



Growth Performance, Carcass Traits and Economics of Kadaknath birds Rearing under Intensive Condition in Hot and Humid Climate

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ABSTRACT

This experiment was conducted to study the growth performance, carcass traits and economics of Kadaknath chicken reared under intensive managerial condition in hot and humid climate of Odisha. A total of 104 day-old straight run chicks of Kadaknath breed of chicken were taken for this experiment, divided into 4 replicates, each comprising of 26 chicks and reared in deep litter system. The weekly body weight, feed conversion ratio (FCR), and mortality of birds were recorded upto 20th weeks of age and carcass traits were studied at the end of the experiment. No significant difference of body weight gain ($P>0.05$) between male and female chicks was noticed upto 4th week, while males showed higher ($P\leq 0.05$) body weights gains from 5th to 20th week of age. The incidence of mortality recorded were 3.8% in the first week of age, whereas, no further mortality of birds was noticed during the rest of the experimental period. Males had higher ($P<0.01$) slaughter weight, eviscerated weight and drumstick percentage, while females had higher ($P<0.01$) breast and giblet percentage. Breast muscle showed higher crude protein, total ash compared to thigh muscle. From the above study it is concluded that Kadaknath breed can profitably be reared under intensive system of management in hot and humid climatic condition.

Key words: Carcass trait, Economics, Kadaknath chicken, Intensive rearing, Growth

INTRODUCTION

Kadaknath is an important indigenous breed of poultry inhabiting vast areas of Western Madhya Pradesh, mainly the Jhabua and Dhar Districts and adjoining areas of Gujarat and Rajasthan. It tolerates extreme climatic conditions and thrives very well under minimal management inputs. It shows appreciable degree of resistance to diseases compared to other exotic breeds of fowl (Thakur *et al.*, 2006). Back yard poultry farming is a part and parcel of typical rural/tribal household. The meat and eggs are also reckoned to be a rich source of protein (Rao and Thomas 1984). The meat of the Kadaknath breed contains high percentage (25.47%) of protein and is believed to have aphrodisiac properties (Mohan *et al.*, 2008). Continual efforts are to be made for the improvement of this breed through effective healthcare, nutrition, management and breeding. However, most of the experiments that have been conducted on Kadaknath are under free range

system of management. The present investigation was planned to study the growth performance and carcass traits of Kadaknath poultry birds reared intensive system in hot and humid climate of Odisha.

MATERIALS AND METHODS

The research work was carried out at the Central Poultry Development Organization (CPDO), Eastern region, Bhubaneswar from February to June. The maximum and minimum temperature and relative humidity were recorded daily and mean was calculated weekly. The weekly average maximum temperature ranged from 31.30 to 39.50°C, minimum temperature ranged from 17.80 to 28.10°C. Similarly, the weekly average maximum relative humidity ranged from 79.00 to 95.00 % and minimum ranged from 32.00 to 75.00 %. The experiment was conducted on 104 day-old straight run chicks of Kadaknath breed. Birds were divided into 4 replicates, each comprising of 26 chicks. All chicks were vaccinated with Marek's vaccine and

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wing banding was done at hatchery before transfer of chicks to the experimental shed. The experimental birds were reared under deep litter system and placed in the naturally ventilated house providing with 1 sq ft floor space per bird. Male and female birds were differentiated at 14th week by observing their comb pattern, then at 21 weeks of age birds were shifted to layer house. During the experiment, birds were offered weighed quantities of feed starting from day one till the end of the experiment as per the feeding practices carried out at CPDO, Bhubaneswar. All the birds were fed chick mash (0-8 weeks of age), grower mash (9-16 weeks of age) and breeder mash (17 week onwards). The weighed quantity of feed was offered daily in the morning and in the afternoon while fresh drinking water was supplied *ad libitum*. The composition of rations fed to the birds during different phases is presented in Table.1.

The body weight of birds was recorded individually at weekly intervals upto 20th weeks of age using a digital electronic balance. The birds were

weighed in the morning before supplying feed. The weekly body weight gain at a given age was found out by deducting the body weight of the previous week from that of the current week. Daily feed given was weighed and recorded. Feed consumption was calculated by subtracting the residual feed at the end of each week from the total feed provided during that week to the birds in each replicate, from which cumulative feed consumption was calculated. Feed conversion ratio (FCR) was derived by dividing the feed consumed with weekly body weight gain. Mortality of chicks was recorded daily. The mortality of all the chicks of the replicate groups were added and expressed on weekly basis.

