



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(4): 1628-1632
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www.thepharmajournal.com

Received: 09-02-2023

Accepted: 12-03-2023

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Growth performance of indigenous chicken of Chhattisgarh plain region under intensive system of rearing

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Abstract

The growth performance of native chicken of Chhattisgarh plains comprising of 756 day old chicks received from seven different hatches was studied. The chicks were reared under intensive management system at Poultry Unit, College of Veterinary Science and A.H., Anjora, Durg. Observations were taken from day old to 20 weeks of age. In addition to weekly body weight, growth rate, weekly feed intake, average total feed intake (kg) per bird and feed conversion ratio (FCR) were also studied. The overall weekly average body weights pooled over for seven hatches ranged from 24.31 g at day-one to 1005.25 g at 20th week of age. Average weekly body weight at 4th, 8th, 12th and 16th week of age was 103.52±0.69, 246.65±0.86, 453.09±1.31, and 704.08±2.93 g respectively. Analysis of variance for hatch effect on body weight showed that hatch has highly significant effect on body weights. Total feed consumption from day old to 20 week of age when it attains 1kg body weight was found to be 6.316 kg/bird. Weekly weight gain at 4th, 8th, 12th, 16th, 20th week was 25.83g, 48.91g, 56.05g, 63.28g and 64.91g, respectively, whereas the feed conversion ratio (FCR) ranged from 5.1 at 4th week to 8.5 at 20th week of age. Overall FCR was 6.4. It can be concluded that the native chicken of Chhattisgarh are slow growing bird with poor growth rate and FCR, and suitable under backyard system of rearing. However, it can be possible to improve their growth performance by adopting appropriate breeding methods.

Keywords: Native chicken, growth performance, Chhattisgarh, hatch

Introduction

In rural, tribal, and semi-urban regions of the nation, native chicken continues to be the cornerstone of self-sufficient, low-input backyard or free-range systems of production. The disease resistance and tropical adaptability of the native breeds of chicken are widely known. As per 20th livestock census there is an increase of 45% population of backyard variety of chicken in comparison to previous livestock census (DAHDF, 2019) [1].

This is due to significant increases in demand for organic meat and eggs, and the willingness of consumers to pay higher price in comparison to the commercially produced meat and eggs. Also Indian farmers are accustomed to backyard system of rearing of their native chicken under low input system. Native chickens have special qualities including tenacity, the capacity to adapt to adverse environments, broodiness, aggression to defend their young, etc. Native chicken's meat and eggs are thought to be tastier and healthier than those of rapidly growing birds. Also, raising native chickens generates side money with the least amount of resources and labour. In addition to ensuring the nutritional security of the home, it also promotes women empowerment and the social advancement of rural and tribal people. Yet, in addition to inadequate nutrition and disease outbreaks, insufficient genetic potential has also been cited as a barrier to increasing the production of indigenous chicken.

In Chhattisgarh, one of the major sources of income for small and marginally wealthy farmers is the backyard raising of local varieties of poultry. The growing demand for indigenous eggs and low investment in backyard poultry keeping provides an opportunity of subsidiary income to the rural poor particularly to the women. Little flock sizes of 5–10 mostly unremarkable birds kept in extensive systems with no inputs are typical of backyard poultry rearing in the state. Yet, these flocks provide the owners with much-needed animal protein as well as additional revenue. There are no previous reports available in the literature regarding growth performance of native chicken of Chhattisgarh. Hence the present research work was under taken to know the growth performance of native chicken of Chhattisgarh plain region.

Materials and Methods

Experiment location and selection of birds

The experiment was carried out to study the growth performance, feed consumption, and feed conversion ratio from day old age to 20 weeks of age in native chicken of Chhattisgarh plains. For the experiment 1631 eggs from desi chicken were collected from the villages situated in Durg, Rajnandgaon, and Kheragarh district of Chhattisgarh plain region. The eggs were hatched at Poultry Unit of Veterinary Collage, out of which 756 chicks were received from seven different hatches and were used for the study. The birds were reared under deep litter system with standard management and feeding system.

