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CRYPTORCHIDISM AMONG INDIGENOUS BREEDS OF BULLS IN A SEMI-ARID REGION OF NIGERIA

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ABSTRACT

The study was carried out with the aim of determining the occurrence of cryptorchidism in bulls slaughtered at the Sokoto metropolitan abattoir. Out of 575 bulls examined, 10 (1.74%) were cryptorchid. Nine (90.00%) of this were unilateral cryptorchidism while 1 (10.00%) was bilateral cryptorchidism. Sokoto Gudali breed had the highest 5 (50.00%) occurrence followed by Red Bororo breed 3 (30.00%) then crosses 2 (20.00%) while none (0.00%) was cryptorchid among Bunaji breed. Young bulls < 1 year old were mostly affected 6 (60.00%) while bulls 1 ≥ - < 2 years, 2 ≥ - < 3 years, 3 ≥ - < 4 years and > 5 years had 1 (10.00%) each. None (0.00%) was cryptorchid among bulls 4 ≥ - < 5 years. Subcutaneous testes 9 (90.00%) occurred more than abdominal testis 1 (10.00%) while left testicles 6 (66.67%) were more affected than the right 3 (33.33%) testicle. There were significant differences ($p<0.05$) between the mean±SEM testicular length, circumference and weight of the descended and retained testes.

Key words: bull, cryptorchidism, hypoplastic, dysgenesis, infertility

INTRODUCTION

Livestock productivity is dependent on reproductive performance (17). However, reproductive diseases have serious consequents on livestock production. Cryptorchidism is one of such diseases. It is failure of one or both testes to descend into the scrotal sac (10). The disease is heritable and usually detected at birth or shortly after (1), it was thought to be caused by inbreeding and managed by culling, but genetic, epigenic and environmental factors have been incriminated in its occurrence (9). Based on recent evidence therefore, cryptorchidism is viewed as a multifactorial disease rather than a single disease, since it provides early evidence on other phenotypic defects such as tumors and defects in spermatogenesis (2). Cryptorchidism may either be unilateral or bilateral although unilateral is most common (10).

The normal position of descended testis is within the scrotum but in cryptorchidism, it may be located in the abdominal, inguinal or subcutaneous area giving the description abdominal testis, inguinal testis and subcutaneous testis respectively (1). Among domestic animals, bucks, ram, boar, stallion, dog and bulls are affected (1, 6, 7, 10). In Nigeria, information on the occurrence of cryptorchidism in bulls is scarce. Apart from studies on the reproductive performance in bulls by Kumi-Diaka et al. (13) where cryptorchidism was reported, no other study have been carried out on cryptorchid bulls to the best of our knowledge. The aim of this study was to determine the occurrence of cryptorchidism in bulls slaughtered at the Sokoto metropolitan abattoir and the prevalence of the disease among different breeds of Nigerian indigenous cattle. The abattoir is located in Sokoto state which is regarded as the second largest livestock producing state in Nigeria (18).

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MATERIALS AND METHOD

The study was carried out at the Sokoto metropolitan abattoir, Sokoto - Nigeria between May and August, 2012. Study area is located in the semi-arid zone of Nigeria (4). At the abattoir, bulls were examined after obtaining the owner`s consent. The breed of the bulls was determined using morphological characteristics as described by Wosu, (19). Briefly, Bunaji breed are white coloured, black-eared and medium-horned breed and is the most numerous and widespread of all Nigerian cattle breeds, while Sokoto Gudali breed are uniform cream, light grey coloured breed with skin folds that are highly developed and the horns are almost absent. The Rahaji breed is one of the largest zebu cattle and is distinguished by its deep red coloured coat, thick horns and pendulous ears which are long. The farming system in the semi-arid region of Nigeria is predominately pastoralist. However, a few practice intensive and semi-intensive system of husbandry.

Age was estimated using dentition. Their testes were examined immediately after slaughter prior to skinning by palpating the scrotum. Bulls with bilaterally descended testes were not examined further. However, those with one or both undescended testes were further examined after skinning. In this case, the undescended testes and their corresponding descended testes were collected by cutting off the spermatic cord. Their weight were measured using compression spring balance (Salter AT-1422 made in England) calibrated in grams. The testicular height and mid circumference were determined using a meter rule. Specimen from the undescended testis were placed in 10% formalin solution from the abattoir to the laboratory, but transferred to bouin's solution in the laboratory. The samples were processed and stained with eosin and haematoxylin. Data generated are presented in table and analyzed using descriptive statistics while mean± SEM were analysed using paired T-test.

