



RESEARCH ARTICLE

Influence of Nest Boxes on Egg Production Performance in Japanese quails

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ABSTRACT

A 14-week study was conducted to identify the preference of nest boxes and their colour on egg production performance in Japanese quails (Nandanam J. quail -3) at the Institute of Poultry Production and Management, Nandanam, Chennai. A total of 1920 Japanese quails aged 5 weeks were housed in deep litter system and were randomly divided into 3 treatment groups with 2 replicates of 80 male and 240 female quails in each group. The treatment groups consisted of the following: 1) control (T1) - without the nest boxes, 2) treatment-2 (T2) - one nest box / 10 females), and 3) treatment-3 (T3) - one nest box / 5 females. The nest boxes were painted with Blue (B), Green (G), White (W) or Brown (Br- natural colour of the nest box) colours. An *Isonitrogenous* and *isocaloric* feed was fed *ad libitum* under standard managerial conditions. The egg production was recorded from 7th to 20th weeks of age. Significant ($P<0.05$) differences were observed in the overall percentage of egg production and the values were 54.71 ± 1.62 , 57.05 ± 1.46 and 61.38 ± 1.80 for T1, T2 and T3 treatments, respectively. Use of an increased number of nest boxes (T3) resulted in a highly significant ($P<0.01$) improvement in the egg production. Significant differences ($P<0.05$) in egg production were also recorded with the use of various coloured nest boxes. The percentages of egg production in T2 were 8.04 ± 0.26 , 9.68 ± 0.41 , 7.82 ± 0.28 and 8.22 ± 0.44 for B, G, W and Br colours, respectively. The percentages of egg production in T3 were 12.83 ± 0.46 , 11.65 ± 0.40 , 12.99 ± 0.54 and 10.47 ± 0.40 for B, G, W and Br colours, respectively. Based on our findings, we conclude that quails reared under deep litter system with one nest box for every 5 females significantly improves the egg production and that the use of white and blue coloured nest boxes results in an enhanced egg production when compared to either green or brown coloured boxes.

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INTRODUCTION

Japanese quails (*Coturnix coturnix japonica*) have been domesticated since the twelfth century AD in Japan, mostly for their singing ability. Commercial production of this species first started in Japan and was successfully introduced later to America, Europe and the Middle East during 1930-1950. Around 1974, the Japanese quails were brought to Central Avian Research Institute, Izatnagar and were subsequently brought to Tamil Nadu during 1984 (Asha, 2011). Over time, a number of animal science institutions have recognized the potential of Japanese quails as an egg and meat producing birds and as a result initiated the commercial farming of Japanese quails.

Because Japanese quail farming is bestowed with farming-friendly factors such as reduced space and feed requirements, early maturity, fairly high egg production rate, high disease resistance and low financial investment, it soon became immensely popular in several regions of India. Japanese quails are marketed at 4-5 weeks of age for meat with a body weight of 200-240g. Females start laying eggs at about 6-7 weeks of age and are generally reared up to 10-12 months of age for breeding. During this period, each female lays about 250-270 eggs, each egg weighing ~12-13g (Asha, 2011). At present, Japanese quails constitute the third largest avian species in numbers, next only to chicken and ducks in commercial poultry production in India. Currently, Tamil Nadu is one

Table 1: Design of the Experiment

Treatment	Replicate	No. of Nest boxes/ Replicate	No. of Japanese quails/ replicate	Total number of Japanese quails/ replicate	
				Males	Females
T1 (Control)	R1	No Nest boxes	320	80	240
	R2	No Nest boxes	320	80	240
T2	R1(One nest box/10females)	24 (6 boxes each of Blue, Green, White and Brown colours)	320	80	240
	R2(One nest box/10females)	24(6 boxes each of Blue, Green, White and Brown colours)	320	80	240
T3	R1(One nest box /5 females)	48(6 boxes each of Blue, Green, White and Brown colours)	320	80	240
	R2(One nest box /5 females)	48 (6 boxes each of Blue, Green, White and Brown colours)	320	80	240
Total			1920	480	1440

of the leading states in commercial quail production in India. The Tamil Nadu Veterinary and Animal Sciences University, during its intensive research on Japanese quails had developed the Nandanam quail strain at its Institute of Poultry Production and Management, Madhavaram. Furthermore, the Namakkal strain of quails was developed at the Department of Poultry Science, Veterinary College and Research Institute, Namakkal. These strains have the production performance of attaining 210g of weight at 28 days of age, a feed conversion efficiency of 2.5 and livability of about 96%. Egg production is about 80% in the cage system and 70% in the deep litter system. Furthermore, previous studies have shown that egg production performance is enhanced if the birds are housed with coloured nest boxes (Michel 1989; Huber-Eicher 2004). Taking these factors into account, we designed our study by introducing coloured mud pots as nest boxes to investigate their influence on egg production performance of Japanese quails aged 5 to 20 weeks.