The readymade concentrate feed was given to the birds during the present investigation. During 2 weeks of brooding period, feed was spread in flat tray and paper, after which the chicks were fed in shallow feeding troughs. The chicks received measured quantity of feed in the morning and evening daily. The left over feed of previous day was weighed and subtracted from the total feed offered earlier to estimate the actual feed consumption. The chicks were provided with starter mash up to 8 weeks of age, grower mash from 9 to 20 weeks of age and layer mash from 21 weeks onwards.

Parameters Studied: Following different growth performance parameters were studied:

Body weight: The body weight in gram (g) of birds were taken using electronic balance and recorded at weekly interval from 0 to 20 weeks of age.

Growth Rate: Weekly gain in Body weight (g) was calculated from week 1 to 20 weeks of age.
Weekly gain in body weight = Body weight in particular week - body weight of previous week

Feed consumption: Weekly feed consumption was recorded up to 20 week of age.

Feed conversion ratio: Feed conversion ratio was calculated by dividing the total quantities of feed consumed (g) by total gain in body weight (g) during the same period.

Statistical analysis: Mean and Standard Error (S.E.) for different growth traits were worked out as per the standard

formulae. To see the effect of hatch on body weights, only 5 selected weeks of age were considered i.e. at day old age, 4th, 8th, 12th, 16th and 20th week of age. Accordingly, one way ANOVA was applied as per the standard method using MS-Excel software package.

Results and Discussion

Body weight

The mean weekly body weights with standard error in seven different hatches and overall pooled averages of desi birds from 0 to 20 weeks of age are presented in table 1. The overall weekly average body weights pooled over for seven hatches ranged from 24.31±0.12 g at day-one to 1005.25±3.85 g at 20th week of age. Average weekly body weight at 4th, 8th, 12th and 16th week of age was 103.52±0.69, 246.65±0.86, 453.09±1.31, and 704.08±2.93 g respectively. To see the effect of hatch on body weights at day old, 4th, 8th, 12th, 16th and 20th week of age, one way ANOVA was performed and it was found that hatch has highly significant effect on body weights (Table-2). It is observed that the desi chickens are slow growing birds which attain 1 kg body weight in 20 weeks and above.

Body weights observed in the present study are comparable with those reported by Gurung and singh (1999)^[2], in Aseel birds under free range system, Thakur *et al.* (2006)^[3] in Kadaknath chicken under free range system, Dana *et al.* (2011)^[4] in Horo chicken, and Ghosh and Sahu (2017)^[5] in Haringhata Black. But most of the authors reported higher weekly body weights *viz.* Sharma *et al.* (2012)^[6], Singh *et al.* (2014)^[7], Pathak *et al.* (2017)^[8], Shanmathy *et al.* (2018)^[9], Ranabijuli *et al.* (2020)^[10], Dubey *et al.* (2021)^[11], Jha *et al.* (2021)^[12], Sharma *et al.* (2021)^[13] and Dalal *et al.* (2022)^[14] in different Indigenous chicken. However, Haunshi *et al.* (2009)^[15] and Vijn *et al.* (2007)^[16] reported lower body weights in Miri chicken of Assam and Red Jungle fowl, respectively. It may be noted that the chick hatching weight is comparable with the other indigenous breeds but in later age the growth is much slower than other breeds leading to attainment of 1.0 kg body weight only after 20 weeks of age (Haunshi *et al.*, 2009^[15]; Malik and Singh, 2013^[17]; Kundu *et al.*, 2015^[18]; Pathak *et al.*, 2017^[8]; Shanmathy *et al.*, 2018^[9]; Ranabijuli *et al.*, 2020^[10]; Chandrashekar *et al.*, 2021)^[19].

The main cause of variation in the body weights observed in the present study as compared to other workers may be due to differences in the genetic stock, management conditions, feeding and environmental conditions.

Table 1: Hatch wise and overall Weekly body weights (Mean±SE) from 0 to 20 weeks of age in native chicken of Chhattisgarh plains.

