

**Histomorphology of accessory sex glands in one-humped camel bull (*Camelus dromedarius*), Uda Rams and Red Sokoto Buck****<sup>a</sup>Mahmud Muhammad Abdullahi\***, **<sup>b</sup>Onu Josephat Edoga**, **<sup>c</sup>Shehu Sani Abdullahi**, **<sup>c</sup>Umar Abubakar Abubakar**, **<sup>c</sup>Danmaigoro Abubakar**<sup>a</sup> Department of Animal Health and Production Technology, Niger State College of Agriculture, Mokwa, Niger State, Nigeria,<sup>b</sup> Department of Veterinary Anatomy, Michael Okpara University of Agriculture, Umudike, Anambra State,<sup>c</sup> Department of Veterinary Anatomy, Usmanu Danfodiyo University, Sokoto, Nigeria.

<b>Authors' Contribution</b>	<b>Mahmud, M. A.</b> designed the experiment and wrote the manuscript, <b>O. J. Edoga &amp; S. S. Abdullahi</b> developed the concept and interpreted the micrographs and <b>U. A. Abubakar &amp; D. Abubakar</b> collected the samples from Sokoto metropolitan abattoir, performed H & E staining technique and took the micrographs.
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**ABSTRACT**

Accessory sex glands of fifteen apparently healthy adult one-humped Camel bulls (OCB), Uda rams (UR) and Red Sokoto bucks (RSB) (Five per species) were collected from Sokoto metropolitan abattoir. They were then dissected out for routine histology using Haematoxylin and Eosin (H&E). The size of muscularis and the number of secretory cells in the ampullary gland were observed to be highest in OCB, followed by UR and least in RSB. In the three species, the vesicular gland has tubular secretory glands and was separated into lobules by connective tissue trabeculae. Multiple acini were observed with an irregular folded lumen and were lined by simple columnar secretory cells. The prostate of OCB was observed to have highest amount of the interstitial connective tissues and rich in striated muscles which surround the lobules. Fibromuscular trabeculae extended into the parenchyma and most pronounced in OCB than other two species. The number of secretory acini appeared to be more in RSB than the other two species. The bulbourethral gland has numerous connective tissue and numerous trabeculae that originated from the capsule and divides the gland into lobules. Each lobule is populated by acini. In all the three species, the parenchyma is lobulated and consists of compound-tubulo-alveolar secretory end pieces. It was concluded that although results showed that the studied animals are different ruminant species, they exhibit some similarities and interesting histomorphological differences in their accessory sex glands compared to the majority of mammals.

**Keywords:** Histomorphology, accessory sex glands, one-humped camel.

**INTRODUCTION:** Secretions of the accessory genital glands constitute 60-90% of total volume of semen (Dukes, 2005). Their secretions were solution of buffers, nutrients and other substances needed to assure optimum motility and fertility of semen. In dromedaries, the accessory sex glands are: the ampullae, the prostate and the bulbo-urethral (Cowper's) glands while the most important feature, is the absence of the seminal vesicles. In sheep and goats their accessory sex glands are the ampullae, vesicular glands, prostate gland and the bulbourethral glands which open and empty their secretion into the urethral passage (Khalaf, 2010). The histomorphology of these glands varies widely among different mammalian species (Thomson and Marker, 2006). Many researchers have worked on the individual histomorphology of the accessory sex glands in mammals including one-humped camel, sheep and goat (Shazia and Shalini, 2012). However, there is paucity of information on the comparative histomorphology of accessory sex glands in these three species.

**OBJECTIVES:** This research work was carried out with the aim of finding out the species variation or similarities in terms of histomorphology of accessory sex glands in One-humped Camel Bull (OCB), Uda Ram (UR) and Red Sokoto Buck (RSB).

**MATERIALS AND METHODS:** Fifteen accessory sex glands of apparently healthy adult OCB, UUR and RSB (five samples per species) were collected from Sokoto metropolitan abattoir (latitudes 10° N and 14° 50' N and longitudes 7° E, east). Following the collection, samples were transported to Veterinary Anatomy Laboratory, Usmanu Danfodiyo Sokoto, Nigeria in 10% buffered formalin. They were

then dissected out for routine histology. The accessory sex gland tissues obtained were immediately fixed by complete immersion in 10% neutral buffered formalin, labelled and kept for two days, followed by preservation in 70% ethyl alcohol. They were dehydrated through ascending grades of ethanol (50%, 70%, 95% and absolute ethanol), cleared in xylene and embedded in paraffin wax. Serial sections of 5µm were cut and stained with Haematoxylin and Eosin (H&E) (Drury *et al.*, 1967). Micrographs were conducted with a Light microscope connected to a video based, computer – linked system (Tuscon CMOS Camera: IS500, Resolution: 5.0 megapixels) that was programmed to take micrographs).

