# First report of cryptorchidism in a dromedary camel (*Camelus dromedarius*) in Nigeria: a case report

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Submitted July 10, 2020; Accepted October 19, 2020; Published November 14, 2020

## Abstract

A study was carried out to examine the incidence of cryptorchidism in dromedary camel males slaughtered at the Sokoto modern abattoir in Nigeria. Testes of 171 males were examined for cryptorchidism by palpating their scrotum and locating their testes. Males without testes were followed to determine the nature, location and obtain the dimensions (longitudinal length, mid testicular circumference, and testicular weight) of the cryptorchid male. These dimensions were also obtained in 5 non-cryptorchid males for comparison. One (0.58 %) of the male samples was cryptorchid, where the cryptorchid testis was bilateral and subcutaneously located. The testicular morphometry of the cryptorchid male was within the range of the non-cryptorchid males examined. However, histological changes characterized by atrophied testis with disrupted architecture, testicular degeneration, decrease seminiferous tubules devoid of spermatids were seen in the cryptorchid testes but absent in the non-cryptorchid males. It was concluded that cryptorchidism rarely occurs in dromedary camel as this is the first report in Nigeria. The cryptorchid male had reduced spermatogenic activities capable of rendering the male unfit for reproduction and could spread if unchecked.

**Keywords**: Cryptorchidism, *Camelus dromedarius*, Nigeria

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## Introduction

The dromedary (*Camelus dromedarius*) is a one-humped camel popularly called "the desert ship." The camel is generally referred to as pseudo-ruminants because of their ruminating habit. Their forestomach comprises three compartments unlike in true ruminants. The rumen is a fermentation vessel charged with bacteria and protozoa that break down cellulose and assimilate it while discarding volatile fatty acids as the end product of their energy metabolism (Lechnerdoll et al., 1995). Their milk, meat, and hides are useful for consumption (Kadim et al., 2013). Camels are found in both Saharan and sub-Saharan areas, where they are essential to people of the Sahel Savanna for many economic and agricultural purposes (Hare, 2008). In East Africa (Kenya, Ethiopia, Sudan, and Somalia), camels are bred for meat (Hare, 2008). However, in the far northern part of Nigeria, they are used mainly as traction animals in addition to proving meat (Tukur and Maigandi, 1999). The slaughtering of camel as meat for human consumption is common in Sokoto, Maiduguri, and Kano states of Nigeria where their meat is ranked second to cattle (Ukashatu et al., 2012).

A unique attribute of reproduction in mammals is the ability to produce their kind (Aka and Adikpe, 2014). This is achieved through functional reproductive organs in the male and female animals. The male reproductive organs consist of the primary reproductive organ (testis) and secondary organs, including accessory sexual organs, conducting tubes, and penis. These organs may experience permanent or temporary, acquired, or genetic changes that can compromise the process of reproduction (Senger, 2015). Damage to the testicles of the male, such as in cryptorchidism, has grave consequences to the process of reproduction. Cryptorchidism is the failure of one or both testes to descend from their foetal position in the sub-lumbar region through the inguinal canal into the scrotal sac (Igbokwe et al., 2014). Descended testis is generally within the scrotum, but maybe within the abdomen, subcutis, or inguinal region in cryptorchid males (Amann and Veeramachaneni, 2006). In domestic animals, cryptorchidism has been reported in bucks, ram, boar, stallion, dog, cattle bulls, buffalo (Amle et al., 2004; Amann and Veeramachaneni, 2007). Although in Nigeria, it has only been reported in the buck (Igbokwe et al., 2009; Uchendu et al., 2015; Okpe and Anya, 2017; Oguejiofor et al., 2018) and bull (Adeyeye and Wakkala, 2013). The incidence of cryptorchidism is higher in horses followed by pigs and least in cattle. It may occur due to disordered endocrine secretion and could also be due to genetic abnormality (Arthur et al., 1989). In camels, development of the scrotal sac and descent of testes occurs between 66 and 296 days after birth. Cryptorchidism has been reported to be influenced by the ambient temperature (Bissa et al., 1988).

