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Effect of Human Menopausal Gonadotropin (Pergonal) and Photoperiod on Laying pattern and Haematological indices in Japanese Quail (*Coturnix coturnix japonica*)

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ABSTRACT: Thirty female Japanese quail were randomly assigned to six treatment groups consisting of intramuscularly administered 0, 2, and 4 IU of Pergonal and Photoperiod (Natural and Extended) in a factorial experimental design for three weeks. At the end of the third week, three birds from each group were bled for haematological indices. Results showed no significant difference($p>0.05$) in Hen day production(HDP), Hen house production (HHP), PCV, Hb and WBC for Pergonal. However, HDP, HHP, Hb, PCV, RBC and WBC were significantly different ($p<0.05$) for photoperiod and their interactions. The values of haematological indices were within normal range indicating that Pergonal had no deleterious effect on these parameters and, extending photoperiod above natural light improved egg production in Japanese quail.

Key words: Japanese Quail; Menopause; Haematological indices; Pergonal; Photoperiod.

Introduction

Initiation of egg production is greatly affected by the stimulus of photoperiod on the pituitary gland which causes the release of follicle stimulating hormone in avian species. Increasing light to 18hours has been reported to improve egg production in chicken (Anthony, 2001). Natural photoperiod available for egg production in the tropics is on the average of 11hours and the process of egg formation (ovulation-oviposition) requires 24-26 hours photoperiod which makes it impossible for birds to lay more than one egg per day. For several decades, natural or synthetic hormones have been used to improve productive and reproductive potentials of animals (Iheukwuemere, *et al*,2006). In reproductive management of farm animals, human menopausal gonadotropin (pergonal) is often used in superovulatory protocols (Ladda *et al*, 1999). Pergonal is a lyophilised gonadotropin preparation which consist of follicle stimulating hormone and luteinizing hormone in ratio of 1:1 (Dixon and Hopkins, 1996). The potential of pergonal at improving egg production in Japanese quail has not been fully established, and information of its combination with photoperiod is scarcely available. Therefore, this study was carried out to investigate the effect of pergonal and photoperiod on egg production in japanese quail.

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Materials and Methods

Animals and experimental design: A total of thirty healthy female Japanese quails (*Coturnix coturnix japonica*) of 10 weeks of age and in active lay were used for the experiment. The birds were housed individually in cages and were fed layers mash (18%CP) and water *ad libitum*. The birds were randomly assigned to 6 treatment of 5 birds, each serving as a replicate in a 3x2 factorial experimental design. The treatment groups consisted bird receiving 0IU, 2IU and 4IU of pergonal intramuscularly for three weeks under natural photoperiod (LO) of 11 hours(between sunrise and sunset) and extended photoperiod (LH) of 18hours achieved using 60 watts electric bulb. Eggs laid were collected daily, hen day production(HDP) and hen house production(HHP) were calculated and used as egg production parameters.

Blood sample collection and analysis: At the end of the experiment, three birds per treatment were sacrificed by cutting through the jugular vein and blood samples collected into tubes containing EDTA as anticoagulant. The blood samples were analyzed for hematological indices according to the methods of Dacie and Lewis(1977).

Statistical analysis: All data were subjected to analysis of variance(ANOVA) as described by Steel and Torrie(1980). Duncan multiple range test was used to compare treatment means found to be statistically significant.

Table 1. Effect of pergonal level, photoperiod and interaction on Hen day and Hen house production of Japanese quail.

	HDP(%)	HHP(%)
Pergonal		
H0	40.8^{a}	28.7^{a}
H2	34.8^{a}	27.7^{a}
H4	42.3^{a}	29.3^{a}
LSD	28.31	12.03
Photoperiod		
LO	15.6^{a}	10.9^{b}
LH	52.1^{b}	44.0^{a}
LSD	22.1	9.54
LxH	NS	NS

Table 2. Effect of pergonal level, photoperiod and interaction on heamatological indices of Japanese quail.

	PCV(%)	RBC($x10^{12}$/l)	Hb(g/dl)
Pergonal			
H0	30.5^{a}	6.25^{a}	23.2^{a}
H2	29.2^{a}	5.85^{a}	22.2^{a}
H4	31.0^{a}	6.55^{a}	23.4^{a}
LSD	2.90	0.37	0.81
Photoperiod			
LO	27.1^{a}	5.13^{a}	21.0^{a}
LH	33.3^{b}	7.30^{b}	24.8^{ab}
LSD	82.37	0.30	0.66

Means in the same column with different superscripts are significantly different ($p<0.05$)

Results and Discussion

The effect of pergonal, photoperiods and their interactions on HDP and HHP are presented in table 1. There was no significant difference($p>0.05$) in HDP, HHP between the treatments for pergonal effect. However, there was a significant increase ($p<0.05$) in HDP and HHP with increase in photoperiod. HDP and HHP are egg production

records expressed as the number of egg produced as a percentage of hen day with and without mortality, respectively(Anthony, 2001). Result of this study indicates that HDP and HHP had the higher value at high or extended photoperiod. This is contrary to Follet and Maung (1978) who reported that quail requires 11.5 and 14 hours for maximum egg production but agrees with 16 to 18 hours for maximum production in chicken as reported by Anthony(2001). Light is the most critical of all environmental factors affecting reproduction in birds (Olarewaju, 2006), it induces ovulation as it stimulates the pituitary gland leading to the release of follicle stimulating hormone(FSH) which act on the ovary. Photoperiod also increase the plasma FSH concentration(Follet and Maung, 1978) resulting into increased egg production as reflected in this study.

Table 2 shows the effect of pergonal, photoperiod and their interactions on haematological indices. There were significant increases ($p<0.05$) in PCV, RBC and HB as photoperiod increased from 11 to 18 hours. The values of PCV are still within the range(28-37%) for avian species as given by Simaraks *et al*,(2004). The increased PCV at 18hours photoperiod reflects an indication that light can affect PCV hence improving the red cell status as well as health status of avian species. The increased Hb as photoperiod is extended to 18 hours could be explained by the fact that, photoperiod increases plasma FSH concentration (Follet and Maung,1978) which is a biological reaction requiring much oxygen carrying capacity derivable through haemoglobin (Hb). Extended photoperiod also improved the RBC status of the birds.

Conclusion

The result of this study suggests that pergonal did not improve egg production in Japanese quail. It is therefore not a good source of exogenous hormone to increase egg production. However, photoperiod of 18 hours has the potential for increasing egg production in Japanese quail and it is therefore recommended.

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