Performance of Ankleshwar Chicken Reared under Intensive Management System in Gujarat

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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, Bhuruch, Valiya, and Chotudaipur 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 S₀ 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 $S_0$ 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 $S_1$ 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 candied 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, Daonthigir 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...
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The 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 S₀ to S₂ generation (Table 1). The lowest mortality (0.91%) was recorded in S₂ generation during 9-16 weeks of age. However, the percent mortality recorded during 17-40 weeks of age for S₁ 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 S₁ and S₂ generations consumed less feed as compared to S₀ generation up to 40 weeks of age.

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 S₀ | Generation S₁ | Generation S₂ | P-value |
|---------------------------------|---------------|---------------|---------------|---------|
| Body weight (g)                 |               |               |               |         |
| Day-old                         | 31.40 ± 0.17<sup>a</sup> | 30.84 ± 0.18<sup>b</sup> | 29.14 ± 0.12<sup>c</sup> | 0.000 |
| 4 week                          | 151.27 ± 2.09<sup>b</sup> | 170.51 ± 2.78<sup>a</sup> | 165.43 ± 3.34<sup>a</sup> | 0.000 |
| 8 week                          | 351.28 ± 3.30<sup>c</sup> | 462.87 ± 5.03<sup>b</sup> | 566.44 ± 7.63<sup>a</sup> | 0.000 |
| 16 week                         | 915.80 ± 5.39<sup>c</sup> | 1004.96 ± 7.43<sup>a</sup> | 957.57 ± 5.66<sup>b</sup> | 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<sup>a</sup> | 71.29 ± 1.28<sup>b</sup> | 66.40 ± 0.97<sup>c</sup> | 0.000 |
| Egg weight (g)                  |               |               |               |         |
| 28 week                         | 36.98 ± 0.14<sup>b</sup> | 38.37 ± 0.19<sup>a</sup> | 36.88 ± 0.19<sup>b</sup> | 0.000 |
| 40 week                         | 44.83 ± 0.16<sup>a</sup> | 43.93 ± 0.29<sup>b</sup> | 44.17 ± 0.19<sup>b</sup> | 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) | 1.399        | 1.567         | 1.600         | -       |
| 0-8 week                        | 3.390         | 3.323         | 3.261         | -       |
| 9-16 week                       | 17.501        | 15.227        | 15.674        | -       |
| 17-40 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            | FES            |               |         |
| TES                             | 73.19         | 70.25         | 66.37         | -       |
| FES                             | 85.30         | 84.95         | 77.10         | -       |
| Age at sexual maturity (days)   | 159.92 ± 0.46<sup>b</sup> | 173.59 ± 0.72<sup>a</sup> | 154.49 ± 0.41<sup>c</sup> | 0.000 |

Reproductive Performance

Fertility
The highest fertility percent was observed in S₂ generation, followed by S₀ and S₁ 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.

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 S₀ to S₂ 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 $163.56 \pm 1.34$ 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 $4^{th}$, $8^{th}$, and $16^{th}$ 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 $40^{th}$ 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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