20% CP	18% CP
Maize	60	60
Soya bean meal	27.5	22
De-oiled rice bran	9.5	15
Mineral mixture[1]	3	3
Common salt	0.3	0.3
L-Lysine (98.5%)	0.1	0.05
DL-Methionine (99%)	0.1	0.05
Trace mineral[2]	0.1	0.1
Choline chloride	0.05	0.05
Toxin binder	0.2	0.2
Colistin	0.01	0.01
Bioblend	0.01	0.01
Ventribee plus	0.025	0.025
Calculated values		
ME-(Kcal/Kg)	2866.0	2822
CP	19.93	18.1
Lysine (%)	0.93	0.98
Methionine (%)	0.46	0.39
Meth. + Cystine (%)	0.73	0.57
Energy: Protein	143.8	165.24
Cost/kg feed (Rs)	29.2	28.7
Analyzed values (% DM)		
Moisture	8.97	9.51
CP	19.79	18.32
Ether extract	4.05	4.11
Crude fibre	4.63	4.22
Total ash	9.45	9.98
Acid insoluble ash	2.21	2.13
Nitrogen free extract	62.08	63.37
Calcium	0.91%	0.90%
Av. phosphorus	0.46%	0.45%

[1]Supplied: Ca 32%, P 6%, Mn 0.27%, Zn 0.26%, I 0.01%, Cu 0.01%, Fe 0.01%, F 0.03%

[2]Supplied per kg: Cu 15 g, I 1 g, Fe 60 g, Mn 80 g, Se 0.3 g, Zn 80 g

2.2 Protocol design

Body weight (BW) of birds was recorded bi-weekly using a digital electronic balance nearest to 1.0 g accuracy. Biweekly cumulative BW was calculated by subtracting the day-old BW from the body weight of the respective week. Heritability of body weight was recorded at 12th, 16th and 20th weeks. The feed consumption of the experimental birds was recorded replicate-wise on weekly basis. From the weekly BW, feed CP and ME consumption data feed conversion ratio (FCR), feed conversion efficiency (FCE), protein efficiency ratio (PER), protein conversion efficiency (PCE), energy conversion efficiency (ECE) and energy efficiency ratio (EER) were calculated as described elsewhere [22]. Production efficiency factor (PEF) was calculated using the following formula.

PEF= (Final weight in kg × livability % × 100) / (Age in days × FCR)

Body conformation traits such as keel length, shank length, shank circumference, shank width, head width, beak length, comb length, body length, height, body girth and breast angle were measured at 8th, 12th, 16th and 20th weeks following standard procedures described below. Except breast angle which was measured by goniometer, all other body conformation traits were determined using measuring tapes (calibrated in centimetres) as described below:

Keel length: The distance between the anterior end of keel bone and the point of keel (posterior end of keel bone) was taken as keel length.

Shank length: The length between hock joint and carpal joint was the shank length.

Shank circumference: It was taken at the centre between the hock joint and carpal joint.

Shank width: It was taken at the centre between the hock joint and carpal joint.

Beak length: It was taken as the distance between the base and tip of the beak.

Comb length: It was taken as the distance between the base and tip of the comb.

Head width: It was measured at the widest region in the head i.e in between two eyes.

Body length: It was taken from the tip of the beak to the tip of the tail and expressed in cm.

Height of the bird: It was taken from tip of the beak to the tip of the middle toe and expressed in cm.

Body girth: It was measured at the centre of the girth region and expressed in cm.

Breast angle: It was recorded with the help of a goniometer to the nearest of one degree accuracy and was measured posterior to the anterior edge of keel bone.

2.3 Statistical analysis

Data collected were subjected to t-test to know the significance level of different parameters and declared significant at $P \leq 0.05$.

3. Results and discussion

3.1 Body weight and weight gain

The 8th, 16th and 20th week body weights of male and female birds were 499.55g and 396.42g, 1249.56g and 979.57g and 1788.26g and 1280.41g, respectively (Table 2). In males, the biweekly body weight gain was highest (439.47±35.95)g during 12th week and in females, it was highest during 16th week (268.65±19.50)g (Table 3). The body weights of male birds were significantly ($P \leq 0.05$) higher than that of female birds after 2nd week onwards throughout the experimental period.

