

**A REPORT ON THE SEXUAL CYCLE IN THE KUDU BULL  
*TRAGELAPHUS STREPSICEROS PALLAS* AND A DESCRIPTION  
OF AN INTER-SEX**

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Although Ansell (1960) reported that there was no seasonal calving pattern in kudu in Zambia, many workers in southern Africa have since reported that there is a definite calving season in late summer from January to March (Dasmann & Mossman 1962; Brand 1963; Wilson 1965; Fairall 1968; Simpson 1968). No information is available on the kudu bull and the object of the present study was to examine the reproductive status of the bull at different times of the year.

**MATERIAL AND METHODS**

Mature bulls were shot on the Langjan Nature Reserve near Alldays in the Northern Transvaal. The vegetation consists of sweet Bushveld and large numbers of kudu are maintained for the purpose of restocking farms.

Material was provided by 20 mature kudu bulls. The weights of the animals and the dates on which they were shot are listed in Table 1. The animals were shot in the neck with a high velocity rifle and immediately afterwards their throats were cut and they were bled in the veld.

**TABLE 1**  
**WEIGHTS OF KUDU BULLS AND DATE ON WHICH THEY WERE SHOT**

<i>Date</i>	<i>No. of animals</i>	<i>Weight (kg)</i>
January 12	4	213,5 ± 8,1
March 3	3	238,0 ± 4,2
June 10	4	248,0 ± 15,9
September 16	4	255,8 ± 21,0
November 11	4	224,0 ± 2,3

The carcasses were weighed and the reproductive tracts dissected out. The testes, epididymides, ampullae, seminal vesicles and bulbo-urethral glands were weighed and pieces fixed in Bouin's fluid. After routine paraffin embedding pieces were sectioned at 6 $\mu$  and stained with Delafield's haematoxylin and chromotrope 2R. Testicular seminiferous tubule diameter was derived from the mean of 25 tubules measured in cross-section with a Zeiss screw-micrometer eye-piece and a  $\times 10$  objective, the eye-piece having been calibrated against a micrometer slide. Epididymal sperm numbers were measured by the method described by Dott & Skinner (1967). Vesicular fructose and citric acid were measured according to the method of Lindner & Mann (1960).

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## RESULTS

The seasonal changes in the weights of the two testes and epididymides are illustrated in Figure 1 together with seasonal changes in seminiferous tubule diameter and numbers of sperm in the epididymis. It is apparent that there was a marked peak in testicular exocrine activity in June. Both testicular and epididymal weight increased by a third from January and seminiferous tubule diameter by about a quarter. The numbers of epididymal sperm increased about ten times. The testes were, however, never devoid of all signs of spermatogenic activity although tubule diameter declined sharply and there was a seasonal decline in spermatogenic activity (Figs. 1, 2 and 3).

Fructose and citric acid were identified as normal constituents of the ampullae and seminal vesicles. Vesicular weight and fructose and citric acid concentration declined in June and a definite seasonal effect was not evident as in the case of testicular exocrine function. The seasonal changes are illustrated in Fig. 2. No explanation can be offered for this anomaly. The concentrations of fructose and citric acid were also much lower in June (70 and 16 mg/100 g respectively) than in other months, rising to 199 and 168 mg/100 g in September respectively. However, the ampullae weighed more in June (4,75 g) than in any other month, as did the bulbo-urethra (2,75 g).

The kudu bull appears to have a distinct sexual cycle despite the fact that chemical assays indicated that testicular hormone secretion did not follow the same pattern as exocrine function. Behavioural observations support this view. In general, bulls are grouped in bachelor herds from September to March and only join herds of cows from May to August.

*The Inter-sex*

One of the bulls shot in March was an inter-sex. In appearance and weight (249 kg) it resembled the other three bulls. In contrast to females, which are hornless, it had large spiral horns. A very small scrotal pouch was evident. The reproductive tract is illustrated in Fig. 4. Only one "testis" was present and this weighed 5,4 g. The histology of this testis is illustrated in Fig. 3: 1 and 2. The uterus and vagina were distended with a large amount of fluid which weighed 76,4 g and which resembled that from the vesicular seminalis. On analysis it was found to contain 46 mg fructose/100 g and 5,5 mg citric acid/100 g. It seems possible that this fluid was secreted by the seminal vesicles and that the vagina became distended as there was no urethral outlet. The pelvic part of the urethra was the same as that found in normal males and normal bulbo-urethral glands were present although they were lighter (1,6 g) than those in normal males (2,9 g). The penis was of normal size and length.

