RESEARCH ARTICLE

Performance of Ankleshwar Chicken Reared under Intensive Management System in Gujarat

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ABSTRACT

The productive and reproductive performance of Ankleshwar chicken under intensive management for three successive generations (S_0, S_1, and S_2) was studied at Poultry Research Station, AAU, Anand, Gujarat. Total 546, 422, and 465 pullets of S_0, S_1, and S_2 generation, respectively, were housed in individual layer cages at 16 weeks of age. Production parameters, *viz.*, body weight (g) of day-old, 4th, 8th, 16th and 40th weeks of age; total feed consumption (kg) per bird; mortality (%) during 0-8, 9-16 and 17-40 weeks of age; total egg production (no.) up to 40 weeks of age and average egg weight (g) at the end of 28th and 40th week of age were recorded for three generations. The reproductive parameters, *viz.*, age at sexual maturity (days), fertility (%) and hatchability (%) on Total Egg Set basis (TES) as well as hatchability on Fertile Egg Set basis (FES) were calculated. It was concluded that the rearing of Ankleshwar chicken in intensive management over three (S_0, S_1 and S_2) generations significantly ($p \leq 0.05$) improved body weight at 4th, 8th and 16th weeks of age, required less feed, improved fertility and showed significantly ($p \leq 0.05$) early age at sexual maturity (154 days) in S_2 generation with significant ($p \leq 0.05$) decreasing trend in egg production up to 40th week of age from S_0 to S_2 generation. Hatchability showed a decreasing trend in progressive generations. The birds have shown better livability reared under intensive management in Gujarat.

Keywords: Ankleshwar chicken, Gujarat climate, Intensive system, Productive performance.

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INTRODUCTION

The Indian poultry industry is one of the fastest-growing segments among the livestock sector. The rural and backyard poultry segment of the Indian poultry industry plays a pivotal role in the sustainable rural livelihood of farmers in India (Padhi, 2016). The non-descript desi birds reared by the farmers in their backyard by the traditional system can sustain very well in various ecosystems. The eggs and meat of backyard poultry have high nutritive value, but they are low producers. One of the most important characters of native chicken is its hardiness (Haunshi and Doley, 2011; Padhi, 2016). The Ankleshwar is the only indigenous breed of chicken registered in Gujarat State. The breeding program to improve the performance of indigenous breeds of chicken through selection is of great help to the farmers of rural areas to improve their earning from an indigenous bird. The selection, maintenance, improvement and *ex-situ* conservation of Ankleshwar breed is being carried out in the intensive rearing system at Poultry Research Station, Anand Agricultural University, Anand, Gujarat. The various production and reproduction performance traits are being studied in successive generations. Simultaneously, day-old chicks are being produced at this center and are being distributed to needy rural poultry farmers with the aim of conservation. The objective of the present study was to evaluate the performance of Ankleshwar chicken reared under intensive management system in Gujarat

MATERIALS AND METHODS

The study was conducted under the research project entitled "ICAR-AICRP on poultry breeding for eggs" at Poultry Research Station, Anand Agricultural University, Anand, Gujarat. Total 1573 hatching eggs of Ankleshwar chicken were collected from rural areas of Ankleshwar, Jambushar, Bharuch, Valiya, and Chotaudaipur of South Gujarat and were incubated. A total of 717 chicks were hatched as population-I. Subsequently, 2985 chicks were generated from them as population-II to have a sufficient number of chicks.

Experimental Birds and Management

The chicks of selected S_0 generation of Ankleshwar chicken were produced from population-II by the mating of selected

80 males with 480 females (mating ratio of 1:6). The chicks of S_1 generation of Ankleshwar chicken were produced from S_0 generation by the mating of 50 sires with 250 dams (mating ratio of 1:5). The chicks of S_2 generation of Ankleshwar chicken were produced from S_1 generation by the mating of 50 sires with 250 dams (mating ratio of 1:5). For all above mating, AI was carried out twice in a week so as to ensure better fertility in all three successive generations.

The identical management practices with regard to feeding, watering, lighting, and bio-security measures were adopted. All the birds were vaccinated following the standard vaccination schedule. The diets were formulated as per the standard norms. The *ad libitum* balanced chick mash, grower mash, pre-layer, and layer mash-I diets were offered during 0-8, 9-16, 17-19 and 20-40 weeks of age, respectively.

Hatchery Operations

Hatching egg collection and Storage

The hatching eggs were collected from 46 to 50th weeks of age, where artificial insemination of hens was carried out twice weekly. The eggs were collected two times in a day, cleaned with mild disinfectant and stored at 15-16° C for maximum of 7 days for maintaining the embryos in the quiescent stage before setting in an incubator. The eggs were selected based on size, shape, cleanliness, and soundness.

