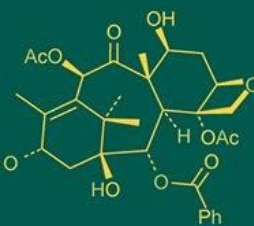
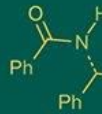


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Optimum housing body weight to achieve maximum production performance in Ankleshwar chicken

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Abstract

The present study evaluated the effect of body weight at 16 weeks of age on subsequent growth and production performance of Ankleshwar chickens. A total of 361 S7 generation Ankleshwar females were categorized into seven body-weight groups based on their 16-week body weight and individually housed for performance recording. Body weight was recorded at 16, 20, 24, 28, 32, 36 and 40 weeks of age; age at first egg (AFE), egg production (17-40 weeks), egg weight (24-40 weeks), and feed consumption were also assessed. Significant differences ($p < 0.05$) were observed among treatment groups for body weight at all ages. Birds with higher body weights at 16 weeks maintained significantly higher weights throughout the laying phase and produced significantly heavier eggs. However, AFE did not differ significantly among treatment groups. These findings indicate that achieving optimum body weight during the rearing period is crucial for attaining desirable egg weight and uniform growth in Ankleshwar chickens.

Keywords: Ankleshwar chicken, body weight, egg weight, age at first egg, growth performance, poultry production

Introduction

The Indian poultry sector is among the fastest growing components of the agricultural industry and currently ranks third in global egg production and fourth in chicken meat production. Annual growth rates of 8.5% for eggs and 7.8% for poultry meat have been reported, with national outputs of 4.062 million tones of chicken meat and 103.32 billion eggs (BAHS, 2019) [1].

Among the indigenous breeds, Ankleshwar chicken is an important native germplasm of Gujarat, primarily distributed in the Bharuch and Narmada districts (GAU Report, 2003). The breed is characterized by small to medium body size, hardness, red comb and wattles, white ear lobes, and cream to brown shell eggs. Earlier estimates reported average body weights of 542 g, 450 g and 885 g in males and 772 g, 1800 g and 1578 g in females at 8, 12 and 72 weeks of age, respectively. The breed lays approximately 74 eggs up to 40 weeks, with an average egg weight of 34.3 g and age at first egg of 181.3 days (Patel *et al.*, 2020) [4]. Uniformity in pullet body weight is a key factor influencing sexual maturity, egg weight, and laying performance. Inadequate rearing management may hinder achievement of target body weights, resulting in poor production (Suawa, 2015) [7]. Uniform pullet flocks—with at least 80% of birds within $\pm 10\%$ of the mean—are essential for optimizing laying performance (Yuan *et al.*, 1994; Leeson *et al.*, 1997) [9, 3]. Body weight at the onset of lay is also positively associated with initial egg weight (Summers and Leeson, 1983) [8].

The present investigation aimed to evaluate the influence of 16-week body weight classification on subsequent body weight profiles, age at first egg, egg production, feed consumption and egg weight in Ankleshwar chickens.

Materials and Methods

Experimental Birds

The study was conducted on 361 Ankleshwar females (S7 generation) maintained under the scheme “Development and Maintenance of Different Population of Poultry”. Birds were categorized into seven treatment groups based on body weight at 16 weeks (Table 1)

Housing and Management

The birds were individually housed in California cage system for precise egg production recording. Management and health care practices followed standard protocols.

Table 1: Distribution of experimental birds under various Treatments.

Treatments	BW 16 (g) Class interval	No. of Birds			
		Hatch 1	Hatch 2	Hatch 3	Overall
1	≤ 900	31	18	3	52
2	901-950	33	7	3	43
3	951-1000	36	15	7	58
4	1001-1050	28	19	5	52
5	1051-1100	39	11	6	56
6	1101-1150	35	12	3	50
7	≥ 1151	44	3	3	50
Total Birds		246	85	30	361

Parameters Recorded

- Body weight at 16, 20, 24, 28, 32, 36 and 40 weeks of age
- Age at first egg (AFE)
- Egg production from 17 to 40 weeks
- Egg weight at 24, 28, 32, 36 and 40 weeks
- Feed consumption during 17-40 weeks

Statistical Analysis

- Data were analyzed using Completely Randomized Design (CRD) as per Snedecor and Cochran (1994) [6]. Treatment means were compared using appropriate statistical tests