## DISCUSSION

The gestation period in kudu is given as 210 to 214 days (Stevenson-Hamilton 1912; Jennison 1927; Wilhelm 1931). If the mating period is calculated from the peak in calving, between January and March, mating should take place from the beginning of June to the end of August. This is in good agreement with the present observations on the bull, although by September, sperm numbers were rather low.

Under the conditions of this investigation it was not possible to measure testicular testosterone. However, there is a close correlation between the concentration of this hormone and of vesicular fructose and citric acid in many ruminants (Lindner & Mann 1960; Short &

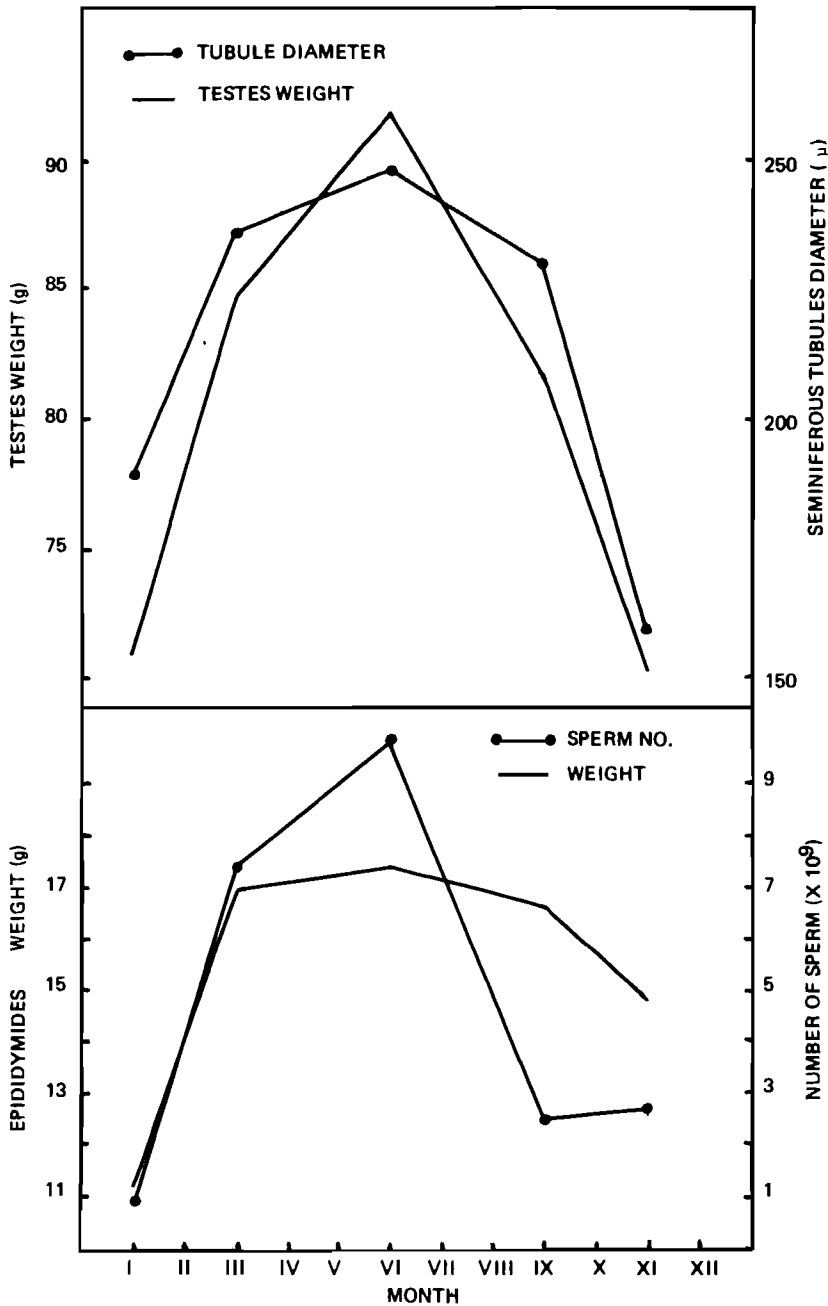


FIGURE 1

Seasonal changes in weight of (a) testes and seminiferous tubule diameter, and (b) weight of epididymides and sperm numbers of kudu bulls at the Langjan Nature Reserve.

