MORPHOMETRIC STUDIES OF THE REPRODUCTIVE ORGANS AND SPERM RESERVES OF M'BORORO (*Bos indicus*) BULLS

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ABSTRACT

Morphometric data of the reproductive organs and the gonadal and extra-gonadal sperm reserves were determined in sexually mature M'bororo bulls. The mean body weight was 560 ± 15.8 kg and measured 175.8 ± 4.3 cm at the withers. The mean paired testes weight and scrotal circumference were 266.5 ± 28.9 g and 28.2 ± 0.8 cm, respectively. The body weight was significantly and positively correlated with the testicular sperm reserves ($P < 0.05$). The paired testicular sperm reserves was $27.3 \pm 3.1 \times 10^9$. The mean weights of the accessory glands were: Seminal Vesicles, 42.2 ± 4 g; ampullae, 12.4 ± 2.0 g; Prostate gland, 2.2 ± 0.29 g and 1.3 ± 0.3 g for the bulbourethral gland. The mean penile length was 80.9 ± 2.9 cm while the glans penis and the urethral process measured 3.1 ± 0.1 cm and 1.9 ± 0.1 cm, respectively.

Key Words: Morphometric Studies, sperm reserves, M'bororo bull.

INTRODUCTION

The M'bororo is a long lyre-horned Zebu, suggested by Gates (1958) to have migrated west-ward from upper Egypt. The Sanga cattle in Egypt have similar head, horns and hump conformations. The name M'bororo is a legacy from the Fulani group which owns large herds of this type. However in Nigeria, this type of cattle is generally known as Rahaji. They have a reddish brown to dark red coat color with narrow bodies and long legs (Gates, 1958). They are found near the northern border of Nigeria from Sokoto to Lake Chad and in the Bamenda and Mambilla areas of the Cameroon.

Few systematic studies to ascertain the genetic merits of this breed have been carried out, hence the present study. A basic morphometric data of the reproductive organs

will be a valuable information for breeding soundness evaluation. While fertility for the male may be measured by the percentage of services resulting into conception (Devendra and Burns, 1970), the evaluation of breeding soundness remains an important aspect of the farmers' reproductive management practice. Several measureable criteria such as scrotal circumference, sperm morphology, fertility, growth and testicular developments have been studied in some bulls (Osinowo *et al.*, 1981; Salau-Daudu and Shoyinka, 1983). Few of such reports are available for this breed.

MATERIALS AND METHODS

Ten apparently healthy M'bororo bulls aged between 4 and 6 years were randomly selected from a herd of 60 due for slaughter at the Maiduguri Central Abattoir. Previous sexual history were not known. The weights were estimated using the chest girth tape. Height at the withers and scrotal circumference were taken prior to slaughter. Physical examination was conducted on each sample using the criteria for breeding soundness. Gross examination indicated that the genitalia were normal.

After slaughter, the testes together with the associated accessory organs were removed. This was achieved after severing the ischial arch. The testes were thereafter excised, freed from fascia and the epididymides carefully removed with a scalpel. The left and right testes as well as all accessory organs were weighed separately after being carefully freed from fat and fascia. Their volumes were determined by water displacement. Each epididymis was divided into caput, corpus and cauda portions (Ashdown and Hancock, 1975), separately weighed and their lengths determined.

The testes and the various portions of the epididymis were separately homogenized in

TABLE 1: DIMENSIONS AND WEIGHTS OF THE REPRODUCTIVE ORGANS OF THE M'BORORO BULL.

PORTIONS OF THE REPRODUCTIVE TRACT	MEASUREMENT MEAN $\pm$ SE
Mean body weight (kg)	560 $\pm$ 15
Weight at withers (cm)	175.8 $\pm$ 4.3
Scrotal circumference (cm)	28.2 $\pm$ 0.8
Testes weight (g)	266.5 $\pm$ 28.9
Testes volume (ml)	253.8 $\pm$ 28.8
Capsule weight (g)	24.7 $\pm$ 2.4
Epididymal weight (g)	36.6 $\pm$ 3.8
Epididymal volume (ml)	36.0 $\pm$ 3.8
Caput weight (g)	18.6 $\pm$ 1.6
Corpus weight (g)	5.8 $\pm$ 0.8
Cauda weight (g)	13.0 $\pm$ 1.6
Seminal vesicles weight (g)	45.2 $\pm$ 4.0
Ampullae weight (g)	12.4 $\pm$ 2.0
Prostate gland weight (g)	2.2 $\pm$ 0.29
Bulbourethral gland weight (g)	9.3 $\pm$ 1.3
Total penile length (cm)	80.9 $\pm$ 2.9
Total epididymal length (cm)	12.4 $\pm$ 1.4

TABLE 2: SPERM RESERVES IN VARIOUS PORTIONS OF THE REPRODUCTIVE TRACT OF M'BORORO BULL.

