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Effect of rearing systems on the growth performance of Giriraja Birds

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Abstract
An experiment was conduct at poultry unit, Department of Animal Husbandry and Dairy Science, Dapoli to investigate the Effect of rearing systems on the growth performance and carcass quality of Giriraja birds. A day old 250 Giriraja chicks rearing in same block during brooding period up to 35 days. Then after 225 Giriraja chicks were divide into three treatments with five replications, thus each treatment having 75 birds. Treatment was deep litter system (T1), cage system (T2) and semi-intensive system (T3). Results of experiment showed that different rearing systems have significant (p<0.05) effect on feed intake during the experimental period which is lowest in treatment T3 (351.10 g/bird) and highest in treatment T1 (483.44g/bird), live body weight was lowest in treatment T3 (130.56 g/bird) and significantly highest in treatment T2 (160 g/bird) and body weight gain higher in treatment T2 (160.00 g/bird) and treatment T1 (144.94 g/bird) and T3 (130.56 g/bird) were at par each other. The feed conversion ratio was superior in treatment T2 (2.81).

Keywords: feed consumption**,** Body weight, Body weight gain, Feed conversion ratio, rearing system

Introduction
India has 1.25 billion people and the number is growing every year. The focus is on "Development" meaning providing good food, better health and living conditions to everyone. People spend more money on food when they earn more. Healthy food at attractive price will be the issue in focus. Eggs and chicken are accepted by all communities and are available at the most reasonable prices. The growth of Indian poultry industry is 6-8 percent in layers and 10-12 percent in broilers per year against the growth of agriculture as a whole which is around 2.5 percent. The recent data of the year 2017 states that the egg production in India is 75 million and the broiler production is 4.2 million tonnes per annum. The growth rate of layer market is 6-7 percent per annum and broiler market is 8-10 percent per annum.

Poultry have been on the earth for over 150 million years, it provides humans with companionship, food and fiber in the form of eggs, meat and feathers. Many peoples love to raise and show chickens and other poultry species at fairs and for fresh eggs every day. India have developed few genetic stocks recently improved backyard varieties like Vanaraja, Gramapriya, Srinidhi, Giriraja *etc.* developed mostly by public sector and a few by private sector like Broiler, Rainbow rooster are substantially contributing to the total chicken egg and meat production of the country (Anonymous, 2015) [1]. They have given good results under traditional backyard and semi- intensive system of poultry production with an improved productivity, adaptability and disease resistance.

Poultry can be housed under different systems based on some factor like availability of land, cost of land, type of farming activity, climatic condition and labour availability. The poultry housing systems are broadly classified into three systems *viz*. free range or extensive system, semi-intensive system and intensive system. In intensive system there is four types of rearing *viz*. deep litter system, slatted floor system, slat cum litter system and cage system (Banerjee, 1998) [5]. Giriraja is a first improved poultry breed of India and it was developed by Karnataka Veterinary, Animal and Fishery Sciences University in 1989 through cross between White Plymouth Rock × Red Cornish × New Hampshire. Giriraja is dual purpose poultry breed and achieved average weight gain of about 3 kg in hens and 4 kg in cocks at 6 months of age and eggs production is 180-190 per year with average egg weight 52-55 g. Egg shell are brown in colour and thicker than other commercial egg (Ayyagiri, 2001) [2].

Material and Methods

In this experiment, 225 chicks were selected from the same hatch and reared separately in three groups under uniform management conditions for brooding from day old to 5th week of their age on litter and after that all birds were divided into five replications and each replication had 15 birds. The treatments were of three rearing systems. The first treatment group was kept on the deep litter, second treatment group were in cage system and group of third treatment were reared under semi- intensive system.

The poultry house, cages, feeders and waterer were kept ready before the arrival birds. The day-old chicks were kept on litter to complete their brooding stage up to 5th weeks then they were transferred into deep litter system, cage system and semi-intensive system up to 13 weeks. Debeaking of all the birds were done to avoid cannibalism. The veterinary aids were provided to all the birds as and when required. Deworming and standard vaccination schedule was carried out with regular interval from chick stage up to growing stage.

The first 3 days maize crumbles were fed to all birds, after that starter feed up to 5th weeks and then gavran finisher was fed till end of 13th weeks. The birds of different groups were fed separately throughout the experimental period, twice a day feeding was followed at 8.30 am in morning and 5.30 pm in evening. The experimental birds were reared on different rearing system up to 13 weeks of age. Fresh and clean drinking water offered to all birds. Adequate health cover was provided to all the birds. Individual body weight of birds from each group was taken at weekly interval starting from the day-old stage. The birds were weighted during morning hours before feeding.

