TESTOSTERONE CONCENTRATION LEVELS IN NORMAL AND CRYPTORCHID SHEEP

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ABSTRACT
The research was conducted to evaluate the influence of cryptorchidism on testosterone concentration in normal and cryptorchid Balami, Uda and Yankasa breeds of sheep. Eighteen (18) rams were used for the experiment, and were fed ad-lib at Kadawa Artificial Insemination Center, Kano. Blood samples of 3ml were collected via the jugular vein for enzyme Immunoassay for the Quantitative determination of testosterone in serum. Data generated were presented in charts with exceeded range of testosterone concentration levels in Balami (B3N 18 ng/ml), Uda (U2N 18 ng/ml) and Yankasa (Y1N 18 ng/ml) for normal rams, and Balami (B1UL 2.1 ng/ml, B2UR 2.1 ng/ml), Uda (U3N 2.6 ng/ml, U3N 3.8 ng/ml, U3UR 1.7 ng/ml, UIUL 8 ng/ml) and Yankasa (Y2UR 8 ng/ml and Y3UR 9 ng/ml) were within the range for normal and cryptorchid (for right and left testes) rams, and in Balami (B1N 0.001 ng/ml) and Uda (U2UR 0.001) were below the range for normal and cryptorchid (right testes) breeds of sheep respectively. It was concluded that cryptorchidism has no effect on testosterone concentration in Balami, Uda and Yankasa breeds of sheep. It was concluded that unilateral cryptorchidism has no effect on the circulating levels of testosterone in affected Balami, Uda and Yankasa breeds of sheep.
Keywords: Cryptorchidism, Testosterone, Balami, Uda, Yankasa

INTRODUCTION

Reproductive defects such as Cryptorchidism have serious effects on livestock production. Cryptorchidism is defined as the failure of one or both testes to descend into the scrotal sac (Igbokwe *et al.,* 2009) as cited by (Mahmud *el al,* 2015). Among domestic animals, bulls, rams, bucks, stallion, dog and boar are affected (Amann and Veeramachaneni, 2006; Igbokwe *et al.* 2009) as cited by (Mahmud *et al,* 2015). Cryptorchidism is an abnormality of the male reproductive system resulting from the failure of one testis (unilateral) or both testes (bilateral) to descend from the fetal position into the scrotal sac, before or shortly after birth (Amann and Veeramachaneni, 2007). Unilateral cryptorchidism is common in small ruminants and typically affects the right testis compared to the left (Igbokwe *et al.,* 2009). Unilateral cryptorchidism has been reported in different breeds of sheep and goat worldwide (Igbokwe *et al.,* 2009; Oguejiofor *et al.,* 2018).

Testosterone is secreted by the interstitial (Leydig) cells of the testis under the stimulation of luteinizing hormone (LH). An impairment in the synthesis or functions of testosterone leads to infertility due to abnormal sperm production and poor libido (Deen 2008; Lejeune *et al* 2013). The influence of unilateral cryptorchidism on circulating testosterone and gonadotrophins is highly variable depending on several factors including the species affected, the duration of cryptorchidism and whether cryptorchidism is natural or experimental (Barth hold *et al.,* 2004). Previous reports on the effect of unilateral cryptorchidism on circulating levels of reproductive hormones in WAD bucks are conflicting (Unchendu and Ezeasor 2015; Okpe and Anya 2017; Onugwu *et al.,* 2018). There is also no available information on the effect of unilateral and bilateral cryptorchidism on libido in the breeds of rams. Testosterone is a steroid known to regulate protein, lipid and glucose metabolism (Birzniece, 2018), and oxidative stress (Marine *et al.,* 2010). Unilateral cryptorchidism has been linked with increased oxidative stress in some studies (Tsounapi *et al.,* 2016). However, it is unknown if unilateral cryptorchidism can influence these physiologic processes in affected breed of rams. The aim of this research work is to evaluate the influence of cryptorchidism on testosterone concentration in normal and unilateral cryptorchid Balami, Uda and Yankasa breed of Sheep.

MATERIALS AND METHODS

The study was conducted in Kadawa Artificial Insemination (A.I) Center, Livestock Department, Ministry of Agriculture and Natural Resource, Kano. A total of eighteen (18) rams were used for this experiment, six (6) per breed of Balami, Uda and Yankasa for normal and cryptorchid sheep.

