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Evaluation of three-way cross 'jharsim' variety of chicken under different system of management

NIRAJ KUMAR, SUSHIL PRASAD and RAVINDRA KUMAR✉

ICAR–All India Co-ordinated Research Project of Poultry, Ranchi Veterinary College, BAU, Ranchi 834 006 India

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Poultry production systems in India are characterized by the simultaneous existence of the traditional extensive system of backyard production and the modern intensive system of production. Backyard poultry serves as an inexpensive means for household to generate highly nutritious food items at minimal cost (Akhtar *et al.* 2013). A new variety Jharsim has been developed by three way cross, which have better result in less input including Punjab Broiler-2 (PB_2), *Desi* birds and Dahlem red. The variety has good productive and reproductive performance even in backyard system. In view of the above ideas, the present investigation has been undertaken to evaluate the performance of Jharsim poultry under different system of management.

The present study was conducted on 600 day-old chicks of Jharsim bird. The brooding of the chicks was done for two months on standard management conditions. All the chicks were maintained under standard management conditions at Hatchery Unit, Ranchi Veterinary College, Kanke, Ranchi up to eight weeks of age (brooding period). After 8^{th} week they were transferred to deep litter, semi-intensive and backyard system of management. Birds of deep litter and semi-intensive system were maintained at All India Co-ordinated Research Project, Ranchi and birds of backyard system were maintained at nearby village from the college.

After two months of brooding period, birds were randomly divided into three groups. In each group 200 birds were kept. Under deep litter, the birds were kept under standard feeding, healthcare and management practices in open sided house. Under semi-intensive system birds were provided with housing with nests. A wire net camp was attached to the house where these chicks can walk freely. The birds which were supplied to the farmers for their evaluation under backyard system were housed only at night. Under backyard system, birds were provided with some amount of supplementary feed in the form of kitchen waste, broken rice or wheat in the morning and allowed to walk in search of feed and these birds used to come back at dusk.

Present address: Birsa Agricultural University, Ranchi, Jharkhand. ✉Corresponding author e-mail: ravindrakumar_rvc@yahoo.com

Body weight: The effect of different management systems on body weight of Jharsim birds at 0 day was observed to be 31.27±0.47 g and at 8^{th} week of age body weight was 571.67±6.35 g under nursery management (Table 1). The findings observed in this study are in close agreement with Singh (2003). The difference in body weight seems to be inherent in the system of management. The low body weight of chicks under backyard system may be attributed to proportionately less availability of ample and desirable nutrient from the feeding of balanced supplement as they were maintained on free range grazing in kitchen garden, kitchen waste, fallen grains etc. In semi-intensive 50% feed supplement relative to their full requirement in comparison to the extensive management group were fed *ad lib*. It may be reasonable to assume that the quantity and quality of nutrient available in semi-intensive and backyard being not commensurate with the essential needs of energy and protein for further growth.

Body weight gain: The body weight gain was observed to be significantly ($P<0.01$) high under deep litter system followed by semi-intensive and backyard system at all the periods under study. The finding observed in this study are in accordance with Padhi *et al.* (2016) who observed higher body weight in deep litter system. The body weight gain of birds maintained under deep litter system was observed to be better followed by semi-intensive and backyard system of management during whole experimental periods (Table 1). The difference in results might be attributed to difference in feed supplement, management systems and other environmental factors like type of soil, temperature, rainfall etc.

In backyard system, birds monthly body weight gain was lower than the average of both deep litter and semi-intensive group. This was but natural owing to difference in total nutritive intake of the birds under different set of environment and management. In intensive management the birds had the advantage of uniform temperature being regulated through control of electricity. The semi-intensive and backyard group is recouping from the effect of the above factor.