Week	Hatch 1	Hatch 2	Hatch 3	Hatch 4	Hatch 5	Hatch 6	Hatch 7	Overall
0	23.66±0.30	23.76±0.29	25.35±0.33	25.24±0.35	24.55±0.28	23.56±0.30	24.27±0.29	24.31±0.12
1	36.24±0.80	35.12±0.71	39.84±1.00	40.61±0.77	39.44±0.93	34.43±0.44	38.60±0.77	37.68±0.30
2	57.78±0.95	57.97±0.92	59.32±1.47	57.89±0.88	60.55±1.29	53.71±1.35	57.87±0.97	57.88±0.47
3	70.29±1.54	79.18±1.16	73±1.21	79.14±1.05	76.91±1.07	83.51±1.41	80.10±1.27	77.61±0.74
4	92.12±1.79	108.22±1.84	96.86±1.84	100.77±1.58	101.16±1.98	117.92±1.79	105.69±1.88	103.52±0.69
5	119.12±0.95	125.29±1.11	127.46±1.29	121.84±1.56	123.12±1.92	131.52±1.94	126.8±1.58	124.76±0.58
6	154.11±1.03	156.32±1.00	162.34±1.62	158.72±2.79	158.28±1.73	163.91±2.14	156.00±1.75	158.20±0.69
7	187.74±1.10	189.70±1.12	209.50±1.94	190.29±1.51	207.80±1.78	201.42±1.70	200.61±1.65	197.26±0.64
8	233.78±1.37	229.02±1.51	260.62±2.62	239.99±1.61	268.48±2.23	233.48±1.36	255.30±2.51	246.65±0.86
9	283.53±0.97	290.44±1.20	303.58±2.68	393.71±1.62	333.48±1.64	294.09±1.91	306.17±3.14	300.27±0.91
10	336.91±1.58	339.97±1.20	344.37±2.78	338.50±1.81	398.57±2.87	342.91±2.67	347.19±2.40	349.70±1.11
11	383.62±2.17	385.30±1.52	392.17±3.25	387.95±1.97	442.01±2.41	388.86±2.14	404.33±3.24	397.58±1.14
12	433.29±2.17	437.36±2.09	460.94±5.06	455.28±3.01	488.52±2.97	453.28±3.11	447.16±3.17	453.09±1.31
13	497.37±2.30	496.87±2.28	512.68±4.96	500.20±2.70	523.52±4.21	506.02±3.71	511.22±4.07	506.28±1.33
14	562.15±3.66	555.16±3.15	589.32±7.16	560.38±3.94	572.19±5.17	566.22±5.07	571.54±6.17	566.93±1.84

15	594.70±8.26	618.20±4.60	668.32±7.82	62.35±5.19	631.70±5.49	625.83±5.90	636.03±5.69	626.82±2.37
16	656.18±6.70	656.91±5.52	771.05±9.67	714.83±6.62	706.30±6.66	702.32±7.06	743.88±5.93	704.08±2.93
17	721.67±6.69	722.57±5.18	844.42±12.36	714.83±7.19	771.5±7.34	768.75±6.77	746.55±6.99	760.41±3.10
18	790.56±6.67	789.63±5.32	946.46±12.37	867.51±7.00	861.09±9.92	848.74±9.24	864.15±10.04	847.41±3.67
19	864.76±7.55	852.36±5.82	1036.16±15.37	957.34±7.20	981.55±8.57	954.01±11.17	959.32±8.60	938.06±4.06
20	938.23±7.35	958.75±6.74	1076.16±50	1006.40±6.76	1026.99±9.32	1037.15±12.45	1018.23±7.93	1005.25±3.85

Table 2: Analysis of variance showing the effect of weekly body weight (M.S.)

Source of variation	M.S. value for						
	Day old	1st week	4th weeks	8th weeks	12th weeks	16th weeks	20th weeks
Between hatches	84.43(**)	671.12(**)	6724.04(**)	19704.32(**)	35044.89 (**)	167654.90 (**)	201244.60 (**)
Error	13.78	68.43	340.81	375.44	943.39	4563.267	8339.30

** significant at (<0.01)

Weekly Growth rate (g) from 1 to 20 weeks of age in local birds:

The mean weekly body weights gain of chicks irrespective of sex and overall means of local birds of Chhattisgarh plains from 1 to 20 weeks of age are presented in table 3. During first week the chicks grew at the rate of 13.4 g / week. The weekly gain in body weight gradually increased as the age advanced and at 20th week the gain was 64.7 g. During the whole study period i.e. from day 1 to 20 weeks of age a bird gains on an average 984 g weight. Maximum weight gain was achieved at 18th and 19th week (89.24 and 91.05 g/wk respectively). It is also found that Chhattisgarhi local chicken grows comparatively at a slower rate up to 8th week of age and then it grows at a higher rate up to 20th week of age.