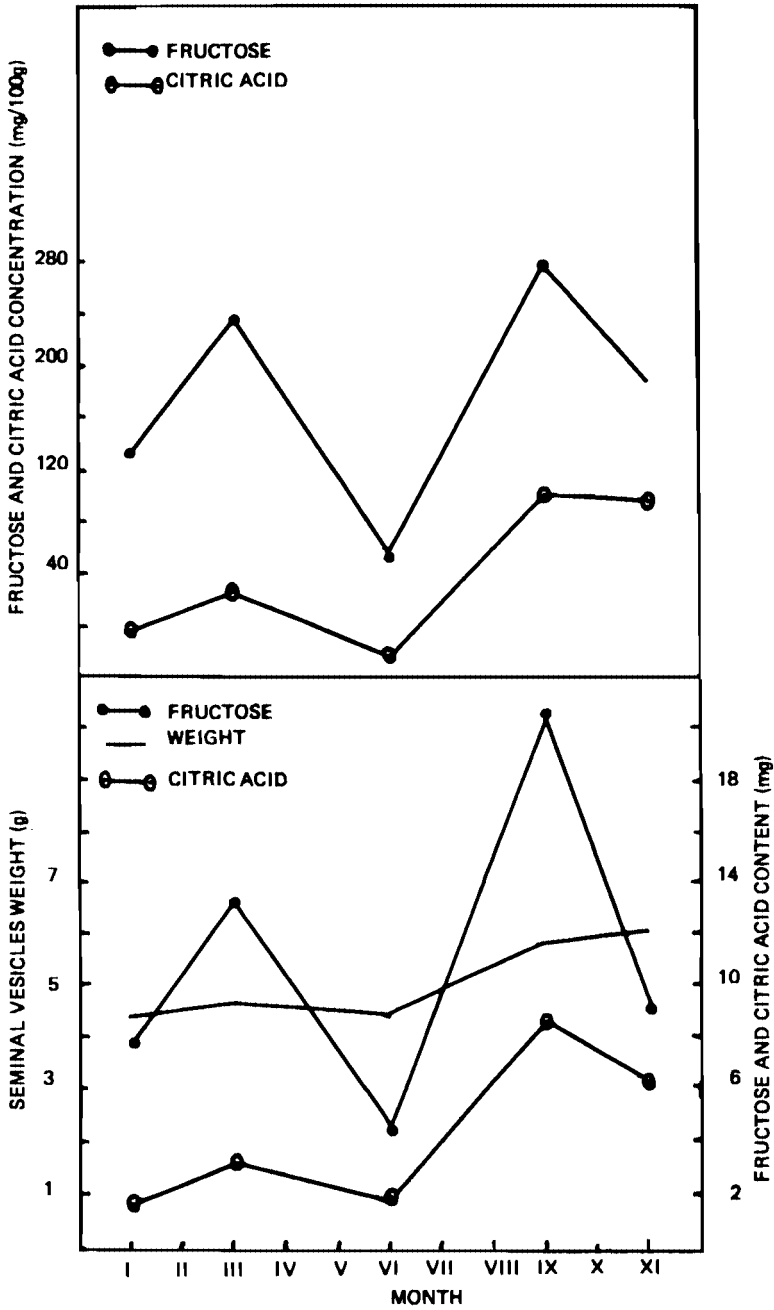
