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Comparative Performance of Some Improved Poultry Crossbreds Under Konkan Region of India

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ABSTRACT

The experiment was conducted at Poultry Farm, College of Agriculture, Dr. B. S. Konkan Krishi Vidhyapeeth to assess the comparative performance of some improved poultry crossbred during laying period. The trial was carried out on five different types of improved poultry crossbred namely, - Giriraja x Delham Red (T1), Delham Red x White Leghorn (T2), Giriraja x Asselkala (T3), Delham Red x Giriraja (T4), Asselkala x Giriraja (T5) and two purebred groups like Delham Red and Vanraja. About 147 experimental birds were replicated three times and each replication consisted of seven birds in seven treatments in a Completely Randomized design. The feed consumption during early laying period and peak laying period differed significantly ($P<0.05$) between the groups. The average egg production was significantly ($P<0.05$) different in the treatments during early and peak laying period. The gross returns from the eggs of purebreds was significantly higher ($P<0.05$) than the crossbreds. It can therefore be concluded that, feed consumption is lower in purebreds than crossbreds. The average egg production is more in purebreds as compared to crossbreds up to peak laying period. Considering the minimum feed consumption and feed cost with maximum egg production and gross returns were observed in purebreds vis-a-vis crossbreds.

Keywords: Feed efficiency, Growth parameter, Feeding cost

INTRODUCTION

Poultry farming in India is and internal part of the agricultural industry. The Indian poultry Industry has come a long way from a backyard enterprise to an organized commercial industry. India produces 3-6% of the total global egg production i.e. 61 million tonnes (FAO 2011). The growth rate of egg production is 5-8%. On the other hand the per capita availability of meat is 1.6 kg and per capita availability of egg is about 1.8 kg (42 eggs). Maharashtra is one of the progressive states in India in poultry farming with rapid growth potential. Among the various aspects in poultry science, improvement in genetic makeup by various breeding methods, such as cross breeding to improve the FCR (Feed Conversion Ratio), egg production and egg quality is an important aspect. Poultry farming can be taken up as an integral component in agriculture, particularly under backyard farming and also as supporting enterprises to crop farming. The poultry products like eggs, meat, and yolk powder have more prices and it is consumed in urban and semi-urban areas. It has also been noticed that demand exists for poultry products in rural areas.

Feed conversion efficiency is higher in poultry crossbred as compared to purebred and mortality is also less in crossbred as compared to purebred. These two factors play very important role in increasing profits in poultry production (Dwivedi et al. 1986).

It is therefore necessary to identify potential poultry crossbreds suitable for backyard farming as well as commercial farming in Konkan region of India which are easily adaptable to high rainfall and high humidity environment. With these views, the present study has been conducted on crossbred and purebred poultry birds with primary objective to study the laying performance of improved crossbred and purebreds, feed conversion ratio, egg production, cost of production and egg quality parameters.

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MATERIALS AND METHODS

The study was carried out at the poultry farm of Department of Animal husbandry and Dairy Science, at Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra (17°N and 73°E). The area is characterized by hilly terrain. The soil is lateritic and acidic in nature with low fertility and poor water holding capacity. The climate is warm and humid. The area receives heavy rainfall (3611 mm) with 60-90 percent humidity coupled with temperatures ranging from 18.70° to 30.70°C around the year.

The trial was conducted on 147 birds of five different type crossbred poultry birds and two purebred poultry birds. Birds were divided into seven treatments with three replicates consisting of seven birds in each replication. The twenty one birds were allocated in the treatments namely, T_1 - Giriraja x Delham Red, T_2 - Delham Red x White Leghorn, T_3 - Giriraja x Asselkala, T_4 - Delham Red x Giriraja, T_5 - Asselkala x Giriraja, T_6 - Delham Red pure and T_7 - Vanraja pure. The day old chicks were housed in seven different compartments containing clean waterers and feeders in deep litter system up to completion of 8th weeks, and then chicks were transferred to cages up to the laying stage. The birds were fed recommended quantity of feed two times in a day, with clean and fresh drinking water *ad libitum*. The general veterinary aids were provided to all birds with regular vaccinations as per the vaccination schedule for layers. The management practices like deworming debeaking were followed at regular intervals.

