Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

J E Z S Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(4): 1504-1507

Received: 16-05-2020
Accepted: 19-06-2020

VK Singh
BAIF Institute for Sustainable Livelihoods and Development-UP38 A, Dandi, Rewa Road, Prayagraj, Utter Pradesh, India

Abhishek Pandey
BAIF Institute for Sustainable Livelihoods and Development-UP38 A, Dandi, Rewa Road, Prayagraj, Utter Pradesh, India

Corresponding Author:
VK Singh
BAIF Institute for Sustainable Livelihoods and Development-UP38 A, Dandi, Rewa Road, Prayagraj, Utter Pradesh, India

Comparative study of growth performance and economics in CARI Nirbheek and Kadaknath breed of poultry

VK Singh and Abhishek Pandey

Abstract
This comparative study on growth pattern, gain in body weight, Feed Conversion Ratio and economics of rearing of CARI Nirbheek and Kadaknath breed of poultry was conducted to understand which local breed among CARI Nirbheek and Kadaknath will be suitable for backyard poultry in the areas around Shahjahanpur. Only Single-generation data was collected for the purpose of this study (2019). There is significant variation in body weight, body weight gain, feed intake and economic benefits for CARI Nirbheek and Kadaknath. The average body weight gains at the age of 1st, 5th, 9th and 13th weeks for both the breeds i.e. CARI Nirbheek and Kadaknath are 39.42±1.84, 522.85±4.14, 501.48±10.60, 458.65±24.23 and 41.66±1.33, 376±5.57, 466.00±32.23, 444.23±46.29 respectively. Higher body weights were observed for CARI Nirbheek breed as compared to Kadaknath breed at different ages. The average body weight of the both CARI Nirbheek and Kadaknath at the age of 13 weeks are 1560.85±22.38 g and 1356.90±35.45 respectively. Feed conversion ratio was 3.44±0.05 and 4.50±0.17 for CARI Nirbheek and Kadaknath respectively. Benefit cost ratio for CARI Nirbheek and Kadaknath are 1.71±0.03 and 2.31±0.07 respectively.

Keywords: body weight, CARI Nirbheek, feed conversion ratio, growth performance, Kadaknath

Introduction
India is an agrarian economy and around 69% of the population lives in rural areas and about 56.6% population of the country are dependent on agriculture and allied sectors for their livelihood as per Census of India (2011) [1]. Farming, rearing large ruminants like cattle, rearing small ruminants like sheep, goat, poultry are few livelihood options for the farmers (Misra *et al*., 2006) [2]. Among these options, poultry contributes greatly to India's economy (Nath *et al.*, 2012) [3] and is considered as one of the easiest ways for poor farmers to raise their income in rural areas. As per Singh (2000) [4], traditional and backyard poultry has always been considered as major source for protein and additional income for 50% population of this country. According to Randhawa (1946) [5], backyard poultry production is an old practice in rural India, tracing back to Indus valley civilization. It is of great importance in a country like India as it not only generates income and livelihood opportunities to small farmers including women but also brings about desired socio-economic change in rural areas which are significant for rural development and rural prosperity (Padhi, 2016) [6]. As per Wong *et al.*, (2017) [7], poultry farming also has central role of income generation for resource poor households. That is why they are considered to be the first rung in the livestock ladder – "Poultry are the seeds you sow to get the fruits, cattle" (Aklilu *et al.*, 2008) [8]. It can be used as a powerful tool for alleviating rural poverty, eradication of malnutrition and generating gainful employment in large rural areas (Chatterjee and Rajkumar, 2015) [9]. As per Drewnowski (2010) [10], village or backyard production may also contribute fruitfully to the intake of dietary protein vitamin A, vitamin B12, riboflavin, iron and zinc. It is also a good source of folate, selenium, vitamin D, and vitamin K (Applegate, 2000) [11].
Traditional poultry is done in a small place in the backyard of the house and can be reared by feeding the remaining food along with the grains. Most poultry production involves rearing native birds (like Titri, Teni, Kalasthi, Kadaknath, etc.), which have low production performance when compared to advanced breeds, that has been reported by Padhi (2016) [6] and Haunshi *et al.* (2009) [12]. However, backyard poultry production can be easily increased with advanced varieties of chicken and can ensure better production of both meat and eggs. In recent times, improved backyard varieties (e.g. Vanaraja, CARI Nirbheek, Grampriya,

Srinidhi, Giriraj, etc.) (Pal *et al*., 2019) [13] developed by the public sector and some by private sector (like croiler, rainbow roaster, etc.) are contributing significantly to the total chicken eggs and meat production in the country.

