

## Performance of Vanaraja Poultry Birds under Semi-Intensive System of Rearing at Leparada District of Arunachal Pradesh

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**ABSTRACT:** Arunachal Pradesh is one of the largest mountainous states of India, which is situated in the north-eastern part of the Himalayan region where economy is derived from horticulture and livestock production. However the productivity of local poultry is poor resulting a huge gap between demand and production. Therefore a high production potential poultry bird Vanaraja was introduced to assess the productive and reproductive performance at different blocks viz., Daring, Basar and Sago (low, mid and high) with objectives to evaluate its performance and suitability for its propagation in Leparada district of Arunachal Pradesh for large scale adoption for commercial production. The statistical technique of multistage stratified random sampling was applied to draw the sample from the selected blocks of Leparada district. The performance of Vanaraja was found to be high and economical compared to indigenous birds and performed found to be best at mid-altitude (Basar circle) compared to low(daring) and high (Sago circle). The average mean body weight at 52 weeks at high altitude was significantly higher than mid and low altitude. Mean age at marketing of Vanaraja was found to be 12±2.79 weeks. On an average, Vanaraja poultry birds attain the sexual maturity at 177 days. Mean body weight of female at egg production was 1747.39±40.63 grams irrespective of the altitude. Average egg production of Vanaraja poultry birds was 25.42±0.13 weeks. Mean monthly egg production was 9.73±0.13 in numbers with no significant differences between the regions. Overall annual mean egg production was 107 numbers of eggs. It was concluded that based on the above study suitable extension model for transfer of improved birds for backyard poultry and its popularization may be developed based on the altitude and preference of the local farmers of the region.

**Keywords:** Vanaraja, Backyard poultry, Arunachal Pradesh.

## INTRODUCTION

North eastern states which comprise of seven states viz., Arunachal, Assam, Mizoram, Manipur, Nagaland, Sikkim and Tripura. Around 50-70 per cent of the population is engaged in agriculture Deka *et al.* (2020). Among the northeast state Arunachal Pradesh, is the largest state with area of 83743 km<sup>2</sup> with rich flora and fauna an approximately 79% of total geographical area of the state is covered by the forest Forest survey of India, (2021). The most of socioeconomic activities of the tribal group is forest dependend, the local ethnic people practicing shifting cultivation Kumar *et al.* (2017), horticulture and livestock production for their livelihood . The topography is varied with high hills, low lands, lush pastures, fodder trees, and huge water bodies favour different kinds of livestock. The 20th Livestock Census (2019) reported 15, 99, 575 poultry population out of which 13,18,133 constitute Desi fowl.

The total egg production is 6,04 lakhs numbers out of which 78 per cent produce from indigeneous eggs (Anonymous 2019). Backyard poultry farming is an inseparable component of tribal community of the state and the farmers mostly rear on almost zero input traditional farming practices which are not economically viable with poor production performances. The farmers rear non-descript birds for about 1 to 1.2 years and sell them in premium prices. The potential of indigenous birds in terms of egg production is only 40 to 50 eggs Bird<sup>-1</sup> Year<sup>-1</sup> and meat production is also very less Islam *et al.* (2014); Singh *et al.* (2017). The per capita availability of egg is around 44 eggs/annum BAHs, (2019). The population of the state is around of 15 lakhs and presently the state is producing only 30 metric tonnes of poultry meat SDAH, Statistical abstract (2019) which is still not sufficient to meet the state requirements of nutritional

