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**N Kalita**

AICRP on Poultry Breeding,  
Department of Poultry Science,  
College of Veterinary Science,  
Assam Agricultural University,  
Khanapara, Guwahati, Assam,  
India

**N Pathak**

AICRP on Poultry Breeding,  
Department of Poultry Science,  
College of Veterinary Science,  
Assam Agricultural University,  
Khanapara, Guwahati, Assam,  
India

**M Ahmed**

AICRP on Poultry Breeding,  
Department of Poultry Science,  
College of Veterinary Science,  
Assam Agricultural University,  
Khanapara, Guwahati, Assam,  
India

**Correspondence****N Kalita**

AICRP on Poultry Breeding,  
Department of Poultry Science,  
College of Veterinary Science,  
Assam Agricultural University,  
Khanapara, Guwahati, Assam,  
India

## Comparative evaluation of various traits of PB-2 x Indigenous and Dahlem red chicken under intensive system of rearing

**N Kalita, N Pathak and M Ahmed**

**Abstract**

An experiment was conducted in the poultry farm of AICRP on Poultry Breeding, Directorate of Research (Vety.), Assam Agricultural University, Khanapara, Guwahati-22 to study the comparative evaluation of various traits of PB-2 x Indigenous and Dahlem Red bird. A total of 1460 chicks were hatched out from both the flocks during the period from January'2013 to March'2013 which was utilized for the research work for different traits. To study the egg quality traits a total of 100 eggs were collected randomly from each of the flock. For carcass traits 40 adult chicken of 10 months old and 10 in either sex from both the flocks were taken. The results obtained are recorded as age at sexual maturity, egg production up to 40 and 52 weeks and egg weight at 40 weeks and 52 weeks in both the flocks. Among the egg quality traits shape index, albumin index, yolk index, Haugh unit and shell thickness were recorded. In the carcass characteristic traits the weight of different body parts were taken.

**Keywords:** crossbred chicken, body weight, conformation trait, egg quality, carcass trait

**Introduction**

Due to the huge demand of poultry meat and egg in Assam and North East India the people of this region shows great interest in poultry rearing (Kalita *et al.* 2011) <sup>[11]</sup>. In Assam, estimated fowl and duck population during 2012-13 was around 111.13 lakh and 41.78 lakh, respectively (Anon., 2013-14) <sup>[2]</sup>. Along with the indigenous bird, the farmers of Assam are generally prefer to rear the broiler, kuroiler and other improved bird like PB-2 x Indigenous and Dahlem Red due to their high economic benefit without following any scientific managerial practices (Kalita *et al.* 2014) <sup>[12]</sup>. PB-2 x Indigenous is a 2 way crossbred which was developed in the All India Co-ordinated Research Project on Poultry Breeding, Directorate of Research (Vety.), Assam Agricultural University, Khanapara, Guwahati-22 (Kalita *et al.* 2015) <sup>[13]</sup> and Dahlem Red is a flock procured from Directorate of Poultry Research, Hyderabad. However, the productive performance of PB-2 x Indigenous and Dahlem Red flock is very scanty in the climatic condition of Assam and North-Eastern region. Therefore, the present study is an attempt to compare the various traits viz. age at sexual maturity (ASM), egg production, egg weight, egg quality traits and carcass characteristics of this newly developed crossbred with the Dahlem Red chicken in intensive system of rearing.

**Materials and Methods**

A total of 1460 numbers of PB-2 x indigenous crossbred and Dahlem Red chicks, being maintained under AICRP on Poultry Breeding, Directorate of Research (Vety.), Assam Agricultural University, Khanapara, Guwahati-22. The chicks were hatched out during the period from January'2013 to March'2013.

After hatching the chicks were initially brooded for a period of 21 days in battery brooder. Thereafter, the birds were reared in deep litter system under standard managerial practices and offered balanced diet. All the birds were vaccinated and dewormed as per standard schedules.