But now it faces severe risks as most of the commercial poultry production in the present scenario is concentrated in urban and peri-urban areas. Only 25% of the population living in urban areas consume about 75–80% of eggs and poultry meat (Chatterjee and Rajkumar, 2015) [9]. However, being less capital extensive, the high market prices offered for local poultry, backyard systems are likely to make a comeback, despite increased competition from commercial sectors.

Kadaknath is an important indigenous breed of poultry mainly found in MP, Odisha and Chhattisgarh. It is poor in egg production, but their black flesh is very delicious and popular. Its flesh is of higher value and is being used for the treatment of many diseases in human beings by tribal/Adivasis living in Jhabua District of Madhya Pradesh. However, proper scientific evaluation is required to verify these claims (Thakur *et al*., 2006) [14]. In various parts of India, Kadaknath birds are in great demand and are very costly. As per Rao and Thomas (1984) [15], the meat and eggs are also reckoned to be a rich source of protein demand of Kadaknath has increased recently in the urban centers around district Shahjahanpur of UP like Bareilly, Lucknow, etc. With demand, the price of these birds also increases. Therefore, it is important to understand its growth pattern and the socio- economic benefits of this breed vis a vis other relatively less famous and economical breeds like CARI Nirbheek.

Materials and Methods

The area under study, Shahjahanpur, is categorized under mid- western plain zone of Uttar Pradesh. District Shahjahanpur is situated in South East of Rohilkhand Division. Geographically, it is situated at 27.35 N Latitude and 79.37 E longitude (Shahjahanpur.nic.in) [16]. The climate in Shahjahanpur is characterized as warm and temperate. There is much more rainfall in Shahjahanpur in winter than in summer. As per the Köppen-Geiger system, climate in Shahjahanpur is classified as Csa. The average annual temperature in Shahjahanpur is 25.1 °C or 77.2 °F. The rainfall here is around 1105 mm (43.5 inch per year). The study was conducted between October 2019 to January 2020 under CLDP project, implemented by BISLD UP and supported by RPSCL.

Poultry Management: A large poultry shed was constructed of about 60 square feet for 30 large birds. But separate arrangement was made for chicks initially for brooding. For brooding management, hover like structure has been designed by using locally available material, especially those which can be readily available in one's house like iron sheet, wire, bricks, etc. To make this structure, a long iron sheet of 6ft long and 3ft wide was used and placed at one corner of the poultry house with support on two edges. The height of the iron sheet from the floor is about 1.5 ft. 3 bulbs of 200 watts were placed under the iron sheet at equal spacing, so that light and heat is evenly distributed in the shed. In case of power cut, an arrangement of charging light has been made.

Participants selection and study: For this study, 10 farmers (women from SHGs) from 2 villages were selected and each of them were provided with 30 chicks which were brought from CARI, Izatnagar, Bareilly. Out of 10 farmers, 3 farmers were provided with Kadaknath and the other 7 farmers were provided CARI Nirbheek. Apart from this, they were given pre- starter, starter, grower and finisher ration up to 13 weeks. Along with this, chicks were being periodically dewormed and vaccinated. None of the chicks were harmed during the study and all the vaccination and deworming was done by the veterinary doctor.

Data Collection and Analysis: To record relevant data, BAIF poultry experts have designed a format and two field guides and two supervisors were assigned to facilitate in data collection process. The body weights were recorded weekly from 0 to 13th weeks of age. Feed consumption was recorded similarly in the same pattern. The data collected through the format from all the 10 farmers' poultry house were analysed using two sample t- test.

Results and Discussion

The present investigation was carried out to detect an increase in body weight in the CARI Nirbheek and Kadaknath breeds of poultry under field conditions. The native chickens have special characteristics of tropical adaptability, improved resistance to disease and meat quality. These properties will lead to economically viable backyard poultry farming, which can be used on a large scale in rural areas.