PORTIONS OF THE REPRODUCTIVE TRACT	SPERM RESERVE $\times 10^9$ MEAN $\pm$ SE
Caput	3.1 $\pm$ 0.7
Corpus	1.3 $\pm$ 0.1
Cauda	8.6 $\pm$ 0.5
Ductus deferens	1.1 $\pm$ 0.4
Total extra-gonadal reserve	14.1 $\pm$ 0.5
Paired testes reserve	27.3 $\pm$ 3.1

0.9% sodium chloride solution containing antibiotic and antimycotic agent to prevent microbial growth (Almquist and Amann, 1961), and eosin to stain the sperm heads. The samples were stored at 4°C for 48 hours before making final dilution and counting in the improved Neubauer hemocytometer (Igboeli and Rakha, 1971). Counting was done at 1:15 dilutions for all the homogenates except testes homogenates which were counted at 1:20 dilution. The gonadal and extragonadal sperm reserves were estimated as the total number of late spermatids and spermatozoa in the homogenate. Each sample was counted three times and the mean used in

the analysis. The penile length was measured from the base of the crura to the tip of glans. The results were subjected to student 't' test and the correlation between various parameters were determined.

RESULTS AND DISCUSSION

The dimensions and weights of the reproductive organs of the M'bororo bull are summarized in Table 1. Correlation coefficients between body weight and testicular reserves were highly significant ($r = 0.92$, $P < 0.05$), between testicular weight and epididymal reserve ($r = 0.84$, $P < 0.05$).

The sperm reserves in various portions of

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the reproductive tract are presented in Table 2. All correlations in the matrix are positive and significant ($P < 0.05$), ranging from $r = 0.55$ between age (4 years) and epididymal sperm reserve to $r = 0.84$ between testes weight and volume. Generally, scrotal, gonadal and epididymal traits were more closely related to body weight than to age of the bull. A very high correlation was also obtained between scrotal circumference and testes weight $r = 0.96$. The epididymis showed highly significant ($P < 0.001$) regional variation in weight, length and sperm reserves.

The mean scrotal circumference and weight of testes of the M'bororo bull of 28.2 ± 0.8 cm and 266.5 ± 28.9 g, respectively were lower than the 518 ± 24.3 g paired testicular weight and 33.2 cm scrotal circumference reported for the Holstein (Almquist and Amann, 1961). It, however, compares favourably with Bunaji having 233.0 ± 4.7 g paired testicular weight and 26.4 ± 0.9 cm scrotal circumference at two years (Osinowo *et al.* 1981). The biometric data obtained from this study were also in close agreement with those reported for the Sokoto Gudali (Akingbemi, 1988), Central African Zebu (Igboeli and Rakha, 1971; Azage *et al.*, 1992).

The extra-gonadal sperm reserve obtained in this study, $14.1 \pm 0.5 \times 10^9$ and paired testes reserve of $27.3 \pm 3.1 \times 10^9$ is much lower than the $69.4 \pm 3.8 \times 10^9$ and $40.6 \pm 2.4 \times 10^9$ extra-gonadal reserve and paired testes reserves, respectively of the Holstein. However, among its fellow breeds occupying the semi-arid and sub-humid zones of Nigeria, it compares favourably and holds a great potential for subsequent improvement. The distribution of epididymal reserve is similar to what has been reported for other breeds and species of mammals. It is now generally agreed that the cauda epididymides contain the most epididymal sperm reserve and hence is the major site of sperm storage (Igboeli and Rakha, 1971; Jindal and Panda, 1980; Daudu, 1984; Osinowo *et al.*, 1981).

The highly significant correlations between the parameters are in agreement with observations reported in both bovine and

caprine species (Igboeli and Rakha, 1971; Ogwuegbu *et al.*, 1985; Kwari and Ogwuegbu, 1992; Akingbemi, 1988). The knowledge of extra-gonadal sperm reserve is essential in the determination of male/female ratio during natural mating and Artificial Insemination (AI) programmes (Wildeus and Entwistle, 1982). The data presented here will, apart from providing scientific data, avail the farmer with a quick reproductive capacity assessment of the M'bororo bull.

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