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Performance of different chicken variety under backyard system in Namsai district of Arunachal Pradesh

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ABSTRACT

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The present study was conducted to evaluate the production performance of Vanaraja, Kalinga Brown, Kamrupa and indigenous chicken in Namsai district of Arunachal Pradesh. Body weight gain, age at first egg, egg production, egg weight and mortality were compared under backyard system of rearing. In the present study, Kalinga Brown (141.00±1.10 days) started laying egg at earliest ($p<0.05$) followed by Kamrupa (175.00±0.63 days), indigenous chicken (195.00±0.49 days) and Vanaraja (197.90±1.38 days) chicken. However, heaviest body weight at 40 weeks was recorded in Vanaraja followed by Kamrupa, Kalinga Brown and indigenous chicken with significant ($p<0.05$) difference among the groups. The mean egg production of Vanaraja, Kalinga Brown and Kamrupa were significantly ($p<0.05$) higher than indigenous chicken at 40 and 72 weeks, respectively. The highest mortality was recorded in Kalinga Brown (7.96±0.56%) followed by Vanaraja (7.29±0.67%), Kamrupa (5.96±0.83%) and Indigenous chicken (4.62±0.54%). It is concluded that the production performance of improved varieties were better than indigenous chicken.

Keywords: Body weight, Egg production, Egg weight, Production economics, Chicken.

INTRODUCTION

Rural poultry farming also referred to as backyard poultry, plays a key role in supplementary income generation and family nutrition to the poorest of the poor and have special importance for tribal community residing in remotest area of the country. Tribal community love to celebrate festival and eat diversified food items among them poultry has important place therefore, gap between demand and supply is very wide (Tayo *et al*., 2016). Namsai district is one of the tribal district of Arunachal Pradesh dominated by tribal population adjoin to Assam and well connected by road transport. Thus, a good scope to popularize poultry as income generation enterprise, however, farmers of Namsai, mostly rural and tribal masses have been keeping poultry by tradition for their livelihood and nutritional security since the time immemorial under traditional backyard system with local bird possess inherent low genetic potential for egg production and body weight gain resulted low economic return. Therefore, to harness the scope and opportunity of poultry sector in Namsai district, it is urgent need to introduce high production potential breed of poultry breed have innate capacity of fast growth, maximum conversion of feed to meat/egg, low mortality and well acclimatize at local prevalent system of rearing. Hence, keeping this view in mind, the present study was designed to assess growth rate, egg production performance and egg weight of improved poultry breeds Vanaraja, Kalinga Brown, Kamrupa as well as indigenous chicken in Namsai district of Arunachal Pradesh.

MATERIALS AND METHODS

The present study was performed in Namsai District of Arunachal Pradesh located between 95.45 to 96.20 E longitudes and 27.30 to 27.55 N latitudes and surrounded by Tinsukia district of Assam in the West and South West, Changlang district in the South and South East, Anjaw & Lohit in the east and Lohit in the North of Arunachal Pradesh. It comes under sub-tropical climatic condition with high rainfall and moderate temperature varied from 10 to 35°C with an elevation of 156 meter above MSL.

The study was conducted under on farm trial at farmer's field for a period of 72 weeks. A total of 900 day old chicks (DOC) of Vanaraja, Kalinga Brown and Kamrupa comprising 300 from each variety were randomly selected and distributed among 30 poultry farmers rearing indigenous bird under semi intensive system in the district. The DOC of Kamrupa birds were procured from C.V.Sc., Khanapara, AAU, Guwahati and Vanaraja and Kalinga Brown chicks were procured from Government Duckery and Poultry Breeding Farm, Jaisagar, Assam. The farmers were selected randomly who kept a minimum of 10 numbers of indigenous chicks of up to 5 days of ages and each farmer was provided

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30 numbers of improved varieties DOC (10 DOC from each of three variety). The chicks were brooded for 4 weeks under standard hover brooder conditions and were provided commercial broiler starter feed and clean drinking water *ad libtum*. The chicks were then let loose in the backyard after proper brooding and supplemented with the broiler starter feed along with natural feeding for a period up to 40-45 days. A small amount of supplemented feed was then provided through out of the experimental period once at evening after the chicks were accustomed with natural feeding. The supplemental feed comprised mainly of locally available feed material *viz*., crush maize and broken rice, kitchen waste etc. (average 30g feed /bird for improved variety and average 15g feed/ bird for indigenous chicken throughout the experimental period). Moreover, vitamins and minerals were also supplemented periodically. All the chicks were dewormed and vaccinated against Ranikhet disease following standard protocol.

