

Semen Characteristics of Three Strains of Local Cocks in the Humid Tropical 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 (36) local breeding cocks comprising of 12 frizzle, 12 normal and 12 naked neck selected randomly from the poultry breeding unit of the University of Port Harcourt 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 naked-neck $4.86 \times 10^9 \pm 0.03/\text{mL}$ ($p < 0.05$) than in frizzle feathered $3.26 \times 10^9 \pm 0.94/\text{mL}$ and normal feathered genotype $3.33 \times 10^9 \pm 0.57/\text{mL}$. Sperm motility was significantly better ($p < 0.05$) in naked neck and frizzle feather than in normal feather. Semen volume of the frizzle and normal feathered, were significantly higher ($p < 0.05$) than naked neck. There was no significant effect ($p > 0.05$) of strains on semen pH, abnormal sperm and non-motile sperm. Morphological defects of the head, middle and tail was not significantly affected ($p > 0.05$) by the genotypes. Variations on semen characteristics abound in the three Nigerian indigenous cocks sampled.

Key words: Indigenous cocks, morphological defects, semen characteristics

INTRODUCTION

The reproductive potential of poultry birds (cocks) is determined to large extent by the quality of the semen it produces. The importance of semen evaluation in poultry breeding (Natural and artificial breeding) for selecting breeding males or for routine monitoring of their reproductive performance cannot be overemphasized. The assessment of semen quality characteristics of Nigerian local chicken gives excellent indices of its reproductive potential and has been reported to be a major determinant of fertility and subsequent hatchability of eggs (Peters *et al.*, 2004).

Several reports on semen characteristics of the domestic fowls have indicated that breed and strain significantly affects semen quality and quantity (Schneider, 1992; Bah *et al.*, 2001; Tuncer *et al.*, 2006; Peters *et al.*, 2008). These indigenous Nigerian breeds have been reported to have many advantageous gene complexes or gene marker; that could be harnessed in the development of meat or egg type chicken suitable for use in the tropics (Machebe and Ezekwe, 2004). Among these major genes are the naked neck, frizzle and normal feathers. According to Ibe (1998) the frizzle and naked neck genes are tolerance to heat stress, disease resistance and increased productive capacity.

The Nigerian indigenous birds (Frizzle, Naked Neck and Normal), even though Obioha (1992) have asserted that their use in commercial poultry does not make any

economic sense, yet, report of its contribution to survival adaptability and biodiversity, have been established by EbOzoje and Ikeobi (1995) and Machebe and Ezekwe (2004). The aim of this study therefore is to determine the comparative influence of Nigerian local cocks on their semen characteristics.

MATERIALS AND METHODS

Thirty Six (36) local breeder cocks aged 50-86 weeks with an average weight of 1.45-2.08 kg comprising three strains of Nigerian indigenous cocks (12 Frizzle, 12 Normal and 12 Naked Neck) pulled from the breeding stock of the University of Port Harcourt Teaching and Research Farm randomly was used for the study. The study was conducted from July to September, 2008 during the rainy season. They were housed individually in 1.0ft³ conventional battery cage, and were fed appropriated growers mash feed from Top feeds Nigerian Limited ® throughout the experimental period (12 weeks). The cocks were also de-wormed with Levamisol (Levaget®) before collection of semen commenced. Feeds and water were given fresh and in *ad-libitum* bases. The three groups were phenotypically identifiable by their plumage and therefore were grouped thus.

Semen collection and evaluation: The semen was collected from the cocks by the abdominal message according to Hafez (1978). The semen from all breeds

Table 1: Effect of genotype on semen characteristics of Nigeria indigenous cocks

Genotype	No	Volume (mL)	Motility (%)	Concentration ($\times 10^9$ /mL)	Abnormal sperm (%)	Non motile (%)	pH
Normal	12	0.83 \pm 0.33 ^a	66.67 \pm 6.67 ^b	3.33 \pm 0.57 ^b	23.33 \pm 6.67	33.33 \pm 0.81	7.01 \pm 0.02
Naked neck	12	0.18 \pm 0.10 ^b	70.00 \pm 12.24 ^a	4.86 \pm 0.03 ^a	11.25 \pm 3.14	30.0 \pm 0.12	7.05 \pm 0.01
Frizzled feather	12	1.10 \pm 0.18 ^a	79.00 \pm 6.40 ^a	3.26 \pm 0.94 ^b	16.00 \pm 4.84	21.0 \pm 0.86	7.04 \pm 0.01
Overall	36	0.72 \pm 0.16	72.91 \pm 4.94	3.68 \pm 0.25	16.25 \pm 2.89	28.11 \pm 0.53	7.03 \pm 0.01