At the end of twenty weeks, 6 healthy birds (3 male and 3 female) were sacrificed for the carcass parameters. Before slaughter the selected birds were separated from the flock and fasted overnight but drinking water was provided *ad libitum* to facilitate proper bleeding and also to know their actual live weights. The birds were slaughtered by severing the jugular vein and

Table 1. Composition of rations provided to the birds

Feed ingredients (kg)	Chick mash (0-8 weeks)	Grower mash (9-16wks)	Breeder mash (17 th week onwards)
Crushed yellow maize	45	45	45
Rice polish	22	25	15
Soya bean meal	30	19	27
De-oiled rice bran	-	8	6
Mineral Mixture	3	3	3
Shell grit	-	-	4
Total	100	100	100
Nutritive value (% DM basis)			
CP	20.15	16.20	17.95
ME (kcal/kg)*	2608	2515	2588
Ether extract	4.15	3.98	4.25
Crude fibre	4.65	8.50	5.25
Total ash	10.52	11.25	9.85
AIA	3.52	4.56	4.58
NFE*	53.25	51.25	52.82
Calcium	1.20	1.12	3.45
Lysine*	1.23	0.85	1.10
Methionine*	0.65	0.54	0.60

*Calculated value

carotid artery below the left ear lobe by a single incision and allowed to bleed for five minutes by holding the birds' heads down. After complete bleeding and cessation of movement the carcass weight was recorded. The carcass was then scalded at 55-58°C for 1 minute 30 seconds. This helps in easy removal of feathers and gives uniform skin colour along with good flesh quality.

The eviscerated carcass along with the edible offal was weighed and recorded as edible carcass yield. The total meat yield was calculated by subtracting the giblet weight (the weight of the heart without pericardium, liver without gall bladder and gizzard without the serous lining) from the weight of the edible carcass.

$$1. \text{Dressing \%} = \frac{\text{Dressed weight}}{\text{Live weight}} \times 100$$

$$2. \text{Giblet weight \%} = \frac{\text{Giblet weight}}{\text{Live weight}} \times 100$$

$$3. \text{Neck \%} = \frac{\text{Neck weight}}{\text{Eviscerated weight}} \times 100$$

$$4. \text{Wing \%} = \frac{\text{Wing weight}}{\text{Eviscerated weight}} \times 100$$

$$5. \text{Back \%} = \frac{\text{Back weight}}{\text{Eviscerated weight}} \times 100$$

$$6. \text{Breast \%} = \frac{\text{Breast weight}}{\text{Eviscerated weight}} \times 100$$

$$7. \text{Thigh \%} = \frac{\text{Thigh weight}}{\text{Eviscerated weight}} \times 100$$

$$8. \text{Drumstick \%} = \frac{\text{Drumstick weight}}{\text{Eviscerated weight}} \times 100$$