The performance of three groups of improved variety along with indigenous poultry were assessed by collecting data on body weight, egg production and egg weight at their productive age of 40 and 72 weeks, respectively. Body weight of individual bird at two different interval was measured by using electronic weighing balance (Precision 1mg - 100g). For recording of egg weight fresh eggs were collected from farm and weight was measured by using electronic weighing balance (Precision 500g- 10kg) The age at first egg and mortality rate of the individual groups were also recorded. The total egg production by single bird was calculated by recording total egg production per day per bird following the formula as Total egg production of the day/ Total number of laying birds of the day. The data collected on various traits were subjected to standard statistical analysis. The means and standard errors of the result of various tests were computed using Analysis of variance. Statistical procedures and tables were used from Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Body weight gain

Body weight gain is one of the important economic traits of poultry. The mean body weight of Vanaraja, Kalinga Brown, Kamrupa and Indigenous chicken were recorded as 2.89±0.08, 1.42±0.03, 1.60±0.03 and 0.80±0.03kg at 40 weeks and 3.80±0.09, 2.10±0.06, 1.90±0.04 and 1.70±0.04kg at 72 weeks, respectively. The body weight of Vanaraja at 40 and 72 weeks was significantly ($p<0.05$) higher than Kalinga Brown, Kamrupa and Indigenous chicken.

The body weight among Kalinga Brown, Kamrupa and Indigenous chicken differed significantly ($p<0.05$) at 40 weeks but did not differ at 72 weeks.

The mean body weight of Vanaraja at 40 weeks was comparable with the body weight reported by Islam *et al*. (2016). However, the mean body weight of Vanaraja in the present study was found to be higher at 72 weeks of age (3.80±0.09) than that reported by Mandal *et al.* (2012) at 75 weeks of age (3475.2±3.4 g) in Kargil area of Jammu and Kashmir and that variation might be due to management & environmental disparity. Body weight of Kamrupa (1450g) reported by Kalita *et al.* (2015) in backyard system of management was comparable with the present finding (1.42kg) at 40 weeks of age which may due to environmental cues and management. Mean body weight of Indigenous chicken recorded in the present study as 0.80±0.03kg at 40 weeks and corresponding values of other indigenous chickens found in India was as high as 1274.31±9.01g in Indigenous fowl of Assam (Islam *et al*., 2016) and 1333.67g in Miri type chicken (Haunshi *et al*., 2009) that might be due to variation in genotype, environment and management or all above the factors.

Egg production capacity

The mean age at first egg of Vanaraja, Kalinga Brown, Kamrupa and Indigenous chicken were recorded as 197.90±1.38, 141.00±1.10, 175.00±0.63 and 195.00±0.49 days respectively. The mean age at first egg of Vanaraja and Indigenous chicken was significantly ($P<0.05$) higher than Kalinga Brown and Kamrupa. However, no significant difference was evident between Vanaraja and Indigenous as well as Kalinga Brown and Kamrupa chicken that might be due to genetic variance among the different groups.

The age at first egg of Vanaraja was comparable to the finding (197.70±1.26 days) reported by Haunshi *et al*.(2009) while Bhattacharya *et al*. (2005) reported that the age at sexual maturity of Vanaraja chicken ranged from 172 to 185 days. The age at first egg of Kalinga Brown was comparable to the finding reported by Panda and Pasupalak (2007) of Gramapriya chicken as5.0 month and that similarity of report might be due to higher egg production capacity of both the varieties. Kalita *et al.* (2015) reported that the age at first egg of Kamrupa varied from 150 – 170 days in intensive system and 180-200 days in backyard system of management which was in agreement with the present finding as 195 days reared under backyard management system The mean age at first egg of other indigenous chickens tested in India were 193.35 days for Hill fowl of Uttarakhand (Pant *et al.*, 2007), 201.31 days for Indigenous fowls of Assam (Islam *et al.*, 2016), 189 days for Naked Neck and 192 days for Frizzle fowl (Padhi *et al.*, 2001). The difference of age at first egg might be due to different variety of chicken reared under different climatic zone

The mean egg production of Vanaraja, Kalinga Brown, Kamrupa and Indigenous chicken were recorded as 54.40±1.13, 120.00±0.75, 70.00±0.88 and 30.00±0.80 numbers upto 40 weeks and 120.40±1.01,

Table 1: Production performance of Vanaraja, Kalinga Brown, Kamrupa and Indigenous chicken under backyard system.