Experimental animals and Management

Animals were housed in conducive, well-ventilated pens and were provided with water and feed *ad libitum*. The animals were acclimatised for one (1) week, during which they undergo treatment for (ecto - and endo – parasites) using Ivermectin Injection subcutaneous and Vitamin. The average body weight (BW) of the normal group and cryptorchids group were recorded using a weighing scale in (Kg). Physiological parameters (rectal temperature, pulse and respiratory rates) were also be recorded.

Ethical Approval

The study was performed in accordance with the National Research Council's Guide for the Care and Use of Laboratory Animals (ILAR, 2011). Approval for ethical clearance from Experimental Animal Ethics Committee on Animal use and Care, Ahmadu Bello University, Zaria were obtained before the commencement of the research work.

Blood samples for hormonal dosage and Testosterone concentration

About 3mls of blood sample were collected for Testosterone concentration level assay. Blood samples were taken from the jugular vein of each ram. The blood was centrifuged immediately, and the serum obtained were frozen at -20ºC until testosterone is assayed. The serum testosterone concentration was determined using Enzyme Immunoassay kits (ST AIA – PACK Testosterone) for quantitative measurement of testosterone in serum on TOSOH AIA System Analyzers).

RESULTS

The results following the evaluation of testosterone concentration levels in normal and unilateral cryptorchid of Balami, Uda and Yankasa breed of sheep were presented in the figures 1, 2 and 3 below:

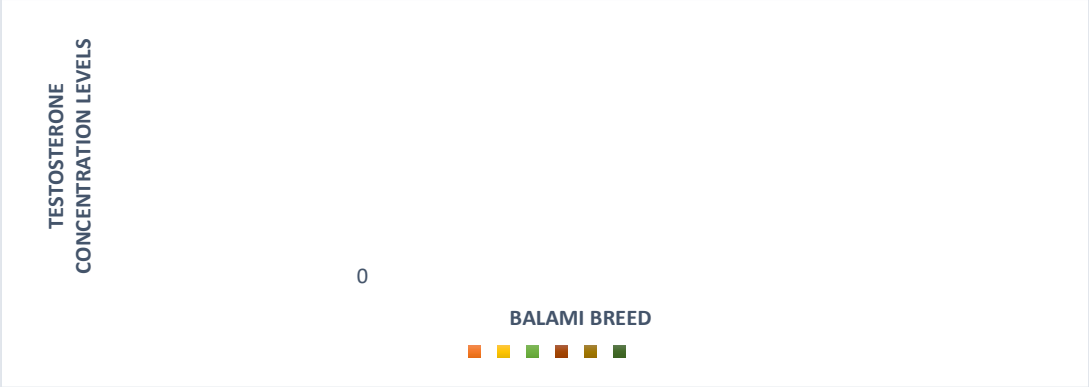


Figure 1. Comparison of serum levels of Testosterone concentration in normal and unilateral cryptorchid Balami breed of sheep

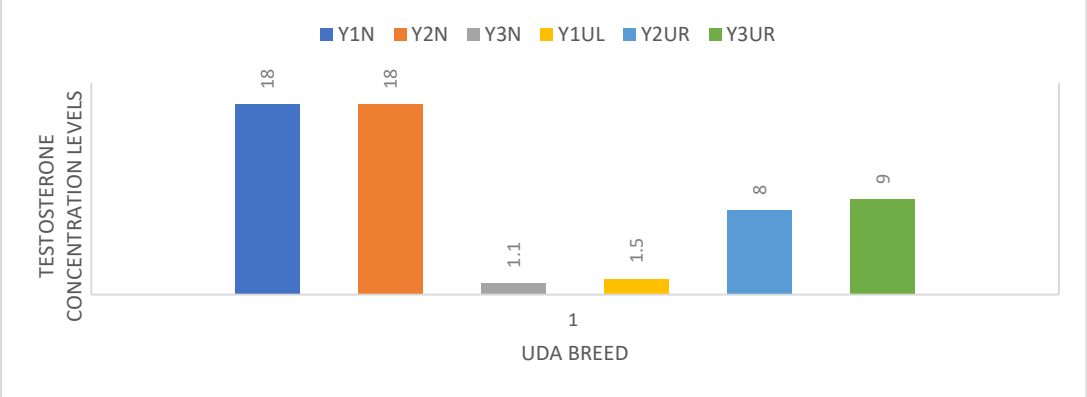


Figure 2. Comparison of serum levels of Testosterone concentration in normal and unilateral cryptorchid Uda breed of sheep.