Incubation and hatching of eggs

All the eggs were fumigated using potassium permanganate and formalin before setting into setter machine. The hatching eggs were candled by using mass candler at 18th day of incubation to remove infertile, dead in a shell and dead in germ. The fertile eggs were transferred to hatcher machine. All the standard management practices were followed during hatchery operations. A total of 2831, 2363, and 1989 eggs were set for S_0, S_1, and S_2 generations, respectively. Out of these total eggs set, a total of 2429, 1954 and 1712 fertile eggs after candling were transferred to hatcher machine and a total of 2072, 1660 and 1320 chicks were hatched in S_0, S_1 and S_2 generations, respectively.

At the start of 16th week of age 546, 422 and 465 pullets were housed individually for recording the further production performance parameters for S_0, S_1 and S_2 generations, respectively.

Parameters Studied

Production parameters

Body weight was measured at day-old, 4th, 8th, 16th, and 40th weeks of age for S_0, S_1 and S_2 generations. Total feed consumption (kg) per bird was recorded during 0-8, 9-16, and 17-40 weeks of age for each generation. The total egg production (no.) was recorded up to 40th week of age in each generation. The average egg weight (g) was recorded

at the end of 28th and 40th week of age in each generation. Mortality was recorded daily, and mortality percent was calculated during 0-8, 9-16, and 17-40 weeks of age for S_0, S_1, and S_2 generations.

Reproduction parameters

The age of sexual maturity (ASM) was recorded in each generation. The fertility percent and hatchability percent on Total Egg Set basis (TES) and hatchability percent on Fertile Egg Set basis (FES) were calculated as mentioned by Patra *et al.* (2014) in S_0, S_1 and S_2 generations.

RESULTS AND DISCUSSION

Productive Performance

Body Weight

Body weight of Ankleshwar chicken reared in intensive management for three generations recorded at various ages during 0-40 weeks of age is presented in Table 1. Body weight of Ankleshwar chicken differed significantly ($p \leq 0.05$) at day-old, 4th, 8th, and 16th week of age among different generations. Body weight at 4th, 8th and 16th weeks of age in Ankleshwar chicken reared under intensive system of management has been improved in S_1 and S_2 generations than that of S_0 generation. Body weight at 40th week of age did not differ significantly between three generations. Various workers reported variation in body weight depending on the rearing system and species under study.

Egg production

The total egg production (Table 1) up to 40th week of age showed significant ($p \leq 0.05$) decreasing trend from S_0 to S_2 generation. Yadav *et al.* (2017) reviewed and reported the annual egg production of Aseel from Andhra Pradesh as 92 eggs, Busra from Gujarat and Maharashtra as 40-55 eggs, Daothigir from Assam as 60-70 eggs, Ghagus from Karnataka and Andhra Pradesh as 45-60 eggs, Kadaknath from Madhya Pradesh as 80 eggs and Nicobari from Nicobar Island as 60-70 eggs. Kalita *et al.* (2012) and Ramana *et al.* (2010) recorded 53.25 ± 5.61 and 52.8 ± 3.64 numbers of egg production up to 40th week in Vanaraja birds reared in an intensive system of housing. Thus, the Ankleshwar chicken produced a higher number of eggs up to 40th week of age as compared to Vanaraja chicken, Busra and Ghagus in intensive housing system.

Egg weight

The egg weight at 28th weeks of age differed significantly ($p \leq 0.05$) in S_1 from S_0 and S_2 generation, but not among S_0 and S_2 generation (Table 1). The egg weight at 40th weeks of age differed significantly ($p \leq 0.05$) in S_0 from S_1 and S_2 generation, but not among S_1 and S_2 generation. This indicated that there was a decreasing trend in egg weight at 40th weeks of age. Yadav *et al.* (2017) reviewed average

Table 1: Production and reproduction parameters of Ankleshwar chicken for three generations at various ages from 0-40th weeks of age reared under intensive management