MATERIALS AND METHODS

A biological experiment of 16 weeks duration from 5 to 20 weeks of age was designed and carried out to evaluate the influence of introduction of coloured mud pots as nest boxes for Japanese quails on their egg production performance. Four different colours of nest boxes were introduced namely; Blue, Green, White and Brown by painting the outer surface of mud pots with respective coloured paints except in case of the brown which was the inherent colour of the pots used in our study. Japanese quail chicks from a single hatch were reared up to 5 weeks under standard managemental conditions. For this experiment, a total of 1920 chicks (1440 female and 480 male quails) were randomly distributed into 3 treatments with 2 replicates each (Table 1).

Control (T1) quails were reared in deep litter, colour painted nest boxes (mud pots) were kept in T2 (one nest box/10 females) and T3 (one Nest box/5 females) groups. Paddy husk was used as the litter material. The number of males and females in each replicate was maintained constant by replacing the same from the buffer stock that was maintained to tackle the cases of mortality.

Age at which the first egg was laid in each replicate was recorded as on 5% egg production. The egg production data of experimental Japanese quails was collected from 7

to 20 weeks of age. The eggs that were laid on the litter material (floor) and inside the different coloured nest boxes in the treatment groups were collected and recorded daily. The data were analysed as per the statistical methods recommended by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The influence of the nest boxes on the egg production performance of Japanese quails from 7 to 20 weeks of age is presented in table 2.

Table 2: Egg Production of Japanese quail as influenced by nest Box (7 to 20 weeks of age). Values are expressed as Mean \pm S.E (%).

Treatment	T1 Control (No nest boxes) (%)	T2 Floor and Nest boxes (1 nest box / 10 females) (%)	T3 Floor and Nest boxes (1 nest box / 5 females) (%)
Overall *	54.71 ^b \pm 01.62	57.05 ^b \pm 01.46	61.38 ^a \pm 01.80
Nest box vs. Floor **			
Nest boxes		33.69 ^a \pm 3.72	47.91 ^a \pm 4.82
Floor		23.44 ^b \pm 2.47	13.51 ^b \pm 1.19
Coloured nest box **			
Blue		8.04 ^{bc} \pm 0.26	12.83 ^a \pm 0.46
Green		9.68 ^a \pm 0.41	11.65 ^{ab} \pm 0.40
White		7.82 ^c \pm 0.28	12.99 ^a \pm 0.54
Brown		8.22 ^{abc} \pm 0.44	10.47 ^b \pm 0.40

* (P<0.05) significant; ** (P<0.01) highly significant; The values bearing same superscript in the overall row and in the same column do not differ significantly.

The overall mean percent egg production in different treatments showed significant (P<0.05) differences. Percent egg production was significantly higher in T3 (61.38 \pm 01.80) than in T2 57.05 \pm 01.46% and control (T1) 54.71 \pm 01.62% groups. Number of eggs laid in the nest boxes were significantly higher (P<0.01) than those laid on the floor both in T2 (33.69 vs. 23.44% and T3 (47.91 vs. 13.51%) groups. Also, an increased number of nest boxes (T3) resulted in an increased number of eggs being laid in them (47.91%) than with a fewer nest boxes (T2), (33.69%). Among the coloured nest boxes, the overall mean egg production in T2 was 23.44 on the floor and 33.69% in the nest boxes, respectively. Significantly higher (P<0.01) number of eggs were laid (9.68 %) in green than in blue (8.04%), white (7.82%) and brown (8.22%) coloured nest boxes. The overall mean percent in egg production in T3 (floor vs. nest boxes) was 13.51%

Table 3: Bi-weekly egg production of Japanese quail as influenced by the nest boxes (7 to 20 week of age). Values are expressed as mean \pm S.E. (%).

