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Comparative evaluation of dahlem red and desi crosses chicken reared under intensive system of poultry management

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Abstract A study was conducted to see the production performance and mortality pattern of crosses of Dahlem Red and local Desi birds under intensive system of management. All chicks were brooded up to two months of age under deep litter system and thereafter transfer in cages and reared under similar management and environment for 72 weeks. There is significant variation in growth rate, age at sexual maturity, egg production, egg weight and mortality pattern of crosses compare to their parent birds. The crosses showed significantly ($P<0.05$) higher body weight, higher feed intake, better egg production rate, early sexual maturity and higher egg weight than local Desi birds under same system of management.

Keywords: Dahlem Red, Desi, cross bird, performance, egg and mortality

Introduction

Indian agriculture sector contributes 28 per cent to the gross domestic production (GDP) in India, among which 17% of income comes from poultry alone. Today India is the third largest in egg and fifth largest in broiler production in the world. The Indian poultry industry is growing at the rate of 8 to 10% for eggs and 15 to 20% for broiler production (Srivastava, 2011). In India per capita availability of egg and meat are 45 and 2.00 kg respectively against the recommended level of 180 eggs and 9.00 kg of meat by Indian council of medical research (Niranjan *et al.,* 2008). To meet the growing demands of the population and to improve the per capita consumption among the rural / tribal people, All India Coordinated Research Project on poultry

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breeding at Ranchi centre, funded by Indian Council of Agricultural Research, New Delhi have developed improved chicken varieties suitable for free range/ backyard farming for rural and tribal areas. A crossbreeding experiment was undertaken by using Dahlem Red and indigenous chickens to determine production performance of laying hens at various ages. The products of the crossings (F_1) showed improved performances to those of their local chicken. Growth and production traits of a bird indicate its genetic constitution and adaptation with respect to the specific environment (Ahmad and Singh, 2007).

Materials and methods

The growth and production performance of 358 birds each of Dahlem Red, local Desi and their crosses were recorded. Dahlem Red is an improved exotic layer type birds, extensively used to improve local birds in developing country. The crosses were produced by artificial insemination with pooled semen of Dahlem Red male birds and local Desi female birds.

All chicks were brooded up to two months of age under deep litter system and thereafter transfer in cages for 72 weeks. Chick starter ration were provided to the chick upto 8 weeks of age. Subsequently, the grower ration during growing and layer ration during laying periods were provided. The experiment was conducted at Ranchi which is located between 22^0 45'- $23^0$45' North latitude to 84^0 45'-84^0 50' East longitude. It experiences subtropical climate, characterized by hot summer from March to May and well distributed rain fall during southwest monsoon from June to October.

All the chicks were immunized against Ranikhet disease by using F_1 and Lasota strain on 7^{th} and 28^{th} days respectively. Gumboro (IBD) disease vaccine was done on 13^{th} and 24^{th} days by using intermediate strain. Other vaccination and deworming schedule were followed upto 72 weeks of age as per Chauhan and Roy (2003). The weekly body weights gain and mortality pattern of chicks were recorded. Relative growth rate of chicks were assessed based on the weekly body weights. The weight of pullet when first egg lay, pullet egg weight, egg weight at 40 weeks of age and increase in egg weight were recorded. Age of laying first egg, number of eggs lay in 40 weeks and in 72 weeks period were recorded. The data was analysed as per standard statistical methods described by Snedecor and Cochran (1994). The effect of genetic group on the different growth and production trait were studied.

Results

The mean body weight of Dahlem Red, Desi and their crosses at different week interval are presented in Table 1. The body weight of crosses differ

significantly ($p < 0.05$) after 4th week of age from their local desi parents. The body weights of crosses were significantly ($p < 0.05$) higher than Desi birds and nearly similar to Dahlem Red birds at different period of age (table 1). Body weight is the direct reflection of growth and it influences the production and reproduction trait of birds. There was significant variation in attaining the sexual maturity in different groups of poultry birds in present study. Dahlem Red matures at the age of 143.65 days, Desi bird at 212.43 days and their crosses at 171.38 days. The higher body weight gain and early age of sexual maturity in crosses compare to desi may be because of genetic inheritance of Dahlem Red birds prevailing in crosses.

Table 1. Growth and performance of Dahlem Red, Desi and their crosses at different age groups

Age of chicks		Dahlem Red (g)	Dahlem Red X Desi (g)	Desi (g)
0 Day		33.24±0.31[b]	32.67±0.25[ab]	29.56±0.20[a]
4 Weeks		145.82±2.13[b]	138.34±2.25[ab]	114.83±1.28[a]
6 Weeks		369.48±1.17[b]	346.38±1.53[b]	185.61±2.54[a]
8 Weeks		495.46±1.86[b]	478.23±2.32[b]	263.75±3.57[a]
12 Weeks		812.75±3.74[b]	785.36±4.25[b]	418.25±4.79[a]
16 Weeks		1243.46±2.90[b]	1136.27±3.97[b]	627.36±5.13[a]
20 Weeks		1546.31±1.87[b]	1468.52±2.78[b]	982.75±5.83[a]
40 Weeks		1795.17±4.25[b]	1724.58±4.63[b]	1136.34±6.26[a]
Age at Sexual maturity (Days)		143.65±1.76[c]	171.38±1.42[b]	212.43±1.65[a]
Pullet egg weight		38.75±0.22[b]	34.94±0.37[ab]	30.82±0.58[a]
Egg weight at 40 weeks of age		55.87±2.24[b]	51.26±2.35[ab]	42.89±2.37[a]
Increase in egg weight (g)		17.12	16.32	12.05
No. of eggs laid in 40 weeks		72.57 ± 3.46[c]	58.26 ± 3.58[b]	11.83 ± 3.72[a]
No. of eggs laid in 72 weeks		214.52 ± 3.95[c]	167.48 ± 4.71[b]	61.83 ± 4.83[a]
Egg shell color		Dark brown	Brown to light brown	Creamy
Mortality (%)	Starter (0-8 week)	7.54	8.63	6.85
	Grower (9-20 week)	2.61	3.57	2.78
	Layer (21-72 week)	0.95	1.27	0.46

Means bearing same superscript within rows (small letters) did not differ significantly ($P < 0.05$).

