COMPARISONS OF SOME REPRODUCTIVE PARAMETERS IN RED SOKOTO AND KANO BROWN BREEDS OF BUCKS

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ABSTRACT

Some reproductive parameters of one-year-old 20 of each Red Sokoto and Kano Brown bucks were investigated. For the Red Sokoto and Kano Brown breeds of bucks, the mean ($\pm$ S.E.) body weight, body condition score, scrotal circumference, testes weight, testes volume, epididymal length, epididymal volume, epididymal weight, testes sperm and epididymal sperm were 13.84 ± 0.54 vs 11.69 ± 0.35 kg, 2.15 ± 0.08 vs 2.10 ± 0.07 , 19.83 ± 0.36 vs 18.27 ± 0.49 cm, 36.41 ± 1.89 vs 29.70 ± 1.98 g, 35.63 ± 1.87 vs 29.48 ± 1.9 ml, 10.67 ± 0.20 vs 9.66 ± 0.25 cm, 6.16 ± 0.23 vs 5.44 ± 0.31 ml 6.46 ± 0.24 vs 5.53 ± 0.34 g, 0.24 ± 0.02 vs $0.16 \pm 0.01 \times 10^9$ and 2.47 ± 0.16 vs $1.59 \pm 0.16 \times 10^9$ respectively, and were significantly different between the breeds. The percentage epididymal segments mass and sperm were also depicted. There were highly significant correlations between many of the reproductive parameters in both breeds. The Red Sokoto bucks seem more adapted than the Kano Brown in terms of their reproductive make-up.

Keywords: Reproductive parameters, Red Sokoto Bucks, Kano Brown Bucks.

INTRODUCTION

The world goat population is estimated to be 627 million with more than 90 per cent from developing countries. Out of this, Nigeria has over 24.5 million representing almost 4 per cent of the world production (FAO, 1995). The human population of the country is presently estimated to be 146.1 million, using the annual growth rate of 3 per cent (Lawani and Babaleye, 1992). Therefore, goat production is at risk since every six Nigerians will have approximately one goat. The distribution of goats throughout the

country is not uniform. A report shows that more than 60 per cent of the goat population is found in the Sudan Savannah zone of Northern States (Adalemo and Baba, 1993). It has also been reported that the total value of the nation's goat is N101,356 million (Nigeria, Federal Office of Statistics, 1995).

Extensive work has been carried out to assess the reproductive potential of indigenous breeds of cattle (Osinowo *et al.* 1973; Salau-Daudu, 1983; Akingbemi, 1988; Akingbemi and Aire, 1990). Some works on indigenous breeds of sheep are also available in the literature (Osinowo, 1982; Dauda, 1984; Akingbemi, 1988), and a few on mature bucks (Ogwuegbu, 1985, on Red Sokoto; Kwari and Ogwuegbu, 1992, on Borno White bucks) but information on these attributes especially for the yearling is not available for the goat breeds.

Reproductive parameters such as gonadal and extra gonadal sperm reserves are of paramount importance in the determination of male/female ratio during natural mating as well as in artificial insemination programme (Wildens and Entwistle, 1982). The use of younger bucks for this purpose has the advantage of saving time and cost of management in rearing bucks for a longer period, usually up to six years. Older bucks constitute a problem as their libido and reaction time decline with increasing age. And the possibility for using them for a longer period of time is at stake. In contrast, yearling bucks can be fully exploited for a much longer period especially for semen collection. Therefore, this study was undertaken to determine differences in reproductive parameters in year old Red Sokoto and Kano Brown breeds of bucks, which are two common goat breeds in the study area.

MATERIALS AND METHODS:

Location and climate of the study area:

The study was conducted at Bauchi Metropolitan Abattoir. Bauchi is on Latitude 10° 27 North 9° 49 East and at an altitude of 690.2 meters above sea level (Kowal and Knabe, 1972).

Experimental Animals

The bucks used for this study were of the Red Sokoto and Kano Brown breeds of goat. The Red Sokoto goat has been described by Osinowo (1990). The breed ranks highest in the country for its skin quality. The yearling weighs between 11 and 21 kg. Kano Brown goat is among the few breeds in Nigeria that are not well-defined. They are characterised by their uniform light brown coat colour with short and horizontal ears. Both sexes have horns. The yearling weighs between 10 and 16 kg. There is no marked distinction between these breeds in their body size.