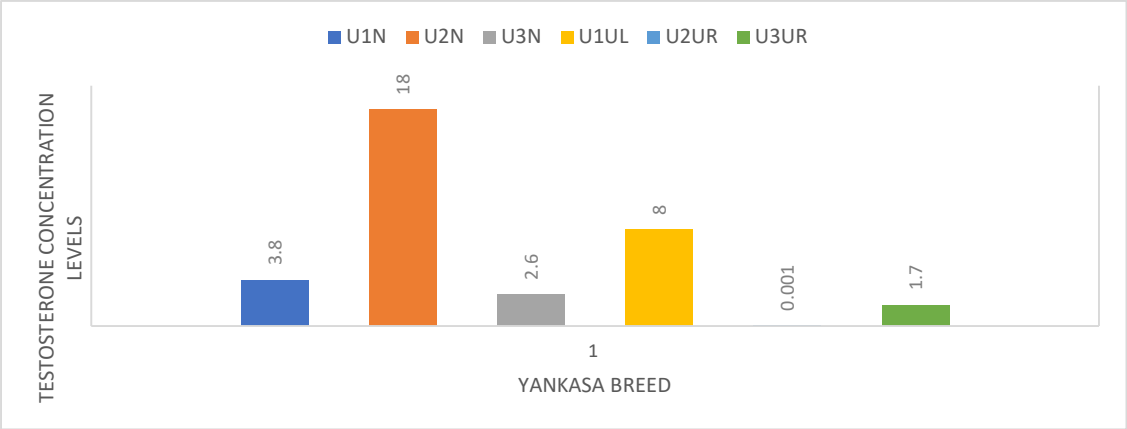


Figure 3: Comparison of serum levels of Testosterone concentration in normal and unilateral cryptorchid Yankasa breed of sheep.

DISCUSSION

Cryptorchidism, is the failure of one or both testes to descend into the scrotal sac leads to abnormal development and function of the testes as reported by Amann and Veeramachaneni (2006). Testosterone are steroid reproductive hormones produced by the testes that can influence libido (Deen, 2008) (Lejeune *et al.,* 2013) and other hormonal and metabolic physiologic processes in the body (Birzniece, 2018) (Marin *et al.,* 2010). There is limited research on unilateral cryptorchidism affecting circulating levels of testosterone in Balami, Uda and Yankasa breed of sheep, and this depend on several factors including the animal species, location and duration of cryptorchidism and whether cryptorchidism is natural or experimental.

The normal range for testosterone concentration level in rams is between 2 – 10 ng/ml of blood which depends on breed, age, season, nutrition and health status as reported by Perkins and roselli (2007). In this research, the exceeded range of testosterone concentration level in Balami (B3N 18 ng/ml), Uda (U2N 18 ng/ml) and Yankasa (Y1N 18 ng/ml) for normal rams, and Balami (B1UL 2.1 ng/ml and B2UR 2.1 ng/ml), Uda (U3N 2.6 ng/ml, U3N 3.8 ng/ml, U3UR 1.7 ng/ml and UIUL 8 ng/ml), Yankasa (Y2UR 8 ng/ml and Y3UR 9 ng/ml) are within the range of testosterone concentration level for normal and cryptochid (right and left testes), and below the range of testosterone concentration level in Balami (B1N 0.001 ng/ml) and Uda (U2UR 0.001) for right testes, breed of sheep respectively. One study Okpe and Anya (2017) reported higher serum levels of testosterone concentration in unilateral cryptorchid bucks. In contrast, other studies did not find any effect on serum testosterone concentration as mentioned by Onugwu *et al.,* (2018) and both testosterone and the gonadotrophins as reported by Uchendu and Ezeasor (2015) which are in agreement with the findings in this research. These conflicting observations may be due to breed differences or differences in the methods and times of sample collection relative to any sexual activation or breeding. However, our findings suggest that unilateral cryptorchidism has no effect on the circulating levels of testosterone in affected Balami, Uda and Yankasa breed of sheep.

CONCLUSION

Unilateral cryptorchidism has no effect on testosterone concentration levels in Balami, Uda and Yankasa breeds of sheep. Rams with cryptorchidism should not be selected for breeding to avoid increasing the prevalence of unilateral cryptorchidism due to its genetic trait.

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