



Production performance and egg quality in Kuzi ducks of Odisha

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(Received on December 23, 2020; accepted for publication on March 14, 2021)

ABSTRACT

Padhi, M.K., Giri, S.C. and Sahoo, S.K. 2021. Production performance and egg quality in Kuzi ducks of Odisha. Indian Journal of Poultry Science, 56(1): 15-18.

Production performances and egg quality parameters of Kuzi ducks of Odisha were studied in 40 drakes and 240 duck sinintensive system of rearing under hot and humid climate conditions. The body weight recorded at first egg of the flock was 1568 ± 3.76 g in ducks and 1730 ± 43.45 g in drakes. First egg of the flock was obtained at 110.67 ± 3.76 days and age at 50% duck house egg production was 135.33 ± 5.60 days. Age of the flock at peak (90%) duck house egg production was 167.67 ± 6.06 days. Duck day egg production calculated at 4 weeks interval revealed that there is no definite trend however, as the age advances there was a decrease in egg production % after 60 weeks of age. The egg weight increased with the ages and the egg weight at 40 weeks of age was 64.26 ± 0.48 g. The egg production of the duck up to 40 weeks of age was 110.79 ± 4.42 eggs and up to 72 weeks of age were 217.68 ± 4.96 eggs. Significant differences in egg weight, shape index, albumen index, yolk colour, shell thickness and Haugh unit score were observed at different weeks of age. Further, as the age of the bird advances there was decrease in Haugh unit and albumen index with increase in egg shell thickness. The internal quality decreased with increase in age of the bird. The production performance showed that the Kuzi ducks may be used as an egg type ducks.

Keywords: Body weight, Duck, Egg production, Egg quality, Egg weight, Kuzi ducks

INTRODUCTION

Duck is the second most important species after chicken which is being reared by many farmers for egg and meat production in the coastal region of the country and other places where large water bodies are found. Duck have many advantages compared to chicken with respect to the husbandry practices, housing and other characteristics. In Odisha, Kuzi ducks are being reared for their easy adoptability and better egg production. Growth and production performance of indigenous duck of Odisha are being reported (Padhi, 2010; Padhi, 2014; Padhi *et al.*, 2019; Kamal *et al.*, 2019). Growth and production performances of indigenous ducks of the country are reported by various researchers (Zaman *et al.*, 2007; Cyriac *et al.*, 2020). Production performances of indigenous ducks other than that of Odisha are also available in the literature (Bhuiyan *et al.*, 2017; Kamal *et al.*, 2020). However, the production performances at different ages of Kuzi ducks are limited. Egg quality parameters of ducks are important and very limited reports are available on egg quality in indigenous duck of the country (Padhi *et al.*, 2009a,b; Nath *et al.*, 2021) and at different ages. Keeping this in view, the present study was carried out to record the performance of Kuzi ducks in respect to production and egg quality traits at different ages.

MATERIALS AND METHODS

The birds used for the present study is Kuzi duck of Odisha being collected from different parts of Odisha

and using the population available in the Regional centre of earlier ICAR-Central Avian Research Institute and presently ICAR-Directorate of Poultry Research during the year 2019-2020. This breed is being selected for higher 8 weeks body weight for last one generation. The ducks and drakes used for the present study were being wing banded during hatching time brooded and reared under standard feeding and management practices. From 16 weeks of age 240 ducks and 48 drakes were divided in three pens in an open sided shed having deep litter. In each room 80 ducks and 16 drakes were kept. Drakes and ducks were reared together as the eggs are being used for hatching purpose. Standard duck layer feeding and management practices were followed. Each ducks were provided three square feet of floor space. Wheat based duck layer ration having crude protein 18% and ME of 2650 Kcal/kg were provided during the experimental period. Duck eggs were collected every day during morning hours. The initial egg weights were recorded in each group for five days during 16 weeks of age. Then egg weights were recorded at 4 weeks interval up to 72 weeks of age. Body weight of both drake and ducks were recorded at first egg of the flock and then at 40, 52 and 72 weeks of age. Age at first egg of the flock as well as age at 20, 50, 80 and 90% duck house egg production of the flock were calculated. Duck day production % was calculated at 4 weeks interval starting from 16 to 72 weeks and at 80 weeks of age. Egg production per duck was calculated up to 40, 60, 72 and 80 weeks of age. Mortality was recorded daily. External and internal egg quality parameters were measured at