Results and discussion

The commercial gavaran starter and gavaran finisher were used for feeding the experimental birds. Starter and finisher procured from local market and used for feeding of birds. The first 3 days fed maize crumble to all birds, after that starter feed up to 5th weeks then gavaran finisher till end of 13th weeks. During research project this feed was analysed in department laboratory to verify the contents mentioned on feed bag. By and large, it was found that actual results agreed with those mentioned on label. The chemical composition of commercial gavaran starter and gavaran finisher are given in Table 1.

Table 1: Average chemical composition (%) of commercial poultry feed

Nutrient contain (%)	Maize crumble	Gavaran starter	Gavaran finisher
Moisture	10.70	8.50	10.10
Dry matter	89.30	91.50	89.90
Crude protein	3.50	18.81	17.93
Crude fiber	2.10	4.03	4.05
Fat	1.50	6.50	4.50
Ash	1.40	9.80	8.20

Feed consumption

The average weekly feed consumption of experimental birds in different groups is presented in Table 2. In present investigation total average weekly feed consumption under different treatment was 483.44, 401.20 and 351.10 for T1, T2 and T3 respectively. Mean feed consumption was significantly lowest in treatment T3 (351.10 g/bird) and significantly highest in treatment T1 (483.44g/bird). The average weekly feed consumption (1-13 weeks) in T1 group was (p<0.05) higher than T2 and T3 groups. The statistical analysis revealed that differences in total feed consumption due to different treatments were significant. Baba *et al.* (2014) [4] was similarly reported that feed consumption mean feed consumption in intensive and backyard system of rearing was 398.02±5.66 g/bird/week and 327.90±7.11 g/bird/week, respectively. Abhale *et al*. (2018) [3] was reported that cage system had significantly (p<0.05) higher feed consumption compared to bird reared under deep litter system.

Table 2: Weekly feed consumption (g/bird) in different treatment groups

Weeks	Treatments			S. E. ±	C. D. (5%)
	T1	T2	T3		
1	77.77	78.54	78.29	0.21	NS
2	140.40	141.06	140.80	0.16	NS
3	210.91	210.71	210.51	0.10	NS
4	280.51	280.49	280.31	0.05	NS
5	350.49	350.54	350.40	0.04	NS
6	420.46	400.09	350.03	10.80	35.23*
7	478.29	435.11	405.14	6.85	22.33*
8	560.26	470.14	420.26	0.04	0.12*
9	630.40	505.17	435.17	0.02	0.07*
10	700.31	540.20	450.20	0.02	0.08*
11	770.49	575.14	465.14	0.03	0.11*
12	823.31	605.86	480.20	0.18	0.58*
13	841.09	622.57	497.86	0.23	0.75*
Total	6284.69	5215.63	4564.31	18.74	59.26
Mean	483.44^{a}	401.20^{b}	351.10^{c}	1.44	7.41*

Means with different superscript differ significantly,
*=Significant, NS= Non significant

Live body weight

From table 3, it was observed that, the average day-old weight of chicks was 36.32, 36.24 and 35.44 in T1, T2 and T3, respectively. The average live weight of the birds at the end of 13th week was 1920.60, 2116.40 and 1732.76 (g/bird) for T1, T2 and T3 respectively. The highest live body weight was observed in T2 (971.96 g/bird) followed by T1 (824.70 g/bird) and T3 (743.21 g/bird) treatments, respectively. The statistical analysis revealed that the average live weight obtained in treatment T2 (p<0.05) was higher as compared to other treatment.

Patil *et al.* (2008) [6] reported the six-month stage Giriraja birds gain 2116 g body weight as against local birds (1257 g). Thus, mean body weight of Giriraja breed recorded significant increase against local breeds. Islam *et al.* (2014) [7] reported that the body weights at 8, 20, 40 and 52 weeks of age as 768.23±6.43 g, 1693.52±11.13 g, 2976.61±18.08 g and 3491.87±21.32 g, respectively in Vanaraja and 365.12±2.74 g, 0.783.14±5.03 g, 1274.31±9.01 g and 1423.47±16.14 g, respectively in case of indigenous chicken. The body weight of Vanaraja was significantly (P≤0.05) higher than the corresponding body weights of indigenous chicken.

Table 3: Weekly live body weight (g/bird) in different treatment groups

Weeks	Treatments			S. E. ±	C. D. (5%)
	T1	T2	T3		
Day old	**36.32**	**36.24**	**35.44**	**0.31**	**NS**
1	67.32	66.84	66.84	0.62	NS
2	124.40	124.40	124.40	0.00	NS
3	179.88	179.76	179.76	0.07	NS
4	281.36	282.48	282.36	0.47	NS
5	403.16	403.80	404.76	0.25	0.82*
6	656.60	747.16	555.28	7.81	25.48*
7	812.28	944.00	669.44	4.37	14.24*
8	965.84	1109.56	820.28	6.06	19.78*
9	1049.56	1260.76	914.00	14.58	47.56*
10	1185.64	1531.04	1057.56	8.79	28.66*
11	1356.04	1827.24	1315.08	30.79	100.40*
12	1718.44	1990.04	1539.16	16.76	54.67*
13	1920.60	2116.40	1732.76	10.19	33.25*
Mean	824.70^{b}	971.96^{a}	743.21^{c}	7.75	36.09

