

## Evaluation of some reproductive indices of the White Fulani indigenous bulls in Kwara State, Nigeria

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### ABSTRACT

This study was designed to evaluate some reproductive indices of the White Fulani Indigenous cattle bulls in Ilorin, Kwara State, Nigeria. Forty apparently healthy bulls of age one to five years were used for this study. The parameters studied included scrotal circumference, scrotal length, chest girth and body weight. These parameters were taken using measuring tapes. The result obtained showed that there was significant ( $p < 0.05$ ) differences in the scrotal circumference and scrotal length between bulls in the age groups 1, 2 and 3 years old while 4 and 5 years old showed no significant ( $p > 0.05$ ) difference. There was significant difference ( $p < 0.05$ ) in the chest girth and body weight of bulls in all the five age groups (1 – 5 years old). This suggests that the age of puberty in the indigenous white Fulani bulls is three years. Veterinarians and farmers can leverage on these reproductive indices (scrotal circumference, scrotal length, chest girth, and body weight) to select bulls with superior breeding potential, ultimately improving herd health and productivity.

**Keywords:** Puberty, reproductive Indices, White Fulani bulls, scrotal circumference

### INTRODUCTION

Food material taken by human is either from plant or animal products. Animal products are rich in nutrients, particularly protein and fat (Susilawati, 2013). Beef is a major source of protein for humans consumption and its demand increase on yearly bases (Smith *et al.*, 2018). Efforts to increase meat output in cattle have been made by empowering cattle farmers, including the Fulanis and other communities (Susilawati, 2013).

The White Fulani breed of cattle, also known as Akou in the Republic of Cameroun, Bunaji, White Bororo, White Kano, and Yakanji, is a West African zebu breed with horns that is traditionally mostly reared by the Fulani people (Norezzine *et al.*, 2019). The White Fulani, known locally as Yakanji by the Fulani people. They are mostly found in Northern Nigeria and the Federated Republic of Cameroun in a typical semi-arid climate (Ngono *et al.*, 2019). The White Fulanis are mostly white coats with black tips. The skin is lax and pigmented with ears that are upright. The horns are medium to long, and curve outwards and upward (Ngono *et al.*,

2019). The breed is largely employed for milk production by the Fulani since milk is the main component of the Fulani diet (Wosu, 2002).

The Breeding Soundness Examination (BSE) is a helpful and non-cost effective method for selecting the best bull for breeding purposes (King and Hopper, 2024, Raji & Ajala, 2015). An essential but straightforward characteristic to measure during BSE, particularly on the farm, is the scrotal circumference and scrotal length (Pezzanite *et al.*, 2013). Studies have shown a strong correlation between scrotal circumference and enhanced semen quality and testicular health in bulls (Bezerra *et al.*, 2009). Bulls with higher scrotal diameter have been shown to produce cows with superior outcomes (Raji *et al.*, 2008). Age and body weight are closely connected parameters that have a considerable impact on scrotal circumference in bulls (Karakus *et al.*, 2010). Shoyombo *et al.* (2012) Reported a correlation between age and subcutaneous fat accumulation, which may also be affected by body weight. Bulls must meet specific criteria such as Age, body weight, body length, scrotal length

and circumference, chest and barrel girth, length at wither and tail, body conformation score, straight and slant body length to ensure optimal reproductive ability (Mann and Plant, 2002).

Reproductive capacity in bull is influenced by semen quality and quantity, male dominance effect during breeding, libido and mating ability (Scheepers *et al.*, 2010). However, reports on some of the reproductive indices of WF bulls are not adequate in Kwara state. Therefore, this study was conducted to evaluate some of the reproductive indices (scrotal circumference, scrotal length, chest girth, body weight) of the white Fulani bulls in Kwara state.

## MATERIALS AND METHODS

### STUDY AREA

The study was conducted in Ilorin which is located between 8°30'N and 4°33'E and is the capital city of Kwara State in north-central Nigeria. Ilorin consists of Ilorin West, Ilorin East, and Ilorin South, has a population estimate of 908,490 and a total land area of around 765 km<sup>2</sup> (295 sq. mi). The climate in Ilorin is tropical savanna. Rainfall there varies from 990.3 to 1,318 millimeters (39 to 52 in) each year. Maximum temperatures in the city range from 33 to 37 °C, or 91.4 to 98.6 °F; March is the warmest month of the year (Kwara, 2022).