Twenty of each of these animals were randomly selected as they entered the slaughter slabs. Most of the animals were purchased from small-scale farmers that practise the traditional system of management where animals graze on natural pasture with little or no supplementary feeding. Provision of housing and medical care in most cases are non-available. The previous sexual activities of these bucks were not monitored but they were normally kept for a period of 1 - 3 days before slaughter. The period of the study covered from late September to late October 1996, which corresponds to the end of the rainy season. The bucks were aged by the dentition method (Sastry and Thomas, 1980) and weighed using a bathroom scale. The body condition scores were taken before slaughter as described by Jefferies (1961).

Scrotal circumference

This was determined ante mortem using a flexible tape. Bucks were restrained by an

TABLE 1. SOME REPRODUCTIVE PARAMETERS IN RED SOKOTO AND KANO BROWN BREED OF BUCKS AND THEIR CORRELATION COEFFICIENTS (R).

Parameters	Red Sokoto	Kano Brown	't' value
n	20	20	
Body weight (kg)	13.8±0.54	11.7±0.35	3.32xx
Body Condition Score	2.2±0.08	2.1±0.07	0.47 Ns
Scrotal circumference (cm)	19.8±0.36	18.3±0.49	2.55x
Testes weight (g)	36.4±1.89	29.7±1.98	2.45x
Testes volume (ml)	35.6±1.87	29.5±1.94	2.28x
Epididymal length (cm)	10.7±0.20	9.7±0.25	3.16xx
Epididymal volume (ml)	6.2±0.23	5.44±0.31	1.88 Ns
Epididymal weight (g)	6.5±0.24	5.5±0.34	2.25x
Caput (g)	3.1±0.32	2.6±0.18	1.10Ns
Corpus (g)	0.94±0.05	0.9±0.05	1.05Ns
Cauda (g)	2.4±0.10	2.0±0.13	2.69x
Testes sperm (x10 ⁹)	0.24±0.02	0.16±0.01	3.28xx
Epididymal sperm (x10 ⁹)	2.5±0.16	1.6±0.16	3.95xx
Caput (x10 ⁹)	0.1±0.01	0.1 0.01	2.34x
Corpus (x10 ⁹)	0.03±0.01	0.03± 0.01	-
Cauda (x10 ⁹)	2.34±0.15	1.5±0.15	3.82xx
Relative epididymal mass distribution (%)			
Caput	47.68	47.74	
Corpus	14.55	16.27	
Cauda	37.77	36.99	
Relative epididymal sperm distribution (%)			
Caput	4.05	3.77	
Corpus	1.21	1.89	
Cauda	94.74	94.34	

Mean ± S.E.

^xP < 0.05; ^{xx}P < 0.01

NS = Not significant

n = number of bucks

REPRODUCTIVE PARAMETERS IN RED SOKOTO AND KANO BROWN BUCKS

TABLE 2. CORRELATION MATRIX FOR SOME REPRODUCTIVE PARAMETERS IN RED SOKOTO (ABOVE DIAGONAL) AND KANO BROWN (BELOW DIAGONAL) BUCKS.

	1	2	3	4	5	6	7	8	9	10	11
1. Body weight	-	0.78	0.54x	0.51x	0.51x	0.62xx	0.61xx	0.53x	-	-	-
2. Body Condition Score	-	-	0.42	0.41	-	-	-	0.32	-	-	-
3. Scrotal circumference	0.76xxx	-	-	0.72xxx	0.73xxx	0.57xx	0.61xx	0.64xx	0.35	0.35	0.30
4. Testes weight	0.50	-	0.53x	-	0.99xx	0.82xxx	0.75xxx	0.77xxx	-	-	-
5. Testes volume	0.51	-	0.54x	0.99xxx	-	0.78xxx	0.74xxx	0.78xxx	-	-	-
6. Epididymal length	0.56x	-	0.65xx	0.82xx	0.89xxx	-	0.62xx	0.59xx	-	-	-
7. Epididymal weight	0.62xx	-	0.69xxx	0.80xxx	0.81xxx	0.87	-	0.97xxx	0.39	-	-
8. Epididymal volume	0.56x	-	0.55x	0.68xxx	0.68xxx	0.78xxx	0.94xx	-	0.41	-	-
9. Testes sperm	0.30	-	0.56x	0.68xxx	0.69xxx	0.61xx	0.64xx	0.51x	-	-	0.30
10. Epididymal sperm	0.29	0.27	0.29	0.29	0.33	0.45x	0.57xx	0.60xx	0.49x	-	0.99 ^{xx}
11. Total sperm reserve	0.29	0.25	0.33	0.33	0.38	0.49x	0.60xx	0.61xx	0.55xx	0.99xx	-

^xP < 0.05;

^{xx}P < 0.01;

^{xxx}P < 0.001

attendant and the scrotal circumference was taken at the point where the circumference of the scrotum was maximum Butswat (1994).

