Growth And Reproductive Performance Of Kadaknath Chicken Reared Under Deep Litter System In The Hill Ecosystem Of Meghalaya, India

Abstract

The kadaknath is important native chicken breed in India. The present study was undertaken with the objective to evaluate the performance of kadaknath chicken under deep litter system in agro-climatic condition of Meghalaya to check for its adaptability in the hill ecosystem. The study was conducted at Poultry Farm Division, Indian Council of Agricultural Research (ICAR)Complex for North Eastern Hill (NEH) Region, Umiam, India. A total of 300 kadaknath parent stock chicks were procured from Directorate of Poultry Research (DPR), Hyderabad, India. The chicks were reared upto 72nd weeks to check their production performance viz., Average weekly body weight (gm), body weight gain (gm), feed intake (gm) and feed conversion ratio (FCR). Egg production traits and reproductive performances were also recorded upto 72 weeks of rearing. The result reveals that the average body weight of day old kadaknath chicks was about 27.05±0.32 gm. At 4th week of age, the average body weight was 117.37±2.69 gm andat 8th week of age, about 250.34±2.51 gm. In terms of average body weight gain (gm), it was found that the overall body weight gain from 0-8 weeks of age was 223.29±14.39 gm. The total feed consumption was about 771.43±1.94 gm upto 8th weeks of rearing. The FCR from 0-8 weeks of age was 3.56. The mortality rate of kadaknath chicks was observed to be about 5.00 % and 0.67 % during 0-4 and 4-8 weeks of age respectively. In conclusion, the kadaknath chicken is adapted well to the hill ecosystem of Meghalaya.

Keywords: Kadaknath, local chicken, FCR, deep litter, intensive, Meghalaya.

1. Introduction

Poultry farming amongst Indian livestock vocations occupies a special position because of enormous potential of bringing rapid economic growth incurring low investment. It is one of the most money-spinning businesses of agriculture that bestows nutritious meat and eggs for human consumption within the shortest duration of time. Understanding how Kadaknath chickens adapt to different agroclimatic zones across India can help farmers select suitable breeds and management practices for their specific regions, thereby maximizing productivity and minimizing risks. In India, there are 19 registered breeds of native chickens as per ICAR- National Bureau of Animal Genetic Resources; kadaknath is one among them (Accession No. INDIA_CHICKEN_1000_KADAKNATH_12009)(ICAR-NBAGR) The kadaknath is important native chicken breed in India. Kadaknath breed, also known as Kalamashi in Hindi, is known for its black-colored meat (Valavan et al., 2016). This breed is reared in Jhabua and Dhar districts of Madhya Pradesh by the tribal people (Jaishankar et al., 2020). The meat and eggs are considered rich sources of protein and iron (Haunshi et al., 2011). Mohan *et al.*, (2008) reported that the meat of the Kadaknath breed contains a high percentage (25.47%) of protein and is believed to have aphrodisiac properties. The skin, beak, shanks, toes and sole of the feet of Kadaknath birds are slate like in colour (Kamble et al., 2019). Most of the internal organs of Kadaknath birds exhibit intense black colouration, which is due to the deposition of melanin pigment, a genetic condition called “Fibromelanosis” (GIJ, 2018). Rao and Thomas, (1984) reported the Kadaknath breed contains a high percentage of protein and believed to have aphrodisiac properties. Kadaknath bird lays apparently 80-90 eggs annually (Rahangdale et al., 2017) and the bird has poor mothering ability as broody hen. The present study was undertaken with the objective to evaluate the performance of Kadaknath chicks under deep litter system in agro-climatic condition of Meghalaya.

2. Materials and methods

2.1 Climatic data

The present study was conducted at Poultry Farm Division, ICAR Research Complex for NEH, Umiam, India. The farm is located at 21.5° N to 29.5° N latitude and 85.5° E to 97.5° E longitude with an altitude of 1010 m above mean sea level. The annual rainfall ranges from 2500 to 3000 mm, and annual sunshine ranges from 3.4 to 8.8 h per day. The maximum temperature ranges from 29.30 to 28.00 °C, and minimum temperature ranges from 18.40 to 21.40 °C during

summer season (May, June, July and August). While maximum temperature ranges from 24.80 to 22.10 °C and minimum temperature ranges from 12.30 to 5.50 °C during winter season (November, December, January and February). The humidity varies from 61 to 90.50%, and average wind speed is 1.65 km/h. The study location is a unique hilly terrain forest with low population density, and pig rearing is an integral part of tribal production system in the Eastern Himalayan region. A total of 300 Kadaknath chicks were undertaken for this study. Birds were reared under deep litter system of management from day old up to 72 weeks of age. Birds were given *ad libitum* feed and water during chick stage(0-8 weeks). Climatic data were recorded from January, 2021 to July, 2022 as presented in Table 1.

