



## **EFFECTS OF CHRONIC STRESS ON MATING BEHAVIOUR AND SEMEN QUALITY OF NIGERIAN INDIGENOUS COCKS**

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### **ABSTRACT**

The present study was conducted to evaluate the effects of chronic stress (exogenous corticosterone, CORT) administration on the mating behaviour and semen quality characteristics in Nigerian indigenous cocks. A total of 36 matured birds consisting 9 cocks and 27 hens were used. Birds were randomly divided into two experimental treatments. Treatment 1 (control) cocks were given 0mg of CORT (4 replicate), while Treatment 2 (stressed) were given 2mg CORT/day orally for 5 consecutive days. After each administration the mating behaviors (number of successful mating, number of approach to hen, attempted mount and waltzing) cocks observed daily between 5:30-6:30pm. At the end of the 5<sup>th</sup> day, cocks were gently restrained and semen samples were collected via rectal massage for analysis. Data collected on semen parameters were subjected to Independent sample T-test, while data collected on mating behaviour was subjected to Mann-Whitney U-test all of SPSS Statistical package (version 21). Birds administered 2mg CORT/day showed a significant decrease in number of successful mating but no effect on other mating behaviours. Also, birds administered 2mg CORT/day showed no effect on semen quality. In conclusion, the administration of exogenous CORT (2mg/day for 5 days) to Nigerian indigenous cocks had a negative effect on successful mating but no significant effect on semen quality.

Keywords: behaviour, cocks, mating, semen and stress

### **Introduction**

Chronic stress that last's for days or even weeks can have deleterious effects, such as inhibiting reproductive functions and reducing body weight (Breuner *et al.*, 2008). CORT can negatively affect function of gonads and reproductive centers in the brain (Wingfield and Sapolsky, 2003), serving as a physiological break on reproductive physiology and behaviour. Increased exposure to elevated glucocorticoids can disrupt reproductive behavior (Rivier and Vale, 1984), thereby decreasing the chances of finding mates, initiating pair formation, or successful copulation (Molly *et al.*, 2010). Increased level of CORT in Japanese quail breeders was accompanied with reduced ejaculate volume, motility and percentage of live sperm (Hanafy and Khalil, 2015).

The response of animals during stress is mainly directed towards survival rather than growth and reproduction (Joseph and Whirlledge, 2017) probably because elevated levels of glucocorticoids results in several pathologies such as dysfunction of reproduction (Whirlledge and Cidlowski, 2017). Stress is harmful to sperm and semen quality, affecting its concentration, appearance and ability to fertilize egg (Janevic *et al.*, 2014). Prolonged exposure to stressors leads to increased CORT levels in bird causing reduced sexual libido (Hanafy and Khalil, 2015). Research work on chronic stress in Nigerian indigenous cocks and its effects on mating behavior and semen quality are not available.

### **Materials and methods:**

The field experiment was carried out at the College of Animal Science and Livestock Production farm (COLANIM farm) and the semen analysis in the Department of Animal Physiology laboratory of the Federal University of Agriculture, Alabata, Abeokuta, Ogun State. A total of 36 sexually matured chickens were selected from an existing flock of Nigerian indigenous chickens consisting 27 hens and 9 cocks housed in a deep litter pen (2.5 x 3 x 6ft) per replicate, birds were fed 120g concentrate feed/bird/day and clean water. Birds were randomly assigned to two treatments namely unstressed (control) and stressed. The mating ratio adopted in both treatments was 1cock:3hens. 100 mg of CORT (Sigma-Aldrich) was added to 50ml of olive oil and then vortexed until the CORT dissolved in the oil



completely giving a concentration of 2mg of CORT/ml of olive oil. Cocks in treatment 1 were stressed by administering 2mg CORT dissolved in olive oil (5 replicates), while for treatment 2, the cocks were administered 1ml of ordinary olive oil (4 replicates). This was done daily (5:00-5:15pm) for 5 consecutive days. Cocks were gently restrained and mouth open before the oil was dropped into their mouth using a sterile syringe. After 10 mins of CORT administration, mating behaviour were recorded using digital cameras fitted in each pen for 1 hr. (5:30–6:30 pm). The behavior monitored were numbers of successful mating, approaches to hen, attempted mount and waltzing. After behavioural observation on the 5<sup>th</sup> day, cocks were separated from the hens and placed individually in battery cages to prevent mating. By 10:00am the following day, semen samples were collected from the cocks following abdominal massage into plain tubes and placed in a bowl containing warm water and then taken to the Animal Physiology Laboratory for analysis. Semen was analyzed for motility, concentration, live: dead ratio and abnormality. Data collected on semen parameters was subjected to independent T-test and data collected on mating behavior was subjected to Mann-Whitney U-test of SPSS Statistical package (version 21).

### Results and Discussion

Administration of 2mg CORT/day for 5 days had no significant effect ( $P>0.05$ ) on number of attempted mount, approach to hen and waltzing; however, there was significant effect ( $P<0.05$ ) on the number of successful mating, being higher in the control than stressed cocks (Table 1). There was no significant difference ( $P>0.05$ ) between stressed and control cocks for all semen parameters measured (Table 2).

Table 1: Effect of exogenous corticosterone on mating behavior of Nigerian indigenous cocks

Behavioral observations	Stressed (n=5 cocks)	Control (n=4 cocks)
Number of successful mating	2.75 <sup>b</sup>	6.25 <sup>a</sup>
Number of approach	4.88	4.13
Number of attempted mount	5.50	3.50
Number of waltz	3.38	5.63

Mean Rank having different superscripts within the same row are significantly different at ( $P<0.05$ ).

Table 2: Effect of exogenous corticosterone on semen parameters of Nigerian indigenous cocks

Semen parameters	Stressed (n=5 cocks)	Control (n=4 cocks)
Motility (%)	83.41±8.09	92.60±1.90
Concentration ( $\times 10^6$ /ml)	180.00±15.49	213.75±21.64
Live (%)	92.50±3.78	94.19±3.75
Dead (%)	7.50±3.78	5.81±3.75
Damaged head (%)	0.95±0.38	1.00±0.20
Damaged mid-piece (%)	0.90±0.30	0.94±0.11
Damaged Tail (%)	2.00±0.34	2.25±0.59
Total abnormality	3.85±0.69	4.18±0.57

Values are means  $\pm$  SEM

**Discussion:** This is the first study to investigate the effect of chronic stress on mating behaviour and semen quality of Nigerian indigenous cocks. 2mg CORT/day for 5 days reduced the number of successful mating. This result is in line with Reedy *et al.* (2014) who reported that the administration of 0.03ml ACTH injection suppressed mating behavior in red-spotted newts. The relationship between CORT and reproductive output between populations suggest that increase in endogenous CORT level predicts lower



reproductive success, however, some studies showed no relationship between endogenous CORT level and reproductive output (Wingfield *et al.*, 1999). The lack of a significant effect of CORT on semen quality observed in the current study could be attributed to the level of CORT used or the short duration of the administration. Administration of 0.25 and 0.50 mg CORT/bird for 14 days had a negative effect on the semen parameters of Japanese quail breeders compared to the control (Hanafy and Khalil, 2015). In conclusion, exogenous administration of 2mg of CORT/day for 5 days to Nigerian indigenous cocks did not affect the number of approaches, attempted mounts, waltz and semen quality but reduced the number of successful mating.

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