

## Original Research Article

### **Growth and Reproductive Performance of Kadaknath chicken reared under deep litter system in the hill ecosystem of Meghalaya**

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#### **Abstract**

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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. The study was conducted at Poultry Farm Division, ICAR Research Complex for NEH, Umiam, India. The result reveals that the average body weight of day old kadaknath chicks was about 26.24 g. At 4<sup>th</sup> week of age, the chicks weight at an average of about 122.35 gm. At 8<sup>th</sup> week of age, the chicks weight at an average of about 242.73 gm. 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. The total feed consumption was about 771.43 gm during nursery management. 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.

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**Commented [U5]:** State the numbers and duration of experimented animals. Also, state the parameters collected.

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

#### **1. Introduction**

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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. In India, there are 19 registered breeds of native chickens as per ICAR- National Bureau of Animal Genetic Resources; kadaknath is one among

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them (Accession No. INDIA\_CHICKEN\_1000\_KADAKNATH\_12009). The kadaknath is important native chicken breed in India. Kadaknath breed, also known as Kalamashi in Hindi, is known for its black-colored meat [1]. This breed is reared in Jhabua and Dhar districts of Madhya Pradesh by the tribal people [2]. The meat and eggs are considered rich sources of protein and iron. Mohan *et al.*, [3] 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 [4]. 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” [5]. Rao and Thomas [6] reported the Kadaknath breed contains a high percentage of protein and believed to have aphrodisiac properties. Kadaknath bird lays apparently 80-90 eggs annually [7] 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.

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## 2. Materials and methods

### 2.1 Climatic data

The present study was conducted at Poultry Farm Division, ICAR Research Complex for NEH, Umiam, India. 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 nursery stage (0-8 weeks). Climatic data were recorded from January, 2021 to July, 2022 is presented in Table 1.

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

| Month          | Max. Temp<br>(°C) | Min. Temp<br>(°C) | RH<br>(Morning) | RH<br>(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            |

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|                 |      |      |      |      |
|-----------------|------|------|------|------|
| 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: RH- Relative Humidity

## 2.2 Production performance

Body weight was measured at weekly intervals up to 20<sup>th</sup> week of age.

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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.

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## 2.3 Statistical analysis

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Statistical analysis such as mean, standard error and percentage were used to draw results and arrive at conclusions.

## 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 4<sup>th</sup> 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.*, [8] and Chatterjee *et al.*, [9], who also stated in their report that the average body weight of kadaknath chicks was around 128 gm and 125 gm respectively. But, the findings differs from that of Pathak *et al.*, [10] who reported higher average body weight of kadaknath chicks at 4 weeks of age (192 gm). At 8<sup>th</sup> week of age, the chicks weight at an average of about 242.73 gm under deep litter system of management in agro climatic

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condition of Meghalaya. However, this finding differs from the findings of Chatterjee *et al.*, [9], 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.*, [9], 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 managerial 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  | -                   | -                  |
| 1 <sup>st</sup> week old | 36.81±0.54  | 9.76±0.67           | 45.20±1.66         |
| 2 <sup>nd</sup> week old | 61.05±1.58  | 24.24±1.47          | 72.89±0.94         |
| 3 <sup>rd</sup> week old | 80.59±0.95  | 19.54±1.76          | 86.49±2.08         |
| 4 <sup>th</sup> week old | 117.37±2.69 | 36.78±2.07          | 99.78±1.52         |
| 5 <sup>th</sup> week old | 182.84±3.42 | 65.47±2.85          | 110.56±2.86        |
| 6 <sup>th</sup> week old | 195.06±9.82 | 12.22±10.49         | 113.30±1.95        |
| 7 <sup>th</sup> week old | 209.86±4.77 | 13.6±10.69          | 120.54±2.39        |
| 8 <sup>th</sup> week old | 250.34±2.51 | 41.68±5.83          | 122.67±2.00        |
| <b>Overall</b>           | -           | <b>223.29±14.39</b> | <b>771.43±1.94</b> |

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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 [11], who stated in their

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study that the average body weight of kadaknath growers at 20<sup>th</sup> week of age in Bhilwara district of Rajasthan was 888±5.66 gm.

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

| Age                   | Average body weight (g) |
|-----------------------|-------------------------|
| 8 <sup>th</sup> week  | 242.73±4.36             |
| 10 <sup>th</sup> week | 357.15±15.31            |
| 12 <sup>th</sup> week | 423.05±29.91            |
| 14 <sup>th</sup> week | 606.10±20.12            |
| 16 <sup>th</sup> week | 590.60±28.15            |
| 18 <sup>th</sup> week | 703.75±28.79            |
| 20 <sup>th</sup> 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%.

