

Performance of CARI Nirbheek in agroclimatic conditions of Tripura

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ABSTRACT

Fertile eggs (1151) of CARI Nirbheek were procured from CARI, Izatnagar and 632 chicks were hatched out. The chicks were brooded on deep litter and at 8 weeks of age, 50% of all the survived chicks were distributed to the farmers of Sambhurampara village of West Tripura district for rearing in backyard system. The growth and production performance of CARI Nirbheek was studied at both the locations, viz. farm and field conditions. The mean body weights at 20 weeks of age were: 1.801 ± 0.019 , 1.414 ± 0.017 and 1.577 ± 0.017 kg, respectively, for males, females and overall mean at the farm and the corresponding body weights under field condition were: 1.642 ± 0.061 , 1.346 ± 0.029 and 1.482 ± 0.04 kg, respectively. The difference in mean body weights at farm and field conditions were nonsignificant except body weight at 20 weeks of age. The cumulative feed consumption up to 6 weeks of age was 0.981 kg at the Institute farm. The feed consumption per day between 19–20 and 39–40 weeks of age were 99.0 and 160.22 ± 0.68 g/bird, respectively. The age at sexual maturity was 187.16 ± 0.35 and 198.04 ± 1.70 days, respectively, at farm and under field conditions. The egg production up to 40 weeks of age was 37.32 and 26.31 eggs, respectively, at farm and field conditions and average egg production up to 72 weeks of age were 161.53 eggs at the farm. The egg quality traits viz. egg width, egg length, shape index, albumin weight, percent thick albumin, total albumin weight, percent albumin ratio, albumin index, yolk weight, percent yolk ratio, yolk index, shell thickness and Haugh unit of CARI Nirbheek were studied at 40 weeks of age at the farm. The value for different egg quality traits and Haugh Unit indicated better quality of the eggs of CARI Nirbheek.

Key words: Body weight, CARI Nirbheek, Egg production, Egg quality traits, Rural poultry production

Poultry population of North East region is 7.46% of the India's poultry population but producing only 2.25% eggs (9 079 lakh eggs) out of total egg production (404 031 lakh eggs, 2003–04) of the country. The egg production per bird in this region is very less. Majority of birds are *desi* and non-descript (79.83%) in which growth and production potential is very low. The average per capita availability of eggs in North East (N.E.) region is only 23 (2003–04), which is very less as compared to national average (40 eggs per capita, 2003–04) and much lower than eggs recommended by Nutritional Advisory Committee of ICMR (180 eggs per capita/year). Therefore, the short fall in egg production of NE region is 62 058.80 lakh (2003–04) and there is inevitable need to fulfil this gap between production and requirement. It is difficult to establish commercial layer farms in North East, due to socio political problems. Second most important factor being high cost of feed, which is reflecting on the cost of egg. So the cost of egg production in intensive system in this region is more than the price of egg in market procured

from other states (Malik and Singh 2008). Therefore, in the prevailing condition, rural poultry production is the only option to ensure the availability of eggs and meat in the N. E. region. But there is need to improve production performance of local bird by replacing local bird with newly developed improved germplasm. Considering this fact, the Indian Council of Agricultural Research had sanctioned a centre of All India Coordinated Research Project on Poultry Breeding (Rural Poultry Production) at ICAR Research Complex for NEH region, Tripura Centre, Agartala, to evaluate various stocks developed for rural poultry production for their suitability in North-East Region.

MATERIALS AND METHODS

A total of 1151 fertile eggs of CARI Nirbheek procured from CARI, Izatnagar were set in 2 hatches, and the 632 chicks that hatched out were wing banded, brooded up to 8 weeks of age in deep litter system. *Ad lib.* drinking water and chick starter ration were provided to the chicks up to 8 weeks of age. The chicks were vaccinated against Marek's disease and New Castle disease (Ranikhet). Layer grower ration was provided from 8 to 20 weeks of age at the farm. Body weights were taken at every succeeding 2 weeks up to

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20 weeks of age and then at 40 weeks of age. The cumulative feed consumption (kg/bird) up to 6 weeks of age, feed consumption (g/day) between 19–20 and 39–40 weeks of age were estimated. The other traits, age at first egg (days), egg weight, egg production up to 40 weeks of age and 72 weeks of age were also estimated.

