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Effect of photoperiod on weight and age at sexual maturity of Japanese quail

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Abstract
An experiment of was conducted, utilising 180-day old Japanese quail chicks, which were randomly kept in three different groups i.e. T_0 (photoperiod 16L:8D), T_1 (photoperiod 24L:0D) and T_2 (photoperiod 12L:12D) each having 2 replicate (30 chicks/ replicate) to evaluate the influences of photoperiod on Japanese quail age at sexual maturity and weight at sexual maturity. The data for all measured variables were analyzed using one way ANOVA procedure of SPSS version 20. The results revealed that the group reared in T1 showed significantly early sexual maturity as compared to rest of the groups. However highest value on body weight at sexual maturity was observed in T0 and T1 as compared to T2. So it could be concluded that Japanese quail reared in (photoperiod 16L: 8D) and (photoperiod 24L: 0D) showed best performance.

Keywords: Sexual maturity, Japanese quail, photoperiods, significantly

Introduction
Quail popularly known as -Bater in Hindi which belongs to class Aves family as Phasianidae and Genus *Coturnix*. The Japanese quail's meat and egg used as a good source of food and provide animal protein in many underdeveloped areas of world (Chaturvedi, 1973) [2]. Now in today era, commercial quail farming is getting popularity in India because they have fast growth rate, early sexual maturity, short generation interval, high rate of egg production and require less floor space and feed. Quails are ready for market at around 6 weeks of age and also it attains sexual maturity at about 6 weeks of age. The adult weight of quail is about 150 – 200g. To obtain maximum growth and production scientific managemental practices should be followed. Among other scientific managemental practices photoperiod also serve important function in growth and production of birds. Proper diurnal rhythms has to be developed by a proper day and night cycle (a routine of typical activities during the day) to optimize production performance in birds. Hassan *et al.*, 2013; Yang *et al.*, 2016 [4, 7] reported that light efficacy has been an effective measure to improve poultry production. Furthermore, light can be used to delay or accelerate age at sexual maturity and to stimulate egg laying because long photoperiods stimulate the sexual function of layers and optimize egg production (Freitas *et al.*, 2005) [3]. Alteration in the photoperiod and wavelength have a major effect on the behaviour, physiology and production performance of poultry (R Parvin, *et al*., 2014) [5].
Therefore the present study was undertaken to determine the optimum photoperiod for attaining early maturity in Japanese quail.

Materials and Methods
Experimental procedure
For the study 180-day old Japanese quail chicks, which were randomly kept in three different groups i.e. T_0 (photoperiod 16L:8D), T_1 (photoperiod 24L:0D) and T_2 (photoperiod 12L:12D) each having 2 replicate (30 chicks/ replicate) to evaluate the influences of photoperiods on quail age at sexual maturity as shown in table 1.

Table 1: Treatment groups

S.No.	Treatments Groups		Treatment details	Number of birds (Japanese quail)
1.	T_0	T_0R_1	Photoperiod (16L:8D)	30
		T_0R_2	Photoperiod (16L:8D)	30
2.	T_1	T_1R_1	Photoperiod (24L:0D)	30
		T_1R_2	Photoperiod (24L:0D)	30
3.	T_2	T_2R_1	Photoperiod (12L:12D)	30
		T_2R_2	Photoperiod (12L:12D)	30

Parameters to be studied

The following observations were recorded during the period of the experiment.

Age at sexual maturity (day)

The age at sexual maturity, which is determined by egg production in quails, which was evaluated as the age when the first egg will be laid. Age at first egg is important since it indicates the sexual maturity age.

Sexual maturity weight (g)

Sexual maturity weight was recorded when the quails laid their first eggs in each pen.

Statistical Analysis

The experimental data were subjected to analysis of variance (Snedecor and Cochran 1989). Means showing significant differences were compared by Duncan's New Multiple Range Test (DNMRT) (Duncan, 1955). Statistical significance was accepted at P<_0.05. The results were interpreted and expressed as means ± SEM.

Results and Discussion

The data on various parameters recorded during the present investigation have been statistically analyzed and the observed results are presented and discussed under the following headings:

Age at sexual maturity (days)

The age at sexual maturity of Japanese quail reared in different photoperiod has been presented in Table 2 and shown in fig 1. Age at sexual maturity (days**)** in three treatment groups i.e. T_0 (16L: 8D), T_1 (24L: 0D) and T_2 (12L: 12D) was 41.17^a, 40.83^a and 43.83^b respectively. The statistical analysis of data revealed significant (P<0.05) effect of photoperiod on age at sexual maturity of Japanese quail. Quails reared on photoperiod T_1 (24L: 0D) showed significantly early age at sexual maturity and is statistically similar to T_0 (16L: 8D) as compared to birds on stocking density T_2 (12L: 12D). This might be due to the reason that light stimulate growth in birds which lead to early sexual maturity.

These results are similar with those of Wilson (1962) [6] who worked to see the effect of photoperiod on sexual development of coturnix. He concluded that coturnix quail start producing eggs at 7 to 8 weeks of age for day length of 14 or more hours. Earlier sexual maturity was obtained by giving more hours of light or by increasing the number of light period per day. Decreasing day length resulted in delay or inhibition of sexual maturity and egg production.