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20, 28, 32, 36 and 40 weeks of age using 30 eggs in each period. Different egg quality parameters were measured and traits were calculated as per the procedure described by Padhi et al. (2009a). Yolk colour was measured using a DSM yolk fan™ (DSM 2016) as per the guidelines. Data were analysed as per Snedecor and Cochran (1989) method.

RESULTS AND DISCUSSION

Body weight recorded at different ages of both drake and duck are presented in Table 1. The body weight of drake at different weeks of age during laying period did not differ significantly (P>0.05). But, in ducks significant (P<0.05) difference between different age of measurement was observed and though the weight increases non-significantly at 40 week of age compared to weight at first egg but it recorded a lower body weight at 52 weeks of age. This may be due to better egg production during period before 52 weeks of age. Lower body weight at 40 weeks of age compared to 16 and 20 weeks of age were also reported in indigenous duck by Padhi (2010). Average adult body weight of drake was comparable to the report of Kamal et al. (2019), but the adult duck body weight was lower compared to present study. This may be due to selection of higher body weight of the present flock.

Table 1: The body weight (g) of adult Kuzi male and female ducks at different ages (weeks)

Age	Male	Female
First egg of the flock	1730 ^a ±44	1568 ^{bc} ±12
40 wk	1729 ^a ±32	1592 ^b ±11
52 wk	1793 ^a ±41	1518 ^c ±17
72 wk	1824 ^a ±51	1656 ^a ±23

Mean having common superscript within a column did not differ significantly (P>0.05).

Different production performance of Kuzi ducks are presented in table 2. It is evident from the table, that first egg of the flock was obtained at 111 days of age and 90% duck house egg production was obtained at 168 days of age. The age at first egg of the flock and age

at 50% of the flock was lower than the available earlier reports in indigenous duck of Odisha (Padhi, 2010), Khaki Campbell (Padhi et al., 2009c; Padhi et al., 2010). Age at peak production was observed in less than 25 weeks of age indicating the utility of this breed for better egg production. The egg production per duck up to 40, 60 and 72 weeks of age (Table 2) revealed that the ducks have laying potentiality of 218 eggs up to 72 weeks of age and 111 eggs up to 40 weeks of age. Number of egg produced from 40 to 60 weeks of age per duck was 71 eggs and from 60 to 80 weeks of age were 57 eggs. This indicates towards later part of the laying cycle the number of egg laid per bird was decreasing. The number of egg produced during different periods were better than reported literatures in indigenous duck of Odisha (Padhi et al., 2009c; Padhi, 2010), Maithili duck of Bihar (Kamal et al., 2020). Bhuiyan et al. (2017) reported annual egg production of 204 eggs in Nageswari ducks of Bangladesh which was lower than the present findings in Kuzi ducks indicating potentiality of this indigenous breed in respect to egg production. The duck day egg production % measured at 4 weeks interval from 16 weeks upto 72 weeks and at 80 weeks of age was presented in the Figure 1. From the chart, it may be observed that though towards the end of laying cycle there was decrease in production %. However, production % decreased from 32 weeks onwards up to 48 weeks and then it reached the peak production and thereafter it gradually decreased and at 72 weeks of age the duck

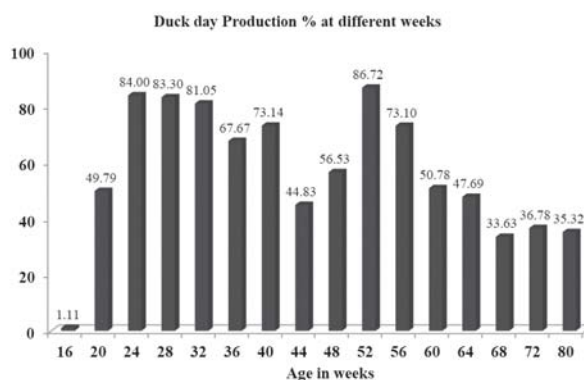


Fig. 1: Duck day production % at different weeks.