The chicks were fed twice a day with commercial egg mash. Clean water was supplied *ad libitum*. Medications and vaccinations were done as and when needed.

Table 1: Chemical composition of experimental feed

Parameter	Egg Mash (%)
Dry Matter	90
Crude Protein	18
Crude Fat	02
Crude Fibre	07
Total Ash	3.5
Calcium	1.4
Phosphorus	0.7
Energy (Kcal)	2644

The experiment was conducted from initial laying stage up to peak egg laying stages of productive cycles of layer namely, early laying stage (21-33 weeks) and peak laying stage (34-40 weeks), the average laying stage being 21-52 weeks.

The feed consumption was determined by subtracting the balance quantity of feed from quantity offered on the previous day. Incidents of sick and dead birds during study were monitored. Weight of the first laid egg was recorded in all groups by digital weighing.

The amount of feed consumed *viz.,* per dozen of eggs and per kg of eggs was also recorded. Egg production was calculated on a Hen day basis by dividing total eggs laid in the period by the average number of birds in the house.

All eggs produced on a certain day of the week were collected separately for different treatment groups and weighed individually with an electronic scale. The width of eggs was measured by vernier calliper. The total eggs were examined for shape index (the ratio of width to length of egg). The egg shell thickness was measured using micrometer (+ µm.). The yolk was separated from the albumen using spoon and weighed with electronic balance. The albumen weight was calculated by subtracting the weight of yolk and shell from the whole egg weight. The albumen index (the ratio of average albumen height to the average of the width and length), yolk index (the ratio of yolk height to its average width) and Haugh unit calculated by using Haugh formula of the ratio of albumen height and egg weight (Nesheim et al. 1979).

Haugh unit = $100 \log [H + 7.57 - 1.7 W^{0.37}]$

Where H = height of albumen (mm) and W = weight of egg (g)

The cost of feeding was worked out considering the prevalent cost of feeds. The experimental data was analyzed statistically with randomized block design (Snedecor and Conhran 1990).

RESULTS AND DISCUSSION

The mean values of the laying performance of improved poultry crossbred and purebred are presented in the Table 2. There were significant difference ($P<0.05$) in the feed consumption values of crossbred and purebreds during early and peak laying period. The result showed that feed consumption in early and peak laying period was

Table 2: Performance of improved poultry crossbred and purebred during experimental period