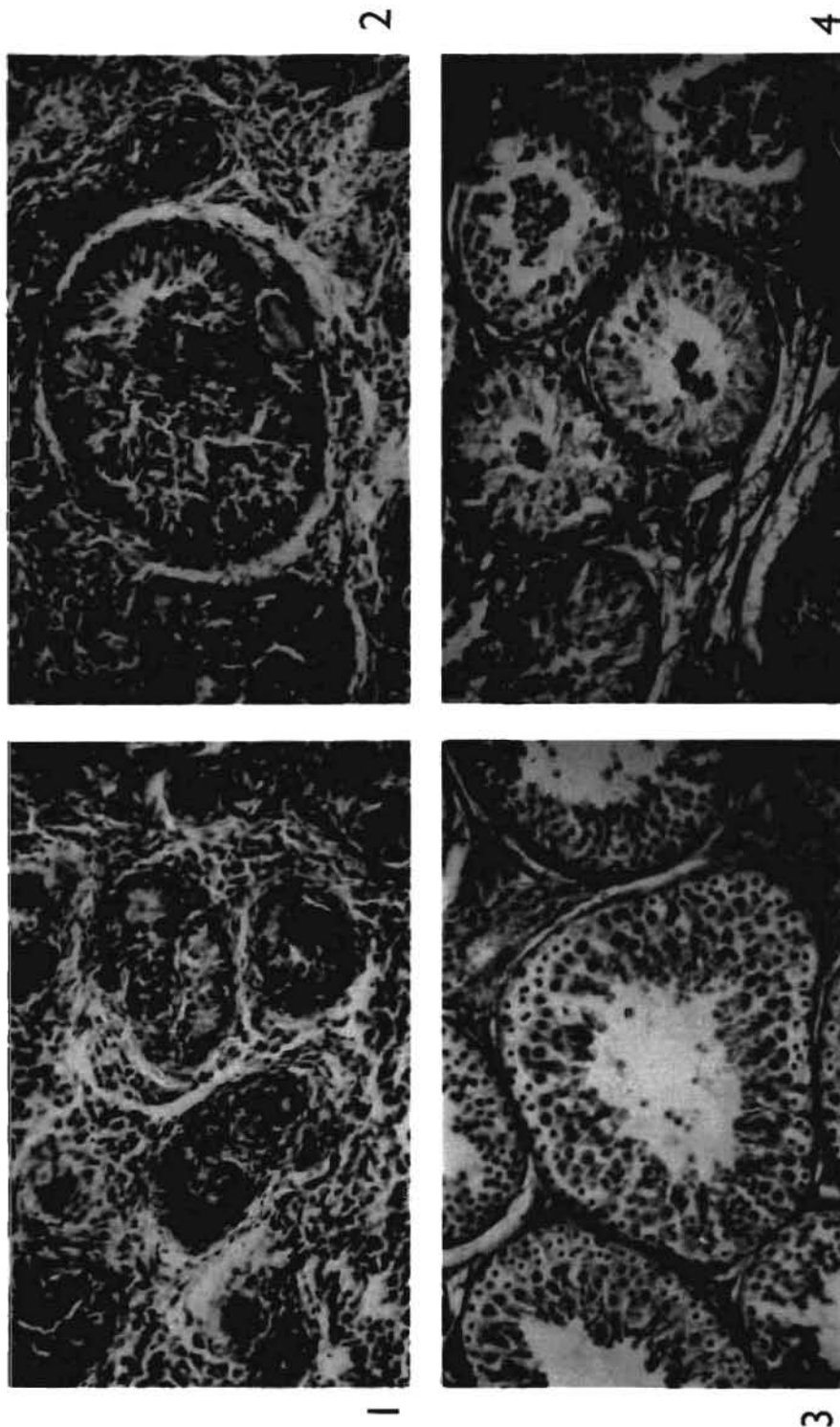