The mean day-old BW of Hansli chick was lower than Hazra [15] and Assel and higher than Kadaknath [13, 31] and native chicks of Pakistan (25.91 g) [19] and Bangladesh (29.14 g) [10]. The body weight of Hansli birds at 2nd, 4th and 6th weeks were also higher than the corresponding body weight of Aseel and Kadaknath [13, 30]. The 8th week BW is higher than Kadaknath (238 g), Aseel (273.72 g) and Hazra (384.54 g) birds [15] and native chickens of north-eastern region of India (356.3g) [6], Bangaladesh (186.5 g) [18], Ethiopia (241.8 g) [4] and Pakistan (400.62 g) [19] but lower than Tripura black (male-650g, female-505 g), native birds from Rajasthan (668.72 g) and Dahlem Red (male-723 g, female-590 g) raised under intensive system of management [9].

The BW of Hansli birds at day-old, 4th week, 6th week and 8th week were lower than the corresponding body weight of Vanaraja birds i.e. 39.91 g, 316.47 g, 629.23 g and 832.51 g [16]. The mean day-old and 8th week body weight of Hansli birds were higher than the corresponding body weight of indigenous birds (27.19 g and 389.56 g for male and 22.39 g and 258.90 g for females), but lower than the corresponding body weight of Vanaraja birds (41.96 g and 1327.69 g for male and 37.58g and 930.22g for female birds) [12].

The 10th week BW of Hansli birds were higher than the corresponding BW of Ankaleshwar and Aseel breeds [9]. The mean body weight at 12th, 16th and 20th weeks of Hansli birds

were higher than the corresponding body weight of desi birds 734g, 870g and 1058g [20]. The 12th week BW of Hansli growers were lower than Aseel but higher than Kadaknath [31]. The 16th, 18th and 20th week BW of the Hansli growers were higher than Kadaknath (619.31 g, 689.88 g and 769.11 g) respectively [13]. The mean body weights of Hansli growers at 14th and 20th week were higher than the indigenous birds, but lower than Vanaraja birds [12, 14, 15].

Table 2: Body weight (mean ± SE) of Hansli birds from 0-20 weeks of age

Age	Body weight (g)				T-value	P-value
	Male		Female			
	Mean±SE	N	Mean±SE	N		
Day-old	30.24±0.34	86	30.14±0.13	761	0.299	0.766
2nd week	115.54±6.97	26	103.34±2.15	191	1.673	0.104
4th week	202.38±10.90[a]	82	174.10±2.75[b]	743	2.515	0.014
6th week	368.58±25.23[a]	26	302.87±6.72[b]	179	2.510	0.017
8th week	499.55±15.53[a]	83	396.42±4.76[b]	635	6.352	0.000
10th week	677.36±33.95[a]	25	562.94±9.95[b]	183	3.233	0.003
12th week	871.88±22.30[a]	82	690.22±7.25[b]	621	7.746	0.000
14th week	1050.90±36.18[a]	30	908.84±13.56[b]	139	3.479	0.001
16th week	1249.56±29.41[a]	80	979.57±12.61[b]	392	8.282	0.000
18th week	1517.22±40.03[a]	36	1178.32±19.06[b]	99	7.643	0.000
20th week	1788.26±32.56[a]	90	1280.41±13.71[b]	287	14.375	0.000

[a,b]Mean with different superscripts in a row differ significantly ($P \leq 0.05$)

Table 3: Biweekly Body weight gain of Hansli birds

Age	Male		Female		T-value	P-value
	Mean±SE	N	Mean±SE	N		
2nd week	85.38±6.91	26	78.84±2.41	153	0.893	0.378
4th week	148.19±9.19[a]	75	111.05±2.09[b]	472	3.930	0.000
6th week	137.00±11.47	26	125.64±4.37	151	0.925	0.361
8th week	375.73±21.85[a]	79	266.11±8.41[b]	349	4.682	0.000
10th week	186.20±9.58[a]	25	157.78±7.02[b]	159	2.392	0.020
12th week	439.47±35.95[a]	73	155.84±7.85[b]	209	7.708	0.000
14th week	201.47±11.32	30	172.82±10.99	128	1.815	0.072
16th week	359.50±40.92[a]	54	268.65±19.50[b]	176	2.004	0.048
18th week	276.56±46.95[a]	34	161.25±8.17[b]	83	2.419	0.021
20th week	246.73±20.96	37	211.01±14.94	216	1.387	0.169