**RESULTS: Ampullary gland:** The ampulla was observed to have its glandular propria and submucosa filled with glandular secretory units. Also observed were muscularis and adventia. The size of muscularis and the number of secretory cells were observed to be highest in OCB, followed by UR and least in RSB (figure 1).

**Vesicular glands (Seminal vesicles):** The vesicular gland has tubular secretory glands and was separated into lobules by connective tissue trabeculae. Multiple acini were observed with an irregular folded lumen and were lined by simple columnar secretory cells (figure 2).

**Prostate:** Mucus-secreting units, interstitial connective tissues, ducts as well as striated muscles were observed. The prostate of OCB was observed to have the highest amount of the interstitial connective tissues and rich in striated muscles which surround the lobules. Fibromuscular trabeculae extended into the parenchyma and most pronounced in OCB than other two species. The number of secretory acini appeared to be more in

RSB than the other two species (figure 3).

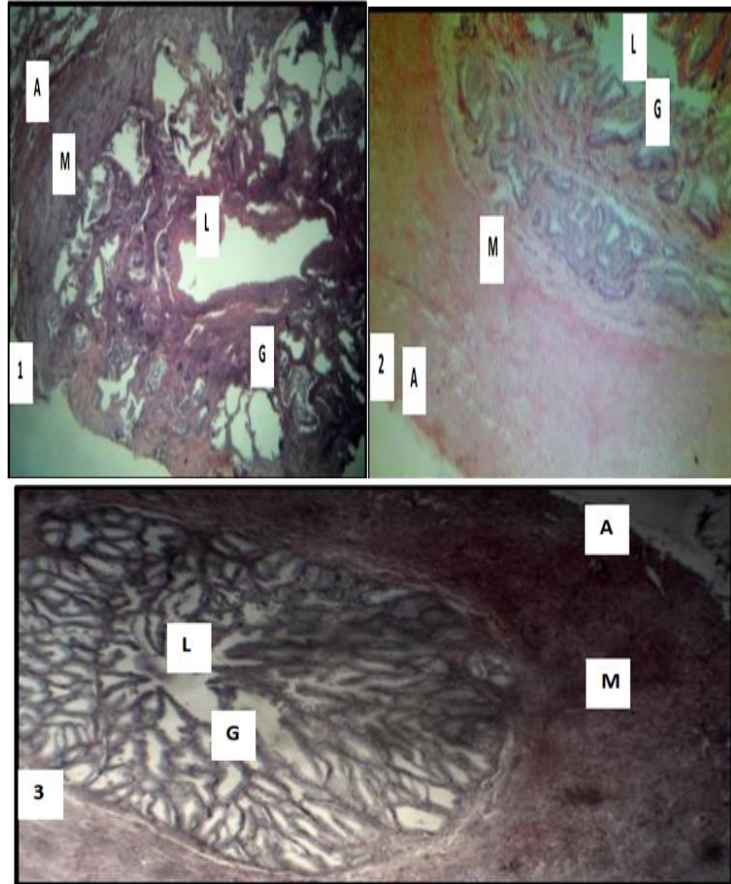


Figure 1: Micrographs of Ampullae (transverse section) of OCB, UR and RSB respectively, showing lumen (L), glandular cells (G), muscularis (M) and adventitia (A) (H & E 40x).