Traits	Vanaraja	Kalinga Brown	Kamrupa	Indigenous Chicken
Age at First Egg	197.90±1.38[a]	141.00±1.10[b]	175.00± 0.63[b]	195.00± 0.49[a]
Body weight (kg)				
40th Week	2.89±0.08[a]	1.42±0.03[b]	1.60±0.03[c]	0.80±0.03[d]
72nd Week	3.80±0.09[a]	2.10±0.06[b]	1.90±0.04[b]	1.70±0.04[b]
Egg Production (nos.)				
40th Week	54.40±1.13[a]	120.00±0.75[a]	70.00±0.88[a]	30.00±0.80[b]
72nd Week	120.40±1.01[a]	191.00±1.31[a]	130.00±0.65[a]	70.00±1.11[b]
Egg weight (g)				
40th Week	49.80±0.65[a]	46.00±0.60[ab]	43.00±0.71[bc]	39.00±0.68[c]
72nd Week	61.00±0.63[a]	52.00±0.88[b]	50.00±0.71[b]	45.00±0.91[c]
Mortality (%)				
Up to 4thweeks	5.29±0.89[a]	6.62±0.71[a]	5.61±0.51[a]	3.96±0.82[a]
Up to 72ndweeks	7.29±0.67[a]	7.96±0.56[a]	5.96±0.83[a]	4.62±0.54[a]

Row-wise figures bearing common superscript do not differ significantly.

191.00±1.31, 130.00±0.65 and 70.00±1.11 numbers upto 72 weeks respectively (Table 1). The egg production of Vanaraja, Kalinga Brown and Kamrupa were significantly ($p<0.05$) higher than Indigenous chicken upto 40 and 72 weeks respectively. The egg production among Vanaraja, Kalinga Brown and Kamrupa at any stage was not significant ($P<0.05$).

In the present study, the mean egg production of Vanaraja up to 40 weeks was comparable with the earlier report (Islam *et al*. 2016) of egg production (52.08±0.32 nos.) at the same age. However, more numbers of annual egg production of Vanaraja (178.01 nos) was reported by Kundu *et al*. (2015) that might be due to different system of rearing and different environmental condition. The mean egg production of Kalinga Brown was highest among all trial groups. However, the data received from the study was lower in comparison to the egg laying report of Central Poultry Development Organization, Bhubaneswar that might be due to difference in rearing system and management practices. The annual egg production reported by Kalita *et al*. (2015) in Kamrupa varied from 118 -130 numbers under backyard system which is close to the present finding. The mean egg production of Indigenous chicken recorded as 30.00±0.80 nos at 40 weeks of age in the present study was comparable with the earlier report of Islam *et al*. (2016) in Indigenous chicken of Assam (27.82±0.18 numbers). However, annual egg production of Indigenous chicken of the trial group showed much lower in comparison with Indigenous Nicobari fowl (108.52) reported by Kundu *et al*. (2015) which might be due to low genetic makeup of particular trait.

The mean egg weight of Vanaraja, Kalinga Brown, Kamrupa and Indigenous chicken were recorded as 49.80±0.65, 46.00±0.60, 43.00±0.71 and 39.00±0.68g at 40 weeks and 61.00±0.63, 52.00±0.88, 50.00±0.71 and 45.00±0.91g at 72 weeks respectively (Table 1). The egg weight of Vanaraja was significantly ($p<0.05$) higher than Kamrupa and Indigenous chicken at 40 week and was significantly ($p<0.05$) higher than all experimental groups at 72 week. The egg weight of Kalinga Brown and Kamrupa did not differ significantly ($p<0.05$) but were significantly higher than Indigenous chicken at 72 weeks.