The proximate composition such as moisture, crude

Table. 2. Body weight, cumulative feed intake and cumulative FCR

Age (weeks)	Body weights (g)			Cumulative feed intake/ bird (g)	Cumulative body weight gain (g)	Cumulative FCR
	Male	Female	Combined			
1	57.00±1.47	53.08±1.13	53.89±0.71	100±0.32	31.95±0.17	3.13±0.01
2	105.40±1.61	94.63±2.08	96.87±1.28	220.00±0.70	74.93±0.53	2.93±0.02
3	155.90±2.62	138.16±3.34	141.93±2.04	350.00±0.72	119.99±0.78	2.91±0.01
4	212.80±4.57	182.02±4.94	188.43±3.16	494.0±0.50	166.49±1.20	2.96±0.04
5	278.00±6.84**	232.47±6.80	241.95±4.45	652.0±0.75	220.01±0.64	2.96±0.02
6	348.80±9.55**	293.55±8.12	305.06±5.42	826.0±1.04	283.66±0.39	2.91±0.03
7	416.40±11.56**	349.00±9.73	363.04±6.53	1022.0±0.91	341.10±2.14	2.99±0.04
8	506.40±15.96**	413.31±11.30	432.35±8.08	1232.0±0.75	410.41±1.78	3.00±0.05
9	591.50±18.02**	476.44±12.30	500.41±9.12	1460.0±1.29	478.47±1.98	3.05±0.06
10	698.30±18.58**	559.52±13.06	588.43±10.02	1702.0±1.43	566.49±2.06	3.00±0.04
11	787.00±16.82**	628.71±9.04	661.68±10.31	1962.0±1.82	639.74±2.43	3.06±0.12
12	905.70±19.02**	706.86±9.65	748.29±11.91	2236.0±1.38	726.35±1.54	3.07±0.03
13	922.80±18.32**	718.47±10.03	761.04±12.20	2490.0±2.21	739.10±1.25	3.36±0.02
14	1028.40±20.45**	790.84±10.73	840.33±13.68	2776.0±1.32	818.39±2.87	3.40±0.04
15	1054.80±17.81**	821.50±11.48	870.10±13.78	3086.0±0.48	848.16±3.14	3.63±0.02
16	1143.80±21.42**	885.23±12.72	939.10±15.37	3368.0±1.88	917.16±2.16	3.67±0.03
17	1214.30±22.94**	941.42±13.76	998.27±16.42	3662.0±3.50	976.33±3.18	3.75±0.05
18	1274.20±23.95**	990.86±14.37	1049.89±17.09	3978.0±3.10	1027.95±3.36	3.86±0.06
19	1323.80±25.35**	1043.44±14.81	1101.85±17.33	4308.0±2.72	1079.91±2.74	3.98±0.04
20	1380.80±24.99**	1098.36±15.08	1157.20±17.51	4652.0±4.21	1135.26±3.48	4.10±0.07

**Mean differ significantly within the rows (P<0.01)

protein, ether extract and total ash content of the chicken meat from the breast and thigh muscles were measured according to the procedure of AOAC (1995). The data obtained from the study were statistically analysed according to Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The body weight of males birds were 1028.40 g and female were 790.84 g at 20th week (Table-2). It was observed that males have significantly ($P<0.01$) higher body weight than females from 5th week to 20th week. But no difference in body weight was found upto 4th week. This may be due to higher rate of cell multiplication in males as well as influence of androgenic hormones on the growth rate of males (Chandra *et al.*, 2004). In contrast to the present findings, Pathak *et al.* (2015) recorded higher body weights of Kadaknath at different ages *i.e.* from day old to 20 weeks under intensive system of management, but Jha *et al.* (2013) reported lower body weights for the same ages of Kadaknath. However, Thakur *et al.* (2006) found significantly lower body weights for the same genetic group under free range system. The higher body weight in intensive system might be due to the supplementation of balanced diet and other proper managerial care.

The body weight gains increased progressively from 1st week upto 20th week. The male chicks recorded significantly ($P<0.01$) higher cumulative body weight gain compared to female chicks from 5th week to 20th week. In this study, at the age of 20th week, the body weight was 1157.20 g which was comparable with the value of 1145.73 g for indigenous chickens reared under intensive system of management as reported by Doley *et al.* (2009). Thakur *et al.* (2006) reported that Kadaknath attain 886.12 g body weight at 20 weeks of age with an overall gain of 858.68 g during 0-20 weeks under field condition which was much lower than the present findings of 1135.26 g gain in body weight during the same age which could be attributed to better feeding and managerial practices adopted in the present study. Jha and Prasad (2013) reported that the body weight of Vanaraja, Gramapriya and Aseel at 20th week was 2013.39, 1574.31 and 1038.75 g respectively. It was observed that the bodyweight of Kadaknath was comparable with Aseel birds.

Data pertaining to the weekly feed intake and cumulative feed intake of the birds are presented in Table 2. The cumulative feed intake per bird increased progressively. At the end of 20th week the cumulative feed intake of Kadaknath bird was 4652.00 g and the

Table. 3. Carcass traits and percentage yield of different cut up parts

Parameter	Male (g)	Female (g)
Live body weight (g)	1150.33±25.78*	964.66±2.96
Dressing (%)	74.17±1.33	75.46±0.52
Eviscerated weight	812.66±24.53*	686.33±6.64
Heart (g)	3.66±0.33	3.66±0.33
Liver (g)	17.00±2.00	18.00±0.57
Gizzard (g)	19.66±1.33	20.00±0.57
Giblet (%)	3.50±0.22	4.31±0.08*
Neck (%)	8.88±0.26	7.91±0.1
Wing (%)	13.52±1.13	15.10±0.07
Breast (%)	23.16±0.11	24.86±0.06**
Back (%)	21.06±1.08	20.30±0.23
Thigh (%)	16.96±0.44	16.70±0.04
Drumstick (%)	16.32±0.08**	15.10±0.03

