



**Comparative Study on Semen Characteristics,
Haematology, and Serum Biochemical Indices of Fulani
Ecotype and Bovansnera Cocks in Semi-Arid Zone of
Nigeria.**

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Abstract

A study was conducted, with the aim of comparing the semen characteristics, hematological and serum biochemical indices of two cocks' genotype. Parameters measured include semen volume, semen colour, semen pH, live and dead ratio, sperm motility and semen concentration. Others include PCV, MCV, Hb, MCHb, MCHC, ALP, ALT, AST, Ca, PHOS, TP, UA and UREL. Result showed that Fulani ecotype had significantly higher ($P < 0.05$) sperm motility (48.5%), live spermatozoa (59.3%), semen concentration (393.20×10^6) and better semen colour (milky). A non-significant difference ($P > 0.05$) between the two genotype in terms of semen volume and pH were observed. The result of hematology showed non-significant difference ($P > 0.05$) between the two breed of cocks.

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For serum chemistry, the result also indicated non-significant difference ($P>0.05$) between the two genotype except in UA where Bovansnera cocks had significantly higher ($p<0.05$) values (328.6). The investigation demonstrated better qualitative semen traits in Fulani ecotype and similar hematological and serum biochemical indices for the two genotypes that falls within the normal range for poultry.

Keywords: Bovans near; Fulani ecotype; Hematology; Serum biochemical indices; Semen.

1. Introduction

Poultry are generally group of birds reared for their flesh, eggs, faeces and leather. Most birds in poultry groups are domesticated using the same principle and belong to avian class galliforms, anseriforms, and columbiforms [1]. Over ten different types of domesticated birds were of economic importance in the tropic [2]. The new poultry industries in Nigeria were essentially urban phenomena, usually financed by urban capital and most of the consumers also stayed in the cities and larger towns. Meanwhile rearing of local chickens is tradition to our people most especially in rural areas.

Semen characteristics of cocks reared in the temperate regions has been documented [3, 4]. It has been established that high environmental temperature and relative humidity have adverse effects on poultry [5, 6, 7, 8]. The detrimental impact of high ambient temperature on sperm quality in breeder cocks was reported by [9] in the Northern Guinea savannah zone of Nigeria. Heat stress is one of the most obvious limitations to poultry production in the areas with hot humid climate. It has been shown that heat evokes series of drastic changes in the body functions of birds leading to significant impairments of production and reproduction [3, 7, 10]. Haematology and serum biochemical parameters have been reported to provide valuable information on the immune status of animals [11]. Such information apart from been useful for diagnostic and management purposes, could equally be incorporated in the breeding programme for genetic improvement of indigenous chickens.

In the sub-humid tropics, there is dearth of information on immunological parameters of native's birds especially those with tropically relevant genes. This limits objectives data based which could be tapped from it, in order to design appropriate breeding strategies.

2. Materials and Method

2.1 Study Area

The study was conducted at the Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture and Agricultural Technology, Kano University of Science and Technology, Wudil. It is located on longitude $11^{\circ}49'$ north, latitude $8^{\circ}5'$ east and a total area of 362 km^2 with a population of 185, 189 according to [12]. The climate of Wudil is the tropical wet and dry type coded in koppens classification with a mean annual rainfall of 850 mm, the highest rainfall occurs between May and September, while minimum and maximum temperature were 26°C respectively [13].

2.2 Experimental animals and their Management

The experimental animals include 20 matured cocks (10 each of Fulani ecotype and Bovansnera) fed with commercial concentrate mixed with maize and wheat offal with constant supply of fresh drinking water. The cocks were also allowed to adapt to the environment for one week.

2.3 Experimental Procedures

The cocks were divided into two groups with 10 cocks each of Fulani ecotype and Bovansnera placed individually in a battery cage. Semen was collected twice weekly for 7 consecutive weeks, while blood samples were collected once per week for 7 weeks for haematology and serum biochemical indices.

2.4 Semen and Blood Collection

Semen samples were collected by abdominal massage, where the cocks were held toward the chest by an assistant and a graduated tube held towards the cloaca of the cock by the second assistant for the semen to drop inside. An abdominal massage was done by the collector for the semen to be released by the cocks. Four milliliters (4 ml) of blood was also collected from the two different breeds (Bovansnera and Fulani ecotype) using sterile syringe and needle through the wing vein of the cocks and 2 ml of the blood sample was placed in a sample bottle that contains EDTA for haematology while the remaining 2 ml was placed in another sample bottle without EDTA for biochemical analysis.

2.5 Statistical Analysis

Data generated were coded and then subjected to analysis of variance (ANOVA) using general linear model (GLM) and where significant differences were observed, the means were separated using Duncan Multiple Range Test (DMRT).

3. Results and Discussion

The result of the semen characteristics of Fulani ecotype and Bovansnera cocks is presented in Table 1. Even though, Fulani ecotype had slightly higher semen volume, the result indicated non-significant difference ($p > 0.05$) in ejaculate volume and semen pH for the two breeds. The values obtained were similar with those reported by [14] and [15] but slightly higher than the range of (0.13 - 0.50ml) reported by [16] for naked neck cocks. This could be attributed to the breed differences and possibly environmental factors.