The different traits measured were age at sexual maturity, egg production up to 40 and 52 weeks, egg weight at 40 weeks and 52 weeks of age. For egg quality traits (shape index, albumin index, yolk index, Haugh unit and shell thickness) a total of 100 numbers of eggs collected randomly from each flock were utilized for the present study. Shape index, albumin index, yolk index and Haugh unit are calculated as per the methods of Shultz (1953) <sup>[24]</sup>,

(1953)<sup>[24]</sup>, Heiman and Carver (1936)<sup>[8]</sup>, Funk (1948)<sup>[5]</sup> and Haugh (1937)<sup>[6]</sup>, respectively.

For carcass traits 40 adult chicken of 10 months old and 10 in either sex from both the flocks were taken. The live weights of bird were recorded with digital balance and were slaughtered by halal method. The birds were scalded, de-feathered and studied for carcass characteristics after singeing, washing and evisceration (Panda, 1998 and Sams, 2005)<sup>[18, 23]</sup>. The carcass characteristics of sacrificed birds were evaluated and are presented in Table 2 and Table 3. The scalding temperature of 62 - 63°C with an average time of 1.5 minutes for a male and 55 seconds for a female was found fairly good to loosen the feathers. The weights of different organs were recorded with sensitive digital balance after cutting the organs as per the standard procedures (Adams, 1990 and Sams, 2005)<sup>[1, 23]</sup>. The data were tabulated and subjected to standard statistical procedure as per Snedecor and Cochran (1994)<sup>[25]</sup>.

## Results and Discussion

Mean and standard error for different traits are presented in Table 1. In the present study average age at sexual maturity (ASM) was recorded as 172.36 ± 5.26 days in PB-2 x indigenous and 158.23 ± 2.75 days in Dahlem Red bird. Similarly Kalita *et al.* (2009)<sup>[10]</sup> recorded average age at sexual maturity of indigenous chicken as 168.09 ± 2.91 in Tribal and 170.18 ± 3.04 in Non-tribal communities of Assam. Contrary to the present observation in PB-2 x Indigenous Ramappa *et al.* (2004)<sup>[20]</sup> reported a delayed sexual maturity in indigenous chicken than the present findings.

Egg production up to 40 and 52 weeks and egg weight at 40 weeks and 52 weeks of age were recorded 39.20 ± 1.21 nos. and 70.23 ± 1.79 nos., 39.64 ± 2.53 g and 49.20 ± 1.25 g, respectively in PB-2 x Indigenous bird and 82.56 ± 5.75 and 124.76 ± 6.23, 48.60 ± 3.55 g and 54.62 ± 2.73 g in Dahlem Red bird, respectively. Kalita *et al.* (2009)<sup>[10]</sup> recorded egg production and egg weight of indigenous chicken up to 72 weeks of age as 65.30 ± 1.45 nos. and 37.80 ± 0.65 g in tribal and 62.60 ± 1.56 nos. and 38.69 ± 0.69 g in non-tribal communities of Assam. Similarly, Sharma and Hazary (2002)<sup>[22]</sup> reported 42 - 44 g egg weight in 40 weeks of Vanaraja bird. Regarding variation of the results, Islam *et al.* (2002)<sup>[9]</sup> stated that these characters are genetically controlled.

Among the egg quality traits the shape index value recorded 74.23 ± 2.56 in PB-2 x Indigenous and 73.56 ± 2.73 in Dahlem Red bird, respectively. Similarly, Niranjana *et al.* (2008)<sup>[16]</sup> recorded shape index as 76.10 at 32 weeks of age in Vanaraja bird. Chatterjee *et al.* (2006)<sup>[3]</sup> observed almost similar shape index for IWI (73.77 ± 3.08) and IWH (72.62 ± 7.56) strains of white Leghorn.

The albumin index was found 0.079 ± 0.001 in PB-2 x Indigenous and 0.076 ± 0.002 in Dahlem Red bird, respectively which was slight lower than the findings of Padhi *et al.* (1998)<sup>[17]</sup> who recorded the albumin index 0.0985 ± 0.01 in white Nicobari chicken. Similarly, Yadav *et al.* (2009)<sup>[27]</sup> also recorded slight higher albumin index (0.085 ± 0.005)

in chicken reared under backyard system in western Uttar Pradesh.

Yolk index was recorded 0.374 ± 0.009 in PB-2 x Indigenous and 0.372 ± 0.009 in Dahlem Red bird, respectively in the present study where as Yadav *et al.* (2009)<sup>[27]</sup> recorded a higher yolk index (0.395 ± 0.008) in the chicken reared under backyard system.