At 8 weeks of age, 240 birds of CARI Nirbheek (12 birds to each of 20 farmers) were distributed to the farmers of Sambhurampara village of West Tripura district. Subsequently, sex-wise body weights were taken from 10 weeks onwards at every succeeding 2 weeks up to 20 weeks of age and then at 40 weeks of age at the field level. Egg production 'Data Card' specially printed in Bengali (local language) was distributed to farmers to record daily egg production. Information was collected about scavenging behaviour and supplementary feeding. Farmers provided shelter at night time and allowed free scavenging in their backyard during the day time. Only few farmers provided broken rice to the birds. Age at first egg (days) and egg production up to 40 weeks of age was also recorded at the field.

Egg quality traits, viz. egg width, egg length, shape index, thick albumin weight, total albumin weight, percent albumin ratio, albumin index, yolk weight, per cent yolk ratio, yolk index, Haugh unit and shell thickness were studied at 40 weeks of age. The shell thickness was measured at 3 locations of the egg, viz. broad and narrow ends and equator. The data for the different traits were analyzed using standard statistical procedures as described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The average per cent fertility was 80.36%. The per cent hatchability on total eggs set (TES) and fertile eggs set (FES) were 54.91 and 68.32%, respectively (Table 2). Higher hatchability than the present study on TES and FES was reported by Singh (2005) in CARI Nirbheek. The lower hatchability on total and fertile egg set was due to problems in hatching machine.

The mean of body weights and other economic traits at different ages of CARI Nirbheek at Institute farm and field condition are presented in Tables 1 and 2. The overall mean body weights of CARI Nirbheek at 4 and 8 weeks of age were 258.88 ± 7.49 and 491.16 ± 8.08 g, respectively, at the farm. Lower mean body weights than the present study at 4 weeks of age were observed in the findings of Kumar *et al.* (2008) and by different NATP Centres viz. CARI, Izatnagar, GAU, Anand, RAU Bikaner and CCSHAU Hisar Centre. Comparable mean body weights at 8 weeks of age to the present study were reported at RAU, Bikaner Centre of NATP. However, GAU, Anand Centre of NATP reported higher body weight (640 g) at 8 weeks of age. Contrary to this CCSHAU Hisar and CARI Izatnagar centres of NATP observed lower body weight at 8 weeks of age (NATP Final Report 2000–2005). The differences in mean body weights at farm and field conditions were nonsignificant except body weight at 20 weeks of age. The body weight at 20 weeks of age was in agreement with Singh *et al.* (2004), Singh (2005), Kumar *et al.* (2008) and CARI Izatnagar centre of NATP. However, Khan (2008) and other centres of NATP reported lower body weight at 20 weeks of age under field conditions (NATP Final Report, 2000–2005). The difference in body weights in different findings may be due to differences in agro-climatic conditions, feed and managerial practices. The differences in mean body weights at farm and field condition at 40 weeks of age were nonsignificant except in males. The body weights of males at different ages were significantly higher as compared to females. This may be due to sexual dimorphism in favour of males, higher rate of cell multiplication in males as well as influence of androgenic hormones on the growth rate of males (Chandra *et al.* 2004).

The cumulative feed consumption up to 6 weeks of age was: 0.981 kg. The feed consumption per day between 19–20 and 39–40 weeks of age were: 99.0 and 160.22 ± 0.68 g/bird, respectively. The feed consumption of CARI Nirbheek is almost similar to CARI Shyama (AICRP Annual Report 2007–08). The lower feed consumption of CARI Nirbheek

Table 1. Mean performance of CARI Nirbheek stock at the institute farm and field

Traits	Institute farm			Field		
	Male	Female	Pooled	Male	Female	Pooled
10 week bw (g)	733.47 ± 10.15	579.70 ± 9.26	638.03 ± 8.33	740.03 ± 24.07	552.60 ± 13.55	616.55 ± 15.45
12 week bw (g)	932.36 ± 20.39	769.86 ± 12.86	832.87 ± 12.32	929.60 ± 17.65	730.61 ± 15.03	818.77 ± 15.98
14 week bw (kg)	1.196 ± 0.02	0.923 ± 0.01	1.026 ± 0.01	1.102 ± 0.03	0.881 ± 0.03	0.990 ± 0.02
16 week bw (kg)	1.366 ± 0.010	1.103 ± 0.019	1.213 ± 0.016	1.428 ± 0.048	1.153 ± 0.03	1.256 ± 0.03
18 week bw (kg)	1.472 ± 0.026	1.197 ± 0.017	1.302 ± 0.017	1.522 ± 0.04	1.240 ± 0.02	1.366 ± 0.03
20 week bw (kg)	1.801 ± 0.019^a	1.414 ± 0.017^a	1.577 ± 0.017^a	1.642 ± 0.061^b	1.346 ± 0.029^b	1.482 ± 0.04^b
40 week bw (kg)	2.660 ± 0.042^a	2.091 ± 0.031	2.284 ± 0.033	2.462 ± 0.280^b	2.021 ± 0.058	2.163 ± 0.059
Age at sexual maturity (days)	—	187.16 ± 0.35^a	—	—	198.04 ± 1.70^b	—
40 Wk egg production	—	37.32	—	—	26.31	—

