SEMEN CHARACTERISTICS OF THREE GENOTYPE OF INDIGENOUS COCKS IN THE HUMID ENVIRONMENT OF NIGERIA

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ABSTRACT

The study was conducted to determine the semen characteristics of three genotypes of Nigerian Indigenous cocks. Thirty Six (60) local breeding cocks comprising of 20 frizzle, 20 normal and 20 naked neck selected randomly from the poultry breeding unit of the Ambrose Alli University Teaching and Research farm was used for this study. Semen were collected from them by abdominal massage and analyzed for semen characteristics. Semen concentration were significantly higher in normal 21.18±0.03mL ($p<0.05$) than in frizzle feathered 20.19±0.093. and normal and naked neck feathered genotype 18.07±0.163. Sperm motility was significantly better ($p<0.05$) in naked neck feather than in frizzle feather. Semen volume of the frizzle and normal feathered, were significantly higher ($p<0.05$) than naked neck. Variations on semen characteristics abound in the three Nigerian indigenous cocks compared.

Key words: Indigenous cocks, morphological defects, semen characteristics

INTRODUCTION

The reproductive potential of poultry birds (cocks) is often determined to a large extent by the quality of the semen they produce. Evaluation of semen quality and quantity of domestic fowls have been studied extensively (Schneider, 1992; Bah *et al.*, 2001; Tuncer *et al.*, 2006; Peters *et al.*, 2008) in indigenous tropical chicken breeds. While the assessment of semen quality characteristics of poultry birds have been reported to be an excellent indicator of reproductive potentials and a major determinant of fertility and subsequent hatchability of eggs (Peters *et al.*, 2004), the genetic effects of breeds and strains significantly affect semen quality and quantity (Schneider, 1992; Bah *et al.*, 2001; Tuncer *et al.*, 2006; Peters *et al.*, 2008). According to Obioha (1992), the use of the Nigerian indigenous poultry for commercial purposes does not make any economic sense, however the Nigerian indigenous chickens account for about 80 to 90 percent of the local population of chickens in Nigeria (Peters *et al.*, 2008) and their contribution to survival and adaptability (EbOzoje and Ikeobi, 1995) of poultry population in the tropics is vital to sustainable genetic improvement and biodiversity security of indigenous chicken populations. Indigenous Nigerian chicken breeds have also been reported to have many advantageous gene complexes or gene marker systems, which could be harnessed in the pursuit of genetic improvement of tropically suitable meat and egg chicken types (Machebe and Ezekwe, 2004). Prominent among these major genes are; the naked neck, frizzle and normal feathers (Ajayi *et al.*, 2011). Their genetic diversity and gene pool play important role in the reproductive adaptability (Ebozoje and Ikeobi, 1995; Machebe and Ezekwe, 2004). The aim of this study therefore was to determine semen characteristics of three know indigenous chicken breeds in Nigeria.

MATERIALS AND METHODS

Study area: The experiment was carried out in the Poultry Unit of the Teaching and Research Farm, Ambrose Alli University Ekpoma, Nigerian (Lat 6.44°N and Log 6.8°E).This area lies within the South-South geo-political zone of Nigeria and has a prevailing tropical climate with a mean annual rainfall of about 1556mm. Mean ambient temperature ranges between 26°C in December and 34°C in February with relative humidity ranging between 61% in January and 92% in August and a yearly average of 82%. The vegetation represents an interface between the tropical rainforest and the derived savanna. A total of 60 cocks generated from indigenous normal feather, naked neck, and frizzled feathered parents were used for this study. These consisted of 20 matured cocks each per type.

Semen Collection: Semen collection from the sire was accomplished by abdominal massage technique (Lake, 1962).Ejaculated semen was collected into graduated conical tubes and the volume of the sample was recorded to the nearest 0.1ml. Blood stained and contaminated semen was discarded. All collection apparatus were sterilized after every collection and kept in a safe dry place. Semen was dispensed after releasing

the abdominal pressure and allowing the oviduct to return to its natural position. Variations in between the sire strains with respect to semen quantity and quality traits were examined. These traits were examined using the following parameters:

Semen volume: Semen volume from each of the sire strains was measured with the use of collection tubes graduated in ml.

Sperm motility: A drop of semen with the aid of a micro-pipette was placed on a microscope slide, which was then covered with a glass cover slip and examined at a magnification of ×400. Several fields were examined and an estimate to the nearest 10% of the motile sperm was made. The motility determination was carried out by taking into consideration subjective measurements based on the judgment of individuals making the determination and finding the average motility for each strain of chicken. Motility of semen samples is expressed as the percentage of cells that are motile under their own power (Hafez, 1978).

