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Influence of Photoperiod and Prolactin on Reproductive Pigeons *Columba Livia Domestica*

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Abstract

The effect of photoperiod and prolactin on the regulation of seasonal reproduction, with the domestic pigeon, was studied male pigeons were exposed to a long daily photoperiod (18 L: 6D), maintained under the same photoperiod regime and treated with prolactin at 10 and 20 ng / ml / of a bird / 3 days. testicular volume, prolactin and thyroxin in plasma were estimated at the end of the experiment, the results show that, under a long photoperiod (18L: 6D), sexual activity lasts 6 weeks, whereas that treatment with prolactin, inhibits the growth of testes, and therefore reproduction, these results suggest that, unlike the other species of birds, the mode of action of prolactin in the onset of the refractory phase, through thyroxin .

Keywords: Photoperiod, Reproduction, Prolactin, Pigeons.

1. Introduction

In most species of birds, the timing of sexual activity is synchronized by the seasonal variations of light (Bissonnette, 1931). Indeed, the growth of gonads begins in the spring, in response to elongation of the photoperiod, but sexual activity ends, quite often during the summer even though the photoperiod is still long (Nicholls *et al*., 1988)

This phase of the reproductive cycle is known by the photorefractive, i.e., long days are no longer stimulating gonadal growth and exposure to a period of short days is necessary for the

reactivation of the neuro-endocrine system (effect of short days of winter). The mechanisms leading to this sudden sexual activity remain unknown. Nevertheless, some hypotheses have been advanced (Nicholls *et al*., 1988). The involvement of prolactin in the regulation of these mechanisms is indisputable. A gradual increase in the level of plasma prolactin was observed in most species studied, coinciding with the end of the breeding season. On the other hand, the injection of the refractory phase (regression of the gonads) (Goldsmith *et al*., 1985). In this regard, this study aims to examine the effect of exogenous prolactin on the different phases of the reproductive cycle of the pigeon *Columba livia*.

2. Materials and methods

The experiment consists of a group of 18 pigeons males, sexually mature. They were divided into three lots of six each, at the facility of the Department of Biology, University of Annaba, at room temperature, humidity of 70% and a natural photoperiod. After an acclimation period of 20 days, the three batches were subjected to an artificial photoperiod of 18 L: 6D, with a control group, a second group receiving a dose of 10ng / ml / of a bird / 3 days of prolactin, while individuals of third group were given a dose of 20 ng / ml / of a bird / 3 days of prolactin during the entire period of experimentation.

The volumes of testes were recorded at 07 day intervals, and testicular volume was calculated using the formula: $\mathbf{V = 3 / 4\ a^2.\ b}$, or is **a** half the width of the testis and **b** the half length of testis (Boulakoud and Goldsmith, 1994). The assay of prolactin and of thyroxin have been carried out by IRA(Radio-immunology), based on the principle of Sandwich.

Table 1: Planned Distribution of the Groups

Groups	**Photopériod**	**Treatment** **Hormone Prolactin Concentration**
Control (n =6)	18L: 6D	0ng / ml / of bird / 3 days
10ng / ml(n =6)	18L: 6D	10ng / ml / of bird / 3 days
20ng / ml(n =6)	18L: 6D	20ng / ml / of bird / 3 days

3. Statistical Analysis

Statistical analysis has been carried out by student t-test to compare between paired groups, whereas the one way analysis of variance (ANOVA) was used to compare between groups. Results are expressed as mean ±SD and the statistical test was considered significant at $p<0.05$ level.

4. Results

Variations in the testicular volume are represented by the figure1.les individuals in the control group and those treated with 10ng / ml / of a bird / 3 days of prolactin, had the same sexual cycle, with a peak at the fourth week, followed by a gradual regression of the gonads from the 5^{th} week (35 day) of the experiment.

For against, among pigeons treated with 20 ng / ml / of a bird / 3 days of prolactin, maximum testicular volume was significantly lower than that of control.

Changes in plasma prolactin are shown in figure 2. The level of this hormone was identical among the three groups of pigeons figure 3 illustrates the changes in the rate of plasma thyroxin. In controls, a significant ($P<0.05$) increase was recorded in the 8th week (60 day) of experimentation before the levels are returning to the initial concentration. In animals treated with prolactin, thyroxin concentrations were relatively lower than those of the control.

Figure 1: Change in testicular volume (mm^3) in male pigeons treated at two different doses of prolactin (10 and 20 ng /ml)subject to a long photoperiod (18L: 6D) Data are expressed as means ± SD (n =18). In each date, different letters above bars indicate significant differences at $p < 0.05$ (ANOVA followed by Student's t test).