Treatment		7-8wk	9-10wk	11-12wk	13-14wk	15-16wk	17-18wk	19-20wk
T1: Control	Floor	28.02 \pm 4.70	54.76 \pm 1.53	62.76 \pm 2.3	63.63 \pm 1.44	49.43 \pm 2.36	58.02 \pm 3.95	66.35 \pm 2.25
T2	Nest boxes	13.92 \pm 2.51	31.04 \pm 1.14	33.18 \pm 0.71	35.20 \pm 2.21	42.41 \pm 0.98	36.50 \pm 1.13	45.58 \pm 2.11
	Floor	16.04 \pm 2.46	31.74 \pm 1.02	30.83 \pm 1.57	25.83 \pm 2.22	15.01 \pm 0.85	22.0 \pm 1.90	22.66 \pm 2.98
T2	Blue	4.18 \pm 0.71	8.75 \pm 0.69	8.22 \pm 0.35	8.36 \pm 0.54	8.37 \pm 0.36	8.57 \pm 0.61	9.86 \pm 0.57
	Green	3.76 \pm 0.61	8.21 \pm 0.51	9.04 \pm 0.46	9.03 \pm 0.67	14.07 \pm 1.07	11.59 \pm 0.74	12.05 \pm 0.96
	White	3.95 \pm 0.72	8.39 \pm 0.54	7.99 \pm 0.43	9.12 \pm 0.44	7.42 \pm 0.45	7.27 \pm 0.63	10.65 \pm 0.62
	Brown	2.61 \pm 0.50	5.68 \pm 0.40	7.91 \pm 0.41	8.69 \pm 1.30	12.52 \pm 1.42	9.06 \pm 0.58	11.05 \pm 0.92
T3	Nest boxes	20.89 \pm 5.14	51.90 \pm 0.80	53.58 \pm 1.51	53.09 \pm 1.57	44.85 \pm 2.18	50.56 \pm 3.36	60.49 \pm 0.96
	Floor	9.49 \pm 1.41	16.86 \pm 0.62	18.45 \pm 0.79	14.12 \pm 0.65	12.24 \pm 0.96	11.59 \pm 0.71	11.83 \pm 1.04
T3	Blue	6.74 \pm 1.48	15.56 \pm 0.45	15.52 \pm 0.54	13.91 \pm 0.70	11.45 \pm 1.06	12.87 \pm 1.45	13.76 \pm 0.80
	Green	5.49 \pm 1.28	12.24 \pm 0.52	11.48 \pm 0.84	13.02 \pm 0.59	11.86 \pm 0.57	12.78 \pm 0.95	14.68 \pm 0.71
	White	4.74 \pm 1.44	14.70 \pm 0.54	14.88 \pm 0.60	14.22 \pm 0.88	10.58 \pm 0.69	13.21 \pm 1.07	18.61 \pm 1.25
	Brown	4.25 \pm 0.98	9.38 \pm 0.38	11.69 \pm 0.38	11.93 \pm 0.69	10.95 \pm 1.16	11.69 \pm 0.77	13.42 \pm 0.91

and 47.91 %, respectively which was significantly different ($P < 0.01$). Furthermore, increased number of eggs was laid in white (12.99%) than in brown (10.47%) coloured nest boxes. In blue and green, it was 12.83 and 11 %, respectively indicating that an increased number of eggs were laid in the nest boxes than on the floor. This finding is in accordance with Schmid and Wechsler (1998), who reported that Japanese quails laid up to 90 % of their eggs in the nest boxes. White coloured nest box was preferred by the quails in our study – a result that was supported by the findings of Michel (1989) who found that quails housed individually preferred cubicles with vertical grey stripes over cubicles with horizontal grey stripes and green coloured cubicles for laying their eggs. Hurnik *et al.* (1973b) and Huber-Eicher (2004) also stated that colour may affect the nest choice of laying hens and concomitantly reduces the percentage of eggs that are laid on the floor. One possible reason behind the colour preference to lay more number of eggs may lie in the genetic predisposition or can be attributed to a maturation effect. These possible reasons were supported by the studies of Hurnik *et al.* (1977), Jones and Carmichael (1998) and Bolhuis (1999) who reported that laying hens seem to generally prefer yellow coloured nests and the reasons include genetic predisposition and/or a maturation effect.

Bi-weekly percent egg production values (expressed as Mean \pm S.E) of Japanese quails in different treatments from 7 to 20 weeks of age is presented in Table 3. The egg production values on the floor and in the nest boxes in T2 and T3 showed that Japanese quails preferred to lay more number of eggs in the nest boxes than on the floor. The bi-weekly egg production in different coloured nest boxes in T2 and T3 groups showed variations from 7 to 20 weeks of age. For example, Japanese quails preferred to lay more number of eggs in green and brown coloured nest boxes in T2 group. On the other hand, more number of eggs was laid in green and white coloured nest boxes in the T3 group. The preference by Japanese quails to reside in the nest boxes was found to be 3 ½ times higher when compared to that of the floor.

Conclusion

Key findings from our study reveal that the Japanese quails laid significantly more number of eggs in the nest boxes than on the floor. In addition, our results also demonstrate that an increased number of nest boxes resulted in more number of eggs being laid and that the nest boxes are preferred for egg laying over the floor. Based on our findings, we also conclude that Japanese quails prefer white over green coloured nest boxes. Our results bear significance for enhanced egg production performance in Japanese quail farming.

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