Table 2: Effect of floor space on Age at sexual maturity (days)

Treatment groups	Age in days	SE
T_0 Photoperiod (16L:8D)	41.17^a	0.792
T_1 Photoperiod (24L:0D)	40.83^a	0.749
T_2 Photoperiod (12L:12D)	43.83^b	0.654

Means having different superscripts in a column differ significantly (P≤0.05)

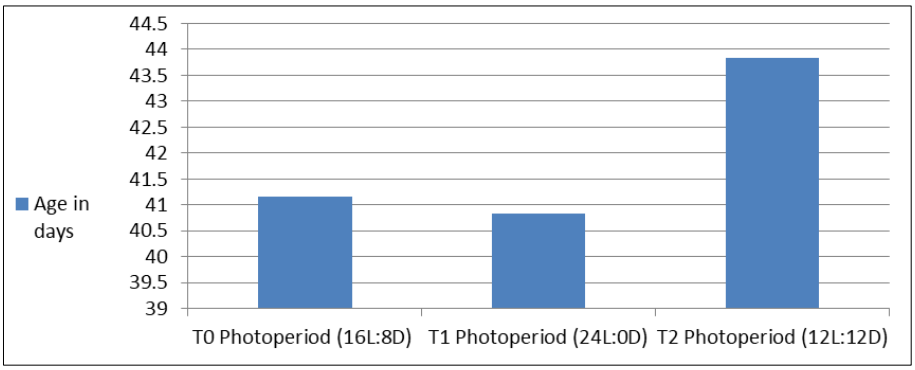

Fig 1: Effect of floor space on Age at sexual maturity (days)

Body weight at sexual maturity (days)

The body weight at sexual maturity of Japanese quail reared in different photoperiod has been presented in Table 3 and shown in fig 2. Body weight at sexual maturity (days**)** in three groups i.e. T_0 (16L: 8D), T_1 (24L: 0D) and T_2 (12L: 12D) was 196.39^{ab}, 200.12^b and 188.78^a respectively. The statistical analysis of data revealed highly significant (P<0.05) effect of photoperiod on weight at sexual maturity of Japanese quail. Quails reared in photoperiod T_1 (24L: 0D) showed significantly higher weight at sexual maturity and is statistically similar to T_0 (16L: 8D) as compared to birds on stocking density T_2 (12L: 12D).

Similar results were obtained by Boon *et al.,* (2000) [1] who investigated the effect of photoperiod and food duration on body weight gain in two strains of Japanese quail (Coturnix *c. japonica),* bred for meat (broilers) or egg production (layers), from 7 to 71 days of age. In a first experiment chicks were kept in different photoperiod as 18L: 6D, 15L: 9D, 12L: 12D, 9L: 15D, or 6L: 18D, with ad lib food during the light period. In a second experiment birds were subjected to a long photoperiod (18L: 6D or 15L: 9D) with ad lib food during part of the light period (first 6 or 9 h, respectively). Results showed that longer photoperiods were associated with larger weight gains.

Table 3: Effect of photoperiod on weight at sexual maturity (gm)

Treatment groups	Body weight (gm)	SE
T_0 Photoperiod (16L:8D)	196.39^{ab}	2.697
T_1 Photoperiod (24L:0D)	200.12^{b}	2.757
T_2 Photoperiod (12L:12D)	188.78^{a}	4.51

Means having different superscripts in a column differ significantly ($P \leq 0.05$)

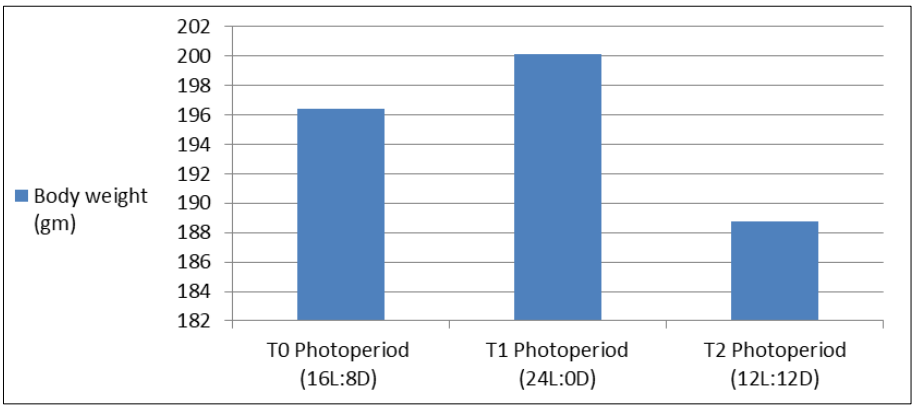

Fig 2: Effect of photoperiod on body weight at sexual maturity (gm)

Conclusion

From the present study it could be concluded that among all the three treatments, Japanese quail having photoperiod 24L: 0D showed early age of sexual maturity and higher body weight at sexually mature age as light stimulate growth and performance.

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Conflict Of Interest

The authors declare that there is no conflict of interest.

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