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Spermogram of the White Ecotype of Sahel Bucks in Maiduguri Metropolis

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Abstract: This study was undertaken to document the spermogram of the white ecotype of Sahel bucks in Maiduguri from peripubertal, pubertal to post pubertal age. Five bucks were subjected to semen collection for a period of ten months. Their body weights and scrotal circumference were also measured from three to twelve months of age, while semen characteristics were analysed from two to twelve months of age. The high significant correlation values obtained between the semen characteristics with body weight and scrotal circumference showed that as one semen characteristic value was increasing, the body weights and scrotal circumference were also increasing. It was also observed that the values of the semen characteristics increased systematically over the months in the period of study. It was concluded that significant levels of semen characteristics at three months indicate that male Sahel goats could begin producing semen with viable spermatozoa by then as other early maturity breeds.

Key words: Sahel, bucks, white ecotype, spermogram

INTRODUCTION

Goats are widely distributed through out the world, but are particularly associated with less favourable environments (Peter, 1987).

In the Savanna of West Africa, the goats are basically of two types the Sudan or Sahel goats in the Sahel belt, south of the Sahara extending from Lake Chad to Senegal and the dwarf goats in tropical countries of the Guinea Coast and Congo (Epstein, 1971). There are several varieties, subtypes or ecotypes of Sahel goats occupying the Sahel belt of Nigeria. Kwari (2001) listed the variants as Maradi, Chad, Maure, Tuareg, Burkina faso and Borno ecotypes.

The white colour ecotype of Sahel goats in Borno maybe indigenous to this ecosystem. The white ecotype also appears to be the pure breed at the centre of this vast ecosystem (Kwari, 2001). The white ecotype of Sahel bucks are slim, long legged goats weighing between 25-35 kg as adults. They are primarily meat animals and important source of leather (Kwari and Ogwuebu, 1992). This study was undertaken to determine the age which good quality semen can be collected from growing bucks and to provide a baseline data for early age selection of proven bucks for genetic improvement.

MATERIALS AND METHODS

Five white ecotype of Sahel breed of goats aged 2 months and obtained from the University of Maiduguri animal farm were used for the study. The study was

conducted between May, 2001 to February, 2002. They were housed at the artificial insemination unit of the Veterinary Teaching Hospital, University of Maiduguri in pens and were taken out to graze in the morning and afternoon and Pened at night. The animals were fed groundnut leaves 1½ kg head⁻¹, maize bran 500 g, bean husks 500 g and wheat bran 500 g head⁻¹ daily. Water was given *ad libidum*.

Semen samples were collected by electroejaculation technique (Akusu *et al.*, 1984). Semen samples were collected three times at an interval of every four days every week from the age periods of 8-12 weeks, after an interval of two weeks, semen was collected three times every two weeks up to 12 months of age.

Semen volume was read soon after collection from the graduated collecting vial and the colour recorded. The semen was then kept in a water bath at 37°C until evaluation was completed. Haemocytometry method was used to determine the spermatozoa concentration (Bearden and Fuquay, 1992), while motility tests were conducted as described by Zemjanis (1970). Eosin-nigrosin stain was used to determine the live dead ratio as described by Moss *et al.* (1979). Only sperm cells that picked the stain were counted as dead, while those colourless were counted as live cells.

Statistical analysis: Analysis of variance (ANOVA) was used to analyze the data collected as earlier described by Snedecor and Cocbran (1973). The results are presented as Mean±SD. Correlations between various parameters were examined.

Table 1: Correlations of body weights, scrotal circumference and semen characteristics of the white ecotype of Sahel bucks

	CT	DH	PD	RT	LT	SET	Concen	Mass activity	Motility	Live (%)	pH	Volume	Scrotum	Weight
Pearson CT	1.000	0.557**	0.576**	0.644**	0.679**	0.531**	-0.114**	0.052	0.016	-0.052	0.131**	-0.086*	-0.560**	-0.450**
Correlation DH	0.557**	1.000	0.471**	0.584**	0.655**	0.625**	-0.036	0.125**	0.096*	0.024	0.174**	-0.026	-0.547**	-0.439**
PD	0.576**	0.471**	1.000	0.540**	0.606**	0.414**	-0.297**	-0.054	-0.092*	-0.208**	0.093*	-0.259**	-0.739**	-0.594**
RT	0.644**	0.584**	0.540**	1.000	0.635**	0.492**	0.028	0.194**	0.181**	0.115**	0.231**	0.031	-0.464**	-0.296**
LT	0.679**	0.655**	0.606**	0.635**	1.000	0.605**	-0.293**	-0.116**	-0.156**	-0.224**	0.019	-0.241**	-0.587**	-0.471**
SET	0.531**	0.625**	0.414**	0.492**	0.605**	1.000	0.007	0.126**	0.113**	0.071	0.146**	0.011	-0.512**	-0.395**
Concen	-0.114**	-0.036	-0.297**	0.028	-0.293**	0.007	1.000	0.802**	0.874**	0.917**	0.575**	0.813**	0.736**	0.698**
Mass act	0.052	0.125**	-0.054	0.194**	-0.116**	0.126**	0.802**	1.000	0.905**	0.858**	0.689**	0.707**	0.460**	0.413**
Motility	0.016	0.096*	-0.092*	0.181**	-0.156**	0.113**	0.874**	0.905**	1.000	0.942**	0.709**	0.769**	0.720**	0.682**
%Live	-0.052	0.024	-0.208**	0.115**	-0.224**	0.071	0.917**	0.858**	0.942**	1.000	0.652**	0.852**	0.779**	0.733**
pH	0.131**	0.174**	0.093*	0.231**	0.019	0.146**	0.575**	0.689**	0.709**	0.652**	1.000	0.576**	0.386**	0.380**
Volume	-0.086*	-0.026	-0.259**	0.031	-0.241**	0.011	0.813**	0.707**	0.769**	0.852**	0.576**	1.000	0.665**	0.606**
Scrotum	-0.560**	-0.547**	-0.739**	-0.464**	-0.587**	-0.512**	0.736**	0.460**	0.720**	0.779**	0.396**	0.665**	1.000	0.843**
Weight	-0.450**	-0.439**	-0.594**	-0.296**	-0.471**	-0.395**	0.698**	0.413**	0.682**	0.733**	0.380**	0.606**	0.843**	1.000