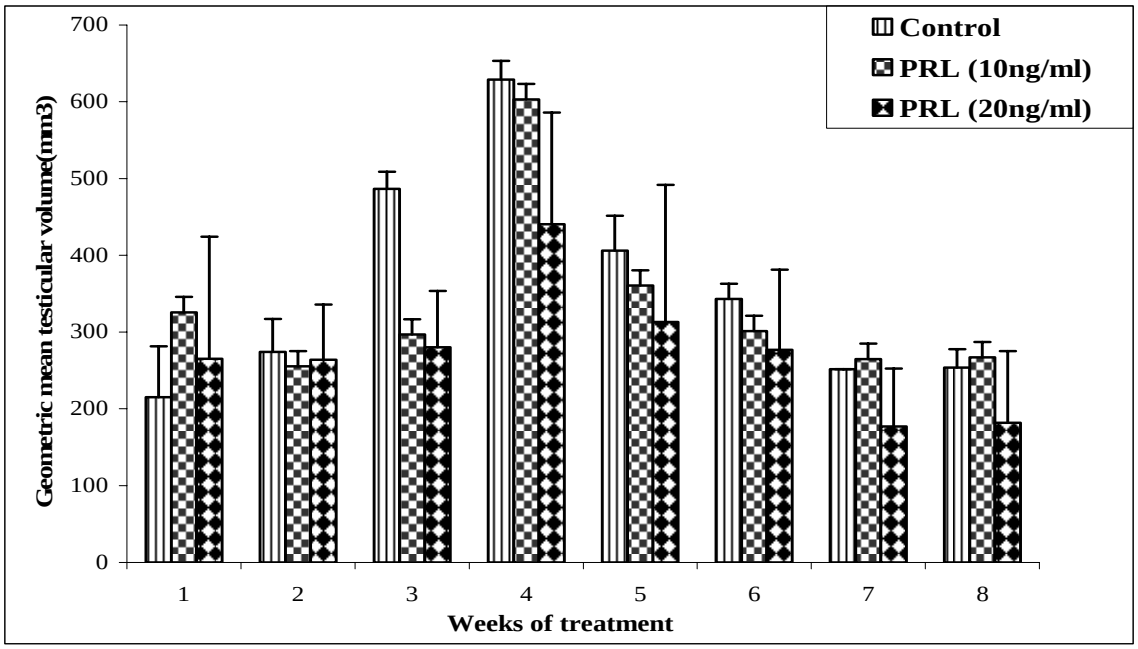


Figure 2: Change in concentration of prolactin (ng/ml) in male pigeons treated at two different doses of prolactin (10 and 20 ng /ml)subject to a long photoperiod (18L: 6D) Data are expressed as means ± SD (n =18). In each date, different letters above bars indicate significant differences at $p < 0.05$ (ANOVA followed by Student's t test).