Results and Discussion

Age at first egg (AFE)

The age at first egg (days) in hatch I was found to be 149.26±2.73, 150.45±2.37, 147.06±1.22, 147.30±2.14, 148.82±1.85, 149.18±1.21 and 151.80±1.82 in treatment 1 to 7, respectively. The age at first egg (days) in hatch 2 was found to be 162.43±3.98, 151.00±3.55, 151.07±3.80, 143.67±1.67, 147.82±2.81, 149.36±1.88 and 145.00±1.00 in treatment 1 to 7, respectively. The age at first egg (days) in hatch III was found to be 144.33±2.40, 156.00±5.86, 148.14±4.78, 157.50±9.02, 153.67±1.93, 149.00±3.21 and 156.00±5.77 in treatment 1 to 7, respectively. The age at first egg (days) in pooled analysis was found to be 153.50±2.33, 150.95±1.92, 148.22±1.35, 146.80±1.56, 149.15±1.41, 149.21±0.97 and 151.78±1.66 in treatment 1 to 7, respectively. There was no significant difference found among the various treatments. An average age at first egg (days) was 149.73±0.61 in Ankleshwar chicken. Age at first egg did not differ significantly among the treatments. AFE did not differ significantly across treatments in pooled analysis. Mean AFE was 149.73±0.61 days, consistent with earlier reports for the breed (Patel *et al.*, 2020) [4]. Birds with lower BW16 tended to exhibit slightly delayed maturity in some hatches, but the trend was not statistically significant Savaliya *et al.* (2015 & 2016) [5, 10], AGRESCO report. (2017) [11].

Body weight (BW) at Different Age

Body weight at 16th week (BW16)

The mean body weight (g) from treatment 1 to 7, at 16 weeks of age in hatch I was found to be 850.70±7.06,

927.45±2.90, 980.09±2.56, 1029.00±2.30, 1076.26±2.29, 1121.91±2.47 and 1217.06±8.47, in hatch II was found to be 841.29±10.36, 922.00±5.40, 980.14±3.49, 1028.00±2.67, 1070.64±4.23, 1124.18±3.97 and 1192.00±8.00, in hatch III was found to be 840.00±19.16, 933.67±8.35, 979.29±5.05, 1033.75±9.47, 1080.50±6.92, 1121.33±12.55 and 1205.33±6.77, respectively. The body weight (g) at 16 weeks of age in pooled analysis was found to be 846.60±5.54, 926.98±2.44, 980.00±1.89, 1029.02±1.74, 1075.60±1.95, 1122.40±2.06 and 1214.93±7.48 in treatment 1 to 7, respectively. The differences between the treatments were found to be significant

Body weight at 20th week (BW20)

The body weight (g) from treatment 1 to 7, at 20 weeks of age in hatch I was found to be 1154.13±17.39, 1229.10±15.87, 1315.59±14.11, 1370.52±14.70, 1418.34±12.82, 1480.18±12.22 and 1598.00±20.48, in hatch II was found to be 1095.93±17.82, 1185.57±19.17, 1284.71±20.39, 1378.72±15.66, 1371.55±23.58, 1458.36±43.62 and 1539.50±37.50, in hatch III was found to be 1061.00±13.65, 1117.67±21.05, 1226.43±22.52, 1273.00±24.07, 1361.67±31.41, 1405.67±26.09 and 1477.00±64.13. The body weight (g) at 20 weeks of age in pooled analysis was found to be 1126.78±12.79, 1213.51±13.36, 1296.38±11.15, 1365.57±10.75, 1402.80±10.89, 1470.52±13.29 and 1586.00±19.14 in treatment 1 to 7, respectively. The differences among the treatments were found to be significant the highest body weight was found in treatment 7 and lowest in treatment 1.