Table. 1. Climatic variables during the whole study period (January, 2021 to July 2022)

Month	Max. Temp (°C)	Min. Temp (°C)	RH (Morning)	RH (Evening)
January, 2021	21.2	7.2	82.5	51.9
February, 2021	23.6	9.3	78.9	47.1
March, 2021	27.3	12.9	82.2	39.0
April, 2021	29.1	16.3	79.4	48.4
May, 2021	26.8	17.9	88.0	79.0
June, 2021	28.0	20.3	89.3	79.1
July, 2021	27.9	20.5	87.9	80.9
August, 2021	27.7	20.3	88.6	83.7
September, 2021	28.5	19.6	85.7	78.8
October, 2021	27.5	18.7	85.4	73.3
November, 2021	24.5	10.6	76.8	54.5
December, 2021	21.8	8.1	78.3	54.5
January, 2022	22.3	6.8	81.2	50.8
February, 2022	23.9	8.9	80.6	47.2
March, 2022	28.1	11.7	83.2	41.3
April, 2022	29.0	15.2	80.1	47.5
May, 2022	28.7	17.1	87.5	81.3
June, 2022	28.7	17.9	89.2	78.7
July, 2022	29.0	19.3	89.7	79.3

Abbreviations: Max. Temp- Maximum temperature; Min. Temp- Minimum temperature; RH- Relative Humidity

2.2 Production performance

Body weight was measured at weekly intervals up to 20th week of age with a weighing balance. Routine data recording from each pen included weekly body weight (random 10% of the females and all males) and daily number of collected eggs.

2.3 Parameters such as body weight gain, feed consumption, mortality rate, feed conversion ratio (FCR) and hen day egg production (HDEP) and reproductive performance were recorded. Feed intake per pen was recorded every day, and average daily feed intake (ADFI) was calculated by dividing pen's feed intake by the total number of birds (females and males) in the pen on that day and averaged for each week. HDEP was calculated by the following formula: Average daily egg production x 100/ Average daily number of birds alive.**Statistical analysis**

Statistical analysis such as mean, standard error and percentage were used to draw results and arrive at conclusions (SPSS, Version 23).

Results and Discussion

Average weekly body weight, body weight gain and feed intake in gm of kadaknath chicks has been presented in Table 2. The average body weight of day old kadaknath chicks was about 26.24 gm. At 4th week of age, the chicks weight at an average of about 122.35 gm. This finding is similar with the findings of Thakur *et al.,* (2006) and Chatterjee *et al.,* (2007), who also stated in their report that the average body weight of kadaknath chicks was around 128 gm and 125 gm respectively. This comparison reinforces the consistency and reliability of the observed growth patterns in Kadaknath chicks across different studies, thereby enhancing the credibility of the current research findings. But, the current findings differs from that of Pathak *et al.,* (2015) who reported higher average body weight of kadaknath chicks at 4 weeks of age (192 gm). Differences in productive performance in poultry across varying climatic conditions primarily stem from the birds' physiological sensitivity to temperature, humidity, and other environmental factors. At 8th week of age, the chicks weight at an average of about 242.73 gm under deep litter system of management in agro climatic condition of Meghalaya. However, this finding differs from the findings of Chatterjee *et al.,* (2007), who reported in their findings, that the average body weight of kadaknath chicks at 8 week of age was 275 gm, which is slightly higher than the present study.

In terms of average body weight gain, it was found that the overall body weight gain from 0-8 weeks of age was 216.49 gm. This finding is in contradiction with the findings of Chatterjee *et al.*, (2007), who reported a body weight gain of about 73.8 gm during 0-2 weeks and 221 gm during 2-8 weeks of age. The difference in the weight gain in the present study in comparison to other researcher may be due to the difference in managemental practice, type of feed and geographical condition etc. The overall feed intake was about 771.43 gm during 0-8 weeks of age.