The Fulani ecotype had significantly higher ($p < 0.05$) sperm motility (48.5%) when compared to Bovansnera cocks (27.67%). This report was similar with the finding of [14] who reported a range of 48.3 – 57.3% for local cocks in Nigeria, but lower than the values reported by [15] for naked neck cocks. This may also be attributed to genotype and possibly season and time of semen collection. Sperm concentration was also significantly ($p < 0.05$) higher in Fulani ecotype when compared with Bovansnera (393.2×10^6 and 297.9×10^6 respectively). This was similar with the report of [15] who recorded 2.02×10^9 /ml for Nigerian local cocks. The difference between the

two breeds (Fulani ecotype and Bovansnera) may also be attributed to environmental adaptation and genetic factors. The percent live spermatozoa was significantly higher ($p < 0.05$) in Fulani ecotype (59.03%) as compared with Bovansnera (46.20%). This finding was at variance with the report of [14] for Nigerian local cocks who reported a range of 17.1 to 20.8%. This indicated that Fulani ecotype breed had higher live spermatozoa compared to Bovansnera cocks. Also the semen colour was better for Fulani ecotype (milky) compared to Bovansnera (watery).

The result for hematological indices for Fulani ecotype and Bovansnera is presented in Table 2. Although higher values in Fulani ecotype were recorded for PCV, Hb, MCHC and MCV, there is no significant difference ($p > 0.05$) in hematological parameters between the two genotype. The result agreed with the report of [17] who recorded a range of 35.9 – 41.00% for PCV, 11.60 – 13.68% for Hb in naked neck cocks.

The result also agreed with the work of [18] who reported that the normal range for MCHC and MCV for chicken (*Gallus gallushomesrieus*) in USA were 26.0-35.0 and 14.0 -90.0 respectively.

The result of serum chemistry for Fulani ecotype and Bovansnera is presented in Table 3. Although Fulani ecotype had slightly higher values in ALP, ALT, CA, PHOS, TP and UREL, the result indicated non-significant difference ($p > 0.05$) for the two breeds. The values obtained were higher than the values report earlier by [19]. But similar with those reported by [17] who recorded a range of 612.50 - 635.56, 375.42 – 441.0, 381.60 – 440.02, 2.20 – 2.30, 1.80 – 2.01, 37.12 – 35.20, 290.53 – 329.34 and 0.40 - 1.05 for ALP, ALT, AST, CA, PHOS, TP, UA and UREL respectively. The values of AST obtained in Bovansnera is slightly higher (437.27) when compared to Fulani ecotype (383.73) cocks in semi-arid zone of Nigeria. Bovansnera had significantly higher ($p < 0.05$) UA (328.67) when compared to Fulani ecotype cocks (291.03).

This report was similar with finding of [15] for naked neck cocks. Serum biochemical parameters are important in the proper maintenance of the osmotic pressure between the circulating fluid and fluid in the tissue spaces so that exchange of materials between the blood and cells could be facilitated [19].

Table 1: Semen characteristics of Fulani ecotype and Bovansnera cocks in semi-arid zone of Nigeria.

Parameters	Fulani ecotype	Bovansnera	SEM
Semen volume (ml)	0.97	0.59	0.09
Semen pH	7.30	7.33	0.10
Motility (%)	48.5 ^a	27.67 ^b	0.49
Semen colour	3.23 ^a	2.70 ^b 0.08	
Live spermatozoa (%)	59.03 ^a	46.20 ^b	0.47
Semen concentration (X10 ⁶)	393.20 ^a	279.90 ^b	1.22

^{ab} means with different superscript along the rows, are significantly different ($p < 0.05$)

SEM = standard error of means

Table 2: Hemotological parameters of Fulani ecotype and Bovansnera cocks in semi-arid region of Nigeria.

Parameters	Fulani ecotype	Bovansnera	SEM
PCV (%)	38.13	32.90	0.34
Hb (%)	11.79	11.46	0.18
MCHC(mg/dl)	23.8322.85	0.28	
MCV (mg/dl)	21.4726.03	0.32	

Table 3: Serum chemistry of Fulani ecotype and Bovansnera cocks in semi-arid region of Nigeria.

Parameters	Fulani ecotype	Bovansnera	SEM
ALP(u/l)	641.27	613.30	1.68
ALT (u/l)	440.30	388.47	1.30
AST(u/l)	383.73	437.27	1.36
CA (mmol/l)	2.29	2.19	0.05
PHOS (mmol/l)	1.80	1.63	0.07
TP (g/l)	36.30	34.70	0.28
UA (umol/l)	291.03 ^a	328.67 ^b	0.74
UREL (mmol/l)	0.33	0.32	0.0 2

^{ab} means with different superscript along the rows, are significantly different ($p < 0.05$)

SEM = standard error of means.

4. Conclusion

It is concluded from the result of this study that Fulani ecotype had better qualitative semen traits when compared with Bovansnera cocks. Although a slightly higher values were observed for hematological and serum biochemical indices in Fulani ecotype, a non-significant difference were obtained for all the parameters for the two breeds except in UA. Where Bovansnera cocks had significantly ($p < 0.05$) higher values than. Fulani ecotype.

5. Recommendations

It is recommended that Fulani ecotype could be use for breeding purposes base on the facts that it has superior semen qualities, hematological as well as serum biochemical parameters when compared with Bovansnera cocks. Further study need to be carried out using more than two genotypes so as to ascertain the differences between our local breeds and the exotic ones.

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