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

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

Age at the time of the first egg (Table 5) was  $219.33 \pm 15.76$  days. Current results differs from that of Bhagora *et al.* [12], 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  $28.54 \pm 1.37$ . The Kadaknath chicken in this study attained its peak egg production potential at 40<sup>th</sup> 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  $\pm$  SE)**

| Parameters               | Mean $\pm$ SE      |
|--------------------------|--------------------|
| Age at first egg (Days)  | 219.33 $\pm$ 15.76 |
| Weight of first Egg (gm) | 28.54 $\pm$ 1.37   |
| <b>HDEP (%) at</b>       |                    |
| 26 <sup>th</sup> week    | 0.84 $\pm$ 0.50    |
| 30 <sup>th</sup> week    | 11.34 $\pm$ 2.33   |
| 37 <sup>th</sup> week    | 34.92 $\pm$ 6.89   |
| 40 <sup>th</sup> week    | 52.38 $\pm$ 6.23   |
| 48 <sup>th</sup> week    | 39.70 $\pm$ 4.40   |
| 57 <sup>th</sup> week    | 30.16 $\pm$ 5.37   |
| 62 <sup>th</sup> week    | 31.74 $\pm$ 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  $73.80 \pm 2.42$ .

**Table 6. Reproductive traits of Kadaknath chicken.**

| Variety   | Hatchability on TES (%) | Hatchability on Fertility Basis (%) | Fertility (%)    |
|-----------|-------------------------|-------------------------------------|------------------|
| Kadaknath | 67.14 $\pm$ 2.43        | 73.80 $\pm$ 2.42                    | 90.61 $\pm$ 1.23 |

### Conclusion

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

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

## References

1. Valavan, S. E., Omprakash, A. V., & Bharatidhasan, A (2016). Production Performance of Kadaknath in an Organized Poultry Farm. *International Journal of Applied and Pure Science and Agriculture (IJAPSA)*, 2(11), 126-128.
2. Jaishankar, S., Jyothi Priya, R., Sheeba, A., & Ilavarasan, S (2020). Productive and Reproductive Performance of Kadaknath Chicken under Semi-intensive System. *Int.J.Curr.Microbiol.App.Sci* 9(4): 513-517.
3. Mohan, J., K. V. H. Sastry, R. P. Moudgal, and J. S. Tyagi (2008). Performance profile of Kadaknath desi hens under normal rearing system. *Int. J. Poult. Sci.* 43:379–381.
4. Kamble, P., Kadam, M., Khose, K., Patil, A., & Rathod, P (2019). Optimization of Dietary Protein and Energy Requirement of Kadaknath Chicken During the Starter Phase. *Journal of Animal Research*, 9(1), 135-141.
5. G. I. J (2018). Government of India, Geographical Indications Journal, 104: 9-10.
6. Rao GV, Thomas PC (1984). The breed characteristics of Kadaknath breed of indigenous (Desi) chicken. *Avian Research*, 68:55-57.
7. Rahangdale, P.B., Sahu, B. and Dange, A. 2017. Growth performance of Kadaknath poultry breed in intensive and backyard rearing. *Contemp. Res. Ind*, 7(3): 354-359.
8. Thakur, M. S., S. N. S. Parmar, and P. V. A. Pillai (2006). Studies on growth performance in Kadaknath breed of poultry." *Livestock Research for Rural Development*, 18.8: 128-132.
9. Chatterjee, R. N., Sharma, R. P., Reddy, M. R., Niranjana, M., & Reddy, B. L. N (2007). Growth, body conformation and immune responsiveness in two Indian native chicken breeds. *Livestock Research for Rural Development*, 19(10), 1-7.
10. Pathak, Prajwalita, et al. (2015). Studies on growth and carcass traits of Aseel and Kadaknath chicken. *Indian Journal of Poultry Science*, 50.3: 327-328.
11. Yadav, C. M., and Bhimawat, B. S. (2020). Growth Performance of Kadaknath Poultry of Tribal Farmers in Bhilwara district of Rajasthan." *Indian Res. J. Ext. Edu.* 20 (2&3)

12. Bhagora, Nikesh., J, Mishra., Fulabhai, Ramkailash., Savaliya, P., Patel, B Atul., Singh, Vijay (2022). Lonkar Production Performance, Phenotypic and Carcass Quality Sensory Evaluation of Kadaknath, Rhode Island Red Chicken and their Reciprocal Crosses. The Indian Journal of Veterinary Sciences and Biotechnology, Volume 18 Issue 1.

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