Table 2:The egg production performance of Kuzi ducks at different ages (weeks)

Parameters	Values
Age at 1 st egg of the flock (days)	110.67±3.76
Age at 20 % duck house egg production of the flock (days)	128.67±4.49
Age at 50 % duck house egg production of the flock (days)	135.33±5.60
Age at 80 % duck house egg production of the flock (days)	153.67±4.09
Age at 90% duck house egg production of the flock (days)	167.67±6.06
Egg production up to 40 weeks of age (no)	110.79±4.42
Egg production up to 60 weeks of age (no)	181.62±4.89
Egg production up to 72 weeks of age (no)	217.68±4.96
Egg production up to 80 weeks of age (no)	239.22±5.13

day egg production was 36.78%. Duck day egg production of 55.67% reported by Bhuiyan *et al.* (2017) in Nageswari ducks under intensive management and duck day egg production % of 33.99 was reported by Gajendran and Karthickeyan (2009) in indigenous duck of Tamil Nadu under minimum inputs farmer's field. In the present study, the duck day egg production was higher than that observed in other local varieties.

The average egg weights recorded at 4 weeks interval from 16 to 72 weeks of age are presented in Table 3. Initial egg weight was found to be significantly lower at 16 weeks of age and reaches more than 60 g at 28 weeks of age. The egg weights shows an increasing trend as the age of measurement advances and at 72

weeks of age it recorded 71.29g. Average egg weight of 62.15g reported by Gajendran and Karthickeyan (2009) in indigenous duck and Bhuiyan *et al.* (2017) reported 55.56g at 35 weeks of age in Nageswari ducks. Padhi (2010) reported higher egg weight than the present study in indigenous ducks of Odisha. The lower egg weight in the present study compared to earlier reports may be due to higher egg production.

Mortality % of the flock was 1.82% from 20 to 40 weeks of age and 1.77% from 40 to 60 weeks of age. However, during 60 to 72 weeks of age, higher mortality of 10.66% were observed. Mortality was lower than the report of Padhi (2010) from 20 to 60 weeks of age. However, the mortality observed from 60 to 72 weeks of age was on higher side and this may be due to some unforeseen reasons and during this period also the egg production was down.

Different external and internal egg qualities parameters measured at different weeks of age are presented in Table 4. Significant ($P < 0.05$) difference between different ages of measurements were observed for shape index, albumen index, yolk index and colour. The values in all these traits were significantly decreased compared to the initial period of measurements. Decrease in shape index, albumen index and yolk index as the age advances reported by Padhi *et al.* (2009b) in different genetic groups of duck. Yolk colour score though differ significantly between different age of measurements but the score was lower compared to report by Bhuiyan *et al.* (2017). The lower yolk colour is mostly due to feeding of wheat based ration to the ducks. Albumen, yolk and shell % did not differ significantly ($P > 0.05$) between different ages of measurements. The albumen % obtained in the present study was higher than the reports of Padhi *et al.* (2009b) and Bhuiyan *et al.* (2017). The above authors also reported higher yolk % than the present

Table 3: Egg weight (g) at different weeks of age in Kuzi ducks

Age (weeks)	Egg weight (g)
16	48.03 ^e ±1.27
20	57.36 ^f ±0.78
24	60.47 ^e ±0.63
28	61.42 ^e ±0.42
32	62.00 ^e ±0.37
36	63.74 ^{de} ±0.39
40	64.26 ^d ±0.48
44	64.78 ^d ±0.37
48	64.98 ^{cd} ±0.39
52	64.25 ^d ±0.41
56	66.05 ^c ±0.28
60	65.19 ^{cd} ±0.27
64	70.87 ^a ±0.40
68	68.38 ^b ±0.38
72	71.29 ^a ±0.30

Means bearing common superscript did not differ significantly ($P > 0.05$)