Feed consumption: The variation in monthly feed consumption was observed during whole of the experimental

Table 1. Average body weight (g) of Jharsim birds at various ages reared under different management systems

Period		Treatment groups			
		T_1 (Deep litter)	T_2 (Semi-intensive)	T_3 (Backyard)	F-value
12th week		886.82±10.58[a] (198)	881.89±6.63[b] (196)	840.86±11.26[c] (198)	6.76**
16th week		1321.98±10.08[a] (196)	1213.85±10.08[b] (196)	1030.60±10.69[c] (196)	237**
20th week	Male	1639.6±12.97[a]	1556.5±9.82[b]	1309.08±6.45c	130**
	Female	1455.50±7.32[a] (194)	1369.4±4.56[b] (194)	1104.91±7.11[c] (194)	121**
	Pooled	1547.55±8.69[a] (194)	1462.95±3.86[b] (194)	1207±10.42[c] (194)	125.65**
Average weight gain					
8–12th week		421.9±6.20[a]	301.20±2.19[b]	280±2.72[c]	57.51**
12–16th week		643.10±5.88[a]	450.20±6.40[b]	320.23±2.10[c]	5088.31**
16–20th week	Male	622.60±8.20[a]	416.66±6.28[b]	392±3.52 [c]	153.12**
	Female	588.40±9.7[a]	396.40±8.40[b]	234±5.12 [c]	213.65**
	Pooled	605.60±7.25[a]	406.6±5.80[b]	280±4.67[c]	167.20**

Different superscript within a row differ significantly. (**P<0.01).

period (Table 2). The different management systems have significant role in daily feed consumption during different stages of growth in poultry. Feed consumption of Jharsim birds increases accordingly as they grow older. The feed consumption in birds of semi-intensive system was lower due to less feed supplied because they also met their feed requirement by grazing and scavenging. This result was similar to the observation of Patel *et al.* (2014).

Feed conversion efficiency: The average value of the feed conversion efficiency in Jharsim birds under nursery management was observed to be 3.10 and the same parameter during 8–12, 12–16 and 16–20 week of age were 2.80, 2.85 and 2.95 in deep litter system. The corresponding values for semi-intensive systems were 2.15, 2.55 and 3.10 respectively.

These results corroborate with the findings of Prasad (1988) who reported significant difference in feed conversion ratio under different management system. The results for the average feed consumption and feed efficiency ratio was indicative of the effect of increase in body size and type of diet since feed intake varies inversely with the concentration of energy in the diet. The lower feed efficiency is manifested in better conversion rate than higher one. The conversion efficiency decreased from 16 to 20 weeks because of rapid increase due to hypertrophy and hyperplasia of cells during this phase of the birds.

Table 2. Average feed consumption (g/4 week/bird) of Jharsim birds at different periods reared under different management system

Period (weeks)		Treatment groups		T-test
		T_1 (deep litter)	T_2 (semi intensive)	
9–12th week		1,181.32	647.58	91.47**
13–16th week		1,832.55	1,148.01	129.38**
17–20th week	Male	1,836.67	1,291.64	78.41**
	Female	1,735.18	1,228.84	74.45**
	Pooled	1,786.52	1,260.46	76.56**
Feed Conversion Ratio (FCR)				
0–8 weeks		3.10	3.10	
9–12 weeks		2.80	2.15	
13–16 weeks		2.85	2.55	
17–20 weeks		2.95	3.10	

Different superscript within a row differ significantly. (**P<0.01).

Carcass characteristics

Carcass yields: Significant effect on different carcass traits like pre-slaughter live weight (g), dressed weight with viscera (g), eviscerated weight (g), giblet weight (g), blood loss per cent, back per cent, breast per cent and dressing percentage of Jharsim birds in all the systems of management. The present findings are in close agreement with the findings of Patel *et al.* (2014). The values of giblet per cent, and non-edible percentage were higher for birds of backyard system than those of birds of deep litter and semi-intensive system of management Akhtar *et al.* (2012). Better growth of giblet and non-edible parts under backyard system as compared to deep litter and semi-intensive system of management might be attributed to the free movement of birds under backyard system.