Parameters	Crossbreds						Purebreds			Mean SE+
	Giriraja x Delham Red	Delham Red x White Leghorn	Giriraja x Asselkala	Delham Red x Giriraja	Asselkala x Giriraja	Mean	Delham Red pure	Vanraja pure	Mean	
Feed consumption(g/bird/day)										
Early laying period (19-33 wk) (g/bird/week)	852.70^{d}	837.70^{d}	847.80^{d}	819.80^{bcd}	790.90^{ab}	829.78	778.00^{a}	796.00^{abc}	787	+6.41*
Peak laying period (34-40 wk) (g/bird/week)	864.70^{f}	867.70^{g}	859.90^{e}	846.90^{d}	839.20^{b}	855.68	836.80^{a}	844.80^{c}	840.8	+4.03*
Age at first lay(days)	124	113	124	136	115	122.4	115	115	115	
Weight of first lay(g)	33.78^{a}	42.75^{e}	36.59^{c}	43.37^{f}	36.30^{b}	38.558	47.16^{g}	36.73^{d}	41.945	+0.14*
Hen day production (%)										
Early laying period (19-33 wk)	40.68^{b}	61.06^{g}	38.95^{a}	47.81^{e}	44.94^{c}	46.688	55.62^{f}	46.68^{d}	51.15	+3.14*
Peak laying period (34-40 wk)	52.71^{d}	51.23^{a}	52.17^{c}	54.87^{f}	53.25^{e}	52.846	58.78^{g}	52.15^{b}	55.465	+1.73*
Average feed conversion efficiency /dozen of eggs										
Early laying period (19-33 wk)	1.59^{bcde}	1.40^{ab}	1.57^{e}	1.52^{abcde}	1.42^{abc}	1.5	1.35^{a}	1.43^{abcd}	1.39	+0.06*
Peak laying period (34-40 wk)	1.45^{g}	1.32^{a}	1.44^{f}	1.33^{b}	1.35^{c}	1.378	1.40^{d}	1.42^{e}	1.41	+0.06*
Average feed conversion efficiency /kg of eggs										
Early laying period (19-33 wk)	5.49^{f}	5.98^{g}	5.28^{b}	5.29^{c}	5.26^{a}	5.46	5.4^{e}	5.34^{d}	5.37	+0.27*
Peak laying period (34-40 wk)	6.08^{c}	6.76^{f}	6.08^{c}	6.40^{e}	6.15^{d}	6.294	6.02^{b}	6.00^{a}	6.01	+0.30*
Mortality pattern (%)	4.76^{a}	9.52^{b}	4.76^{a}	4.76^{a}	4.76^{a}	5.712	4.76^{a}	4.76^{a}	4.76	+0.03*

Means with different superscripts in a row differ significantly (*P< 0.05)

highest at 829.78 and 855.68 g/day/bird in crossbreds than in the purebreds i.e. 787.00 and 840.80 g/day/bird. The results of the investigation are in agreement with Dalivedi et al. (1986) and Dutta et al. (1991). It is observed that purebred groups attained sexual maturity earlier than the crossbred groups. Rao (1977) observed that the age at first egg on improved desi pullets were between 171-190 days of age. The average weight of first lay (g) was higher (P<0.05) in purebreds than the improved crossbreds birds. The hen day production were significantly more (P<0.05) in purebreds than the crossbreds during both early and peak laying periods. Balachandran (1979) also reported that the hen day production of White Leghorn birds ranged from 45.34 to 74.86 (%).

The feed conversion ratio calculated on the basis of dozen egg produced was significantly different (P<0.05) between crossbred and purebreds. During early laying period purebreds utilized their feed more efficiently than the crossbreds. But during peak laying period crossbreds utilized their feed more significantly. Rao (1977) observed feed efficiency/dozen of eggs was highest in indigenous breeds (2.97 kg) as compared to White Leghorn (2.8 kg) and Rhode Island Red (2.9 kg). The feed conversion efficiency ratio based on per kg egg produced was significantly higher in crossbred (P<0.05) during early and peak laying period than the purebred. The maximum mortality was observed in crossbreds as compared to purebreds.

Mean values of various egg quality parameters viz. egg weight, egg shape index, egg shell thickness, yolk weight, albumin weight, yolk index and Haugh unit are shown in Table 3. The egg weight, egg shell thickness and egg shape index in purebreds was significantly higher (P<0.05) than that of crossbreds. The results of investigation are also similar to the findings of Chand et al. (1972), Jahari and Singh (1968) and Mahanta and Sapcota (2007).

The eggs produced by crossbreds had lighter yolk (P<0.05) than those of purebreds. Suk and Park (2001) also found that the yolk weight increased with increase in age of the birds. The albumen of crossbred eggs was lighter than the eggs of purebreds; similarly, Izat et al. (1985) also found that Haugh unit values decreased with increase in age of birds. Many factors have been reported to affect Haugh units such as storage time, temperature, age of birds, strain, nutrition and disease (Toussant and Latshaw 1999).