RESULTS

The overall prevalence of cryptorchidism in bulls examined at the Sokoto metropolitan abattoir is presented in Table 1.

Table 1. Overall prevalence for cryptorchidism in bulls examined at the Sokoto abattoir

Number examined	Number cryptorchid	Prevalence (%)
575	10	1.74

Out of 575 bulls examined within the study period, 10 were cryptorchid representing a prevalence of 1.74%. The distribution of cryptorchidism according to type, breed, age and location is presented in Table 2. Nine (90.00%) of the bulls had unilateral cryptorchidism while 1 (10.00%) had bilateral cryptorchidism. Among breeds, cryptorchidism was highest 5 (50.00%) in Sokoto Gudali, followed by Red bororo 3(30.00%) then crosses 2 (20.00%) and none 0 (0.00%) was observed among Bunaji bulls. Across age groups, bulls less than 1 year had the highest 6 (60.00%) occurrence followed by bulls greater than or equal to 1 year but less than 2 years, bulls greater than or equal to 2 years but less than 3 years, bulls greater than or equal to 3 years but less than 4 years and bulls greater than 5 years with 1 (10.00%) each, while none 0 (0.00%) was seen among bulls greater than or equal to 4 years but less than 5 years. According to location of cryptorchidism, 9 (90.00%) were subcutaneous testes while 1 (10.00%) was an abdominal testis.

The position of undescended testis among the unilaterally cryptorchid bulls examined is presented in Table 3.

Table 2. Distribution of cryptorchidism according to type, breed, age and location in bulls examined at the Sokoto abattoir

	Number cryptorchid	Prevalence
Type of cryptorchidism		
Unilateral	9	90.00
Bilateral	1	9.00
Breed		
Red Bororo	3	30.00
Sokoto Gudali	5	50.00
Bunaji	0	0.00
Crosses	2	20.00
Age (years) of cryptorchid		
< 1	6	60.00
1 ≥ - < 2	1	10.00
2 ≥ - < 3	1	10.00
3 ≥ - < 4	1	10.00
4 ≥ - < 5	0	0.00
> 5	1	10.00
Location of cryptorchidism		
Subcutaneous	9	90.00%
Abdominal	1	9.00%

Six (66.67%) of them occurred on the left while 3 (33.33%) occurred on the right. The mean± SEM testicular morphometry of 8 out of 9 unilateral cryptorchid bulls is presented in Table 4. There were significant ($p<0.05$) differences between the longitudinal length of descended left testis (11.42±0.71 cm) and retained right testis (6.75±0.73 cm) as well as descended right testis (10.00±0.87 cm) and retained left testis (5.53±0.52 cm). The mid testicular circumference of descended left testis (15.83±1.49 cm) and retained right testis (9.83±1.05 cm) as well as descended right testis (13.20±1.30 cm) and retained left testis (6.05±0.05 cm) were significantly ($p<0.05$) different. The mean± SEM of testicular weight of the descended left testis (284.00±46.84 g) and retained right testis (68.00±32.53 g) as well as the descended right testis (225.00±25.00 g) and retained left testis (97.50±2.50 g) were also significantly ($p<0.05$) different.

Table 3. Position of undescended testis among unilateral cryptorchid bulls examined at the Sokoto abattoir

	Number examined	Prevalence (%)
Right	3	33.33%
Left	6	66.67%
Total	9	100.00%

Table 4. Testicular morphometry of descended and cryptorchid testes of bulls examined at the Sokoto abattoir

Testicular parameter	Descended Left	Retained Right	Descended Right	Retained Left
Longitudinal length (cm)	11.42±0.71[a]	6.75±0.73[a]	10.00±0.87[b]	5.53±0.52[b]
Mid testicular circumference (cm)	15.83±1.49[c]	9.83±1.05[c]	13.20±1.30[d]	6.05±0.05[d]
Weight (gm)	284.00±46.84[e]	68.00±32.53[e]	225.00±25.00[f]	97.50±2.50[f]

Means with the same superscript are significantly ($p<0.05$) different from each other

Figure 1 show a visibly smaller left unilateral cryptorchid testis compared to the right. The cryptorchid testis was found in the subcutaneous cavity of a Red Bororo bull. Figure 2 shows the seminiferous tubules of a cryptorchid testis with scanty cells and wide intertubular space.