[a,b]Mean with different superscripts in a row differ significantly ($P \leq 0.05$)

3.2 Heritability estimates of body weight

This was presented in Table 4. Calculated heritability for 12th, 16th and 20th week body weights were 0.990, 0.493 and 0.229. It indicated that 99% variation of the 12th week body weight, 49.3% of 16th week body weight and 22.9% of 20th week body weight was due to heredity and rest is controlled by environment. Differences in heritability estimates could be attributed to method of estimation, environmental effects and sampling error. Faruque *et al*. [10] reported that the heritability for 12th week body weights of non-descript (ND), hilly (H) and naked neck (NN) genotypes were 0.16, 0.50 and 0.73, respectively and for 16th week body weight of H and ND genotypes were 0.72 and 0.35, respectively.

Table 4: Heritability estimates of body weights of Hansli birds

Parameters	Mean±SE	Heritability
BW at 12th week	711.41±7.25	0.990
BW at 16th week	1025.33±12.49	0.493
BW at 20th week	1401.65±17.13	0.229

3.3 Feed and nutrient utilization efficiency

The 8th week cumulative FCR of Hansli was recorded as 4.52 in the present investigation (Table 5). The FCR value is higher than the FCR value reported in native germplasm (3.08) maintained at Bengaluru AICRP centre. Khandoker [18] reported FCR of 6.36 in indigenous chicken. Mohanta [23] reported FCR of 3.74 in a desi chicken population of Odisha. 10 Faruque *et al*. [10] in three indigenous breeds recorded FCR of 3.58, 3.45 and 3.34 up to 8 weeks of age. Ogbu *et al*. [26] reported FCR in two light and heavy indigenous chicken breeds as 8.11 and 5.11 respectively up to 8 weeks of age. During 2nd week, the FCR and FCE were 2.72 and 0.37 respectively. At 20th week, the cumulative FCR was 7.38 and cumulative FCE was 0.14. The EER and PER were gradually decreasing with the advance of age. On 2nd week the EER and ECR were 12.85 and 0.08 respectively. At the end of 20th week the EER and cumulative EER were 3.33 and 4.83 respectively and the ECE and cumulative ECE were 0.30 and 0.21 respectively. On 2nd week the PER and PCE were 1.84 and 0.54 respectively. At the end of 20th week, the PER and cumulative PER were 0.52 and 0.76 respectively and the PCE and cumulative PCE were 1.91 and 1.32 respectively. The weekly FCR in Kadaknath breed were 2.75, 2.46, 2.09 and 2.84 for 2, 4, 6 and 8 weeks of age and 6.46, 9.97 and 12.56 for 3, 4 and 5 months of age [7].

Table 5: Feed and nutrient utilization efficiency of Hansli birds during experimental period

Parameters	2nd wk	4th wk	6th wk	8th wk	10th wk	12th wk	14th wk	16th wk	18th wk	20th wk
PEF	25.35	16.56	17.80	14.83	15.60	14.14	14.83	13.16	13.71	12.85
FCR	2.72	4.05	4.32	5.31	6.81	7.93	8.41	8.62	9.73	10.64
Cumulative FCR	2.72	3.51	3.83	4.52	5.00	5.67	6.09	6.59	6.96	7.38
FCE	0.37	0.25	0.23	0.19	0.15	0.13	0.12	0.12	0.10	0.09
Cumulative FCE	0.37	0.29	0.26	0.22	0.20	0.18	0.16	0.15	0.14	0.14
EER	12.85	8.91	8.25	6.66	5.15	4.48	4.25	4.11	3.64	3.33
Cumulative EER	12.85	10.15	9.31	7.85	7.17	6.31	5.88	5.42	5.13	4.83
ECE	0.08	0.11	0.12	0.15	0.19	0.22	0.24	0.24	0.27	0.30
Cumulative ECE	0.08	0.10	0.11	0.13	0.14	0.16	0.17	0.18	0.19	0.21
PER	1.84	1.28	1.18	0.95	0.81	0.70	0.67	0.64	0.57	0.52
Cumulative PER	1.84	1.46	1.33	1.12	1.12	0.99	0.92	0.85	0.80	0.76
PCE	0.54	0.78	0.85	1.05	1.24	1.42	1.50	1.55	1.75	1.91
Cumulative PCE	0.54	0.69	0.75	0.89	0.89	1.01	1.09	1.18	1.24	1.32