### METHODS

The reproductive indices were obtained using data from the White Fulani cattle population in two cattle farms Ilorin, Kwara State (Faculty of Veterinary Medicine, University of Ilorin Research Farm and Alhaji Badmus Cattle Farm, Egbejila Ilorin). The study included 40 bulls of the White Fulani indigenous breed in a farm. The measurements were obtained in April/May 2023, before the animals were sent out for grazing. The animals in the farms were subjected to identical management and feeding settings prior to the assessment on semi-intensive management system.

### STUDY DESIGN

The measurement of the bulls' body parts should be carried out when the bulls are standing in a normal, square posture. The bulls' dorsal line (back) and head should be level, and all four hooves should be flat on the ground for accuracy. Rondo tape was used to measure the chest girth while tape was used to measure the scrotal circumference and scrotal length.

### MEASUREMENT OF SOME OF THE REPRODUCTIVE INDICES

#### AGE

Dentition was used to determine the age of each bull sampled since proper record was not available on the farms visited (Chandler and Phillips, 2018). Age range from 1 to 5

years were sampled from different farms in Ilorin Kwara State. The age range was not more than 5 years because the Fulani used to sell out mature male bull which serve as source of income.

### SCROTAL CIRCUMFERENCE

The scrotal circumference is measured around its widest point using a flexible measuring tape and express in centimetres (cm) (Raji and Ajala, 2015).

### SCROTAL LENGTH

Scrotal length shows the reflection of the height of each testicle and these can be used to determine the productivity of each bull. Length of right and left testicle were measured separately to determine the symmetry of both testicles. Scrotal length was measured by milking each testicle within the scrotal sac down for accuracy (Menegassi *et al.*, 2017).

### BODY WEIGHT

The body weight was estimated by measuring the length of the animal's body using a measurement tape. The body weight was calculated using the formula: Heart Girth X Heart Girth X Body Length / 300 = Bull Weight (Shoimah *et al.*, 2021).

### STATISTICAL ANALYSIS

Descriptive statistics were computed using the Statistical Package for Social Scientists (SPSS version 25, USA). Mean values were tested using Tukey's post-hoc multiple comparison test after undergoing a one-way analysis of variance (ANOVA). Every value at  $p < 0.05$  was considered significant.

## RESULTS

In this study, the ages of white Fulani cattle were assigned into five groups (A, B, C, D and E) which correspond to ages 1,2,3,4 and 5 respectively. Some reproductive indices were measured in White Fulani cattle breed between the ages of 1 year to five years. There was significant ( $p < 0.05$ ) difference between some age groups while some have no significant difference.

The scrotal circumference of bulls in groups A, B and C (1, 2 and 3 years old respectively) were significantly ( $p < 0.05$ ) different while there was no significant ( $p > 0.05$ ) differences observed between group D and E (4 and 5 years old respectively).

Considering the scrotal length, the bulls in group A, B and C (1, 2 and 3 years old respectively) recorded significantly ( $p < 0.05$ ) difference in the mean values while bulls in group D and E (4 and 5 years old respectively) recorded no significant ( $p > 0.05$ ) difference.

**Table I: Mean Values of Scrotal Circumference, Scrotal Length, Chest Girth and Body Weight of White Fulani bulls between the ages of one and five years**

Key: SC- Scrotal Circumference, SL- Scrotal Length, CG- Chest Girth, BW- Body Weight