Body weight at 24th week (BW24)

The body weight (g) from treatment 1 to 7, at 24 weeks of age in hatch I was found to be 1276.91±23.20, 1322.42±20.65, 1425.26±16.92, 1476.56±22.50, 1535.84±20.03, 1615.44±20.58 and 1784.80±26, hatch II was found to be 1263.50±28.71, 1371.57±33.07, 1421.64±31.72, 1486.39±22.67, 1508.27±23.14, 1582.64±57.25 and 1626.00±51.64. Body weight of birds of treatments 7 was significantly higher ($p<0.05$) than other treatments and were at par with treatment 6 and 5. The highest body weight was found in treatment 7 and lowest in treatment 1. The body weight (g) at 24 weeks of age in hatch III was found to be 1209.67±33.18, 1214.33±31.00, 1373.71±12.30, 1444.50±58.23, 1519.83±27.22, 1509.00±54.15 and 1702.67±60.78 in treatment 1 to 7, respectively. The body weight (g) at 24 weeks of age in pooled analysis was found to be 1267.18±16.82, 1322.90±17.46, 1417.78±13.31, 1477.55±15.42, 1528.58±14.82, 1601.27±19.86 and 1770.70±24.95 in treatment 1 to 7, respectively. The differences among the treatments were found to be significant ($p<0.05$) The highest body weight was found in treatment 7 and lowest in treatment 1.

Body weight at 28th week (BW28)

The body weight (g) from treatment 1 to 7, at 28 weeks of age in hatch I was found to be 1308.00±23.84, 1350.94±19.23, 1440.00±20.18, 1517.41±25.51, 1559.00±18.55, 1617.15±21.93 and 1802.26±34.20, in hatch II was found to be 1307.71±43.71, 1406.57±30.42, 1465.64±31.31, 1495.28±33.02, 1548.55±26.74, 1687.91±69.25 and 1640.50±66, in hatch III was found to be 1306.67±57.14, 1329.33±76.84, 1474.57±14.94,

1544.50±46.75, 1650.50±53.57, 1666.33±59.29 and 1863.33±117.38, in pooled analysis was found to be 1307.80±20.49, 1358.85±16.36, 1452.75±15.07, 1512.22±18.86, 1566.89±15.32, 1636.44±22.41 and 1798.75±31.74. Body weight of birds of treatment 7 was significantly higher ($p<0.05$) than other treatments. The highest body weight was found in treatment 7 and lowest in treatment 1.

Body weight at 32th week (BW32)

The body weight (g) from treatment 1 to 7, at 32 weeks of age in hatch I was found to be 1326.17±24.76, 1371.03±16.68, 1458.06±22.11, 1552.33±28.16, 1603.61±22.61, 1617.29±28.68 and 1847.97±39.13, in hatch II was found to be 1344.07±40.39, 1406.57±49.11, 1431.57±50.73, 1526.89±37.91, 1590.64±41.19, 1705.73±74.44 and 1564.00±34.00, in hatch III was found to be 1244.00±33.95, 1439.00±98.19, 1483.43±13.38, 1580.50±50.87, 1738.33±47.22, 1724.33±64.67 and 1939.67±74, in pooled analysis was found to be 1326.28±20.24, 1382.07±16.30, 1454.55±18.70, 1545.29±21.03, 1615.71±19.02, 1644.25±27.71 and 1840.65±36.18. Body weight of birds of treatment 7 was significantly higher ($p<0.05$) than all other treatments. The highest body weight was found in treatment 7 and lowest in treatment 1.

Body weight at 36th week (BW36)

The body weight (g) from treatment 1 to 7, at 36 weeks of age in hatch I was found to be 1356.04±28.73, 1381.06±24.54, 1488.32±21.75, 1569.30±29.87, 1611.61±23.44, 1665.71±35.17 and 1851.40±41.10, in hatch II was found to be 1355.57±43.02, 1435.57±44.49, 1473.57±40.45, 1567.17±34.52, 1590.18±45.19, 1699.82±68.42 and 1629±45.00, in hatch III was found to be 1222.33±57.10, 1437.67±69.11, 1514.57±22.61, 1613.50±48.07, 1727.00±46.24, 1697.33±67.11 and 1956.00±52, in pooled analysis was found to be 1345.85±22.97, 1394.51±20.58, 1487.91±17.00, 1572.12±20.89, 1619.91±19.61, 1675.50±29.59 and 1848.13±37.48. Body weight of birds of treatment 7 was significantly higher ($p<0.05$) than other treatments. The highest body weight was found in treatment 7 and lowest in treatment 1.