Figure 1. Left unilateral subcutaneous cryptorchid with its descended right from a Red Bororo bull

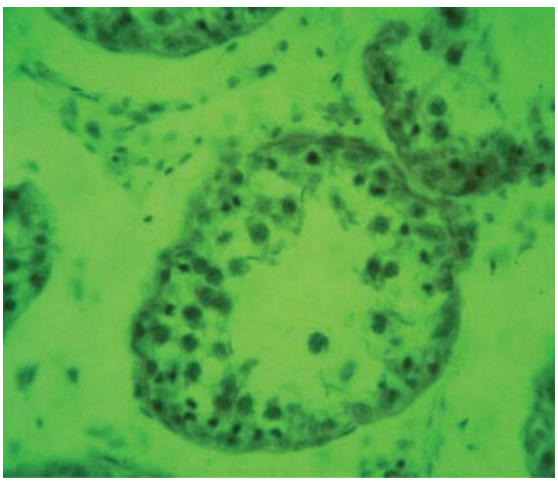

Figure 2. Seminiferous tubules of cryptorchid testis showing scanty cells and wide intertubular space. (H & E x40)

DISCUSSION

From the study, a prevalence of 1.74% was recorded for cryptorchidism in bulls. This is similar to the report of Kumi-Diaka et al., (13) although it contradicts the reports of Amann and Veeramachaneni (2), who recently reviewed cryptorchidism in animals and reported that prevalence rates in bulls is less than 0.5 %. Cryptorchidism is a hereditary condition which occurs where there is inbreeding over several generations (10). There are possibilities that inbreeding is practiced in these bulls considering the nomadic nature of livestock in Nigeria where cattle are herded together for grazing over a long period. Apart from this, exposure of females to environmental agents such as estrogenic plants during pregnancy can alter fetal development (1). There is likelihood that animals in the semi-arid region of Nigeria are exposed to these estrogenic plants particularly during the drought when there is scarcity of pasture (10). The ability of non-cryptorchid siblings to transmit cryptorchidism trait (1) maybe another possible reason.

Unilateral cryptorchidism was more frequent than bilateral cryptorchidism. This is consistent with earlier reports (2, 3, 11, 14). Cummins and Glover (5) reported that unilateral cryptorchidism causes infertility (temporal loss of procreation ability) while bilateral cryptorchidism causes sterility (permanent loss of procreation ability). However, unilaterally cryptorchid bulls are not recommended for breeding due to the heriditary nature of the condition (14). In this study, Sokoto Gudali breed

were mostly affected with cryptorchidism than other breeds examined. This is consistent with the reports of Kumi-Diaka et al. (13). Breed disposition in the occurrence cryptorchidism in bulls have not been fully established, although Barth (3) attributed the occurrence of cryptochidism to polled bulls than horned bulls. Further studies may therefore be necessary to determine the true breed disposition of cryptorchidism in animals.

Bulls less than one year old had the highest occurrence of cryptorchidism. The early discovery of the condition may be responsible for this since slaughter of young animals is a common practice in Nigerian abattoirs (15). However, culling the animals for fattening should have been a better option. Subcutaneous testis occurred more than abdominal testis. This is consistent with similar reports in human (2) but contradict the reports of Igbokwe et al. (10) in bucks. The high prevalence of subcutaneous testis over abdominal testis is unknown. However, there are possibilities that failure of the inguinoscotal migration of bull's occur more often than the inguinal migration. Apart from this, it is also possible that decreased released of androgen which mediates this final migration into the scrotal sac (8) is responsible for this.

In this study, the left testes were more affected than the right testis. This agrees with the report of Barth (3). Earlier studies on the testicles of sexually mature Bunaji breed revealed that the left testicles were more subjected to morphological defects (16) suggesting that the left testicles in bulls is more predisposed to abnormalities. There was significant decrease in the testicular morphometry of cryptorchid testes compared to the normal testes, indicating reduction in size. This is consistent with other reports (6, 10, 12). The reduction in size coupled with the high body temperature causes degeneration of the seminiferous tubules characterized by none viability of spermatogenic cells resulting in infertility (11).

In conclusion, cryptorchidism was observed to be present at a prevalence of 1.74% with unilateral cryptorchidism occurring more. Among breeds, Sokoto Gudali had the highest prevalence while bulls less than 1 year old were more affected. The testes were retained more in the sub-cutis than other abnormal areas. Significant differences ($p < 0.05$) were found between the mean testicular morphometry of retained and descended testis.

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