According to Haunchi *et al.* (2009)<sup>[7]</sup> the average albumin and yolk index (%) value in improved varieties are higher than indigenous breed.

Haugh unit value was recorded 75.02 ± 1.17 which was lower than the findings of Yadav *et al.* (2009)<sup>[27]</sup>. Similarly, in case of Dahlem Red bird this value was recorded as 79.23 ± 1.45.

Shell thickness was found 0.289 ± 0.005 in PB-2 x Indigenous bird and 0.301 ± 0.005 in Dahlem Red bird, respectively. Likewise, Wani *et al.* (2007)<sup>[26]</sup> in Vanaraja bird and Doley (2006)<sup>[4]</sup> in indigenous chicken in North-Eastern India reported almost similar findings in their study under different managemental system. Shell thickness is important to maintain the strength of eggshell which is affected by environmental temperature, age of the bird and its genetic constitution (Sachdev *et al.* 2011)<sup>[21]</sup>. The values for almost all the traits are found to be larger than the indigenous chicken of Assam which might be due to better genetic make up of the crossbred.

## Effect of strains on carcass characteristics

In the present study carcass traits of both the flocks are presented in Table 2. The results show that live weight of PB-2 X indigenous chicken (1757.50 ± 170.28) was significantly (P ≤ 0.05) higher than Dahlem Red at (1691.00 ± 128.62). A similar trend was also observed for the eviscerated weight. Non-significant difference was observed in breast weight and giblet yield between both the groups. Neck weight, Thigh weight, drumstick weight, wings weight and back weight were significantly (P ≤ 0.05) better in PB-2 X indigenous than Dahlem Red chicken (155.50 ± 31.27 vs 139.60 ± 4.25), (203.50 ± 28.12 vs 169.20 ± 8.96), (178.60 ± 29.68 vs 160.50 ± 9.95), (136.70 ± 20.32 vs 110.50 ± 4.43), (211.30 ± 26.19 vs 170.40 ± 5.17) respectively. Razuki *et al.* (2011)<sup>[19]</sup> reported significant strain differences in body weight at different ages among breeds of broiler chicken. There is evidence that there are differences in body weight among strains of chickens (Musa *et al.*, 2006)<sup>[15]</sup>. However, Karima and Fathy (2005)<sup>[14]</sup> found no differences in the body weight in a similar study.

## Effect of sex on carcass characteristics of chicken

The effect of sex on carcass characteristics is presented in Table 3. Males compared to females shows significantly (P ≤ 0.05) higher weight for all the traits in both the groups. These differences probably arise from metabolic differences and sex dimorphism. Similarly, Musa *et al.* (2006)<sup>[15]</sup> found significant differences between sexes in the yield of all carcass parts when conducting a study on Carcass characteristics of chicken breeds raised under the intensive condition.

**Table 1:** Mean  $\pm$  Standard error for various traits in intensive system of rearing.

Traits	PB-2 x Indigenous	Dahlem Red
Age at sexual maturity (Days)	172.36 $\pm$ 5.26	158.23 $\pm$ 2.75
<b>Egg production (Nos.)</b>		
Up to 40 weeks	39.20 $\pm$ 1.21	82.56 $\pm$ 5.75
Up to 52 weeks	70.23 $\pm$ 1.79	124.76 $\pm$ 6.23
<b>Egg weight (g)</b>		
At 40 weeks	39.64 $\pm$ 2.53	48.60 $\pm$ 3.55
At 52 weeks	49.20 $\pm$ 1.25	54.62 $\pm$ 2.73
<b>Egg quality traits</b>		
Shape index	74.23 $\pm$ 2.56	73.56 $\pm$ 2.73
Albumin index	0.079 $\pm$ 0.001	0.076 $\pm$ 0.002
Yolk index	0.374 $\pm$ 0.009	0.372 $\pm$ 0.009
Haugh unit	75.02 $\pm$ 1.17	79.23 $\pm$ 1.45
Shell thickness	0.289 $\pm$ 0.005	0.301 $\pm$ 0.005