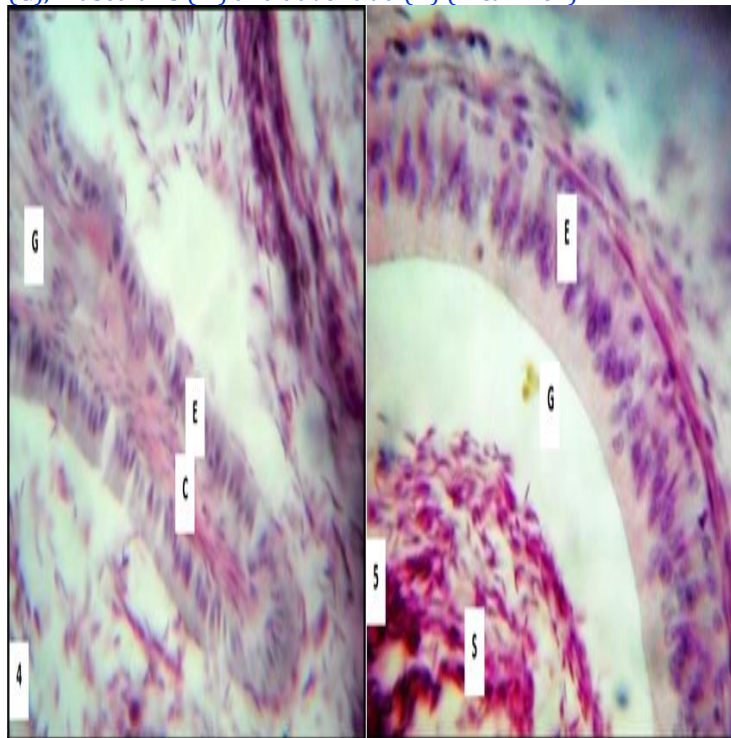


Figure 2: Micrographs of vesicular glands (transverse section) of UR and RSB, showing secretions (S) in the lumen, trabecular connective tissue (C), the gland (G), simple columnar epithelium (E) (H & E 400x).

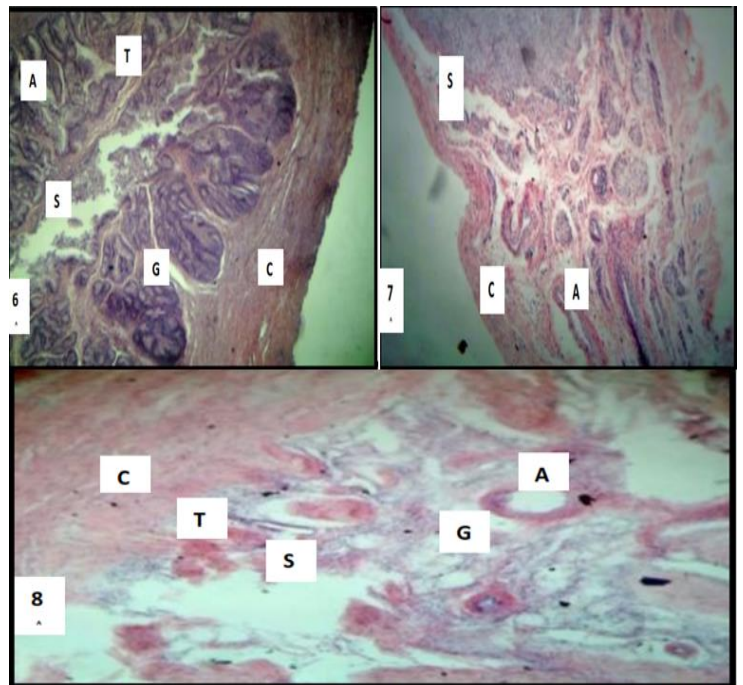


Figure 3: Micrographs of the prostate glands (transverse sections) of OCB, UR and RSB, showing secretory acinii (A), fibromuscular trabeculae (T), fibromuscular capsule (C), glandular cells (G) and secretions (S) (H & E x100).

**Bulbourethral gland:** The bulbourethral gland has numerous connective tissue and numerous trabeculae that originated from the capsule and divides the gland into lobules. Each lobule is populated by acini. In all the three species, the parenchyma is lobulated and consists of compound-tubulo-alveolar secretory end pieces (figure 4).