Egg production and egg weights determine the success of poultry enterprise. The pullet egg weight of Dahlem Red, Desi and their crosses were 38.75, 30.82 and 34.94 g, egg weight at 40 weeks of age were 55.87, 42.89 and 51.26 g and increase in egg weight were 17.12, 12.07 and 15.42 g respectively. Egg weight at first lay and at 40 weeks of age was significantly ($p < 0.05$) varied in crosses compare to their parents as shown in table 1. The egg production at 40 weeks and at 72 weeks of age was investigated in the present study and it varied significantly ($p < 0.05$) among them. The excelled performance of crosses might be due to the paternal inheritance from Dahlem Red birds utilized in developing the crosses. Mortality percentages in crosses

were more than their parents in all starter, grower and layer stages and it was within permissible limit (table 1). Mortality rate was higher in winter, lower in rainy and least during summer season. There was no any specific disease outbreak recorded during the experimental period in the farm. The cross has substantial production capabilities as dual purpose bird suitable for rural and backyard farming in India. Therefore, it is concluded that the cross is better than the proven rural varieties and can be a suitable alternative dual purpose variety for backyard farming.

Discussion

The hatchability percentages were 87.56%, 89.36% and 85.72% on fertile egg set and 68.23%, 68.92% and 64.74% on total egg set basis respectively in Dahlem Red, Crosses and local Desi birds. The mean percent hatchability observed in this study on fertile egg set and total egg set basis was higher than the values observed by Pandian *et al.,* (2011) (85.99% and 64.48%) in bantam chicken. The body's weight of F_1 cross was higher than the indigenous birds used in breeding at respective week interval. The excelled performance of crosses might be due to the paternal inheritance from Dahlem Red utilized in developing the crosses. Body weight is the direct reflection of growth and it influences the production and reproduction trait of birds (Nirajan *et al*, 2008).

The significant effects of genetic group on body weight of chicken were reported by many workers (Mohammed *et al.,* 2005, Chatterjee *et al.,* 2007) similar to the present study. The present estimates were comparable to the reports of Haunshi *et al.,* 2009 and Niranjan *et al.,* 2008 in Gramapriya birds. The performance of Desi birds in present study were in agreement with earlier report of Jha *et al.* (2012), who reported similar type of growth pattern for desi birds. The lower body weight of local Desi birds was on expected line since indigenous chicken are known to have lighter and compact body weight to escape from the predators in free range system of rearing (Haunshi *et al.,* 2009).

Average ages at sexual maturity (ASM) in our finding were 143.65, 212.43 and 171.38 days respectively in Dahlem Red, Desi and their crosses. The lower age at sexual maturity in the layer is desirable, which may lead to the increase laying period and improving the egg production. Previously, Haunshi *et al.* (2009) reported that there was comparatively higher age of sexual maturity in improved varieties Gramapriya (179.50 days) and Vanaraja birds (197.70 days), which were developed for backyard farming. Niranjan *et al.* (2008) reported 160.89 and 164.79 days in attaining sexual maturity for Gramapriya and Vanaraja birds in backyard farming. Giri and Sahoo (2012), who reported comparatively lower age of first lay for Gramapriya birds in intensive (138 days) and extensive (142 days) system of management.

Pullet egg weight, egg weight at 40 weeks of age and total number of egg lay in 40 weeks and 72 weeks were higher in Dahlem Red than Desi and their crosses as shown in table 1. The pullet eggs weight, egg weight at 40 weeks of age and increase in egg weight of local desi birds of Jharkhand (India) is better than than indigenous Miri type birds of northeastern region of India (Haunshi *et al.,* 2009). The total eggs produced for crosses at 40 weeks and 72 weeks period in present study was higher than the report of Niranjan *et al.* (2008), who reported 56.15 and 149.47 eggs respectively for Vanaraja birds. Giri and Sahoo (2012) reported 93.25 eggs in intensive system and 78.0 eggs in extensive system of management in Gramapriya birds. The value of egg quality obtained in these study were comparable with the report of Arya *et al.* (2012) in desi and exotic crosses under backyard farming and Malik and Singh (2011) in coloured broiler sire line under agro climatic condition of Tripura.

The overall mortality of all the three group of birds was recorded as shown in table 1. Mortality in the present study was mainly due to yolk sac infection, coryza, colibacillosis and coccidiosis. There was no outbreak or death due to specific diseases was observed during the course of study. These finding were better than the earlier report of Jha *et al.* (2012) who reported 23.12 % mortality in Desi birds under intensive management system. Giri and Sahoo (2012) reported that 9.65 % and 24.66 % mortality upto 8 weeks of age in Gramapriya birds under intensive and extensive system of management respectively.

Conclusion

The present study was conducted to compare the production performance of Dahlem Red, Local Desi and their crosss under intensive system of management. Crosses birds showed much better growth and production performance compare to local desi parent birds. Mortality and disease incidence was within permissible limit and it will be suitable for dual purpose backyard poultry production. This study showed that the crosses bird could perform better for important economic traits than desi birds of Jharkhand under same management and it is more beneficial to rear the crosses birds than local desi birds in Jharkhand (India).

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