Parameters	Generation S_0	Generation S_1	Generation S_2	P-value
Body weight (g)				
Day-old	31.40 ± 0.17^a	30.84 ± 0.18^b	29.14 ± 0.12^c	0.000
4 week	151.27 ± 2.09^b	170.51 ± 2.78^a	165.43 ± 3.34^a	0.000
8 week	351.28 ± 3.30^c	462.87 ± 5.03^b	566.44 ± 7.63^a	0.000
16 week	915.80 ± 5.39^c	1004.96 ± 7.43^a	957.57 ± 5.66^b	0.000
40 week	1471.13 ± 9.80	1493.35 ± 13.26	1478.68 ± 8.63	0.347
Total egg prod. up to 40 weeks	74.10 ± 0.94^a	71.29 ± 1.28^b	66.40 ± 0.97^c	0.000
Egg weight (g)				
28 week	36.98 ± 0.14^b	38.37 ± 0.19^a	36.88 ± 0.19^b	0.000
40 week	44.83 ± 0.16^a	43.93 ± 0.29^b	44.17 ± 0.19^b	0.000
Mortality (%)				
0-8 week	9.88	7.15	6.54	-
9-16 week	7.89	5.83	0.91	-
17-40 week	2.75	28.67	7.31	-
Total feed consumption per bird (kg)				
0-8 week	1.399	1.567	1.600	-
9-16 week	3.390	3.323	3.261	-
17-40 week	17.501	15.227	15.674	-
0-40 week	22.290	20.117	20.535	-
Reproduction parameters				
Total number of eggs set	2831	2363	1989	-
Total number of fertile eggs	2429	1954	1712	-
Fertility (%)	85.80	82.69	86.07	-
Total number of chicks hatched	2072	1660	1320	-
Hatchability (%)				
TES	73.19	70.25	66.37	-
FES	85.30	84.95	77.10	-
Age at sexual maturity (days)	159.92 ± 0.46^b	173.59 ± 0.72^a	154.49 ± 0.41^c	0.000

egg weight of Assel from Andhra Pradesh as 50 g, however in other species the egg weight was either low as in Busra from Gujarat and Maharashtra or comparable as in Daothigir from Assam as 42-44 g, Ghagus from Karnataka and Andhra Pradesh as 40.25 g, Kadaknath from Madhya Pradesh as 46.8 g and Nicobari from Nicobar Island as 38.91 g.

Mortality

The percent mortality recorded during 0-8 and 9-16 weeks of age was in decreasing trend from S_0 to S_2 generation (Table 1). The lowest mortality (0.91%) was recorded in S_2 generation during 9-16 weeks of age. However, the percent mortality recorded during 17-40 weeks of age for S_1 generation was the highest because of the incidences of Marek's Disease in this particular group of birds.

Total Feed Consumption

Among all the generations, group feeding was practiced. The results of total feed consumption (Table 1) revealed that the birds belonging to S_1 and S_2 generations consumed less feed as compared to S_0 generation up to 40 weeks of age.

Reproductive Performance

Fertility

The highest fertility percent was observed in S_2 generation, followed by S_0 and S_1 generation (Table 1). The fertility percent of Ankleshwar chicken observed in the present study was comparable with Vanaraja chicken reported in an intensive system of housing (Kalita *et al.,* 2012). Yadav *et al.* (2017) reported 66 % fertility of Aseel from Andhra Pradesh. Ahmad *et al.* (2019) reported the lowest egg infertility rate of Naked Neck chicken (*p*<0.0001) in free-range hens, followed by those kept in the semi-intensive and intensive systems.

Hatchability

The hatchability was calculated based on Total Egg Set (TES) and on the basis of Fertile Egg Set (FES). There was a gradual decrease in the hatchability from S_0 to S_2 generation (Table 1). Lower hatchability, *i.e.,* 63% and 60% in Aseel and Busra, respectively, were reported by Yadav *et al.* (2017).

Age at sexual maturity

The age at sexual maturity in Ankleshwar differed significantly (*p*≤0.05) among different generations. It was

significantly ($p \leq 0.05$) lowest in birds of S_2 generation and highest in S_1 generation as compared to the other two generations (Table 1). Haunshi and Doley (2011) reported the age at first egg in Mizo-local chicken of Mizoram as 163.56 ± 1.34 days.

Earlier reports on native chicken in particular ecotype showed low potential for their egg production and growth in rural management conditions. However, under improved feeding, an intensive system of housing and selection, the level of production has been increased significantly (Nchinda *et al.,* 2011; Padhi, 2016). The performance of native fowl can be improved by a change in husbandry practices, feeding management, and better health coverage (Yadav *et al.,* 2017).

CONCLUSIONS

It was concluded that the rearing of Ankleshwar chicken in intensive management in Gujarat over three generations (S_0, S_1 and S_2) significantly ($p \leq 0.05$) improved body weight at 4th, 8th and 16th weeks of age, required less feed, improved fertility and showed significant ($p \leq 0.05$) early age at sexual maturity. Birds also showed significant ($p \leq 0.05$) decreasing trend in egg production up to 40th week of age. Hatchability was decreased in progressive generations (S_0, S_1, and S_2). Birds have shown better livability reared under intensive management system in Gujarat.

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