Means with different superscript differ significantly,
*=Significant, NS= Non-significant

Body weight gain

It was observed from the table 4 that the average gains in live weight gain were 144.94, 160.00 and 130.56g in T1, T2 and T3, respectively. The highest gain in body weight observed in treatment T2 (971.96) group followed by T1 (824.70) and T3 (743.21). The statistical analysis revealed that treatment T2 (971.96) are significantly higher and treatment T3 (743.21) are significantly lower in body weight gain.

Kumar *et al*. (2014) [8] reported that the RIR bird had significantly (p<0.05) higher mean DOC body weight (35.42±1.14 g), final body weight (1350±33.76 g), body weight gain (1314±31.77 g) and weight gain/bird/day (8.5±0.17 g) than those of 31.82±0.85 g, 1220±36.55 g, 1188±35.45 g and 7.7±0.23 g for Bovans White, respectively. Abhale *et al*. (2018) [3] reported that cage system had significantly (p<0.05) higher body weight and weight gain compared to bird reared under deep litter system.

Table 4: Weekly body wt. gain (g/bird) in different treatment groups

Weeks	Treatments			S. E. ±	C. D. (5%)
	T1	T2	T3		
1	31.00	30.60	31.40	0.57	NS
2	57.08	57.56	57.56	0.62	NS
3	55.48	55.36	55.36	0.07	NS
4	101.48	102.72	102.60	0.52	NS
5	121.80	121.32	122.40	0.53	NS
6	253.44	343.36	150.52	7.75	25.28*
7	155.68	196.84	114.16	9.03	29.45*
8	153.56	165.56	150.84	8.22	NS
9	83.72	151.20	93.73	11.35	37.02*
10	136.08	270.28	143.56	20.57	67.09*
11	170.40	296.20	257.52	33.03	NS
12	362.40	162.80	224.08	20.87	68.07*
13	202.16	126.36	193.60	15.86	51.72*
Mean	144.94^{b}	160.00^{a}	130.56^{b}	9.92	46.44

Means with different superscript differ significantly,
*=Significant, NS= Non-significant

Feed conversion ratio

It was observed from the Table 5 that average weekly feed conversion ratio was 3.36, 2.81 and 2.83 for treatment T1, T2 and T3 respectively. The statistical analysis revealed that the treatment T2 (2.81) had significantly (p<0.05) good average feed conversion ratio over T1 (3.36) and T3 (2.83) treatment. Treatment T1 (3.36) and T3 (2.83) are at par with each other and treatment T2 (2.81) and T3 (2.83) are also at par with each other.

Baba *et al*. (2014) [4] was similarly reported that feed conversion ratio of Vanaraja in intensive and backyard system of rearing was 2.24±0.11 and 2.02±0.12, respectively. Jha and Prasad (2013) [9] reported feed conversion ratio 4.28, 3.85 and 5.47 in Vanaraja, Gramapriya and Aseel birds, respectively at 40 weeks of age under Jharkhand agro climatic conditions. Abhale *et al*. (2018) [3] studied effect of rearing system on growth performance and carcass characteristics of Desi chicken. They conclude that cage system had significantly (p<0.05) higher feed conversion ratio compared to bird reared under deep litter system.

Table 5: Weekly feed conversion ratio (FCR) in different treatment groups

Weeks	Treatments			S. E. ±	C. D. (5%)
	T1	T2	T3		
1	2.515	2.571	2.503	0.046	NS
2	2.463	2.452	2.447	0.027	NS
3	3.807	3.812	3.808	0.005	NS
4	2.766	2.731	2.733	0.014	NS
5	2.877	2.889	2.862	0.012	NS
6	1.661	1.168	2.362	0.119	NS
7	3.111	2.220	3.626	0.204	0.667*
8	3.776	2.856	2.787	0.197	0.643*
9	4.249	3.069	2.886	0.221	0.721*
10	5.211	2.021	3.734	0.575	1.877*
11	4.754	1.971	2.018	0.371	1.211*
12	2.305	3.913	2.260	0.265	0.866*
13	4.273	4.955	2.779	0.292	0.954*
Mean	3.36^{a}	2.81^{b}	2.83^{ab}	0.18	0.91*

Means with different superscript differ significantly,
*=Significant, NS= Non-significant

Conclusion

It was concluded that, different rearing system significantly improve growth performance in cage system which was found superior in average weekly live weight (967.96 g/bird), body weight gain (160.01 g/bird), feed conversion ratio (2.781).

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