FIGURE 2

Seasonal changes in (a) fructose and citric acid concentration and (b) weight of seminal vesicles and vesicular fructose and citric acid content of kudu bulls at the Langjan Nature Reserve.



**FIGURE 3**  
 1 and 2. Cross-sections of the "testis" from an inter-sex kudu bull stained with Delafield's haematoxylin and chromotrope 2R. Note the complete absence of spermatogenesis and the large follicular-like tubules present in certain areas.  
 3 and 4. Cross-sections of testes from normal kudu bulls stained with Delafield's haematoxylin and chromotrope 2R. Note optimum spermatogenesis in June (3) and reduction in tubule size in November (4).

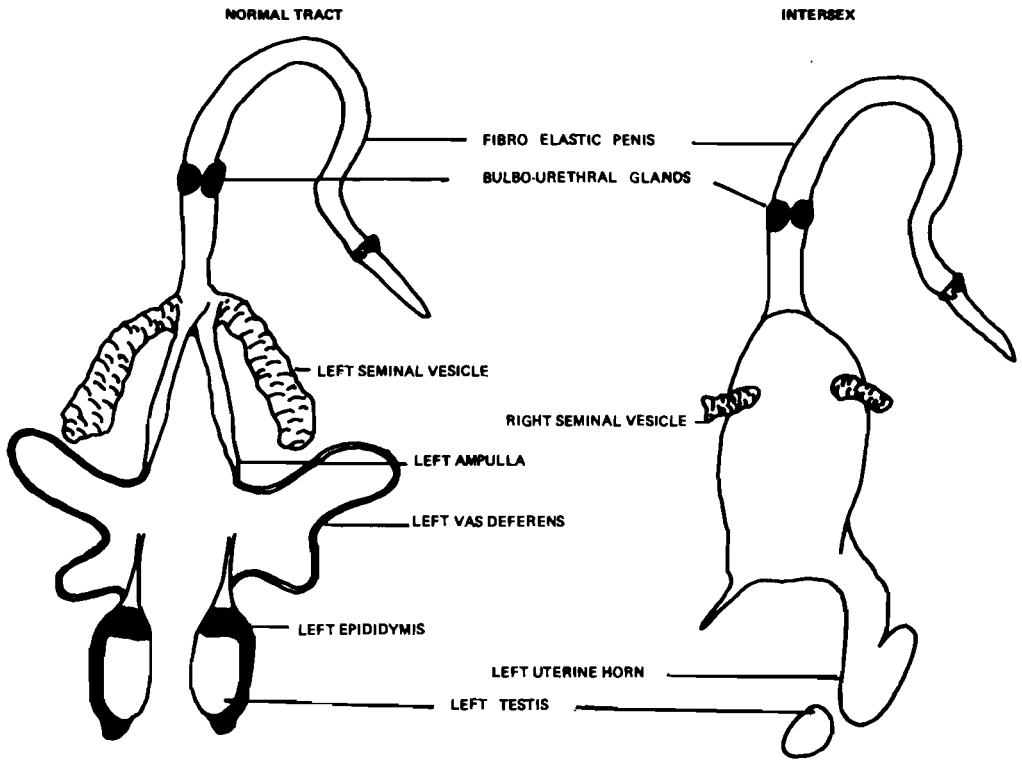


FIGURE 4

Diagram of the dorsal view of the reproductive tracts of normal and inter-sex kudu bulls.

Mann 1966; Skinner, Booth, Rowson & Karg 1968). Unlike other species of antelope (Skinner 1970; Skinner & Van Zyl 1970; Skinner & Huntley 1971) androgen production did not show the same seasonal pattern as sperm production. However, only small numbers of animals were used in this study and this observation requires confirmation.

The kudu bulls in this study increased in weight throughout the breeding season and their weight only began to decline after September. This is in contrast to other species studied where the onset of the rut and consequent fighting causes males to lose weight. However, the kudu is essentially a browser (Roberts 1951) which may have been the main reason for this difference, the quality of the food available to it during the winter months remaining high. This is not usually the case with species which are largely dependent on grass, the nutritive value of which is much lower in winter than in summer. The present hunting season in the Transvaal is from May 15 – August 15. As this coincides with the breeding season, this is a distinct disadvantage for the continued survival of this species.

## SUMMARY

A total of 20 mature kudu bulls were shot at intervals throughout one year at the Langjan Nature Reserve in the Northern Transvaal. One of the bulls was apparently an inter-sex and the reproductive tract has been described in some detail. The reproductive organs showed a distinct activity cycle, reaching a peak at the rut in June and declining to minimal values in November. Androgen secretion, as determined by fructose and citric acid concentration, never ceased, nor did spermatogenesis.

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