Means bearing different superscripts at farm and field sex wise differ significantly ($P \geq 0.05$).

at all the ages may be due to lower body weight of the bird. The age at sexual maturity was significantly higher in field condition in comparison to the farm. However, lower age at sexual maturity at farm and field conditions (176 and 174 days, respectively) than the present study was reported by Singh *et al.* (2004), Singh (2005) and Kumar *et al.* (2008). Comparable values for egg weight were reported by Singh (2005), Kumar *et al.* (2008), CARI Izatnagar and CCSHAU Hisar centre of NATP (NATP Final Report, 2000–2005). However, RAU, Bikaner and GAU, Anand centre of NATP reported lower egg weight in CARI Nirbheek. The egg production up to 40 weeks of age was 37.32 and 26.31 eggs, respectively, at farm and field conditions and the average egg production up to 72 weeks of age were 161.53 eggs at the farm (Tables 1, 2). Higher annual egg production than the present study was observed by Singh (2005), Kumar *et al.* (2008) and by different NATP centres. The lower egg production may be due to continuous stress from longer hot and humid season of Tripura.

The per cent mortality was lower than reported by the RAU Bikaner and GAU, Anand centre under NATP on small farm rural poultry production (Table 2). The higher mortality during brooding was due to infection of Gumboro (IBD) at 3–4 weeks of age. Overall CARI Nirbheek has sufficient resistance to most of the diseases. The mortality due to

predators in field condition was lower than the other stock tested at this Centre.

Egg quality traits: The means of egg width (cm), egg length (cm) and shape index were 4.196 ± 0.018 , 5.419 ± 0.027 and 77.51 ± 0.37 , respectively. The present results of shape index was comparable with those of reported by Chatterjee *et al.* (2007) in White Nicobari and Kaur *et al.* (2008) in clean shank local hill fowl of Uttarakhand. However, lower value for the shape index was observed by Padhi *et al.* (1998) in Nicobari and Naked neck; Chatterjee *et al.* (2007) in Naked neck, barred desi, Frizzle and Brown Nicobari and Kaur *et al.* (2008) in feathered shank local hill fowl of Uttarakhand. Contrary to this Chatterjee *et al.* (2007) in Black Nicobari fowl and Niranjan *et al.* (2008) in crosses of broiler and layer line observed higher shape index. Significant genetic variation for shape index in different breeds or strains was reported by Chatterjee *et al.* (2007). The lower coefficient of variation indicates lower variation in the shape of CARI Nirbheek eggs.

The mean and coefficient of variation (cv) of per cent albumin were 53.68 ± 0.42 and 6.71% respectively. The mean for per cent albumin ratio was in close agreement with the findings of Chatterjee *et al.* (2007) reported in White Nicobari. However Padhi *et al.* (1998) in Nicobari fowl and Naked neck and Chatterjee *et al.* (2007) in Naked neck, Barred desi, Frizzle, Brown and Black Nicobari reported lower albumin ratio. The mean albumin index along with their CV was 0.056 ± 0.001 and 25.96%, respectively. Similar results for albumin indices were reported by Padhi *et al.* (1998) in Naked neck. However, Devi and Reddy (2004) observed lower albumin indices in the IWF strain of WLH. Comparatively higher albumin indices were reported by Padhi *et al.* (1998) in Nicobari and WLH and Chatterjee *et al.* (2007) in Naked neck, Barred desi, Frizzle and Nicobari fowl. Eggs with thicker albumin and higher total albumin content (% albumin ratio) are considered comparatively better eggs. Higher albumin ratio indicates lower cholesterol. However, albumin quality decreases as the hen become older (Jacqueline *et al.* 2000) but certainly albumin quality has significant breed or strain differences in genetic variation (Padhi *et al.* 1998, Chatterjee *et al.* 2007).