From literature, unilateral and bilateral cryptorchidism has been reported in the camel (Youssef, 1993; Vyas et al., 1996). To the best of our knowledge, none has been reported in camel bulls in Nigeria. Therefore, this study demonstrated a case of cryptorchidism seen during an abattoir survey.

## Materials and Methods

### *Study location*

The study was carried out at the Sokoto modern abattoir Sokoto, Sokoto State, Nigeria. The state is situated between 5º and 6º E and between 13 and 14º N and at 308 m above sea level (Figure 1). An average number of 16 camels are slaughtered at the abattoir per day, with an average number of 5 camel bulls slaughtered per day, depending on the season. This study was carried out during the raining season, when the bulls are used for draught and farm work, thereby reducing the number presented for slaughter.

### *Study Design*

A total of 171 camel bulls presented for slaughter at the abattoir were examined by palpating their scrotum for the presence or absence of testis. Any male without a scrotal testis was further examined after skinning to determine the location and position of the undescended testes. The longitudinal length, mid testicular circumference, and testicular weight of cryptorchid testes were determined as described by Abdullahi et al. (2012). Sections of the cryptorchid testis were also taken, placed in Bouins solution, and processed for histological studies as described by Alturkistani et al. (2016). These parameters were also taken from 5 scrotal testes to obtain a representative of normal scrotal testes for comparison.

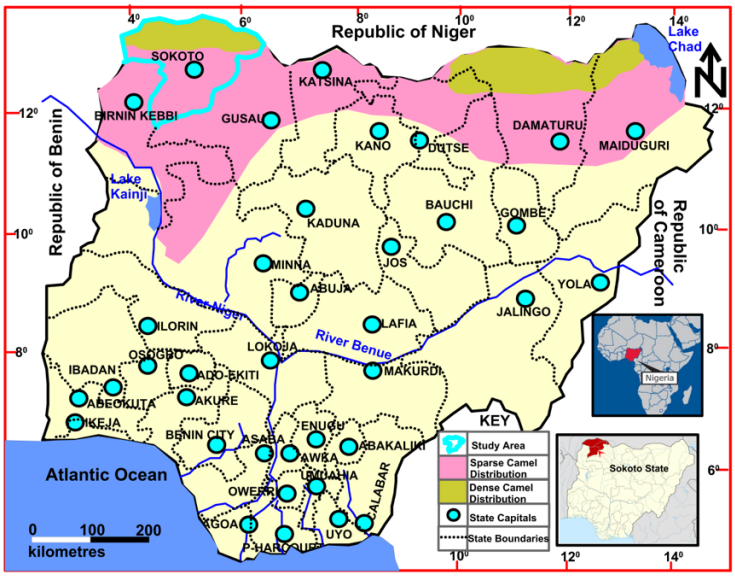


**Figure 1**: Map showing the location of Sokoto and distribution of camel in Nigeria

### *Data analysis*

Data generated were analyzed using Statistical Package for Social Sciences (SPSS) version 20.0, expressed in a frequency distribution, and presented in tables.

## Results

The overall prevalence of cryptorchidism in camel bulls slaughtered at the Sokoto modern abattoir is presented in Table (1). Out of 171 camel bulls examined, 1 (0.58%) was a bilateral cryptorchid and located in the subcutis (Table 1).

