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Ideal floor space requirement of ducks during brooding and early growing period

Abstract

Ducks (*Anas Platyrhynchos*) are the second most important avian species next to chicken contributing towards egg and meat production for human consumption. Unlike chicken, duck farming is not much commercialized in India where the farmers practiced extensive or semi-intensive method of rearing for livelihood and nutritional security. However, ample opportunity lies with duck farming to harvest the full potential of the species for egg production as they lay eggs more in number as well as bigger in size in a productive life span compared to chicken. In order to popularize commercial duck production for more economic gain, emphasis is being given on intensive duck rearing where housing and floor space provision need to be addressed fully besides feeding and management practices. Thus an experiment was planned to study and standardize the floor space requirement of a laying variety duck[1] for optimum performance during brooding and early growing period up to five weeks of age.

Volume 9 Issue 2 - 2025

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Received: May 31, 2025 | **Published:** July 25, 2025

Materials and method

Experimental birds: The present experiment was conducted in Regional Station, Directorate of Poultry Research, Bhubaneshwar, India. A total of 1042 day old duckling [1] hatched in the institute experimental hatchery was collected for the study. The ducklings were randomly divided into five groups of unequal numbers and reared under different floor space provision at different weeks of age (table 1) with uniform managerial practice (Table 1).

Table 1 Floor space provision for Khaki Campbell ducks maintained under study

Age of ducks (week)	Floor space (sq cm/bird) provisions to different group of ducks				
	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5
0-2	250 (247)	275 (224)	300 (205)	325 (190)	350 (176)
3-5	400 (188)	425 (177)	450 (167)	475 (158)	500 (150)

(Figures in parenthesis indicates the number of birds)

Brooding management and feeding: The day old ducklings were brooded under hovers fitted with electric bulbs which were switched on as per the requirement of temperature for ducklings. Rice husk was used as litter material and were replaced periodically. Feeding tray and chick drinkers were provided in each group as per the requirement. Feed (*ad lib:* wet duck mash: CP 21 percent and ME 2500 kcl/kg) and sufficient clean drinking water were offered to the ducklings. Antibiotic preparation (for three consecutive days in prophylactic dose) in drinking water and multivitamin preparation in feed were offered during the first week of brooding to keep the ducklings healthy with an aim to reduce early mortality.

Early growing management: After two weeks of brooding, the hovers were withdrawn. The floor space per bird is increased (Table 1) by reducing the number from each experimental pan. Little bigger feeding and drinking troughs were provided in place of small ones. . The growing ducks were offered standard duck mash[2] and clean drinking water (*ad lib*) during the experiment period up to 5th week of age. The daily feed offered and residue left for each group was measured and the feed consumed per duck per day is calculated on dry matter basis.

Data recording and analysis: The growth performance (weekly body weight), mortality rate (percent) and weekly feed intake of experimental birds reared under different floor space provision at different age were recorded and were subjected for analysis[3] to find out the relationship between floor space and performances, if any.

Results and discussion

Performance of ducks between 0-2 weeks of age:

The body weight (g) of the ducklings up to 2nd week of age recorded for all the five groups are presented (Table 2).The average body weight of ducklings on the day of hatching (day old) for all the groups are almost same; but the values recorded are less than that observed by Padhi et al.[4] where the sample size seems to be much less compared to present study. The body weight recorded at 1st week is the highest in group 3 and is statistically similar to Gr 2 and Gr 5 but differs significantly ($p<0.05$) with Gr 1 and Gr 4. The higher body weight recorded at 1st week is in close proximity with Padhi et al. (Table 2).[4]

Table 2 Growth performance of ducklings between 0-2 weeks of age

Age in wk	Avg Wt (g) ± S.E. of birds under different experiment Groups					
		Gr.1 (250 sq cm) n=247	Gr.2 (275 sq cm) n=224	Gr.3 (300 sq cm) n=205	Gr.4 (325 sq cm) n=190	Gr.5 (350 sq cm) n=176
0 Day	Mean	36.87	37.37	36.08	36.52	37.03
	± SE	0.47	0.48	0.43	0.4	0.45
1st	Mean	67.27^{b}	69.33^{ab}	72.77^{a}	67.43d	70.20^{ab}
	± SE	1.35	1.37	1.59	1.52	1.98
2nd	Mean	142.95 ^{b}	155.73 ^{b}	151.10^{b}	153.77^{b}	170.77 ^{a}
	± SE	5.82	4.1	4.85	5.45	5.93

(Different superscripts in the row differ significantly p<0.05 between the groups)

The growth of ducklings during 2nd week is the highest in Gr 5 which is significantly (p<0.05) higher than all other experimental groups. The value so observed in Gr 5 is also higher than that reported by Padhi et al. 2019 for Khaki Campbell. The better growth performance during 2nd week observed in the present investigation might be the result of highest floor space provision made for the birds of the group among all. The daily feed intake (g) per bird and mortality percent recorded during 0-2 weeks of age is presented (table 3). It is observed that feed consumption per duckling is the highest in group 5 during 1st and 2nd week of age. Consumption of feed per duckling increases from group 1 to 5 except there is little deviation in group 2. Thus, feed consumption increases as floor space increase (Table 3).