Survivability: The survivability percentage of Jharsim birds has been recorded under deep litter, semi-intensive and backyard system of management. The survivability percentages under deep litter, semi-intensive and backyard system of management were 96, 97 and 97% respectively (Table 3). Kumar (1991) also reported comparatively higher viability percentage.

SUMMARY

The present research work was conducted on 600 day old Jharsim chicks to evaluate the performance of Jharsim poultry under different system of management. The average value of day old Jharsim birds was 31.27 g. Significant effect of body weight and body weight gain at various stages of growth was observed under different condition of

Table 3. Average carcass yields of Jharsim bird raised under different management systems

Parameter		Treatment groups			F-value
		T_1 (Deep litter)	T_2 (Semi-intensive)	T_3 (Backyard)	
Live weight	Male	1979±2.08[a]	1888.33±7.26[b]	1792.33±4.33[c]	344.45**
	Female	1936.33±2.96[a]	1888.33±7.26[b]	1792.33±4.33[c]	344.45**
Blood loss (%)	Male	3.30±0.05[a]	3.00±0.057[b]	2.68±0.01[c]	41.08**
	Female	3.40±0.11[a]	2.89±0.05[b]	2.60±0.02[c]	28.50**
Defeathered wt. (%)	Male	90.10±0.057[a]	88.65±0.23[b]	89.90±0.11[c]	25.55**
	Female	90.91±0.07[a]	89.36±0.24[b]	88.88±0.008[b]	53.40**
Breast (%)	Male	25.20±0.50[a]	26.35±0.07[b]	24.82±0.04[a]	7.26*
	Female	23.06±0.08[a]	21.10±0.58[b]	20.92±0.01[c]	4.47NS
Back (%)	Male	18.81±0.64[a]	19.74±0.005[b]	18.60±0.006[c]	539.28**
	Female	20.73±0.011[a]	20.14±0.006[b]	19.46±0.02[c]	935.77**
Giblets (%)	Male	3.17±0.014[a]	3.28±0.011[b]	3.71±0.005[c]	635.32**
	Female	4.73±0.008[a]	4.51±0.008[b]	5.05±0.028[c]	218.25**
Non-edible parts (%)	Male	25.74±0.01[a]	25.38±0.008[b]	27.27±0.014[c]	697.23**
	Female	34.18±0.015[a]	36.86±0.023[b]	36.48±0.011[c]	6148.79**
	Pooled	29.96±0.015[a]	31.12±0.015[b]	31.87±0.011[c]	4470.84**
Dressing (%) with giblet	Male	74.19±0.003[a]	76.12±0.011[b]	73.79±0.008[c]	6218.45**
	Female	67.29±0.005[a]	63.79±0.005[b]	66.21±0.008[c]	66744.53**
	Male	71.19±0.008[a]	71.91±0.008[b]	70.21±0.008[c]	9365.47**
Dressing (%) without giblet	Female	62.83±0.005[a]	58.84±0.005[b]	60.95±0.006[c]	107586.70**

Mortality percentage

Parameter	Nursery management	T_1 (Deep litter)	T_2 (Semi-intensive)	T_3 (Backyard)
No. of birds housed	600	200	200	200
No. of birds died	12	08	06	06
Mortality (%)	02	04	03	03
Survivability (%)	98	96	97	97
Overall mortality			5.33	

management. The overall average body weight in deep litter system of management was 1547.55±8.69 g at 20 weeks of age. The corresponding values for semi-intensive and backyard system were 1462.95±3.86 and 1207±10.42 g respectively. The average monthly body weight gain under deep litter system was 605.60±7.25 at 16th- 20th weeks of age. The corresponding values for semi-intensive and backyard system of management were 406.6±5.80 g and 280±4.67 g respectively. Feed consumption was observed to be significantly higher in deep litter system than semi-intensive system of management. Significant effect of different carcass traits was observed under different systems of management.

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