*, **represent significant and highly significant

Table 2: Semen characteristics of the white ecotype of Sahel bucks

Month	pH		Mass activity		Motility		% Live		Concentration	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.25	2.97	3.29	0.07	0.26	0.67	2.58	0.00	0.00	0.00	0.00
2.50	4.30	3.15	0.53	0.52	5.67	6.51	6.33	7.19	0.19	0.27
2.75	5.93	1.66	1.60	0.63	27.33	13.87	26.00	9.86	0.51	0.32
3.00	6.80	0.25	2.67	0.49	61.00	7.84	49.33	5.94	1.33	0.46
3.50	6.99	0.22	2.73	0.46	67.67	6.78	50.33	7.90	1.68	0.26
4.00	7.07	0.24	2.80	0.41	68.67	6.11	58.67	6.94	1.76	0.18
4.50	7.11	0.18	2.87	0.35	68.67	6.11	59.00	5.07	1.76	0.13
5.00	7.11	0.26	2.73	0.46	68.33	6.17	64.00	5.73	1.75	0.15
5.50	7.05	0.21	2.73	0.46	67.67	4.58	69.00	4.71	2.10	0.80
6.00	7.11	0.26	3.33	0.49	74.00	6.04	73.67	6.11	2.68	0.35
6.50	7.01	0.25	3.47	0.52	78.00	5.92	77.00	5.28	2.78	0.40
7.00	7.04	0.28	3.53	0.52	80.67	4.95	85.13	7.89	2.66	0.32
7.50	7.18	0.24	3.40	0.51	81.00	3.87	93.80	2.14	2.81	0.51
8.00	7.14	0.20	3.20	0.41	81.33	3.52	94.40	1.72	2.89	0.45
8.50	7.11	0.28	3.13	0.52	80.00	3.78	94.80	1.82	2.80	0.23
9.00	7.10	0.21	3.27	0.46	82.33	4.95	94.27	2.34	2.98	0.51
9.50	7.17	0.24	3.20	0.41	83.67	5.81	94.33	2.26	2.88	0.32
10.00	7.17	0.24	3.33	0.49	86.33	5.16	94.53	1.73	3.31	0.40
10.50	7.20	0.25	3.47	0.52	85.67	4.95	94.87	2.33	3.32	0.50
11.00	7.13	0.30	3.73	0.80	84.33	3.72	93.93	2.28	3.26	0.45
11.50	7.17	0.24	3.80	0.77	84.00	3.87	95.40	2.16	3.33	0.58
12.00	7.13	0.23	3.80	0.94	87.00	5.61	96.07	1.91	3.23	0.50

RESULTS AND DISCUSSION

The physical characteristics such as body weight and scrotal circumference, semen characteristics such as volume, pH, mass activity, motility, concentration, percentage live and spermatozoa abnormalities such as rudimentary tail, coiled tail, detached head, simple bent tail, looped tail and protoplasmic droplets were examined and the findings recorded (Table 1). There is a high significant correlation between most of the parameters studied.

Table 2 revealed that there is a systematic increase of semen characteristics over age.

The positive correlation values within the semen characteristics obtained in this study shows that as one semen characteristic value is increasing the others are also increasing over the months. This agrees with

findings of Salhib *et al.* (2003) who found the highest positive and significant correlations between semen characteristics ($r = 0.29 - 0.68$). The high significant correlation ($r = 0.843$; $p < 0.01$) between body weight and scrotal circumference agrees with values obtained by Bongso *et al.* (1982) who recorded values of ($r = 0.84$; $p < 0.05$), Kwari and Ogwegbu (1992), ($r = 0.845$) between body weight and scrotal circumference in goats.

There was associated decrease in spermatozoa abnormalities as the bucks grew in physical size and age. This confirms by El-Sawaf (1971) that immature bucks have a larger proportion of sperm abnormalities. The marked decrease of protoplasmic droplets with attendant increase in body weight and scrotal circumference shows the maturity of the sperm cells overtime. Protoplasmic droplets indicate the state of immaturity of sperm cells (Zemjanis, 1970).

It is observed in this study, that the values of the semen characteristics increased systematically over the months in the period of study and that after three months of age, there was no marked increase and that the values of the semen characteristics remain relatively constant. The average values for ejaculate volume, progressive mortality and sperm concentration were 1.2 ± 0.5 mL, $75 \pm 10\%$ and 4.0 ± 1.6 as reported by Salhib *et al.* (2003) which tallies with ejaculate characteristics determined in this study.

From this study, it was shown that as semen characteristics increased over months, scrotal circumference size and body weight also increased. Morris *et al.* (1978) and Coulter (1982) stated that there is a good correlation between sperm production, testicular size and age of the animal. Scrotal circumference is also an indirect way of measuring testicular weight and sperm production.

In conclusion, this study indicates that the white ecotype of Sahel goats can be utilized in accelerated breeding programmes as early as three months as other early maturing breeds.

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