**Table 1:** Prevalence, type and location of cryptorchidism in camel bulls slaughtered at the modern abattoir Sokoto, Nigeria

| | Number examined | Number affected | Prevalence (%) |
|---|---|---|---|
| **Prevalence** | 171 | 1 | 0.58 |
| **Type** | | | |
| Unilateral | | 0 | |
| Bilateral | | 1 | |
| **Location** | | | |
| Abdominal | | 0 | |
| Inguinal | | 0 | |
| Subcutaneous | | 1 | |

The testicular morphometry of testes is presented in Table (2). The longitudinal length, mid testicular circumference, and weight of the right cryptorchid testis are 14.20 cm, 11.30 cm, and 148.40 gm, respectively, while the left was 15.50 cm, 11.50 cm, and 150.20 gm, respectively. The mean and range of longitudinal length, mid testicular circumference, and weight of the right

descended testes are 13.28 (11.5-15.1) cm, 12.40 (11.3-13.6) cm, and 142.86 (117.6-159.6) gm, respectively. The mean morphometry of the descended left is 13.68 (12.5-15.1) cm, 12.18 (11.1-13.6) cm, and 144.50 (122.6-158.4) gm. Histology of the cryptorchid testes and scrotal testes is presented in Figure (2). The cryptorchid testes had atrophic testis with disrupted architecture, marked testicular degeneration, decrease seminiferous tubules devoid of spermatid. All these were absent in the descended testes.

**Table 2:** Testicular morphometry of bilateral cryptorchid and descended testes in Nigerian camel bull

| Testicular parameter | Retained right (n = 1) | Descended right (n = 5) | Retained left | Descended left (n = 5) |
|---|---|---|---|---|
| Longitudinal length (cm) | 14.20 | 13.28 (11.5-15.1) | 15.50 | 13.68 (12.5-15.1) |
| Mid testicular circumference (cm) | 11.30 | 12.40 (11.3-13.6) | 11.50 | 12.18 (11.5-13.6) |
| Weight (gm) | 148.40 | 142.86 (117.6-159.6) | 150.20 | 144.50 (122.6-158.4) |