Body weight at 40th week (BW40)

The body weight (g) from treatment 1 to 7, at 40 weeks of age in hatch I was found to be 1376.04±31.11, 1381.74±20.03, 1473.12±25.48, 1583.22±24.72, 1599.66±25.89, 1669.74±38.24 and 1842.26±46.50, in hatch II was found to be 1355.29±54.17, 1486.57±59.28, 1481.64±35.34, 1581.78±39.00, 1594.55±62.46, 1691.27±69.22 and 1690.50±77.50, in hatch III was found to be 1230.00±128.13, 1457.00±77.16, 1522.57±32.60, 1609.50±47.88, 1751.67±59.42, 1681.67±69.03 and 1986.00±57, in pooled analysis was found to be 1357.83±27.49, 1405.15±19.57, 1481.58±18.48, 1584.84±19.83, 1615.22±23.23, 1675.42±31.23 and 1845.45±42.05. Body weight of birds of treatment 7 was significantly higher ($p<0.05$) than all other treatments. The highest body weight was found in treatment 7 and lowest in treatment 1.

Body weight (g) recorded at 16, 20, 28 and 40 weeks of age was 1029.95±6.10, 1354.32±8.91, 1520.44±11.01 and

1567.51±12.72, respectively. Body weight at all stages differed significantly among the treatments.

Egg Weight (EW) at Different Ages

Egg Weight at 24 weeks of age (EW24)

The egg weight (g) from treatment 1 to 7, at 24 weeks of age in hatch I was found to be 34.36±0.60, 35.68±0.46, 35.11±0.44, 35.90±0.39, 35.62±0.40, 36.48±0.37 and 37.20±0.51, in hatch II was found to be 34.04±0.73, 36.56±0.72, 34.24±0.53, 35.51±0.54, 36.65±0.67, 38.22±0.64 and 37.80±1.60, hatch III was found to be 33.51±1.27, 36.37±1.04, 35.41±0.70, 34.73±1.60, 37.64±0.60, 38.74±0.42 and 40.32±0.35, in pooled analysis was found to be 34.19±0.43, 35.88±0.37, 34.93±0.32, 35.66±0.32, 36.05±0.32, 37.02±0.32 and 37.46±0.46. Egg weight of birds of treatment 7 was significantly higher ($p<0.05$) than other treatments and was at par with treatment 6. The highest egg weight was observed in treatment 7 and lowest in treatment 1.

Egg Weight at 28 weeks of age (EW28)

The egg weight (g) from treatment 1 to 7, at 28 weeks of age in hatch I was found to be 36.41±0.51, 36.77±0.36, 37.89±0.37, 37.42±0.31, 38.02±0.33, 38.44±0.28 and 39.41±0.27, in hatch II was found to be 37.85±0.65, 38.40±1.16, 38.58±0.43, 38.46±0.60, 38.11±0.66, 38.41±0.65 and 39.52±0.02, in hatch III was found to be 36.36±1.77, 37.12±0.98, 35.83±0.58, 39.65±0.45, 38.38±0.34, 40.53±1.90 and 41.84±2.41, in pooled analysis was found to be 36.91±0.40, 37.07±0.35, 37.80±0.28, 37.99±0.29, 38.08±0.26, 38.56±0.28 and 39.60±0.30. Egg weight of birds of treatment 7 was significantly higher ($p<0.05$) than all other treatments. The highest egg weight was observed in treatment 7 and lowest in treatment 1.

Egg Weight at 32 weeks of age (EW32)

The egg weight (g) from treatment 1 to 7, at 32 weeks of age in hatch I was found to be 37.82±0.62, 38.70±0.49, 39.80±0.54, 40.10±0.59, 40.18±0.50, 41.28±0.55 and 42.39±0.50, in hatch II was found to be 38.83±0.68, 38.70±0.86, 40.07±0.45, 40.65±0.63, 41.28±0.52, 41.71±0.60 and 41.00±1.80, in hatch III was found to be 38.90±1.25, 41.12±1.59, 38.92±0.50, 40.88±0.49, 38.86±0.77, 40.60±1.10 and 45.88±0.00, in pooled analysis was found to be 38.25±0.44, 38.87±0.42, 39.76±0.36, 40.37±0.40, 40.26±0.38, 41.34±0.42 and 42.58±0.49. Egg weight of birds of treatment 7 was significantly higher ($p<0.05$) than all other treatments. The highest egg weight was observed in treatment 7 and lowest in treatment 1.