Table 3 Feed intake and mortality rate between 0-2 week of age

Age in wk	Avg Feed (g) Intake / day / bird under different expt Groups					
		1 (250 sq cm) n=247	2 (275 sq cm) n=224	3 (300 sq cm) n=205	4 (325 sq cm) n=190	5 (350 sq cm) n=176
1st	Mean ±S.E NS	11.03±1.20	10.98±1.12	11.48±0.71	11.62±1.01	13.20±1.73
2nd	Mean ±S.E NS	23.47±0.94	24.14±1.45	23.81±0.85	24.06±1.42	28.55±1.73
Mortality % (0-2 wk)		33.19 (82)	11.6 (26)	10.73 (22)	15.26 (29)	10.79 (19)

The average feed intake of Khaki Campbell ducklings (starter stage) under intensive management was reported [5] where consumption during 1st and 2nd week is much higher and body weight gain is less as compared to the present study; thus contradicts. The mortality rate in Khaki Campbell ducklings upto 2 weeks of age (Table 3) found almost same for all the groups except Gr.1 where it is the highest (above 30 percent) which might be attributed to the more congestion and hurdling of ducklings during brooding due to less floor space available to them.

Performance of growing ducklings between 3-5 weeks of age:

The body weight (g) recorded at 3rd, 4th and 5th week of age for the ducklings reared with different floor space provision is presented (Table 4) which revealed significantly higher (p<0.05) body weight for Group 4 and 5 during 3rd and 4th wk age and non-significant higher value for 5th group at 5th week age. The 3rd, 4th and 5th week body weight in the present observation is almost at par with the report of Padhi et al.[1] where provision of floor space was not a criteria for evaluation of economic traits of ducks. Padhi and Sahoo[6] also reported a near value of 4th week body weight to the present study while reporting the body weight and conformation traits of different genetic groups of ducks. Further, Joshi et al.[5] reported higher body weight for Khaki Campbell ducks to the present study at 3rd, 4th and 5th week age while experimenting the effect of dietary protein on growth performance. However, the present observation noticed the better growth performance of ducks as the floor space provision increases during 3,4 and 5 weeks age and a no-significant highest body weight is recorded for the growing ducklings of group 5 where floor space provision was the highest among all the groups (Table 4).

Table 4 Growth performance of ducklings between 3-5 weeks of age under various floor space provisions

Age in wk	Avg Wt (g) ± S.E. of birds under different expt Groups					
		Gr.1 (400 sq cm) n=188	Gr.2 (425 sq cm) n=177	Gr.3 (450 sq cm) n=167	Gr.4 (475 sq cm) n=158	Gr.5 (500 sq cm) n=150
3rd	Mean	289.13 ^{b}	286.07^{b}	281.47 ^{b}	328.57 ^{a}	309.17 ^{ab}
	± SE	10.43	7.9	12.57	10.85	10.27
4th	Mean	374.47^{c}	391.50^{c}	396.67^{bc}	439.83^{a}	436.07^{ab}
	± SE	16.72	12.31	15.33	14.39	14.1
5th	Mean	593.90^{NS}	628.47 ^{NS}	610.77 ^{NS}	611.07 ^{NS}	632.13 ^{NS}
	± SE	18.53	18.61	16.8	14.79	18.1

(Different superscripts in the row differ significantly p<0.05 between the groups)

Citation: Giri SC, Padhi MK. Ideal floor space requirement of ducks during brooding and early growing period. *Int J Avian & Wildlife Bio.* 2025;9(2):63–65. DOI: 10.15406/ijawb.2025.09.00234

The intake of feed (g) and mortality recorded during 3-5 weeks of age is presented (Table 5). It is found that feed consumption increases in the groups at all ages (3-5 weeks) when floor space provision increases except in Gr.2 which is the least among all. The present observation on duck w.r.t. floor space and feeding corroborates the findings of Hansen and Becker[7] who reported that increase floor space enhances feeding in chicken during brooding and growing stage. Further, mortality recorded in the present experiment was the highest in Gr.1 (lowest floor space) and the lowest in Gr.5 (maximum floor space). Even though the number of birds died during 2-5 week of age is negligible, yet the lowest mortality observed in Gr 5 might be the result of higher floor space provision available for the growing ducklings during the experiment period (Table 5).

Table 5 Feed intake and mortality rate between 3-5 weeks of age

Age in wk	Avg Feed (g) Intake / day of birds under different expt Groups					
		1 (400 sq cm) n=188	2 (425 sq cm) n=177	3 (450 sq cm) n=167	4 (475 sq cm) n=158	5 (500 sq cm) n=150
3rd	Mean ±S.E. *	35.60±1.85^{b}	43.74±3.05^{ab}	37.63±2.56^{b}	42.26±2.94^{ab}	50.26±2.81d
4th	Mean ±S.E. *	46.52±2.45^{b}	57.71±2.80^{ab}	50.0±2.47b	57.87±2.56^{ab}	68.02±3.66d
5th	Mean ±S.E. **	52.06±1.33^{d}	62.99±1.68^{bc}	58.42±0.75^{dc}	65.38±1.15^{b}	75.65±1.80^{a}
Mortality percent (3-5 wk)		4.25 (08)	5.08 (09)	4.79 (08)	2.53 (04)	2.0 (03)

(Different superscripts in the row differ significantly p<0.05 between the groups)

It is therefore concluded that ideal floor space provision of 350 sq cm/ duckling between 0-2 week and 500 sq cm / duckling between 3-5 weeks of age is an ideal requirement for khaki Campbell ducklings during brooding and early growing stage of life under intensive management practice for better growth performance with least mortality.

Acknowledgements

None.

Conflicts of interest

All authors declare that they have no conflict of interest associated with this research article.

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