Egg weight

The mean egg weight of Vanaraja in the present study was in agreement to Sahu *et al*. (2016) who recorded the overall mean egg weight as 54.65 g ranging from 43.75±0.15 (at 6 month of age) to 62.47 ±0.16 (at 17 month of age). However, Islam *et al*. (2016) and Haunshi *et al*. (2009) reported slightly higher egg weight at 40 weeks of age. The mean egg weight of Kalinga Brown was recorded lower compared to the this variety in Central Poultry Development Organization, Bhubaneswar (50.0 g at 40 weeks and 54 g at 72 weeks) that might be due to difference in rearing system and management practices. The mean egg weight of Kamrupa reported by Kalita *et al*. (2015) as 55g in intensive system of management and 52g in backyard system of management was higher than the present finding as 43g at 40 weeks of age reared under backyard system. However, egg weight was increased to 50 g at 72 weeks of age and this variation could be due to plan of nutrition at the end of birds under different agro-climatic condition. The mean egg weight of Indigenous chicken was comparable to the earlier report of Haunshi *et al*. (2009) in Miri type chicken. However, Islam *et al*. (2016) also recorded the average weight of egg as 32.06±0.07g in case of indigenous chicken of Assam. The variation might be due to difference in genetic potential in different indigenous chickens.

Mortality pattern

The highest mortality was recorded in Kalinga Brown followed by Vanaraja, Kamrupa and Indigenous

Table 2: Economy of production performance of different chicken varieties under backyard system.

Variety	Parameters	Total	Gross total	Net Profit	B:C Ratio
Cost of production of different varieties					
Vanaraja/	i. Cost of DOC (@Rs 30/Chick)	30.00	730.00		
Kalinga	ii. Feed cost (@ 0.03kg/chick/day	648.00			
Brown/	@Rs40/kg for avg. 540 days).				
Kamrupa	iii. Misc. expenditure including medicine/	52.00			
	vaccine etc.				
Indigenous	i. Cost of DOC (@Rs 30/Chick)	30.00	410.00		
Chicken	ii. Feed cost (@ 0.015kg/chick/day	524.00			
	@Rs40/kg for avg. 540 days).				
	iii. Misc. expenditure including medicine/	56.00			
	vaccine etc.				
Gross income of different variety					
Vanaraja	i. Selling of live bird (avg. body wt.	950.00	2150.00	1420.00	2.9
	3.8 kg @Rs 250/kg)				
	ii. Selling of eggs (avg. 120nos. @Rs 10/egg)	1200.00			
Kalinga	i. Selling of Live Bird (avg. body wt.	525.00	2435.00	1705.00	3.3
Brown	2.1kg @Rs 250/kg)				
	ii. Selling of egg (avg. 191nos. @Rs10/egg)	1910.00			
Kamrupa	i. Selling of live bird (avg. body wt. 1.9kg	475.00	1775.00	1045.00	2.4
	@Rs 250/kg)				
	ii. Selling of egg (avg. 130nos. @Rs10/egg)	1300.00			
Indigenous	i. Selling of live bird (avg. body wt. 1.7kg	510.00	1210.00	800.00	2.9
Chicken	@Rs 300/kg)				
	ii. Selling of egg (avg. 70nos. @Rs10/egg)	700.00			

chicken in all ages but differences were not significant ($p<0.05$). The early chick mortality irrespective of varieties was found to be higher in comparison to adult chicken that might be due to cold shock as the fluctuation of temperature in weather changes is very high in Namsai District of Arunachal Pradesh. A slightly higher mortality (6 – 10 %) of indigenous chicken of Assam was also reported in previous study (Kalita *et al.*, 2012, Islam *et al.*, 2016). In contrast to the present findings, Ghosh *et al.* (2005) also reported higher mortality percentage of 22.63% in Vanaraja up to 6 weeks of age in high altitude of Arunachal Pradesh. The variation of the finding might be due to brooding management at early age (Yerpes *et al.*, 2020).

Economy of production

In the present study, Kalinga Brown recorded maximum egg production and Vanaraja recorded highest body weight gain in compare to other three groups of chickens and the maximum net profit calculated at 72 weeks of age achieved by Kalinga Brown followed by Vanaraja, Kamrupa and Indigenous chicken respectively. Since, the rate of growth in term of body weight gain of Vanaraja is better from 0 to 40 weeks than 40 to 72 weeks, hence it is advisable to rear this variety up to 40 weeks for maximum profit under backyard condition.

CONCLUSION

In the present study Kalinga Brown started laying egg at earliest followed by Kamrupa, Indigenous chicken and Vanaraja chicken. However, heaviest body weight at 40 weeks was recorded in Vanaraja followed by Kamrupa, Kalinga Brown and Indigenous chicken. Hence, considering the economics of production performance of different chicken varieties, Kalinga Brown variety showed better with higher B:C ratio followed by Vanaraja variety under backyard system.

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