Body weight (0-13th week): The mean values of day- old, 1st, 5th, 9th and 13th week body weight of CARI Nirbheek and Kadaknath chicks are given in table 1. It was found that mean value of day- old chick is higher in case of CARI Nirbheek as compared to Kadaknath and this difference is highly significant as indicated in the Table 1. Similar pattern has been observed in case of 1st, 5th, 9th and 13th week body weight, i.e., in all these weeks, mean values of body weight of CARI Nirbheek is recorded higher than Kadaknath. However, the difference is significant in case of 1st week (CARI Nirbheek- 77.85±1.55 gm, Kadaknath- 70.66±2.33 gm) and 9th week (CARI Nirbheek- 1102.20±9.78 gm, Kadaknath- 912.66±35.55 gm), whereas, the difference is highly significant in case of 5th week (CARI Nirbheek- 600.71±4.14 gm, Kadaknath- 446.66±3.33 gm) and 13th week (CARI Nirbheek- 1560.85±22.38 gm, Kadaknath 1356.900±35.45 gm) body weight. These findings on CARI Nirbheek and Kadaknath are in close agreement with Khadda *et al*., (2007) [17] and Ekka *et al*., (2018) [18]. The variation in results can be attributed to geographical location, feeding and housing pattern. Also, similar to this findings, several researchers like Pal *et al*., (2019) [13], Mekky *et al*., (2008) [19]; Nath *et al*., (2007) [20] ; Ulaganathan *et al*., (1989) [21]; Padhi *et al.* (1992) [22]; Mallik *et al*., (2005) [23]; Jayalaxmi *et al*., (2009) [24] and Rajkumar *et al*., (2015) [25], while using different chicken breeds, reported that crossbreeds have superiority over pure breeds for body weight at different ages.

Table 1: Overall average body wt. (g) between 0 to 13th week of Carri Nirbheek and Kadaknath poultry breed.

Breed	Carri Nirbheek	Kadaknath	t-Value
Age in weeks	Mean	Mean	
Day old chicks	38.42±.65	29±1.53	6.86 **
1 week	77.85±1.55	70.66±2.33	2.55*
5 weeks	600.71±4.14	446.66±3.33	22.49**
9 weeks	1102.20±9.78	912.66±35.55	5.13*
13 weeks	1560.85±22.38	1356.900±35.45	4.94**

Average Body weight gain and feed conversion ratio (0 to 13th week age): As depicted in Table 2, difference in body weight gain in CARI Nirbheek and Kadaknath during the first week (between 0-1 week) is not significant. However, body weight gain is highest in between the age of 2 to 5 weeks for CARI Nirbheek (522.85±4.14 gm). Corresponding BWG for Kadaknath is 376±5.57 gm. Therefore, there is highly significant difference between BWG for CARI Nirbheek and Kadaknath between the age of 2 to 5 weeks. There was no significant difference between the BWG of CARI Nirbheek and Kadaknath for the age of 6 to 9 weeks and 10 to 13 weeks. It was found that CARI Nirbheek breed had significantly higher overall average gain in body weight 1522.42±22.93 gm) when compared to Kadaknath breed (1327.900±36.10 gm). Similar observations regarding superiority of crossbreed over Kadaknath for body weight gain has been reported by Gurung and Singh, (1999) [26] and Sharma *et al*., (2012) [27]

Analysis of FCR shows that there is no significant difference in FCR at the age of 0 -1 week in CARI Nirbheek (1.63) and Kadaknath breed (1.60). Average feed conversion ratio during 2 to 5, 6 to 9 and 10 to 13 weeks of age was 2.03±0.04, 3.97±0.09 and 4.64±0.11 in CARI Nirbheek and 3.35±0.09, 4.73±0.20 and 5.71±0.20 in Kadaknath respectively, which is in close agreement with the findings of Haunshi *et al.*, (2007) [28] and differences were highly significant for these weeks as shown in Table 2. It was found that the overall feed conversion ratio is lower in CARI Nirbheek, a crossbreed (3.44±0.05) as compared to Kadaknath, an indigenous breed (4.5±0.17) which is also reported by Padhi *et al*., (2016) [6] and this difference is highly significant. The present findings are also in close agreement with the findings of Bhatti *et al*., (1997) [29] and Gupta *et al*., (2010) [30] which suggest that indigenous breed have higher FCR than crossbreed. The difference in results of other studies can be attributed to difference in type of birds, amount of feed taken, management system and environment conditions.

Table 2: Average Body weight gain and feed conversion ratio (0 to 13th week age)

Breed	Carri Nirbheek Kadaknath			Carri Nirbheek Kadaknath		
Age In week	BWG Mean	BWG Mean	t-Value	FCR Mean	FCR Mean	t-Value
1 week	39.42±1.84	41.66±1.33	0.74NS	1.63±0.03	1.60±0.02	0.77NS
5 weeks	522.85±4.14	376±5.57	19.98**	2.03±0.04	3.35±0.09	-15.37**
9 weeks	501.48±10.60	466.00±32.23	1.39NS	3.97±0.09	4.73±0.20	4.06**
13 weeks	458.65±24.23	444.23±46.29	0.35NS	4.64±0.11	5.71±0.20	5.05**
Total	1522.42±22.93	1327.900±36.10	4.01**	3.44±0.05	4.50±0.17	8.25**