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

Table 2: Morphological defects in the semen of Nigerian indigenous cocks

Genotype	Head (%)	Mid-piece (%)	Tail (%)
Normal	2.25 \pm 0.12	3.68 \pm 0.81	16.58 \pm 2.67
Naked neck	2.45 \pm 0.11	3.45 \pm 0.72	5.10 \pm 2.13
Frizzled feather	2.34 \pm 0.16	4.62 \pm 0.64	8.04 \pm 2.01
Overall	2.36 \pm 0.06	3.71 \pm 0.60	9.01 \pm 2.31

was collected twice a week, on Tuesdays and Thursdays between 08:00 am and 10:00 am from July-September during the wet season. Each bird responded to massage by partial aversion of the cloaca, and semen was collected from the ventral lip of the vent in a tube maintained at \pm 38-40°C. Individual ejaculates were collected into 15 ml graduated collection tube to record the volume of the semen per ejaculate. During collection the semen tube was maintained at 38-40°C in a thermo flask. Following semen collection, the sperm were analyzed for motility. Motility was expressed as the percentage of motile sperm with moderate to rapid progressive movement (Cheng *et al.*, 2002).

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 colour, semen motility, semen concentration, semen morphology and semen pH. Data collected on semen characteristics were subsequently subjected to one way analysis of variance (ANOVA) according to Steel and Torrie (1980) with following the statistical model:

$$Y_{ij} = \mu + T_i + E_{ij}$$

where,

- μ = Overall mean common to all observations
- T_i = Effect of strains on the ejaculate characteristics
- E_{ij} = Error term

RESULTS

The comparative effects of three Nigerian indigenous strains of local cocks on the semen quality and their morphological defects are presented in Table 1 and 2.

From the results, sperm motility and concentration are significantly (p<0.05) lower in normal (66.67 and 3.33) than naked neck (70.00 and 4.86) and frizzled feather (79.00 and 3.24), respectively.

The abnormal sperm cells, non-motile sperm cells, sperm pH and semen volume was not significant (p>0.05) among the three strains of indigenous chicken.

DISCUSSION

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 Rivers State through their semen characterization.

The mean semen volume of the genotypes probed in this study compares favorably with both exotic cocks and other indigenous cocks of the regions. Bah *et al.* (2001) reported semen volume of Sahel regional local breeding cocks to be averaged 0.28 mL Tuncer *et al.* (2006) reported semen volume of Denizli cocks to be 0.7 mls. It also falls within the range reported by Peters *et al.* (2008) 0.37-0.73 mL, 0.76 mL for Nigerian indigenous breeds.

Variations arising from semen concentration and sperm motility with frizzled, naked neck and normal feathers, having better semen concentration and motility of these strains could be attributed to their different genetic background and their natural tendencies. This is consistent with Peters *et al.* (2008) who observed differences in strain in terms of semen volume, concentration and motility of Nigerian indigenous cocks. Also the mean values of semen motility and concentration obtained amongst the genotypic strains sampled are within the range reported by Egbunike and Nkanga (1999) required for effective fertilization in birds.

The values obtained for semen pH are within the range reported by Etches (1998). The mean values of abnormalities also fall within the normal range reported by Hafez (1978) and Sarka *et al.* (1996). Usually sperms abnormalities indicate disturbances of spermatogenesis and this could be attributed to age, nutrition and pollution (Bah *et al.*, 2001).

The morphological defects recorded in this experiment showed no breed or strain differences in the indigenous strains examined. Percentage defect was however more in the tail region than in other parts of the spermatozoa- (2.36 \pm 0.06, 3.71 \pm 0.60 and 9.01 \pm 2.31%), respectively for head, mid-piece and tail. Higher percentages of tail defect were also reported by Tabatabaei *et al.* (2009) in exotic Ross-308 and indigenous chicken in Iran- 41.04 \pm 10.19 and 44.1 \pm 0.26%, respectively. Improper handling of ejaculates during processing for microscopy has been identified as a major cause for sperm abnormality. The low percentage of sperm abnormality of less than 10% observed in the semen of the cocks is insignificant as to cause fertility worries on the local strains examined.

CONCLUSION

The semen characteristics of Nigerian local cocks compared favourably 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. Major genes of frizzling and naked neck also showed better semen concentration and motility in this study as reported by earlier workers (Peters *et al.*, 2008). Morphological defects were more pronounced in the tail region than defects in both the head and mid-piece regions.

ACKNOWLEDGMENT

The authors wish to acknowledge the management of University of Port Harcourt for permission to use the birds for this research and technical staff on the farm. This kind gesture is highly appreciated. We are also grateful for the assistance rendered by Mr. Uchenna Anusionwu in the laboratory analysis of semen.

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AUTHOR'S CONTRIBUTION

The practical collection of semen from the cocks for analysis was done by Ajayi, F.O. and B.O. Agaviezor, while Ajuogu, P.K. assisted in data analysis and some aspect of report writing.