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ORIGINAL ARTICLE

# A study on performance of a crossbred chicken developed using both exotic and indigenous breeds under backyard system of rearing

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## Abstract

Backyard poultry farming is popular in rural and tribal areas in India. Recently in addition to indigenous birds, exotic crossbreds having multicolour plumage are also being reared under backyard poultry farming. Development of different crosses for backyard poultry is being carried out at different organization. In the present study PD1 x PD4 cross which have both exotic and indigenous inheritance was evaluated in farmer's field under backyard system of rearing. At 6 wks of age 20 unsexed chicks each were given to 5 farmers at Warangal district of Andhra Pradesh for their evaluation in the field. One farmer completed rearing upto 72 wks of age. Average 20 wks body weights of male and female were 1671 and 1371 g, respectively. Corresponding body weights at 40 wks of age were 2784 and 178 g. Total egg production of per bird upto 72 wks of age were 148 eggs. Egg weight at 40 wks of age was 50.70 g. The farmer earned a net profit of Rs. 8195/- from the backyard poultry using 20 number of PD1 x PD4 chicks from 6 to 72 wks of age. Due to good performance of this bird, the farmer able to hatch 58 chicks using broody hen and able to sale the chicks to get higher return than eggs.

**Keywords**: Backyard poultry, egg production, net profit, PD1 x PD4 cross.

## Introduction

Backyard poultry farming using indigenous chicken is an age old practice. However, the production potential of these birds is poor. In developing countries, native chickens are frequently crossed with exotic stocks to develop crossbreds that may perform better and, in the mean time suitable for scavenging or semi-scavenging system (Das *et al.*, 2008). Different crossbreds using exotic and indigenous chickens are being developed and are evaluated under backyard system (Padhi *et al.*, 2001; Khan, 2008; Adelake *et al.*, 2011). Different exotic crosses are being developed and are being used for backyard poultry (Padhi *et al.*, 2003; Khan, 2008; Haunshi *et al.*, 2009; Padhi *et al.*, 2012a). However, there is always demand to develop new varieties of bird for backyard poultry using both exotic and indigenous inheritance with characteristics similar to indigenous birds having high production potential than the indigenous birds. Keeping this in view Directorate of Poultry Research, Hyderabad, developed a hybrids using both exotic and indigenous germplasm for backyard farming and in the present study evaluated the same under backyard system of rearing in the farmer's field.

## Materials and Methods

### Birds and diets

A total of 136 chicks were hatched for this study using PD1 as male parent and PD4 as female parent. The male parent (PD1) used for the cross was developed and selected for higher shank length since last six generation. The aim of selecting for higher shank length is to develop crossbred which can run faster to protect them from predators. The female parent (PD4) used in this was developed from Aseel, an indigenous breed selected for higher body weight. Artificial insemination was made to produce the fertile eggs and the chicks hatched were wing banded and kept for brooding under floor upto 6 weeks of age. The chicks were vaccinated for Marek's and New Castle disease. Chicks were provided *ad libitum* broiler starter ration (2800 kcal/ kg of ME and 20 % CP on calculated basis) up to 6 wks of age. Standard brooding management practices were followed upto 6 wks of age. After 6 wks of age 100 chicks were distributed to the 5 farmers with 20 chicks each for their rearing under backyard system at Warangal District of Andhra

Pradesh, India. Farmers were advised to rear the birds as they are rearing for the indigenous chicken. Though the farmers were advised to allow maximum time for scavenging but they provided some supplementary feeds like broken rice, maize and paddy to get higher growth and egg production. Under backyard system they constructed a night shelter using locally available materials like bricks, bamboo, mud and used asbestos sheet.

### Data collection

During brooding period body weight data in the farm were collected at 0, 2, 4 and 6 wks of age and the weight gain from 0-2, 2-4 and 4-6 wks were calculated. Periodical visits by the Scientist and Technical Officer were made to the farmer's field for the collection of data. Out of the 5 farmers supplied chicks, in 3 farmers' field the chicks were killed by the predators before 8 wks of age. So, the other 2 farmers kept the birds and 1 farmer sold the available birds after 52 wks of age. Only 1 farmer kept the bird upto 72 wks of age. Farmers were advised to sale the extra male for table purpose after 20 wks of age. However, they kept the male to produce fertile eggs which are either sold or being hatched using broody hen. So for collection of data for body weight and other traits upto 52 wks two farmers data were being used and for profits calculation only the farmers who completed upto 72 wks of age was taken in to consideration. In farmers field the body weight were recorded 8, 12, 16, 20 and 40 wks of age. Body weight data at 72 wks of age of survived birds were recorded in one farmer field. Daily egg production and mortality of the bird were recorded by the farmers.