S/N	Age (Years)	N	SC (cm)	SL (cm)	CG (cm)	BW (kg)
1	A (1 year old)	8	19.2±0.2 <sup>a</sup>	9.0±0.1 <sup>a</sup>	121.8±0.3 <sup>a</sup>	158.7±0.2 <sup>a</sup>
2	B (2 years old)	8	26.1±0.5 <sup>b</sup>	12.6±0.4 <sup>b</sup>	136.8±0.2 <sup>b</sup>	215.0±0.6 <sup>b</sup>
3	C (3 years old)	8	29.2±0.1 <sup>c</sup>	14.6±0.6 <sup>c</sup>	147.5±0.5 <sup>c</sup>	263.4±0.3 <sup>c</sup>
4	D (4 years old)	8	30.4±0.7 <sup>c</sup>	15.6±0.2 <sup>c</sup>	157.4±0.7 <sup>d</sup>	327.2±0.5 <sup>d</sup>
5	E (5 years old)	8	30.8±0.0 <sup>c</sup>	15.8±0.3 <sup>c</sup>	196.4±0.9 <sup>e</sup>	637.5±0.8 <sup>e</sup>

Mean with different superscript in the same column are statistically significant at  $P \leq 0.05$ 

The highest age of White Fulani Cattle Breed that was measured in this study was Group E (age 5) which had the body weight of 637.5 which significantly ( $p < 0.05$ ) surpass the other ages in groups A, B, C and D. Group D was significantly higher than group C, B and A while the lowest group was group A which was as a result the developmental stages of body building.

Considering chest girth, the widest group was group E (196.4 cm), which differ significantly ( $p < 0.05$ ) from group D (157.4 cm) and group C (147.5), group B (215.0 cm) and group A (158.7 cm).

## DISCUSSION

The study was carried out to evaluate reproductive indices of White Fulani bulls between the ages of one and five years. It was observed that the scrotal circumference of the three year-old bulls were more developed than those of the one and two-year-old bulls. However, there were no significant differences when compared to those of four and five-year-old bulls. This suggests that the age of puberty in the White Fulani bulls is three years (Tawah & Rege, 1996).

Testicular size is considered a reliable predictor of sperm production ability, and testicular volume has been suggested as a criterion for assessing reproductive potential (Love *et al.*, 1991). The scrotal circumference of white Fulani indigenous cattle at puberty in the study ranged from 29.2 to 30.8 cm. This is consistent with a study by Lunstra *et al.*, (1978), which found that scrotal circumference at puberty ( $27.9 \pm 0.2$  cm) was relatively constant across different breeds and bulls of varying ages and weights. Abdhakeem *et al.* (2017) provided scrotal circumference ranges for bulls in millimetres, which when converted to centimetres fall within 30-34cm. This indicates that a mature and fertile bull should have a scrotal circumference of at least 27cm, depending on factors such as geographical location, weather conditions, and nutritional status, to ensure satisfactory

sperm production. In bulls aged 15 months or older with a scrotal circumference below 300 mm, sperm production will be significantly decreased. The texture of the testicles and the findings of a semen analysis will assist in assessing whether testicular function is faulty (Wolfe, 2018).

A bull's reproductive potential can be estimated by measuring the scrotal circumference. This measurement indirectly reflects the size of each testicle, which is linked to sperm production and overall fertility (Perumal, 2014). Length of each testicle which are the right and left testicle was measured separately to determine the symmetry of both testicles. Scrotal length was measured by milking both testicle which is present in the scrotal sac down for accuracy. The estimated scrotal length of white Fulani from this study ranges from 14.6 to 15.8cm (Osinowo *et al.*, 2021).

When estimating the weight of male cattle, it is essential to measure the chest girth and refer to a breed chart or a measuring tape to determine the live weight corresponding to the measured chest girth at a certain age. In two out of three situations, the anticipated live weight will deviate from the actual live weight by no more than 7 percent.

## CONCLUSION

From this study, the relationship between the reproductive indices which include the age, scrotal circumference and scrotal length, chest girth, slant and body weight and selection of bulls for breeding purpose suggest that these indices are very important to be checked and measure before an animal can be used in reproduction. Age determination should be checked using dentition, scrotal length and scrotal circumference and other measurement can be done with the use of measuring tape. This suggests that the age of puberty in these indigenous white Fulani bulls is three years. These reproductive indices will also help the Veterinarian and farmers in selection of bulls to be used for breeding..

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