**Table 2:** Strain effect on carcass characteristics of chicken

Traits	PB-2 X indigenous	Dahlem red
LW	1757.50 <sup>a</sup> $\pm$ 170.28	1691.00 <sup>b</sup> $\pm$ 128.62
EW	1490.00 <sup>a</sup> $\pm$ 176.03	1152.00 <sup>b</sup> $\pm$ 77.84
BR	271.60 <sup>a</sup> $\pm$ 26.82	272.90 <sup>a</sup> $\pm$ 29.87
BKW	211.30 <sup>a</sup> $\pm$ 26.19	170.40 <sup>b</sup> $\pm$ 5.17
WW	136.70 <sup>a</sup> $\pm$ 20.32	110.50 <sup>b</sup> $\pm$ 4.43
DW	178.60 <sup>a</sup> $\pm$ 29.68	160.50 <sup>b</sup> $\pm$ 9.95
TW	203.50 <sup>a</sup> $\pm$ 28.12	169.20 <sup>b</sup> $\pm$ 8.96
NW	155.50 <sup>a</sup> $\pm$ 31.27	139.60 <sup>b</sup> $\pm$ 4.25
GW	76.60 <sup>a</sup> $\pm$ 3.67	75.90 <sup>a</sup> $\pm$ 8.45

Different superscripts within a row differs significantly ( $P \leq 0.05$ )

LW= Live weight, EW= Eviscerated weight, BR=Breast weight, BKW= Back weight, WW= Wings weight, DW= Drumstick weight, TW= Thigh weight, NW= Neck weight, GW= Giblet weight

**Table 3:** Sex effects on the carcass characteristics of chicken

Traits (wt.)	PB-2 X indigenous		Dahlem red	
	Male	Female	Male	Female
LW	2255.00 <sup>a</sup> $\pm$ 64.30	1260.00 <sup>b</sup> $\pm$ 50.99	2072.00 <sup>a</sup> $\pm$ 36.50	1310.00 <sup>b</sup> $\pm$ 23.02
EW	2000.00 <sup>a</sup> $\pm$ 70.70	980.00 <sup>b</sup> $\pm$ 6.35	1776.00 <sup>a</sup> $\pm$ 37.50	928.00 <sup>b</sup> $\pm$ 27.82
BR	344.60 <sup>a</sup> $\pm$ 22.00	198.60 <sup>b</sup> $\pm$ 9.58	348.00 <sup>a</sup> $\pm$ 32.50	197.80 <sup>b</sup> $\pm$ 11.95
BKW	283.00 <sup>a</sup> $\pm$ 21.20	139.60 <sup>b</sup> $\pm$ 8.22	223.00 <sup>a</sup> $\pm$ 8.31	117.80 <sup>b</sup> $\pm$ 4.73
WW	164.20 <sup>a</sup> $\pm$ 25.50	108.20 <sup>b</sup> $\pm$ 5.65	129.60 <sup>a</sup> $\pm$ 3.66	91.40 <sup>b</sup> $\pm$ 2.82
DW	204.40 <sup>a</sup> $\pm$ 32.90	152.80 <sup>b</sup> $\pm$ 3.33	186.20 <sup>a</sup> $\pm$ 5.92	134.80 <sup>b</sup> $\pm$ 3.62
TW	224.40 <sup>a</sup> $\pm$ 32.20	182.60 <sup>b</sup> $\pm$ 3.02	198.60 <sup>a</sup> $\pm$ 3.28	139.80 <sup>b</sup> $\pm$ 3.96
NW	236.20 <sup>a</sup> $\pm$ 33.70	74.80 <sup>b</sup> $\pm$ 3.33	209.80 <sup>a</sup> $\pm$ 3.69	69.40 <sup>b</sup> $\pm$ 3.96
GW	83.40 <sup>a</sup> $\pm$ 2.38	69.80 <sup>b</sup> $\pm$ 3.07	90.40 <sup>a</sup> $\pm$ 3.50	61.40 <sup>b</sup> $\pm$ 3.04

## Conclusion

From the above study it can be concluded that egg production traits of Dahlem Red bird found to be better than PB-2 x Indigenous flock. However, for carcass traits a reverse trends were observed.

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