Sperm concentration: The sperm concentration was measured by the direct cell count method, using the haemocytomete. Normal saline 0.5 was mixed with 1ml of semen at the dilution rate of 1:250. The diluted semen was then picked up using a micropipette. A drop of the diluted semen was then placed from each of two ends of the haemocytometer using a micro pipette and allowed to settle. The loaded haemocytometer was then placed on the microscope set to a magnification of ×400. The spermatozoa's head that fall within the subdivided smaller squares at the four edges and centre of the haemocytometer were counted and the average per strain of bird was recorded based on the judgment of the individuals making the determination. The concentration of sperm per volume was determined using the formula:

$$C = 50{,}000 \times N \times D.$$

Where C=concentration of semen per volume (ml), N=Number of spermatozoa counted, D=Dilution rate

Semen pH: This was determined with the aid of a calibrated pH meter to two decimal points.

Data analyses:

The semen collected was subjected to microscopic examinations and physical evaluations according to Zemjanis (1970). Observations were made and records taken on semen volume, semen motility, semen concentration and semen pH. Data obtained for the various semen traits were analyzed using the General Linear Model procedures of SAS (1999) in a complete randomized design and Duncan Multiple Range Test was used to separate significantly different means (Gomezand Gomez, 1984). Following the statistical model: $Yij = u + Ti + Eij$

where, u = Overall mean common to all observations, Ti = Effect of strains on the ejaculate characteristics, Eij = Error term

RESULTS AND DISCUSSION

Averages for semen volume, concentration, sperm motility and pH varied significantly ($P<0.05$). Semen volume was highest for Frizzle feather, followed by Normal feather and naked neck (0.59±0.00, .56±0.00 and 0.39±0.00) respectively. Motility and concentration were significant ($P<0.05$) and higher in normal feathered cocks (97.55% and 21.18×10^{9}/ml) than frizzle feathered cocks(60.20% and 20.19×10^{9}/ml) and naked neck (80.10% and 18.07ml) respectively. Semen pH also varied significantly ($p<0.05$) between the three strains of indigenous cocks. Semen characteristics and assessment are important indicators of the reproductive potential of breeding cocks. This study aims at probing and comparing the reproductive details of Nigerian indigenous cocks in Edo State through their semen characterization. The mean semen volume from the strain probed in this study compared favorably with that from both exotic and other indigenous cocks of the tropics. Peters et al. (2008) reported a mean of 0.40-0.73 ml on seven different indigenous chickens . In the same vein, Bah *et al.*(2001) reported 0.28ml for breeding cocks of the Sahel, while Tuncer *et al.*(2006) documented 0.7ml for Denizli cocks. The observed range of 0.39 – 0.56ml compared favorably with the ranged of 0.37-0.73ml, reported by peters *et al.* (2008) for Nigeria indigenous strains. Variations arising from semen concentration and sperm motility for normal feathered, naked neck and frizzled feathered cocks could be attributed to their different genetic background and their natural tendencies. Average semen motility of 83.50 %

was reported by Peters *et al.* (2008) reported a range of 70% to 87.35% and the 2.26 x 109 reported by Bah *et al.* (2001) on Nigerian local breeder cocks.

Values obtained for semen pH compared well with the range reported by Etches (1998). The mean pH Range obtained by Peters *et al.* (2008) was also in consonance with the current findings in this study. Differences in values of semen quality characteristics of the roosters used in this study and some of those reported in literatures can been attributed to effects of strain, body weight, age and season. Strain differences affect volume, concentration and motility and pH.

Conclusion

The semen characteristics of Nigerian local cocks compared favorably to both exotic strain and other local strains of other regions especially the semen volume, concentration, motility and pH. The high semen volume and total sperm count is an indication of the superior genetic tendencies of Nigerian indigenous local cocks for reproductive ability and higher fertility.

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Table 1: Semen characteristics of the three Nigerian indigenous cocks

Genotype	No	Volume (ml)	Concentration ($\times 10^9$/ml)	Motility (%)	pH
Normal feather	20	0.56 ± 0.00^b	21.18 ± 0.03^a	97.55 ± 1.16^a	8.30 ± 0.62^a
Frizzle feather	20	0.59 ± 0.00^a	20.19 ± 0.09^b	60.20 ± 0.05^c	7.49 ± 0.05^b
Naked neck	20	0.39 ± 0.00^c	18.07 ± 0.16^c	80.10 ± 0.43^b	7.49 ± 0.05^b

Mean ± SEM in the same column with different superscript differs ($p<0.05$) significantly