Egg Weight at 36 weeks of age (EW36)

The egg weight (g) from treatment 1 to 7, at 36 weeks of age in hatch I was found to be 39.19±0.52, 40.07±0.63, 40.41±0.52, 40.66±0.61, 40.72±0.34, 42.59±0.38 and 42.96±0.44, hatch II was found to be 41.26±1.08, 40.31±1.16, 41.89±0.70, 41.18±0.50, 42.35±0.76, 40.70±1.27 and 43.78±0.88, in hatch III was found to be 40.28±1.21, 42.77±1.33, 39.98±1.23, 41.21±0.70, 42.86±0.55, 42.01±1.11 and 44.27±1.15, in pooled analysis was found to be 40.00±0.50, 40.31±0.53, 40.74±0.40, 40.90±0.38, 41.28±0.30, 42.12±0.41 and 43.10±0.39. Egg weight of birds of treatment 7 was significantly higher ($p<0.05$) than other treatments except treatment 6. The highest egg weight was observed in treatment 7 and lowest in treatment 1.

Egg Weight at 40 weeks of age (EW40)

The egg weight (g) from treatment 1 to 7, at 40 weeks of age in hatch I was found to be 40.46±0.76, 41.33±0.51, 41.41±0.45, 41.07±0.65, 41.81±0.42, 43.05±0.34 and 42.94±0.39, in hatch II was found to be 41.03±0.96, 42.98±0.95, 40.86±0.87, 41.94±0.58, 42.80±0.43, 45.30±1.53 and 49.55±0.60, in hatch III was found to be 42.63±1.19, 38.77±0.42, 39.55±0.85, 41.56±0.68, 42.54±0.46, 45.09±1.38 and 39.03±1.95, in pooled analysis was found to be 40.82±0.56, 41.42±0.44, 41.04±0.38, 41.43±0.42, 42.09±0.31, 43.69±0.45 and 42.98±0.46. Egg weight of birds of treatment 6 was significantly higher ($p<0.05$) than other treatments and was at par with treatment 7. Egg weight of birds of treatments 2, 3, 4 and 5 did not differ significantly from each other. The highest egg weight was observed in treatment 6 and lowest in treatment 1. Egg weight increased with increase in the body weight at all stages. So, it indicates positive relationship of egg weight with body weight.

Total Egg Number Produced up to 40 Weeks of Age (TEN40)

The total egg number from treatment 1 to 7 upto 40 weeks of age in hatch I was found to be 66.83±4.35, 76.26±3.60, 74.12±3.99, 78.67±4.19, 80.29±3.19, 72.97±2.85 and 65.51±3.44, in hatch II was found to be 57.21±4.80, 62.57±6.22, 58.21±4.87, 60.22±4.06, 66.64±4.44, 69.27±4.49 and 60.50±2.50, in hatch III was found to be 63.33±10.14, 64.00±7.23, 72.00±8.56, 63.75±8.62, 64.83±6.15, 82.00±6.56 and 59.67±12.99, in pooled analysis was found to be 63.20±3.16, 73.02±3.06, 69.80±3.24, 70.67±3.58, 75.87±2.60, 72.69±2.30 and 64.83±3.13. The grand mean of TEN40 in pooled analysis was 70.36±1.16. The differences among the treatments were found to be non significant ($p<0.05$). The highest total egg number was observed in treatment 5 followed by treatment 2, 6, 4, 3, 7 and 1. TEN40 did not differ significantly among the treatments. However, birds having body weight between 901 g to 1150 g produced higher number of eggs upto 40 weeks of age. Among these, birds having body weight ranging from 1051 to 1100 g produced maximum number of eggs upto 40 weeks of age.

Feed Consumption

The mean of feed consumption (g/day) in treatment 1 to 7 per bird during 17 to 40 weeks of age in hatch I was found to be 99.67, 100.11, 102.83, 102.82, 103.15, 102.42 and 103.99, in hatch II was found to be 100.34, 101.43, 101.28, 102.46, 103.18, 103.33 and 103.28, in hatch III was found to be 99.48, 100.59, 101.43, 103.02, 103.14, 103.74 and 103.44, in pooled analysis was found to be 99.91, 100.36, 102.28, 102.70, 103.16, 102.72 and 103.92. The highest feed consumption was observed in treatment 7 followed by treatments 5, 6, 4, 3, 2 and 1.

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