BWG- Body weight growth

Economics of CARI Nirbheek and Kadaknath per family

The total recurring and non- recurring cost (that includes cost of feeding, medicines, chicks, poultry house cost per cycle, etc. and other costs) and income from sale of chickens are presented in Table 3. The investigation revealed that the average expenditure of rearing CARI Nirbheek and Kadaknath chicken per farmer was Rs. 6374.46±460.03 and 7073.53±300.59 respectively and hence not significantly different. The total gross income earned from sale of birds of CARI Nirbheek and Kadaknath breeds was Rs. 10926±156.66 and Rs. 15058.57±629.04 per family for the batch of 30 birds respectively, which shows that the difference in incomes is significant. Net income per farmer was found to be Rs. 4551.53±159.63 in CARI Nirbheek breed and Rs. 7985.03±466.49 in Kadaknath and which statistically shows highly significant difference to each other. The benefit cost ratio was recorded 1.71±0.03 per family in CARI Nirbheek which is quite close to the findings by Khadda *et al*., (2017) [17] and 2.31±0.07 is BCR for Kadaknath breed. High BCR for Kadaknath can be attributed to its medicinal properties as observed by Sharma *et al*., (2012) [27].

Table 3: Economics of CARI Nirbheek and Kadaknath per family.

Particulars	CARI Nirbheek	Kadaknath	t-Value
	Mean Value	Mean Value	
Total expenditure in Rs	6374.46±460.03	7073.53±300.59	-2.27NS
Gross income in Rs	10926.00±156.66	15058.57±629.04	-6.375*
Net income in Rs	4551.53±159.63	7985.03±466.49	-9.13**
BCR	1.71±0.03	2.31±0.07	-6.90**

Conclusion

CARI Nirbheek has performed better in various growth performance parameters and feed parameters like body weight, body weight gain and FCR as compared to Kadaknath under backyard poultry conditions. However, due to the huge claimed benefits of Kadaknath, price offered to it is way greater than CARI Nirbheek, therefore, BCR of Kadaknath is higher than CARI Nirbheek. Hence, it will be better to rear Kadaknath under backyard poultry system if the market linkages are well established and connectivity to big urban centers are present around the district of Shahjahanpur. However, since performance of CARI Nirbheek in growth parameters is better than Kadaknath, it is suggested to conduct in- depth study of nutritional benefits of CARI Nirbheek so that these can be compared with claimed benefits of Kadaknath which can help it in fetching better rates than Kadaknath in backyard poultry system.

Acknowledgement

We extend our gratitude to the management of RPSCL, which has provided all kinds of support in conducting this study. This study would not have been possible without the exceptional support from our colleague Mr. Dinesh Dwivedi and his team, who facilitated in data collection. Special thanks to Mr. A.K. Sinha and Dr. Raviraj Jadhav for allowing us to work freely and providing timely guidance.

References

1. https://censusindia.gov.in. 7 July, 2020.
2. Misra AK, Subrahmanyam KV, Vijoy Sankar Babu M, Reddy TY, Shivarudrappa B, Ramakrishna YS *et al*. Improving the livelihood of landless and marginal farmers through sheep rearing in rainfed agro-ecosystem of India. Livestock Research for Rural Development. 2006; 18: Article #73.
3. Nath BG, Pathak PK, Mohanty AK. Constraints analysis of poultry production at Dzengu area of North Sikkim in India. Iranian Journal of Applied Animal Science. 2012;