The means and coefficient of variation of yolk weight (g), % yolk ratio and yolk index were observed as 17.61 ± 0.29 , 31.69 ± 0.37 , 0.43 ± 0.047 and 14.15, 10.0 and 9.49%, respectively. Present results for the per cent yolk ratio are in agreement with the Padhi *et al.* (1998) in White and Brown Nicobari fowl. Lower per cent yolk ratio from the present findings was reported Padhi *et al.* (1998) in Black Nicobari and WLH and Chatterjee *et al.* (2007) in Nicobari fowl. However, Padhi *et al.* (1998) in Naked neck and Chatterjee *et al.* (2007) in Naked neck, Barred desi and Frizzle fowl observed higher per cent yolk ratio than the present study. The yolk index was estimated as 0.43 ± 0.047 and their CV was 9.49%. The yolk index indicated the spherical nature of

Table 2. Mean performance of CARI Nirbheek stock at the institute farm

Traits	Mean performance		
	Male	Female	Pooled
Fertility (%)	–	–	80.36
Hatchability (%) (i) TES (ii) FES	–	–	54.91 68.32
2 wk bw (g)	–	–	144.32± 1.38
4 wk bw (g)	–	–	258.88± 7.49
6 wk bw (g)	382.60± 8.14	337.24± 8.87	362.10± 6.27
8 wk bw (g)	531.84 ± 12.5	457.86± 9.72	491.16± 8.08
Cumulative feed consumption up to 6 wks of age (kg/bird)	–	–	0.981
Feed consumption between 19–20 weeks of age (g/day)	–	–	99.00
Feed consumption between 39–40 weeks of age (g/day)	–	–	160.22 ± 0.68
40 WK egg weight (g)	–	53.78± 0.09	–
72 Wk egg production	–	161.53	–
Per cent mortality up to 6 weeks of age	–	–	12.34
Per cent mortality from 7 to 20 weeks of age	–	–	2.71
Per cent mortality from 21 to 40 weeks of age	–	–	1.72

the yolk. Similar yolk indices were determined by Padhi *et al.* (1998) in Naked neck and WLH. However, Padhi *et al.* (1998) in White and Black Nicobari, Chatterjee *et al.* (2007) in Naked neck, Barred desi, Frizzle fowl and Nicobari fowl and Kaur *et al.* (2008) in Clean shank local hill fowl reported lower yolk indices than the present study. Contrary to this, higher estimate of yolk indices were observed by Padhi *et al.* (1998) in Brown Nicobari and Kaur *et al.* (2008) in feathered shank local hill fowl. The differences for yolk weight, per cent yolk ratio and yolk index in different study may be due to breed/strain effect, differences in temperature and/or season (Chatterjee *et al.* 2007, Kaur *et al.* 2008).

The mean of shell thickness (mm) was observed as 0.31 ± 0.001 . The present findings are in agreement with those of Padhi *et al.* (1998) in White Leghorn. However, Padhi *et al.* (1998) in Naked neck and Devi and Reddy (2004) in IWD strain and control of WLH showed lower value than the present study. Higher estimates for shell thickness was reported by Devi and Reddy (2004) in IWK and Commercial strain of WLH and Niranjana *et al.* (2008) in Gramapriya and Vanaraja. Genetic variation for shell thickness in different breed/strain was reported by Kaur *et al.* (2008).

The Haugh unit is the measure of albumin quality. The estimated mean and CV of Haugh Unit was 83.32 ± 0.56 and 5.72%, respectively. Lower estimates for Haugh Unit were observed by Padhi *et al.* (1998) in White Nicobari and Naked neck, Kaur *et al.* (2008) in local hill fowl of Uttarakhand and Niranjana *et al.* (2008) in Gramapriya and Vanaraja. Contrary to this, Padhi *et al.* (1998) in Brown Nicobari, Black Nicobari and WLH reported higher estimates for Haugh Unit. The Haugh unit were significantly influenced by different genetic groups (Niranjana *et al.* 2008). The higher value for Haugh Unit in the present study indicates the better quality of egg of CARI Nirbhic.

It was concluded that CARI Nirbhic performed well in the agro-climatic conditions of Tripura. Farmers were satisfied by the egg production of CARI Nirbhic but due to its lower body weight than Gramapriya, farmers preferred CARI Nirbhic next to Gramapriya.

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