### Statistical analysis

Data were analysed as per Snedecor and Cochran (1980). For calculating the profit all the inputs cost were taken in to consideration using Indian rupees as unit.

## Results and Discussion

The body weight during different weeks during the study period i.e. upto 6 wks of age and weight gain during brooding period are presented in Table 1. The body weight recorded at different weeks of age is better than the reports in indigenous fowl (Padhi *et al*., 1999; Haunshi *et al*., 2011; Dana *et al*., 2011) and lower than the report of Haunshi *et al*. (2009), Padhi *et al*. (2012a) in improved *Vanaraja* germplasm developed for backyard farming. The better body weight of this cross compared to indigenous birds indicates the presence of heterosis. Weight gain at 2 week interval recorded highest gain from 4-6 wks of age followed by 2-4 and 0-2 wks of age. The trend of weight gain between different periods is in agreement with reports of Haunshi *et al*. (2009) and Padhi *et al.* (2012a). Higher weight gain between 4-6 wks of age was in agreement with the findings of Haunshi *et al*. (2009) and Padhi *et al*. (2012 b).

Table 1: Body weight and weight gain during different period of PD1 x PD4 in the farm during rearing period

| Traits (n=130) | Weight (g) |
|---|---|
| 0 day | 32.11±0.24 |
| 2 week | 86.99±1.27 |
| 4 week | 177.25±3.11 |
| 6 week | 380.63±6.85 |
| Weight gain (0-2 week) | $54.88\pm1.25^{c}$ |
| Weight gain (2-4 week) | $89.95\pm2.53^{b}$ |
| Weight gain (4-6 week) | $205.34\pm4.24^{a}$ |

*Average having different superscript for weight gain during different period differ significantly at P<0.05.*

The body weights during growing and laying period in the farmer's field are presented in Table 2. The body weight of male and female was significantly higher than the female irrespective of age. Higher body weight of male than female and presence of early sexual dimorphisms in chicken are reported (Mohammed *et al*., 2005; Padhi *et al*., 2012a), which is in agreement with the present findings. The body weight obtained in the crossbred was higher than the indigenous Aseel (PD4) at different weeks of age and comparable to *Gramapriya* at 20 and 40 wks of age as reported by Haunshi *et al.* (2009). Padhi *et al*. (2003) reported comparable body weight in CARI Devendra cross in the field. Higher body weight in commercial *Vanaraja* compared to the present findings was reported by Islam *et al*. (2014). The farmer sold the male only after they attained 2000 g body weight. Since the birds are having better plumage colour and are active like indigenous birds they fetch better price by selling the birds in the local market.

The birds start lying at 29 wks of age and the egg production upto 40 wks of age was 26.12 eggs per female and average egg weight at 40 wks of age was 50.70± 0.96 g. The age at first egg was better than the indigenous birds under backyard system as reported by Barua *et al.* (1998) and Magothe *et al*. (2012), and higher than the reports of Halima *et al*. (2007) in indigenous birds of northern Ethiopia. The egg production per survived female upto 52 wks of age was 90 eggs; and the hen housed egg production during 40 to 52 wks of age was 75 %. The hen housed egg production from 40 to 52 wks of age was better than the report of Haunshi *et al*. (2009) in improved varieties of backyard chickens. This may be due to

better availability of feed stuffs and the effect of genotype. The egg production from 29 to 40 wks of age was comparable to the production of Horro Chicken of Ethiopia (Dana *et al*., 2011). The average egg production per bird upto 72 wks of age in one farmer was 148 eggs. The egg production recorded in the field of this cross upto 72 wks of age was in agreement with indigenous Nicobari fowl (Padhi *et al*., 1999) and higher than the report of Barua *et al*. (1998) in Fayoumi and Rhode Island Red cross with extra feed. This is to be mentioned here that the egg production data may vary according to the genetic makeup of the birds and also the management and environment of the backyard rearing areas.