PEF: production efficiency factor; FCR: feed conversion ratio; FCE: feed conversion efficiency; EER: energy efficiency ratio; ECE: energy conversion efficiency; PER: protein efficiency ratio; PCE: protein conversion efficiency

3.4 Mortality%

The mortality during 0-8th week and 9th-20th week were 7.88% and 5.24% respectively. Maximum mortality was recorded during the juvenile phase (0-8th week) of rearing and thereafter the mortality was minimum. The mortality in native germplasm was reported to be 7.4% from 0-8 weeks of age and 10.12% from 9-20 weeks of age by Ludhiana AICRP centre, Punjab. Gonmei [12] reported mortality ranging 5-10% in indigenous chicks from 0-5 weeks of age, 1.30% during 6-20 weeks of age. The mortality up to 8weeks of age in Hansli was 6.66% [8]. Ghosh *et al.* [11] reported higher mortality percentage of 22.63% in Vanaraja up to 6 weeks of age in high altitude of Arunachal Pradesh. They also recorded highest mortality during the brooding period. Kumerasen *et al.* [21] also recorded 8.4% of mortality up to 5th week of age in case of Vanaraja birds. Kalita *et al.* [17] also reported 6 to 10% of chick mortality in indigenous chicken of Assam. Mondal *et al.* [25] reported 5% mortality for Vanaraja birds reared under intensive system of management in Kargil area of Jammu and Kashmir. Jha *et al.* [15] reported that the mortality percentage in three indigenous breeds viz. Hazra, Aseel and Kadaknath under intensive farming system were 7.28, 9.85 and 3.72%, respectively. Desha *et al.* [5] observed that the mortality (%) of indigenous chicken of Sherpur district in Bangladesh was 19.63%. The mortality in birds is influenced by several factors including the management practices. Therefore, a wide variation in mortality for the same genotype has been reported by different workers.

3.5 Linear body measurements of Hansli birds at different periods of experiment

At 8th week, all the body measurements were observed significantly ($P \leq 0.05$) higher in male than female except body girth (Table 6). The body length of Hansli birds (male-28.50 cm, female-24.46) at 8th week was higher than the Nigerian native chicken (male-18.20cm, female-26.66cm). The shank length and keel length of Hansli birds were higher than the values reported by Sahota *et al.* [27]. They observed the shank length (cm) to be 6.48, 6.51 and 6.7 and keel length (cm) to be 5.70, 5.70 and 5.78 respectively for black, dark brown and light brown varieties of desi chickens of Rawalpindi, Pakistan. The shank length (male-7.96cm and female-6.96cm) and keel length (male-7.60cm and female-6.64cm) of Hansli chicks were found to be higher than the values reported in native germplasm (shank length: 5.05 cm and keel length: 6.06cm) at 8th week of age maintained by CARI, Izatnagar centre but the breast angle (^{0}) was lower in Hansli chicks of Odisha (male-43.72, female-42.41) than the values reported in native germplasm maintained by CARI, Izatnagar centre (45.50) at 8th week of age. At 12th week, all the measurements were observed significantly ($P \leq 0.05$) higher in male than female except beak length. At 16th week, all the measurements were observed significantly ($P \leq 0.05$) higher in male than female except head width and comb length. Chatterjee *et al.* [3] observed the shank length, keel length and breast angle of Kadaknath and Aseel to be 7.75 cm, 6.89 cm and 70.45º and 9.52 cm, 8.40 cm and 81.65º, respectively at 15th week. At 20th week, all the measurements were observed significantly ($P \leq 0.05$) higher in male than female except comb length and breast angle. The shank length of male and female Hansli birds was higher but the body length was lower than the corresponding values of Aseel birds at 20th week of age [31]. The linear body measurements of the Hansli chicken of Odisha was found to be higher than that of indigenous chicken of the Lake Victoria from 2-4 months where the breast angle was 32.9º in male and 14.8º in female, body girth was 16.09cm in male and 18.00cm in female, shank length was 4.57cm in male and 5.40cm in female, keel length was 6.30cm in male and 7.40cm in female [29]. In the present study, the linear body measurements of male birds were higher than female birds. Similar to the present findings, Mishra [22] also observed higher values with significant difference ($P<0.05$) with respect to parameters such as body length, body girth, keel length, shank length, shank width, and shank circumference in males than females at 8th, 12th and 16th week in Hansli birds.