Table 4: External and internal egg quality traits of Kuzi ducks at different weeks of age (n=30)

Parameter	20 wk	28 wk	32 wk	36 wk	40 wk
Egg weight (g)	64.40 ^b ±0.58	67.13 ^a ±0.61	66.07 ^{ab} ±0.99	67.61 ^a ±0.97	68.19 ^a ±0.73
Shape index	75.14 ^a ±0.58	74.14 ^{ab} ±0.63	72.93 ^b ±0.69	74.43 ^{ab} ±0.59	74.26 ^{ab} ±0.50
Albumen index	0.168 ^a ±0.003	0.170 ^a ±0.004	0.154 ^b ±0.005	0.162 ^{ab} ±0.003	0.154 ^{ab} ±0.005
Yolk index	0.455 ^a ±0.004	0.447 ^{ab} ±0.006	0.429 ^b ±0.007	0.441 ^{ab} ±0.005	0.447 ^{ab} ±0.006
Yolk colour	2.24 ^b ±0.11	2.862 ^a ±0.163	2.833 ^a ±0.160	2.433 ^b ±0.092	1.602 ^c ±0.113
Albumen %	60.31±0.99	60.88±0.37	60.66±0.54	60.59±0.43	60.73±0.43
Yolk %	29.22±0.93	28.79±0.34	29.03±0.51	29.34±0.36	29.15±0.25
Shell %	10.47±0.13	10.33±0.09	10.32±0.13	10.08±0.12	10.13±0.24
Shell thickness with membrane (mm)	0.407±0.007 ^c	0.445 ^{ab} ±0.006	0.438 ^b ±0.0039	0.455 ^a ±0.002	0.445 ^{ab} ±0.005
Shell thickness without membrane (mm)	0.342 ^b ±0.008	0.379 ^a ±0.005	0.352 ^b ±0.005	0.386 ^a ±0.002	0.384 ^a ±0.004
Haugh unit	97.10 ^{ab} ±0.75	99.16 ^a ±0.51	95.74 ^{bc} ±1.14	96.79 ^{abc} ±0.46	94.05 ^c ±1.51
Meat spot%	0	0	0	0	0
Blood spot%	0	0	0	0	6.66

Means having common superscript in a row did not differ significantly ($P > 0.05$)

findings. Shell % obtained in the present study was in agreement with the findings of Padhi et al. (2009b) in White Pekin and different crossbred groups. Shell thickness measured both with membrane and without membrane differ significantly ($P < 0.05$) and as the age of measurements increased the shell thickness also increased. Haugh unit score decreased as the age of measurements increases. The Haugh unit scores obtained in the present study were better than the reports of Padhi et al. (2009b) and Bhuiyan et al. (2017). Blood spot was observed at 40 weeks of age only in other ages no blood or meat spot were recorded. Overall the eggs were of good quality irrespective of ages.

CONCLUSIONS

The study investigates the production performance of Kuzi ducks of Odisha along with the egg quality parameters at different ages. It was evident from the results, that the drake gain body weight as the age advanced, whereas, duck weight decreases during peak production and then gained weight at the end of the laying period. The Kuzi duck under intensive system attained 50% duck housed egg production at 20 weeks of age and peak production by 24 weeks of age. The duck day production % showed two peaks and towards the end of the laying cycle it reduced to less than 40%. Further, the egg production per bird in a laying cycle was found to be 218 eggs showing the potentiality of the breed for egg production. The egg weight increase as the age of measurement increases and the egg weight were of acceptable range. Egg quality measured at different weeks of age revealed that external and internal egg quality parameters decreased as the age advanced. However, the quality of the eggs was found to be good irrespective of age of the bird.

ACKNOWLEDGEMENTS

Authors are gratefully acknowledge the Department of Biotechnology, Government of India for providing financial support under the project “Genetic up-breeding of duck production to strengthen livelihood security in NER of India by converging conventional and molecular techniques” for the present study. The support in respect to providing facilities, manpower and necessary guidance during the execution of the project by Director, ICAR-Central Avian Research Institute and Director, ICAR-Directorate of Poultry Research are gratefully acknowledged.

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