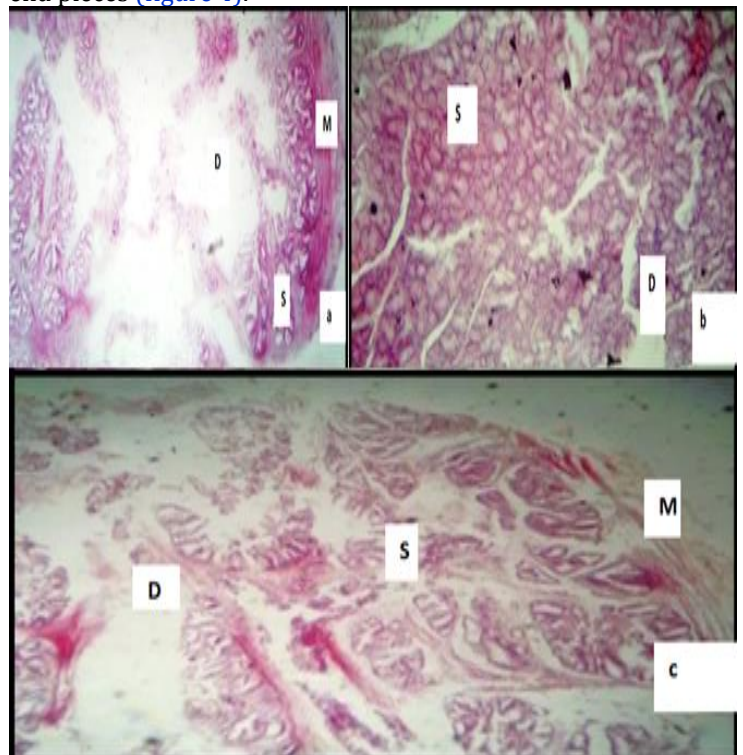


Figure 4: Micrographs of bulbourethral glands (transverse sections) of OCB (a), UR (b) and RSB (c), showing mucus-secretory epithelium lined acini (S), duct (D) and striated muscle capsule (M) (H & E 100x).

**DISCUSSION:** The ampullae of the three species have their submucosa filled with secretory units, as well as presence of muscularis and adventia are similar to the findings of [Ali et al. \(1978\)](#) in one-humped camel and [Bacha et al. \(2000\)](#) in sheep and goat. The size of muscularis and the number of secretory cells observed in OCB were more than those of the remaining two species. This agrees with earlier reports of [Ali et al. \(1978\)](#) in one-humped camel, who said that, tunica muscularis of the ampulla in camel is thick in non-glandular portion of the vas deferens; where it consists of a thick circular smooth muscular layer together with longitudinal smooth muscle bundles disposed peripherally. He further stated that in the glandular portion, the tunica muscularis is comparatively thin and irregularly arranged in an inner circular layer of smooth fibres which are loosely disposed and an outer layer of irregularly arranged muscle fibres. In the present study, the vesicular glands of UR and RSB have tubular secretory glands that were separated into lobules by connective tissue trabeculae. These agree with the reports of [Bacha et al. \(2000\)](#) in the boar and ruminants' vesicular glands. In addition, they reported that it is absent in the carnivores, while in the stallions, there are true vesicular out pocketings in the form of bladder-like sacs with wide central lumina into which glands open. The results on the prostate gland of OCB in this study showed that it has the highest amount of connective tissues and striated muscles. These are in agreement with the earlier report of [Ali et al. \(1978\)](#) in one-humped camel. They also added that there are high extensions of fibromuscular trabeculae into the parenchyma. Each lobule consists of tubuloalveolar secretory units resting on a distinct basement membrane and presenting a wide variation in size and diameter. The highest number of secretory acini was observed in the disseminate prostate of the RSB and least in OCB in this study. This agrees with the studies of [Kainer et al. \(1969\)](#) in one-humped camel, who reported that the disseminate prostate extends along the entire lengths of the pelvic urethra and contains abundant mucous acini. [Ali et al. \(1978\)](#) also, reported that in one-humped camel, the pars disseminate seems to be small, confined to the prostatic urethra and contain only few mucous units. The histological observations on the bulbourethral glands of the three species showed that they have lobulated parenchyma which consists of compound-tubulo-alveolar secretory end pieces. This agrees with the report of [Aughey and Frye \(2001\)](#) who reported that

they are compound tubulo-mucus secreting glands. The glands have connective tissue capsule that sends fine trabeculae into the glands and the outer layer of striated muscle on the dorsal and lateral aspect (Bulbourethralis muscle). The slightest fluctuations in the size of interstitial tissues and secretory units observed in this study may be ascribed to a normal functional response to changing environmental conditions, as reported in other domestic animals by [Julian and Tyler \(1959\)](#).

**CONCLUSION:** It was concluded that although results showed that the studied animals are different ruminant species, they exhibit some similarities and interesting histomorphological differences in their accessory sex glands compared to the majority of mammals

**CONFLICT OF INTEREST:** Authors have no conflict of interest.

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