balance diet of the human population as per the ICMR recommendation (which is 10.95 kg meat annum<sup>-1</sup> and 180 eggs annum<sup>-1</sup>). The state is entirely dependent on neighboring states for meat and egg due to their non-vegetarian dietary pattern. With introduction of improved varieties of chicken, the backyard poultry production can boost up and there is potential to increase the production of meat and egg in the state. Vanaraja birds, a dual-purpose variety for free range farming in rural and tribal areas is developed by ICAR–Directorate of Poultry Research, Hyderabad. The male birds weigh about 1.5 to 2.0 kg at 10–15 weeks and females lays about 130–150 eggs in a laying year which is suitable for rural and tribal farmers because of its low input system and preference by the farmers in terms of egg and meat. The Vanaraja variety of chicken produces relatively larger size of eggs as compared to commercial layer birds at any point of laying period Patra *et al.* (2017). The body weights of Vanaraja birds were significantly higher than that of Desi chicken which might be due to different genetic makeup Saikia *et al.* (2017). Vanaraja can be successfully reared under different agro-climatic condition of Sikkim under traditional tribal production system to augment the meat and egg availability in the rural areas (Singh *et al.*, 2017). It has significant higher of bodyweight, egg laying, annual egg production B.C ratio compared to desi birds in sikkim condition (Pathak *et al.*, 2019). The growth rate of Vanaraja was higher compared to RIR and Desi birds in hill agro-climatic condition of west Bengal Roy *et al.* (2017). Therefore, evaluation of such a promising variety under field condition was required for recommending under agroclimatic condition of Arunachala Pradesh. Moreover, there are very few studies undertaken in these regions. So, an attempt was made to introduce high production potential poultry bird Vanaraja: a dual-purpose breed and assessed the productive and reproductive performance at three different altitudes with objective to understand the suitability for its propagation and overall sustainable production in Arunachal Pradesh for large scale.

## MATERIALS AND METHODS

**Study Sites.** The present study was carried purposively in Leparada district of Arunachal Pradesh longitude 93.57°E to 95.23°E & Latitude 27.69°N to 29.20°N. At an altitude of approximately 680m. The mean annual precipitation approximately 2100 mm, with nearly 79% falling between May and September the mean annual temperature is 20.2°C, with a maximum monthly mean value of 26.2°C (August) and a minimum monthly mean value of 11.9°C (January) Kumar *et al.* (2020). The whole district covers 7643 km<sup>2</sup> approximately 62% of total geographical area of the district is covered by the forest. The vegetation is temperate forest Kumar *et al.* (2020) Where local ethnic people practicing shifting cultivation Kumar *et al.* (2017), horticulture and livestock production for their livelihood.

This study was conducted in the during 2019-20, at present the Poultry population of Leparda district 14,819 Anonymous (2019). The district was bifurcated from west siang district and consist of four circle viz., (daring, Basar, tirbin and sago circle). Based on altitude three circle was purposively selected daring circle (300m), Basar (600m and Sago circle 1000m).

A multistage stratified random sampling technique was applied to draw the sample for the study. A list of the villages was collected from the district veterinary office based on the poultry population. From the selected circle, four villages were selected randomly from four different directions (East, West, North and South) to have representative data of the zones. Eight resource poor tribal families comprising the backyard poultry were selected randomly from the list of each selected village. Thus, a total of 96 families were selected randomly from 12 villages located at three circles within the district. Each identified families were provided 20 Vanaraja poultry birds of 46 days old along with complete package of practices along with a data card for data collection after vaccination against Marek's and Ranikhet disease. Data were collected twice (before and after introduction of Vanaraja birds) with the same family after one year. An interview schedule comprising data entry sheets which was given to each family for the purpose of collecting data on productive and reproductive parameters. One youth member was identified from each family who made the entries in data sheet regularly up to 10 months. After collecting the data from 96 tribal families, it was tabulated and analyzed separately for the three distinct altitudes. The data collected on various traits were subjected to standard statistical analysis (Snedecor and Cochran, 1994).

## RESULTS AND DISCUSSION

**Productive and reproductive performance of Vanaraja poultry birds at different altitudes. Body weight gain:** The data in Table 1 revealed that overall mean body weight of Vanaraja birds at 12, 16, 20, 24, 28, 32, 36, 40, 48 and 52 weeks were 1.19, 1.41, 1.70, 1.98, 2.20, 2.49, 2.73, 2.76, 2.84, 2.95 and 3.03 kg respectively. The average mean bodyweight at 52 weeks at high altitude was significantly ( $P < 0.05$ ) higher than mid and low altitude.