Testes sperm reserves and epididymal measurements

Testes were collected post mortem and were immediately transported and preserved in an ice insulated container from the abattoir to the laboratory. In the laboratory, the adhering connective tissues and fat coverage were carefully trimmed. Testes were then dissected, the epididymides were separated. The tunica albuginea was carefully removed with minimal loss of parenchyma. The right and left testes weight were taken. The volume of the testes was determined through water displacement using a run-off beaker. The epididymal length, weight and volume were recorded. The epididymides were divided into capita, corpora and cauda, and their weights were also taken. Gonadal sperm/spermatid and epididymal sperm reserves were determined as previously described by Osinowo *et al.* (1981) and Butswat (1994).

Data analysis

Data obtained were subjected to 't' test as described by Parker (1979) and correlation coefficients analysed for relevant parameters.

RESULTS

Table 1 depicts the results on the reproductive parameters in both Red Sokoto and Kano Brown bucks studied. From the table, the Red Sokoto was superior to the Kano Brown bucks in body weight, scrotal circumference, testes weight, testes volume, epididymal length, epididymal weight, testes sperm and epididymal sperm values.

There were no significant difference ($P > 0.05$) between some of the parameters such as body condition score and epididymal volume. The correlations between the parameters in the two breeds were mainly negative. The relative epididymal mass and sperm percentage were compared favourably between the breeds as shown in the table.

The correlation matrix in Table 2. shows that there were significant correlations

between parameters studied in the two breeds. For instance, there were high and positive correlations between body weight and scrotal circumference ($r = 0.79$) vs ($r = 0.76$), scrotal circumference and testes weight ($r = 0.72$) vs ($r = 0.53$) and testes weight and epididymal length ($r = 0.82$) vs ($r = 0.82$) ($P < 0.01$) for the Red Sokoto and Kano Brown bucks respectively.

The relationships between body weight (Y_1) and scrotal circumference (X_1), testes weight (Y_2) and scrotal circumference (X_2), testes weight (Y_3) and epididymal length (X_3), are described by the regression prediction equations $Y_1 = 12.04 + 0.56X_1$ vs $8.37 + 0.85X_1$, $Y_2 = 38.81 + 3.79X_2$ vs $-19.02 + 2.66X_2$ and $Y_3 = 7.43 + 0.09X_3$ vs $6.75 + 0.10X_3$ for the Red Sokoto and Kano Brown bucks respectively.

DISCUSSION

The superior reproductive parameters exhibited in the Red Sokoto compared to the Kano Brown bucks indicate that differences in reproductive parameters exist between genotypically different breeds as similarly reported by Giri *et al.* (1994). The significant differences in most of the parameters also suggest that the Red Sokoto is more adapted to the environment and has a higher potential for use in breeding programme in this environment and probably elsewhere, since testes weight has been reported to correlate highly positively with body weight (Akingbemi and Aire, 1990; Butswat, 1994). Testes volume has also been shown to correlate significantly with initial motility and sperm concentration (Giri *et al.*, 1994). The correlations between the parameters in the two breeds were mainly negative suggesting that while there is an increase in the parameters in one breed, the other remains low. These attributes have been similarly observed in Black Bengal and Ganjam breed of goats in India (Giri *et al.*, 1994).

The existence of significant ($P < 0.05$) correlations between many parameters in the two breeds confirm previous reports by Osinowo *et al.* (1985) and Butswat (1994).

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Given the beneficial attributes and high heritability estimates (0.4-0.7) of testicular size (Counter and Foote 1979; Butswat, 1994), size measurements would be useful in selection criteria for improvement of herd or flock fertility. For instance, scrotal circumference correlates genuinely with testes and epididymal weights and these have been reported to correlate with sperm and spermatid counts in these small ruminants (Butswat, 1994). Body weight also correlates significantly ($P < 0.05$) with scrotal circumference, testes weight and epididymal measurements. The easily measured traits can be used as indicators of the less easily measured ones.