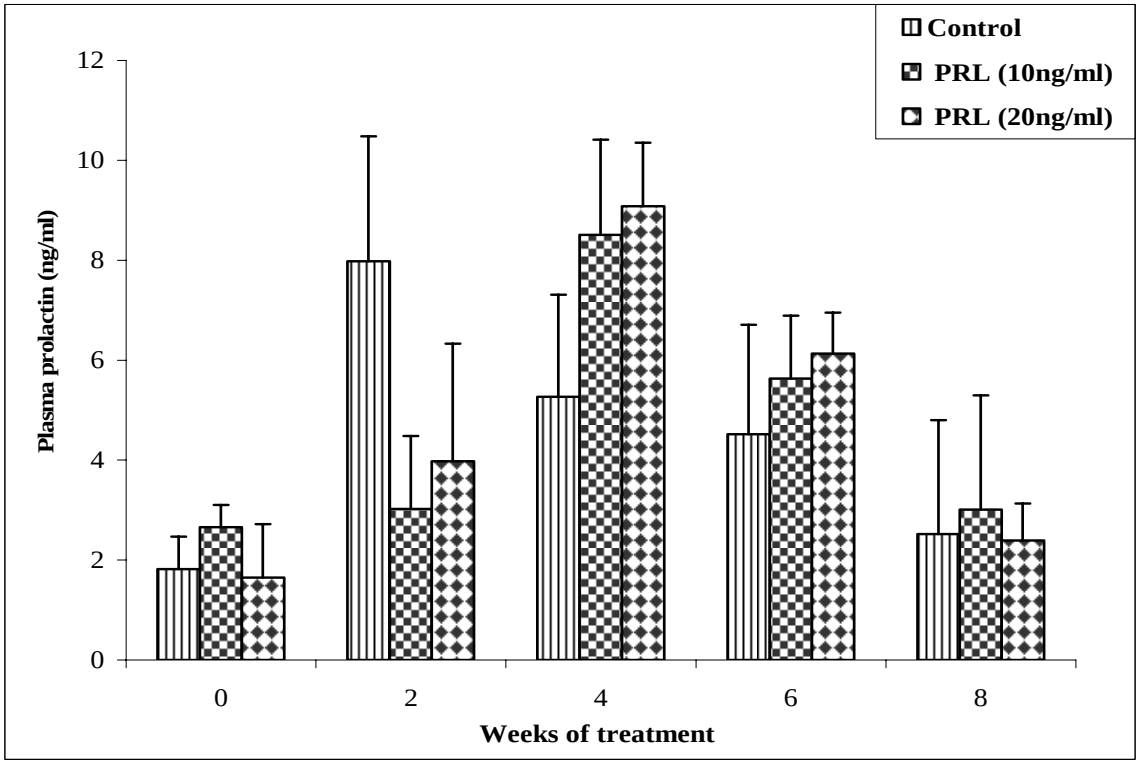
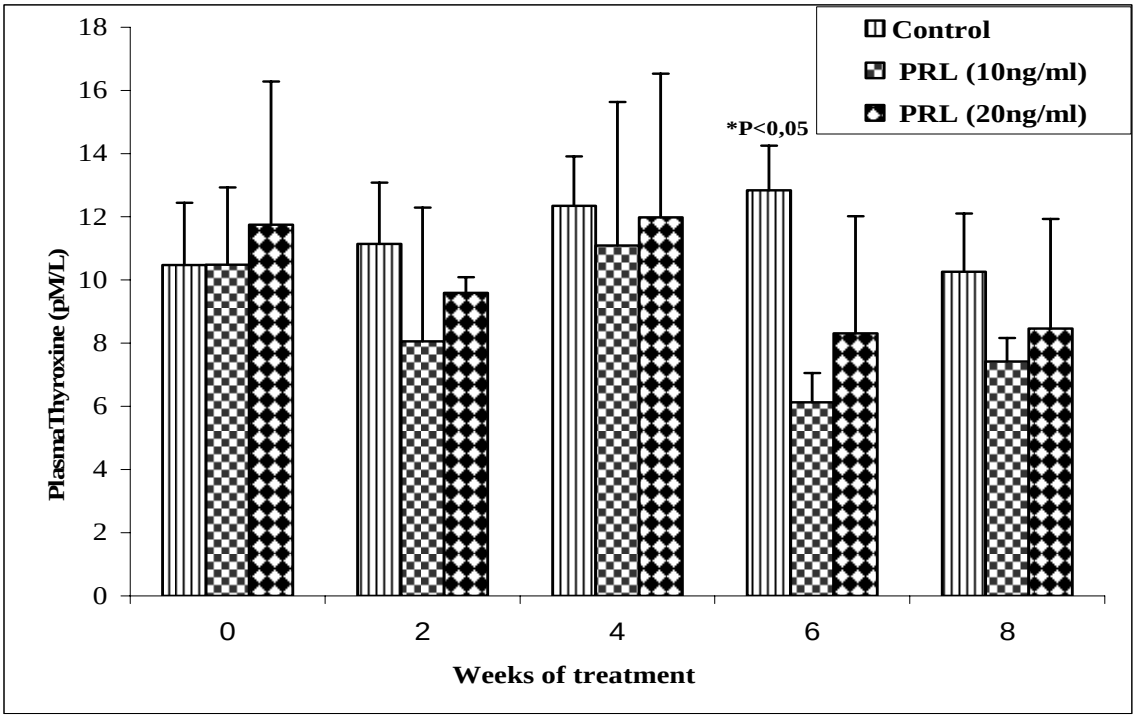


Figure 3: Change in concentration of Thyroxin (pM/L) in male pigeons treated at two different doses of prolactin (10 and 20 ng /ml) subject to a long photoperiod (18L: 6D) Data are expressed as means ± SD (n =18). In each date, different letters above bars indicate significant differences at $p < 0.05$ (ANOVA followed by Student's t test).



5. Discussion

The resultants from this study confirm the importance of photoperiod in the regulation of reproduction in pigeons. Indeed, sexual activity lasts only thirty days after the pigeons exposed to a long photoperiod 18L: 6D, whereas under a long photoperiod of 14L:10D, it was shown to the cycle of sexual is 40 days (Lechekhab, 1997).

Furthermore, prolactin appears to play a role in the timing of reproduction in this species (Dawson and Goldsmith, 1983).as treatment with prolactin prevents the gonads reach maximum volume, compared with that of control. taking into account comments on the changes in plasma thyroxin, it is suggested that the application of prolactin affects the hypothalamic-pituitary-gonadal via thyroxin (Silverin and Goldsmith, 1997). This hypothesis is entirely consistent with subsequent work, in which hypothyroidism inhibits the growth of gonads in pigeons, as well as in other species of birds (Buntin, 1987 and Lechekhab, 1997).

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