Table 6: Linear body measurements of Hansli birds at different periods of experiment

Attributes	Age (wk)	Male		Female		T-Value	P-Value
		Mean±SE	N	Mean±SE	N		
Keel Length (cm)	8th	7.60±0.07^a	46	6.64±0.05^b	99	10.592	0.000
	12th	9.25±0.06^a	41	8.40±0.05^b	107	10.636	0.000
	16th	10.86±0.06^a	25	9.78±0.08^b	58	10.927	0.000
	20th	12.10±0.17^a	25	11.04±0.14^b	39	4.753	0.000
Shank Length (cm)	8th	7.96±0.11^a	46	6.96±0.07^b	99	7.336	0.000
	12th	8.99±0.10^a	41	8.47±0.08^b	107	4.082	0.000

	16th	10.85±0.14[a]	25	9.89±0.11[b]	58	5.344	0.000
	20th	12.22±0.27[a]	25	10.99±0.18[b]	39	3.839	0.000
Shank Circumference (cm)	8th	3.65±0.06[a]	46	3.37±0.04[b]	99	4.029	0.000
	12th	4.33±0.05[a]	41	4.13±0.02[b]	107	3.981	0.000
	16th	4.78±0.07[a]	25	4.51±0.04[b]	58	3.380	0.000
	20th	5.46±0.10[a]	25	5.10±0.07[b]	39	2.838	0.006
Shank Width (cm)	8th	1.80±0.06[a]	46	1.41±0.03[b]	99	5.930	0.000
	12th	2.15±0.02[a]	41	2.05±0.01[b]	107	4.213	0.000
	16th	2.32±0.03[a]	25	2.20±0.02[b]	58	3.188	0.002
	20th	2.58±0.05[a]	25	2.44±0.04[b]	39	2.187	0.033
Head Width (cm)	8th	2.75±0.05[a]	46	2.56±0.03[b]	99	3.381	0.001
	12th	3.18±0.03[a]	41	3.11±0.02[b]	107	2.161	0.033
	16th	3.57±0.05	25	3.45±0.04	58	1.831	0.073
	20th	4.00±0.07[a]	25	3.72±0.04[b]	39	3.329	0.001
Beak Length (cm)	8th	2.20±0.05[a]	46	1.99±0.04[b]	99	3.512	0.000
	12th	3.05±0.04	41	3.24±0.28	107	-0.662	0.508
	16th	3.57±0.04[a]	25	3.43±0.04[b]	58	2.445	0.017
	20th	4.05±0.06[a]	25	3.86±0.04[b]	39	2.701	0.009
Comb Length (cm)	8th	-	-	-	-	-	-
	12th	-	-	-	-	-	-
	16th	0.37±0.03	25	-	58	-	-
	20th	0.82±0.17	25	-	39	-	-
Body Length (cm)	8th	28.50±0.48[a]	46	26.66±0.27[b]	99	3.361	0.000
	12th	34.04±0.39[a]	41	33.08±0.25[b]	107	2.029	0.045
	16th	43.28±0.53[a]	25	39.95±0.38[b]	58	5.095	0.000
	20th	45.52±0.67[a]	25	43.49±0.48[b]	39	2.473	0.017
Height (cm)	8th	35.20±0.53[a]	46	33.00±0.37[b]	99	3.409	0.000
	12th	47.40±0.65[a]	41	45.11±0.51[b]	107	2.785	0.006
	16th	57.32±0.63[a]	25	53.07±0.55[b]	58	5.075	0.000
	20th	62.56±1.02[a]	25	59.62±0.77[b]	39	2.302	0.025
Body Girth (cm)	8th	19.42±0.23	46	19.86±1.95	99	-0.227	0.820
	12th	25.96±0.43[a]	41	24.35±0.27[b]	107	4.283	0.001
	16th	30.40±0.26[a]	25	28.65±0.36[b]	58	3.890	0.000
	20th	33.84±0.37[a]	25	31.79±0.34[b]	39	4.026	0.000
Breast Angle (°)	8th	43.72±0.46[a]	46	42.41±0.30[b]	99	2.386	0.019
	12th	50.12±0.52[a]	41	46.93±0.44[b]	107	4.657	0.000
	16th	53.40±1.03[a]	25	50.88±0.67[b]	58	2.050	0.046
	20th	57.60±1.05	25	55.13±0.87	39	1.816	0.074