Values within brackets are ranges while those outside the bracket are means

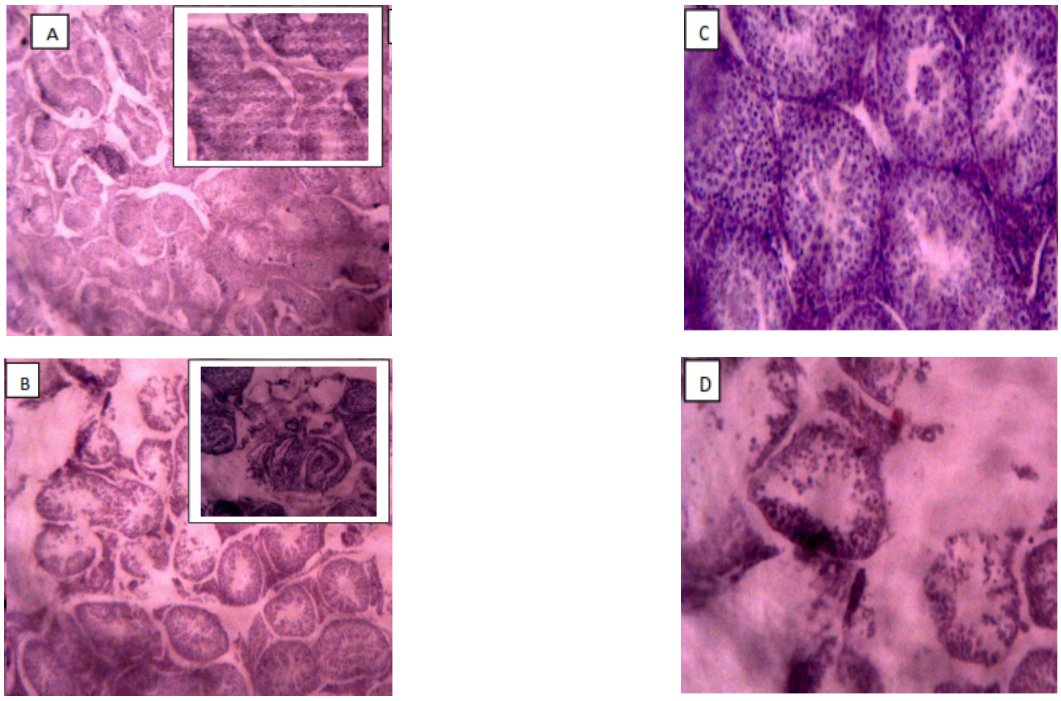


**Figure 2**: Photomicrograph of camel testis showing (A) scrotal testis with well formed semiferous tubules containing spermatids and spermatozoa (X40) (insert X250) (B) cryptorchid testis with atrophic testis with disrupted archicteture, testicular degeneration with few seminiferous tubules devoid of spermatid with prominent sertoli cells nodules (X40) (insert X250) (C) scrotal testis with well formed semiferous tubules containing spermatids and spermatozoa (X100) (D) cryptorchid testis with marked testicular degeneration, few seminiferous tubules containing sertoli cells (X100). H & E

## Discussion

The incidence of 0.58 % recorded in this study is similar to the 0.70 % reported by Hemeida et al. (1985) in Egypt. Cryptorchidism in camel bull is rarely reported, probably because few studies have been designed in that direction. The low incidence in this study may be associated with large number of males in camel herd despite the pastoral method of animal husbandry practiced by breeders in Sokoto. Pastoralism encourages inbreeding due to herding together of animals over a long period (Ogah, 2016). In contrast, many males in a herd minimize the rate of inbreeding by providing an opportunity for effective selection (Mapiye et al., 2007). The cryptorchid testis was bilateral, although unilateral cryptorchidism is more frequent in mammals (Amann and Veeramachaneni, 2006). Vyas et al. (1996) reported bilateral cryptorchidism in Bikaneri camels similar to our present study, although Youssef (1993) reported unilateral cryptorchidism in Arabian dromedary camel. It is not clear which is most common in camel species since there is little information about the condition in camels.

In this study, the cryptorchid testes were subcutaneous testis suggesting failure to complete inguinoscrotal migration to their final destination in the scrotum. Adeyeye and Wakkala (2013) observed a similar trend in cattle bulls slaughtered at the same abattoir. Subcutaneous testis is most common in humans and, to a lesser extent, in domestic animals (Amann and Veeramachaneni, 2006). The dearth or lack of information on cryptorchidism in camel bulls make it difficult to conclude on the most common location in this species. Cryptorchid testes are known to have lower testicular morphometry compared to descended testes (Amann and Veeramachaneni, 2007). However, in the present study, parameters of the cryptorchid testis were within the range of values obtained from descended testis in the present study and previous studies (Abdullahi et al., 2012), except for the longitudinal length of the left retained testis that was slightly higher than its corresponding left descended testes. Nonetheless, this did not rule out the deteriorating changes associated with cryptorchid testis caused by elevated body temperature. Histologically, the cryptorchid testes had atrophic testis with disrupted architecture, marked testicular degeneration, decrease seminiferous tubules devoid of spermatid. This is not unexpected as the body temperature cannot favour the process of spermatogenesis. Similar observations were made by Youssef (1996) in unilateral cryptorchidism of the camel bull. Spermatogenesis occurs at 2–4°C lower than body temperature. Elevated temperature causes testicular atrophy leading to spermatogenic arrest (Durairajanayagam et al., 2015), which will invariably affect camel reproduction due to reduced spermatogenic activities. In conclusion, the study showed an incident of 0.58 % of cryptorchidism in camel bulls slaughtered at the Sokoto modern abattoir. The cryptorchid testis was bilateral in nature and subcutaneously located. There were no morphometric changes in the testicular parameters, but histological changes capable of altering camel reproduction were seen. Therefore, we recommend studies on cryptorchidism in camel be designed in other regions to ascertain the true incidence of the condition using other parameters such as hormonal assay.

## Conflict of interest

The authors do not have any conflict of interest regarding the publication of this work

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