The reason may be that the in high climatic condition due to colder temperature energy is converted in terms of meat and fat for its maintenances as compared to low and mid altitudes. Bhattacharya *et al.* (2005); Zuyie *et al.* (2009) also reported that Vanaraja birds showed encouraging results at high altitudes. Singh *et al.* (2017) also reported higher weight gain in East and South Sikkim at any which may be due to conducive climate of these two districts, in addition to regular supply of feed and medicine. Patra *et al.* (2017) reported higher growth rate in adult birds during winter months and for brooding stage during summer period.

**Table 1: Body weight gain (kg) at three different altitudes.**

Bodyweight gain(weeks)	Low altitude	Mid altitude	High altitude	Overall
12	1.18±4.06 <sup>ab</sup>	1.25± 5.21 <sup>a</sup>	1.15± 4.27 <sup>b</sup>	1.19± 5.38
16	1.41±5.39 <sup>b</sup>	1.65± 5.90 <sup>a</sup>	1.44±5.68 <sup>b</sup>	1.41± 6.32
20	1.62±5.93 <sup>b</sup>	1.80± 6.31 <sup>a</sup>	1.70±6.20 <sup>b</sup>	1.70± 5.01
24	1.89±6.52 <sup>c</sup>	2.08± 6.80 <sup>a</sup>	1.99 ±6.59 <sup>b</sup>	1.98± 4.66
28	2.01±3. 52 <sup>b</sup>	2.34± 6.71 <sup>a</sup>	2.26±7.11 <sup>a</sup>	2.20± 3.45
32	2.43± 6.33 <sup>b</sup>	2.57± 6.50 <sup>a</sup>	2.49±6.66 <sup>a</sup>	2.49 ± 5.12
36	2.70± 5.54 <sup>a</sup>	2.78± 5.40 <sup>a</sup>	2.71±5.57 <sup>a</sup>	2.73 ± 5.23
40	2.80± 5.54 <sup>a</sup>	2.89± 5.14 <sup>a</sup>	2.84±5.18 <sup>a</sup>	2.84 ± 5.37
48	2.89± 3.72 <sup>b</sup>	3.00± 5.11 <sup>a</sup>	2.96±5.18 <sup>ab</sup>	2.95 ± 4.61
52	2.95± 6.55 <sup>b</sup>	3.10± 5.11 <sup>a</sup>	3.05±5.18 <sup>a</sup>	3.03 ± 4.79

Means bearing different superscripts in a row differ significantly (P<0.05)

**Age at marketing.** Mean age at marketing of Vanaraja was found to be 13±2.79 weeks. Significant difference (p<0.05) in age at marketing were found between the region at low and mid altitude with the poultry reared at high altitude (Table 2).

**Age at Sexual maturity.** Table indicates that Vanaraja poultry birds on an average could attain sexual maturity at 165 days. There was significant (p<0.05) difference in mean age at sexual maturity between the region which was about 162 days at low altitudes, 161 days at mid and 172 days at high altitude region. Similar findings were also reported by Deka *et al.* (2014) during their studies in Assam whereas Kumaresan *et al.* (2008) reported 154± 9 days and Niranjana *et al.* (2008) 164±0.79 days in Vanaraja at different altitude. Singh *et al.* (2017) reported in ranged from 165 to 189 days.

**Bodyweight at egg production.** Mean body weight of female at egg production was 1.747±40.63 kg irrespective of the altitude. No significant difference was observed regarding body weight at egg production between low and mid altitude regions. Bodyweight gain however was higher at high altitude as compared to low and mid altitudes and found statistically significant.

**Average weight of first egg.** The first egg weight of Vanaraja poultry birds at low, mid and high altitudes were 45.78, 44.7 and 42.03 g, respectively with no significant difference between the regions. Overall mean weight of first egg was 48.33± 0.61g. Ghosh *et al.* (2005); Niranjana *et al.* (2008) also reported that Vanaraja egg weight of 44.86 g at 24–25 weeks age

whereas Singh *et al.* (2019) reported around 51 g respectively in Sikkim.