The results obtained in the study on comparisons of some reproductive parameters of Red Sokoto and Kano Brown breed of bucks have shown that the Red Sokoto bucks are superior to the Kano Brown in all the parameters investigated. This means the breed has higher potential for use in breeding programmes since reproductive parameters can be a viable index for selection of breeding bucks.

REFERENCES

- ADALEMO, I.A. and BABA, J.M. (1993). Nigeria: Giant In The Tropics, 1:129. Gabumo Publishing Co. Ltd. Lagos, Nigeria.
- AKINGBEMI, B.T. (1988). Some reproductive parameters in the male camel (*Camelus dromedarius*), Sokoto Gudali and Ouda ram. M.Sc. degree project report in the Department of Veterinary Anatomy, University of Ibadan, Nigeria.
- AKINGBEMI, B.T. and AIRE, T.A. (1990). Some reproductive parameters of Sokoto Gudali (*Bos indicus*) bulls. *Journal of Animal Production Research*. 10(2):121 - 133.
- BUTSWAT, I.S. (1994). Study on seasonal variations in the reproductive status of sheep and goats in Bauchi, Ph.D. Thesis, A.T.B.U. Bauchi, Nigeria.
- COULTER, G.H. and FOOTE, R.H. (1979). Bovine testicular measurements as indicators of reproductive performance and their relationship to reproductive traits in cattle: A review *Theriogenology* 11:297 - 311.
- DAUDA, C.S. (1984). Yankasa ram: Body weight, withers height, scrotal and penis size, and sperm reserves, *Int. Goat and Sheep Res.* 2(2) 126 - 128.
- FOOD AND AGRICULTURAL ORGANIZATION (1995). Quarterly Bulletin of Statistics Vol. 8 No. 2, 3 and 4. Rome, Italy.
- GIRI, S.C. MOHANTY, B.N., RAY, S.K.H. and MOHANTY, D. N. (1994). Biometry of scrotum and testicles in Black Bengal and Ganjam breed of bucks with relation to fertility. *Indian Veterinary Journal*. 71: 561 - 564.
- JEFFEROES, B.C. (1961). Body condition scoring and its use in management. *Tesmanian Journal of Agriculture*. 32:19 - 21.
- KOWAL, J.M. and KNABE, D.T. (1972). An agro climatological Atlas of the Northern Nigeria with explanatory notes. Ahmadu Bello University, Press, Zaria, Nigeria.
- KWARI, H.D. and OGWUEGBU, S. O. (1992). Morphometric studies of the reproductive organs, gonadal and extragonadal sperm reserves of the Kuri bulls and Borno White buck of the Sahelian zone of North Eastern part of Nigeria. *Tropical Veterinary* - 83 - 87.
- LAWANI, S.M. and BABALEYE, T. (1992). Recent development in cereal Production in Nigeria. International Institute of Tropical Agriculture, Ibadan, Nigeria.
- OGWUEGBU, S.O. OKE, B.O., AKUSU, M.O. and AIRE, T.A. (1985). Gonadal and extragonadal sperm reserves of the Red Maradi (Red Sokoto) goat. *Bull Anim, Hlth Prod, Afr.* 133 - 141.
- OSINOWO, O.A. (1990). Breed selection, reproduction and breed management in the Local small ruminants breeds. In: The Nigeria sheep and Goats Production Manual. PP 7-18. O.A. Osinowo and A.A. Abatan (eds). NAPRI, A.B.U., Zaria.
- OSINOWO, O.A., BALE, J.O., OYEDIPE, E.O. and EDUVIE, L.O. (1982). Semen quality of Yankasa rams. *Tropical Animal Health and Production* 14:189 - 192.
- PARKER, R.E. (1979). Introductory statistics for Biology. Edward Arnold (Publishers) Ltd, London 2nd ed.
- SALAU-DAUDA, C. and SHOYINKA, V. (1988). Scrotal circumference, daily sperm production and epididymal spermatozoa of the indigenous Bunaji and Sokoto Gudali bulls in Nigeria. *British Veterinary Journal*. 139: 467 - 470.
- SASTRY, S.R. and THOMAS, C.K. (1980). Dentition in Farm Animal Management, PP. 39 - 45 In: Farm Animal Management VIKAs Publishing House PVT Ltd, India.
- WILDENS, S. and ENTWISTLE, D.W. (1982). Post pubertal changes in gonadal and extragonadal sperm reserves in *Bos indicus* strain of bulls *Theriogenology*. 17: 655 - 667.