During brooding period the mortality was 4.41 %. The mortality reported during brooding period was higher than the report of Padhi *et al*. (2012a) in PD1 and *Vanaraja* commercial chicks kept under intensive system. Higher mortality during brooding period was reported by Islam *et al*. (2014) in *Vanaraja* and indigenous chicken than the present findings. The mortality observed showed that out of the five farmers all; in three farmers all the birds are being killed by the predators like dogs and jungle cat during initial period before 8 wks of age in the field. This may be due to the birds are not able to protect themselves during the initial period as they are reared under confinement upto 6 wks of age. This indicates that the birds have to be taken care for initial period for protection from predators. Out of the two farmers who kept the bird upto 52 wks of age, 11 chicks were killed by Jungle cat before 8 weeks of age, however no mortality was observed in birds upto 52 wks of age. The farmers who reared upto 72 wks of age the mortality during the rearing period upto 28 wks of age were three birds died due to diseases and two due to predators attack so the mortality from 6 to 72 wks of age was 15 % due to diseases and 10 % due to predation. Higher mortality % due to diseases in different crosses upto 20 wks of age was reported by Padhi *et al*. (2003) under field condition.

The model calculation of net profit as observed in the farmer keeping the birds upto 72 wks of age was calculated and presented in Table 3. The net profit was calculated using minimum sale price of eggs and live birds as well as deducting the cost of supplementary feed, medicine and cost of 6 wks old chicks (though the farmer were supplied chicks free of cost). The table indicates that taking in to consideration of all the inputs upto 72 wks of age the farmers earned a benefit of Rs. 8195/- as supplementary income from a 20 birds unit. The profit could have been more if the amount of supplementary feed could have been reduced and the male birds sold at an early age. The egg rates used for calculation was kept at minimum of Rs. 6/- egg however, the farmer used to sale the egg at Rs. 6- to Rs.10/- per eggs as per demand and the fertile eggs were sold at Rs. 10/- eggs. The farmer was so much impressed with the performance of the birds and ready to rear more chicks

Table 2: Body weight of male and female chickens in field in the free range

| Traits | Male | Female |
|---|---|---|
| 8 week body weight (g) | $627\pm7^{a}$ (9) | $528\pm10^{b}$(19) |
| 12 week body weight (g) | $918\pm8^{a}$ (9) | $789\pm12^{b}$ (19) |
| 16 week body weight (g) | $1234\pm14^{a}$ (9) | $1092\pm13^{b}$ (19) |
| 20 week body weight (g) | $1671\pm65^{a}$ (9) | $1371\pm28^{b}$ (19) |
| 40 week body weight (g) | $2784\pm99^{a}$ (7) | $1978\pm68^{b}$ (12) |
| 72 week body weight (g) | $3309\pm307^{a}$ (2) | $1827\pm62^{b}$ (5) |

*Figures in parenthesis are number of observation, Means showing different superscript in a row differ significantly (P<0.05)*

Table 3: Model calculation of outputs of a farmer by keeping PD1 x PD4 (20 birds unit of 6 wls old) upto 72 wks of age

| Output | | | | Input (Rs.) | Net Profit (Rs.) |
|---|---|---|---|---|---|
| Produce | Quantity | Rate (Rs.) | Total (Rs.) | | |
| Live birds | 3 male and 4 female (15.3 kg) | Rs. 200/ kg live weight | 3060 | 3515 (Includes supplemental feed, medicine and 6 weeks old 20 number chicks) | 8195 |
| Culled bird | 2 male and 5 female (14.5 kg) | -do- | 2920 | | |
| Eggs | 839 | Rs.6/- per egg | 5034 | | |
| Chicks | 58 | Rs.12/- per chicks | 696 | | |
| Total | | | 11710 | 3515 | 8195 |

by purchasing chicks. After seeing the success many nearby farmers also got interested and want to adopt backyard poultry which does not need much investment. Seeing the performance of the birds in the field and since the cross have indigenous blood and look similar to indigenous birds; in future this cross may be useful for the backyard poultry farming for improving the supplementary income of rural farmers. The crossbred using both exotic and indigenous birds may be of important in other country where rural/ backyard poultry are of importance.

## Conclusions

PD1 x PD4 performance during brooding period is better than reported literature in indigenous birds. Total egg production of per bird upto 72 wks of age were 148 eggs under backyard system of rearing with supplemental feed. The farmer earned a net profit of Rs. 8195/- from the backyard poultry using 20 number of PD1 x PD4 chicks from 6 to 72 wks of age. The use of PD1 x PD4 cross for backyard poultry farming is profitable if initial mortality due to predators can be controlled.

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