Table 2. Average weekly body weight, body weight gain and feed intake in gm of kadaknath chicks (0-8weeks). (Mean ± SE)

Age	Av. B.wt	Av. B.wt Gain	Av. feed intake
Day old	27.05±0.32	-	-
1st week old	36.81±0.54	9.76±0.67	45.20±1.66
2nd week old	61.05±1.58	24.24±1.47	72.89±0.94
3rd week old	80.59±0.95	19.54±1.76	86.49±2.08
4th week old	117.37±2.69	36.78±2.07	99.78±1.52
5th week old	182.84±3.42	65.47±2.85	110.56±2.86
6th week old	195.06±9.82	12.22±10.49	113.30±1.95
7th week old	209.86±4.77	13.6±10.69	120.54±2.39
8th week old	250.34±2.51	41.68±5.83	122.67±2.00
Overall	**-**	**223.29±14.39**	**771.43±1.94**

Abbreviations: **Av. B.wt: Average body weight (gm); Av. B.wt Gain- Average body weight gain; Av. feed intake- Average feed intake**

The fortnightly body weight of kadaknath birds during 8-20 weeks of age has been presented in Table 3. The body weight of kadaknath grower at 20 week of age was 832.55±31.19 gm, which is slightly lower than the findings of Yadav and Bhimawat, (2020), who stated in their study that the average body weight of kadaknath growers at 20th week of age in Bhilwara district

of Rajasthan was 888±5.66 gm. Such differences may be attributed to variations in genetic strains, nutritional management, environmental conditions, or sample populations.

Table 3. Fortnightly body weight of kadaknath birds during 8-20 weeks of age. (Mean ± SE)

Age	Average body weight (g)
8th week	242.73±4.36
10th week	357.15±15.31
12th week	423.05±29.91
14th week	606.10±20.12
16th week	590.60±28.15
18th week	703.75±28.79
20th week	832.55±31.19

The FCR of Kadaknath chicks (Table- 4) under deep litter system in agro-climatic condition of Meghalaya during 0-4 weeks and 4-8 weeks of age was found to be 3.17 and 3.88 respectively. The FCR from 0-8 weeks of age was 3.56. Mortality rate was observed to be about 5.00% and 0.67% during 0-4 and 4-8 weeks of age. However, the overall mortality rate of Kadaknath chicks was about 5.67%.

Table 4. Average FCR of kadaknath chicks. (Mean ± SE)

Age	Mean±SE
FCR	
0-4 weeks old	3.17±0.25
4-8 weeks old	3.88±0.47
Overall FCR (0-8 weeks)	**3.56±0.29**
Mortality	
0-4 weeks old	5.00±0.05
4-8 weeks old	0.67±0.02
Overall Mortality (0-8 weeks)	**5.67±0.03**

Age at the time of the first egg (Table 5) was 219.33 + 15.76 days. Current results differs from that of Bhagora *et al.*(2022), who found that the age at which Kadaknath chickens laid their first egg was 195.223.62 days. This may be due difference in nutritional and environmental factors. The average weight at first egg recorded was 28.54±1.37. The Kadaknath chicken in this study attained its peak egg production potential at 40th week of age, with a HDEP (Hen Day Egg Production) of about 52.38 percent.

Table 5. Age at first egg, weight of first egg and HDEP (Mean ± SE)

Parameters	Mean±SE
Age at first egg (Days)	219.33±15.76
Weight of first Egg (gm)	28.54±1.37
HDEP (%) at	
26th week	0.84±0.50
30th week	11.34±2.33
37th week	34.92±6.89
40th week	52.38±6.23
48th week	39.70±4.40
57th week	30.16±5.37
62th week	31.74±5.23

The reproductive traits of Kadaknath chicken has been presented in Table 6. Kadaknath breed of chicken has good fertility (90.61%) and hatchability on TES (73.80%) status. The hatchability on Fertile Egg Basis was 73.80±2.42.

Table 6. Reproductive traits of Kadaknath chicken.

Variety	Hatchability on TES (%)	Hatchability on Fertility Basis (%)	Fertility (%)
Kadaknath	67.14±2.43	73.80±2.42	90.61±1.23

Conclusion

In conclusion, kadaknath chicken has demonstrated comparable performance to local varieties in terms of production in the hill ecosystem. However, there is room for improvement in

terms of body weight and egg weight. This indicates a growing tendency for adaptation of this indigenous breed in the hill ecosystem.

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