[a,b]Mean with different superscripts in a row differ significantly ($P \leq 0.05$)

4. Conclusion

Body weight of Hansli birds at different ages was found to be higher than the body weight of most of the reputed indigenous/non-descript breeds as well as some improved dual purpose breeds. So, it can be popularised as a location-specific meat breed in Odisha. All recorded linear body measurement parameters like keel length, shank length, shank circumference, shank width, head width, body length, height and breast angle were higher in male birds than the female birds.

5. Acknowledgments

The authors are grateful to the All India Coordinated Research Project on Poultry Improvement, Post-Graduate Department of Poultry Science, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha for providing the facilities to carry out this research work.

6. References

1. AOAC. Official Method of Analysis. 12th ed., Association of Official Analytical Chemists, P.O. Box 540, Benjamin Franklin Station, Washington, D.C. 20044. 1995, 1-1094.
2. Behera D, Pradhan CR, Behura NC, Mohapatra LM, Mohanty GP, Sethy K. Phenotypic characterization of indigenous Hansli chicken of Odisha. e-planet. 2016; 14(2):78-85.
3. Chatterjee RN, Ahlawat SPS, Yadav SP, Senani S, Kundu A, Jeya Kumar S *et al*. Comparative growth performance of Nicobari fowl and their cost effectiveness under backyard and intensive system. Indian Journal of Poultry Science. 2002; 37:63-66.
4. Dana N, Vander Waaij EH, Van Arendonk JAM. Genetic and Phenotypic Parameters Estimates for Body Weights and Egg Production in Horro Chicken of Ethiopia. Tropical Animal Health Production. 2010; 43:21-28.
5. Desha NH, Islam F, Ibrahim MNM, Okeyo M, Jianlin Hand Bhuiyan AKFH. Fertility and Hatchability of Eggs and Growth Performance of Mini-Incubator Hatched Indigenous Chicken in Rural Areas of Bangladesh. Tropical Agricultural Research. 2015; 26(3):528-536.
6. Doley S, Barua N, Kalita N, Gupta JJ. Performance of Indigenous Chickens of North Eastern region of India under different systems of rearing. Indian Journal of Poultry Science. 2009; 44(2):249-252.
7. Dubey P, Joshi S, Chouhan L. Juvenile growth rate and feed conversion efficiency in Kadaknath breed of fowl. IPSACON National Symposium on Poultry Production Feed, Food and Environmental Safety, CARI, Izatnagar, Bareilly, India, 2013.
8. Ekka R, Behura NC, Samal L, Nayak GD, Pati PK, Mishra PK. Evaluation of carcass characteristics and meat quality of Hansli, CSML and Hansli×CSML cross under intensive system of management. Advances in Bioresearch. 2017; 8(5,6)
9. Ekka R, Behura NC, Samal L, Nayak GD, Pati PK,