Table 3: Egg quality parameters in different improved poultry crossbreds and purebreds

Parameters	Crossbreds						Purebreds			Mean SE+
	Giriraja x Delham Red	Delham Red x White Leghorn	Giriraja x Asselkala	Delham Red x Giriraja	Asselkala x Giriraja	Mean	Delham Red pure	Vanraja pure	Mean	
External Egg quality parameters										
Egg weight (g)	46.60^{f}	51.47^{a}	45.79^{g}	48.40^{c}	48.34^{d}	48.12	49.99^{b}	47.63^{e}	48.81	+0.13*
Egg shape index (%)	73.60^{e}	71.78^{f}	73.60^{e}	74.60^{d}	77.19^{a}	74.154	74.35^{c}	75.57^{b}	74.96	+1.87*
Egg shell thickness(mm)	0.45^{c}	0.45^{c}	0.47^{a}	0.46^{b}	0.45^{c}	0.456	0.47^{a}	0.47^{a}	0.47	+0.01*
Internal Egg quality parameters										
Yolk weight(g)	14.54^{g}	14.81^{f}	15.24^{c}	15.06^{e}	15.76^{a}	15.082	15.45^{b}	15.12^{d}	15.285	+1.55*
Albumen weight(g)	27.06^{f}	31.47^{a}	25.78^{g}	28.20^{c}	27.62^{e}	28.026	29.10^{b}	27.77^{d}	28.435	+1.16*
Albumen index (%)	7.53^{e}	7.01^{g}	8.22^{b}	9.06^{a}	8.09^{c}	7.982	7.70^{d}	7.26^{f}	7.48	+1.46*
Yolk index (%)	37.55^{f}	39.89^{a}	36.74^{g}	38.39^{d}	38.16^{e}	38.146	38.61^{c}	39.07^{b}	38.84	+1.16*
Haugh unit	68.45^{f}	66.51^{g}	72.98^{b}	77.50^{a}	69.86^{d}	71.06	71.27^{c}	69.73^{e}	70.5	+6.75*

Means with different superscripts in a row differ significantly (*P< 0.05)

Cost of feed incurred on crossbred and purebred birds are presented in the Table 4. Data revealed that the average minimum feed consumption (17.76 kg), minimum total feed cost (₹230.88) with maximum eggs produced (83.85) and more gross returns (₹ 335.40) was observed in purebreds (T_6). The average minimum feed consumption within crossbreds (17.93 kg) is seen in T_5. The maximum production in terms of number of eggs (82.95) and higher gross returns from eggs (₹ 331.80) was seen in the T_2 group.

CONCLUSIONS

The study concluded that feed consumption was lower in purebreds and they produced more eggs and utilized their feed more efficiently along with more gross returns as compared to crossbreds. The results also proved that the Delhemred purebred was superior to other crossbreds and purebreds. Therefore, rearing of purebreds is a good profitable venture, considering minimum feed consumption and feed cost with maximum egg production.

Table 4: Cost of production of eggs in different improved poultry crossbreds and purebreds

Parameters	Crossbreds					Purebreds	
	Giriraja x Delham Red	Delham Red x White Leghorn	Giriraja x Asselkala	Delham Red x Giriraja	Asselkala x Giriraja	Delham Red pure	Vanraja pure
Average feed consumption per bird (kg)	18.89	18.75	18.78	18.33	17.93	17.76	18.04
Feed cost / kg (Rs.)	13.00	13.00	13.00	13.00	13.00	13.00	13.00
Total cost of feed (Rs.)	245.57	243.75	244.14	238.29	233.09	230.88	234.52
No. of eggs produced per bird up to 40th wk	66.09	82.95	64.23	73.61	71.33	83.85	74.00
Price of egg (Rs.)	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Gross returns from eggs (Rs.)	264.36	331.80	256.92	294.44	285.32	335.40	296.00
Cost of production per egg (Rs.)	3.71	2.93	3.80	3.23	3.26	2.75	3.16
Net returns (Rs.)	18.79	88.05	12.78	56.15	52.23	104.52	61.4
Benefit Cost Ratio	1.07	1.36	1.05	1.23	1.22	1.45	1.2

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