2(4):397-401.
4. Singh DP. Thrills and challenges of for backyard poultry production. In proceedings of recent advances in rural poultry farming, 2000, 7-16, CARI, Izatnagar.
5. Randhawa MS. Role of domesticated animals in Indian history. Science and Culture, 1946, 12(1).
6. Padhi MK. Importance of Indigenous Breeds of Chicken for Rural Economy and Their Improvements for Higher Production Performance. Scientifica (Cairo). 2016; 2016:2604685.
7. Wong JT, de Bruyn J, Bagnol B, Grieve H, Li M, Pym R, *et al*. Small-scale poultry and food security in resource-poor settings: a review. Global Food Security. 2017; 15:43-52.
8. Aklilu HA, Udo HMJ, Almekinders CJM. How resource poor households value and access poultry: village keeping in Tigray, Ethiopia. Agricultural Systems. 2008; 96(1-3):175-183.
9. Chatterjee RN, Rajkumar U. An overview of poultry production in India. Indian Journal of Animal Health. 2015; 54(2):89-108.
10. Drewnowski A. The Nutrient Rich Foods Index helps to identify healthy, affordable foods. American Journal of Clinical Nutrition. 2010; 91:1095S-1101S.
11. Applegate E. Introduction: nutritional and functional roles of eggs in the diet American Journal of Clinical Nutrition. 2000; 19(Suppl. 5):495S-498S.
12. Haunshi S, Dooley ST, Shakuntala I. Production performance of indigenous chicken of northeastern region and improved varieties developed for backyard farming. Indian Journal of Animal Sciences. 2009; 79:901-05.
13. Pal S, Gupta T, Wagh S, Yadav DK. Comparisons of growth performance of direct and reciprocal crosses of Aseel Peela (AP) and Kadaknath (KN) with Cari-Red. Journal of Entomology and Zoology Studies. 2019; 7(2):1356-1359.
14. Thakur MS, Parmar SNS, Pillai PVA. Studies on growth performance in Kadaknath breed of poultry. Livestock Research for Rural Development. 2020; 18: Article #116.
15. Rao GV, Thomas PC. The breed characteristics of Kadaknath breed of indigenous (Desi) chicken; Avian Research. 1984; 68:55-57.
16. https://shahjahanpur.nic.in. 7 July, 2020.
17. Khadda BS, Lata K, Kumar R, Jadav JK, Singh B, Palod J *et al*. Production performance and economics of CARI Nirbheek chicken for backyard farming under semi-arid ecosystem in central Gujarat, India. Indian Journal of Animal Research. 2017; 51:382-386.
18. Ekka P, Singh M, Mukherjee K, Barwa DK, Jain A, Choudhary M *et al*. Carcass characteristics of Kadaknath fowl reared under intensive system in Chhattisgarh. International Journal of Advanced Biological Research. 2018; 8(1):106-109.
19. Mekky SS, Galal A, Zaky HI, Zein-EI-Dein A. Diallel crossing analysis for body weight and egg production traits of two native Egyptian and two exotic chicken breeds. International Journal of Poultry Science. 2008; 7:64-71.
20. Nath M, Singh BP, Saxena VK, Singh RV. Analyses of cross-breeding parameters for juvenile body weight in broiler chicken. Journal of Applied Animal Research. 2007; 32:101-106.
21. Ulaganathan V, Rathnasabapathy V. Genetic effects of influencing juvenile body weight in meat type chicken estimated from diallel mating system. Indian Veterinary Journal. 1989; 66:308-313.
22. Padhi MK. Estimation of crossbreeding parameter in a complete diallel experiment using four broiler lines. M.V.Sc. Thesis, Indian Veterinary Research Institute, Deemed University, Izatnagar, Bareilly, UP., India, 1992.
23. Mallik BS, Didar Singh, Singh RP. Evaluation of production performance of two strains of white Leghorn and their crosses. Proceedings of IPSACON, 2005.
24. Jaya Laxmi P, Ramesh Gupta B, Chatterjee RN, Sharma RP, Ravinder Reddy V. Combining ability analysis for certain economic traits in White Leghorn. Indian Journal of Poultry Science. 2009; 44:291-295.
25. Rajkumar U, Niranjan M, Haunshi S, Raju MVLN, Rama Rao SV. Characterization of Aseel chicken for growth and production parameters up to 40 weeks of age. Annual Conference of Indian Poultry Science Association. 2015; 32:36-37.
26. Gurung BS, Singh M. Network project on Survey of poultry (Aseel) genetic sciences- Terminal Report, 1996-1999.
27. Sharma P, Tripathi SM, Vishwakarma N, Jain A, Rai HS. Performance of Kadaknath and Krishna-J Birds Reared as Backyard System of Farming in Mandla District of M.P. International Journal of Livestock Research. 2012; (2):241-244.
28. Haunshi S, Sexana SC, Biswajit D, Bujarbaruah KM. Comparative performance of Vanaraja chicken under backyard and intensive system at climatic condition of Meghalaya. Indian Journal of Animal Sciences. 2007; 77:99-102.
29. Bhatti MA, Ahmad A, Mahmud A. Comparative studies on the performance of Aseel Rhode Island Red White Leghorn and their crosses Indian Journal of Poultry Sciences. 1997; 32(1):100-101.
30. Gupta RK, Singh M, Singh U, Gurung BS. Feed efficiency and carcass characteristics of Aseel chickens. Indian Journal of Animal. Sciences. 2000; 70(11):1170-1171.