Mishra PK. Growth performance and linear body measurements of Hansli, CSML and Hansli×CSML cross under intensive system of rearing, Journal of Livestock Science. 2016; 7:114-121.
10. Faruque S, Islam MS, Afroz MA, Rahman MM. Evaluation of the performance of native chicken and estimation of heritability for body weight. Journal of Bangladesh Academy of Sciences. 2013; 37(1):93-101.
11. Ghosh MK, Ahmed FA, Buragohain R, Pathak PK, Bhattacharya M. Growth performance of Vanaraja birds in high altitude areas of Arunachal Pradesh under backyard system of management, XXIII IPSACON, National Symposium. 2005, 198.
12. Gonmei G. Performance of indigenous and Vanaraja chicken under deep litter system of rearing. *M.V. Sc. Thesis*, Assam Agricultural University, Guwahati-22, Assam, 2012.
13. Haunshi S, Niranjan M, Shanmugam M, Padhi MK, Reddy MR, Sunitha R *et al*. Characterization of two Indian native chicken breeds for production, egg and semen quality and welfare traits. Poultry Science. 2011; 90(2):314-320.
14. Jha DK, Prasad S. Performance of improved varieties and indigenous breed of chicken in Jharkhand. Indian Journal of Poultry Science. 2013; 48(1):109-112.
15. Jha DK, Prasad S, Soren SK, Bharti A. Production performance of indigenous chicken in intensive farming system. Indian Journal of Poultry Science. 2013; 48(1):105-108.
16. Jha DK, Prasad S, Soren SK, Mahto D. Performance of Vanaraja birds under deep litter system of management. Indian Veterinary Journal. 2012; 89(1):75- 76.
17. Kalita N, Barua N, Pathak N, Islam R. Performance of Vanaraja birds reared under intensive system of management in Assam. Indian Journal of Poultry Science. 2012; 47(1):125-127.
18. Khandoker MA. Performance of indigenous (deshi), Rhode Island Red (RIR) and Deshi × RIR chickens under farm condition. M.Sc. Thesis. Bangladesh Agricultural University, Mymensingh, 1993.
19. Khawaja T, Khan SH, Mukhta N, Parveen A. Comparative study of growth performance, meat quality and haematological parameters of Fayoumi, Rhode Island Red and their reciprocal crossbred chickens. Italian Journal of Animal Science. 2012; 11(39):211-216.
20. Krishna CH, Mahender M, Ramana DBV, Chandra AS. Performance of coloured layers under backyard rearing system in South Telangana region of Andhra Pradesh, Indian Journal of Animal Production and Management. 2007; 23(1-4):102-106.
21. Kumerasen A, Bujarbaruah KM, Pathak KA, Chhetri B, Ahmed SK, Haunshi S. Analysis of a village chicken production system and performance of improved dual purpose chicken under a subtropical hill agro-ecosystem in India. Tropical Animal Health Production. 2008; 40(6):395-402.
22. Mishra RC. Effects of dietary crude protein levels on performance of Hansli birds under intensive system of management. M.V. Sc. Thesis submitted to College of Veterinary Science and Animal Husbandry, Orissa University of Agriculture and Technology, Bhubaneswar, 2016.
23. Mohanta NB. Evaluation of performance of an indigenous chicken population of Odisha under intensive system of management. M.V. Sc. Thesis submitted to College of Veterinary Science and Animal Husbandry, Orissa University of Agriculture and Technology, Bhubaneswar, 2016.
24. Mohapatra SC, Mishra SC, Das K. Poultry genetic resources of Orissa (ISNRMPO PROGRAMME SERIES 4), Intercorporation India Deligation, Hyderabad and Indo-SWISS Natural Resources Management Programme, Orissa, Bhubaneswar. 2006, 1-58.
25. Mondal G, Kakati BK, Das TK, Mehdi M. Evaluation of locally available feeds on performance of Vanaraja birds under Kargil condition. Indian Journal of Animal Sciences. 2012; 82(9):1067-1069.
26. Ogbu Cosmas C, Joseph J Tule, Chijioke C Nwosu. Effect of genotype and feeding plan on growth and laying parameters of nigerian indigenous chickens. Global journal of Biology, Agriculture and Health Sciences. 2015; 4(1):251-256.
27. Sahota AW, Bhatti BM, Akhtar LA. Growth performance and caracass characteristics as influenced by different varieties of desi chickens. Pakistan Veterinary Journal. 2003; 23(2):97-99.
28. Sahu PK, Das B, Sahoo L, Senapati S, Nayak GD. Genetic relationship and population structure of three Indian local chickens. Mitochondrial DNA. 2015; 12:1-3.
29. Semakula J, Lusembo P, Kugonza DR, Mutetikka D, Ssennyonjo J, Mwesigwa M. Estimation of live body weight using zoometrical measurements for improved marketing of indigenous chicken in the Lake Victoria basin of Uganda. Livestock Research Rural Development. 2011; 23:170.
30. Thakur MS, Parmar SNS, Pillai PVA. Studies on growth performance in Kadaknath breed of poultry. Livestock Research for Rural Development. 2006; 18:116.
31. Valavan SE, Omprakash AV, Bharatidhasan A. Production performance of kadaknath under Indian tropical condition. International Journal of Applied and Pure Science and Agriculture. 2016; 2(11):107-110.