**Average monthly egg production.** Average monthly egg production at mid altitude was better *i.e.* 10.91± 0.3 number of eggs followed by 9.5 ± 0.13 at high and 9.41±0.33 at low altitude. Overall mean monthly egg production was 9.73 ±0.13 in numbers with no significant difference between the regions. Similar finding was reported by Sahu *et al.* (2016) in Vanaraja birds who reported average monthly egg production of 9.79 eggs. Ghosh *et al.* (2005) reported 9 to 12 eggs month<sup>-1</sup>. Contrary, Niranjana *et al.* (2008) reported 20 eggs month<sup>-1</sup> from improved variety under farm condition which might due to quality feed and better management.

**Annual egg production (AEP).** The mean egg production up to 52 weeks was 109 ± 2.1at low, 112.94 ± 0.44 in mid and 108 .6 ± 21.72 at high altitude. Overall annual mean egg production was 110.18 ±1.29 numbers of eggs (Table 2) with significant difference between the low and mid and high and mid altitude regions. The finding was lower as reported Deka *et al.* (2014) 145.75 ±1.44 of eggs, Kumaresan *et al.* (2008) 176 ±9.2 eggs under semi intensive system at Mizoram whereas Islam *et al.* (2014) reported only 87.29 ±1.0 in 52 weeks under field condition in Assam. The difference may be due strain, feed, and different climatic condition for low annual egg production in the study area.

**Table 2: Productive and Reproductive parameters at three different altitudes.**

Productive & Reproductive parameters	Low altitude	Mid altitude	High altitude	Overall
Age at marketing (Weeks)	13±3.2 <sup>a</sup>	14±2.2 <sup>a</sup>	14±3.57 <sup>b</sup>	13±2.79
Age at sexual maturity (Weeks)	23.2±0.31 <sup>a</sup>	23±0.69 <sup>a</sup>	24.69 ±0.27 <sup>b</sup>	23.63 ±0.58
Age at first egg production (Weeks)	24.6± 0.23 <sup>a</sup>	24.43± 0.54 <sup>a</sup>	25.33 ± 0.34 <sup>b</sup>	24.78 ±0.13
Body weight at egg production (g)	1716.69±128.61 <sup>a</sup>	1734.69±129.61 <sup>a</sup>	1795.41±133.94 <sup>b</sup>	1748.93±131.63
Average first egg weight (g)	45.78± 0.47	44.7 8± 0.44	42.03 ± 0.43	44.17 ± 0.38
Average monthly egg production (no)	9.41±0 .33	10.91± 0.34	9.5 ±0.13	9.9 ±0.13
Annual egg production (no)	109 ± 2.1 <sup>a</sup>	112.94 ±0.44 <sup>b</sup>	108 .6 ±21.72 <sup>a</sup>	110.18 ±1.29
Mortality (%)				
0–8weeks	6.03 ± 0.26	8.81± 0.29	12.91 ± 0.18	2 .91± 0.18
9–24 weeks	0.03 ±.03	0.22 ± 0.74	0.19 ± 0.56	0.02± 0.06
25–52 weeks	0.34 ± 09	0.19 ± 0.07	0.41 ± 0.12	0.13± 0.13

Means bearing different superscripts in a row differ significantly (P<0.05)

**Mortality:** Mortality was high up to 8 weeks which might be due to cold shock during early brooding stage due to lack of proper management. Similar finding were also reported by Singh *et al.* (2019) in Sikkim. Sankhyan and Thakur (2016) who has recorded similar results in Himachal Pradesh. Islam *et al.* (2014) also reported Kumaresan *et al.* (2008) also recorded high of mortality up to 5th week of age in case of Vanaraja birds. In contrast to the present findings.

## CONCLUSION

The performance of Vanaraja was higher than indigenous birds and performed best at mid altitude compared to low and high in the region. Backyard poultry farming with improved strain of poultry birds can give encouraging result under traditional low input system with initial care and management. Further for horizontal expansion a suitable extension models is required for development, popularization of improved poultry birds based on attitude and preferences of the local tribes living at different altitudes of Arunachal Pradesh.

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**Conflict of Interest.** None of the conflict of interest is associated with this study.

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