*/** Mean differ significantly within rows ($P\leq0.05$, $P\leq0.01$)

Table. 4. Meat quality traits

Parameters (%)	Thigh muscle	Breast muscle
Moisture	74.83±0.60	73.77±0.40
Crude protein	80.08±0.90	83.31±0.44
Ether extract	9.07±0.40	6.26±0.13
Crude fibre	0.57±0.01	0.58±0.02
Total ash	3.66±0.15	7.75±0.18
Acid insoluble ash	0.06±0.01	0.08±0.01

cumulative body weight gain was 1135.26 g. The Feed conversion ratio of the birds upto 4th, 8th, 12th, 16th and 20th week were recorded to be 2.96, 3.00, 3.07, 3.67 and 4.10, respectively. An FCR value of 5.24 at 40 weeks of age was reported by Jha *et al.* (2013) in Kadaknath birds maintained under deep litter system of management. The mean cumulative FCR was 3.07 at 12th weeks of age which was in agreement with the observation of Gupta and Mehta (2016). They also found the FCR of 3.18 at 12 weeks of age in Kadaknath birds kept in deep litter system of housing. Jha and Prasad (2013) also reported that the FCR (upto 40th week) of the three coloured breeds like Vanaraja, Gramapiya and Aseel were 4.28, 3.85 and 5.47, respectively.

During the whole experimental period mortality rate of 3.8% was recorded during starter period (0-8 weeks) which was lower than 12.86% reported by Malik *et al.* (2009). On the other hand, the mortality of birds was higher under extensive system (17.13%) followed by those under semi-intensive system (15.28%) and intensive system (14.35%), but the differences were statistically non-significant in indigenous chicken as reported by Doley *et al.* (2009).

Data pertaining to mean carcass traits for the male and female birds are presented in Table 3. The live weight of males and females that was selected for carcass study was 1150.33 g and 964.66 g, respectively. Similarly the eviscerated weight was 812.66 and 686.33 g in males and females, respectively. As the live weights of the male birds was higher than females at 20 week, the eviscerated weight was also significantly higher in male birds. The breast yield (%) of the female birds was higher whereas the drumstick % was higher in male birds. No difference was observed with respect to other

cuts between the sex. Haunsi *et al.* (2013) reported lower dressing percent of 65-66% in Kadaknath and Aseel bird. But in the present experiment higher dressing % was observed. Other cut up parts percentage were similar as reported by Haunsi *et al.* (2013). Sharma and Naryankhedkar (2005) reported comparable carcass traits in the crosses of Kadaknath breeds.

From the proximate composition of thigh and breast muscle of male birds, it was found that the protein content of breast muscle (83.31%) was higher than thigh muscle (80.08%), whereas the ether extract of the thigh muscle was 9.07% as against 6.25% in breast muscle (Table 4). No difference was observed in moisture, crude fibre and acid insoluble ash content of both the muscle, but the total ash content of breast muscle was higher than the thigh muscle. Similar findings were also reported by Haunsi *et al.* (2013) who found higher protein value of 83.75 and 87.65 % for thigh and breast muscle, respectively from the meat of 20 week male Kadaknath bird. The economics of Kadaknath rearing in the intensive system was evaluated on 20 week taking the feed consumption and body weight gain (Table 5). From the dressing (%) the

Table. 5. Economics of production

Particulars	Values
Cumulative feed intake/bird (g)	4652
Cost of feed (₹/kg)	27.01
Feed cost/bird (₹)	125.60
Cumulative body weight gain/ bird (g)	1135.25
Feed cost/ kg live weight gain (₹)	110.63
Dressing (%)	74.81
Feed cost/kg of meat (₹)	129.41

feed cost per kg of meat was also evaluated. The cumulative FCR up to 20th week was 4.1. As the 20th week cumulative weight gain was 1135.25 g and feed intake was 4652 g, the feed cost per bird was ₹ 125.60 feed cost and per kg live weight gain was ₹ 110.63. Taking the dressing % of 74.81 (male birds) into account, the feed cost per kg of meat produced was ₹ 129.41.

CONCLUSION

From the above study it could be concluded that Kadaknath breed of chicken can be reared under intensive system of management in hot and humid climatic condition. From the economics of production it was found that the cost of production of per kg live weight gain was ₹ 110.63.

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