In comparison to the present study, higher body weight gain of different breeds during different weeks of age was also reported by many authors, like, Chatterjee *et al.* (2007) [20] in Aseel, Haunshi *et al.* (2007) [21] in Vanaraja, Sharma *et al.* (2012) [6] in Krishna-J birds, Khawaja *et al.* (2012a) [22] and Parveen *et al.* (2017) [23] in Desi, Fayoumi and RIR, and Singh *et al.* (2017) [24] in non-descript local bird and Improved Dual Purpose coloured bird.

Weekly Feed Consumption:

3.4 Feed consumption gradually increases with advancing age. The feed consumption was 84.5 g at 1st week, 130.6 g at 4th week, 168.6 g at 5th week, 292 g at 8th week, 305.34 g at 9th week, 347 g at 12th week whereas 344.8 g at 13th week to 547 g at 20th week (Table- 3).

Higher feed consumption in different breeds during the corresponding ages have been reported by many workers, viz, Bhatti *et al.* (1996) [25] in Aseel and WLH, Asiedu and Weever (1993) [26] in Aseel and Creole, Akthar *et al.* (2007) [27] in LSB, Bekele *et al.* (2009) [28] in Fayoumi and RIR, Khawaja *et al.* (2012b) [29] in RIR, Fayoumi, RIFI and FIRI, Khawaja *et al.* (2012a) [22] in Desi, Fayoumi, RIR, Jatoi *et al.* (2014) [30] in Aseel varieties, Kumar *et al.* (2014) [31] in RIR and BW, and Parveen *et al.* (2017) [23] in Desi and RIR.

Based on studies, it may be concluded that native chicken of Chhattisgarh plains have lower feed intake in comparison to other desi chickens. The differences in feed consumptions in different breeds and varieties could be due to the differences in their genetic makeup and growth rate.

Feed conversion ratio

The feed conversion ratio ranged from 5.1 to 6.3 during 1-4 weeks, 6.0 to 7.7 during 5-8 weeks, 5.7 to 6.8 during 9-12 weeks and from 5.3 to 8.5 during 13 - 20 weeks (Table-3). The overall feed conversion ratio from 1 to 20 weeks was

found as 6.4 indicating that for every kg gain in body weight a desi bird consumes 6.4 kg of feed.

Similar feed conversion ratio of different breeds during the corresponding ages have been reported by many workers, viz., Padhi (2001) [32] in Naked neck and Frizzle, Khawaja *et al.* (2012b) [29] in RIR, Fayoumi and Desi, Khawaja *et al.* (2012a) [22] in RIFI and FIRI, Jatoi *et al.* (2014) [30] in Aseel varieties, Kumar *et al.* (2014) [31] in RIR & BW, and Parveen *et al.* (2017) [23] in Desi, Fayoumi and RIR. However, lower feed conversion ratio have been observed by Yeasmin *et al.* (2003) [33] in RIR, WLH and Fayoumi, Nthimo (2004) [34] in New Hampshire and RIR, and Haque *et al.* (1999) [35] in native naked neck chicken and their crosses with exotic chicken.

Table 3: Weekly body weight gain, feed consumption and feed conversion ratio of desi birds from 0 to 20 weeks of age

Weeks	Weekly body weight gain	Weekly feed consumption	Feed conversion ratio
1	13.41	84.56	6.3
2	20.11	114.03	5.7
3	19.55	119.49	6.1
4	25.83	130.62	5.1
5	21.78	168.63	7.7
6	33.63	249.2	7.4
7	39.67	287.21	7.2
8	48.91	292.18	6.0
9	53.32	305.34	5.7
10	49.22	306.11	6.2
11	47.87	325.57	6.8
12	56.05	346.99	6.2
13	53	344.89	6.5
14	61.44	374.22	6.1
15	59.81	382.69	6.4
16	63.23	471.59	7.5
17	72.18	463.61	6.4
18	89.24	477.4	5.3
19	91.05	524.3	5.8
20	64.71	547.4	8.5
Overall	0.984 kg	6.316 kg	6.4

Conclusion

From the present study, it is concluded that the hatch effect was significant on body weight. Besides, the native or indigenous chickens are slow growing birds with poor feed conversion ratio, but are hardy to the existing environment and suitable under backyard system of rearing.

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