

## UNILATERAL SPERMATIC CYST AND GRANULOMA IN THE BOVINE EPIDIDYMIS

### CISTO ESPERMÁTICO E GRANULOMA UNILATERAL EM EPIDÍDIMO BOVINO

Haroldo Francisco Lobato Ribeiro<sup>1</sup>

Sebastião Tavares Rolim Filho<sup>2</sup>

Vitória Fonseca Rodrigues<sup>3</sup>

Juliana Vasconcelos Figueiredo<sup>4</sup>

Renzo Brito Lobato<sup>5</sup>

Larissa Cristina Silva Teixeira<sup>6</sup>

**ABSTRACT:** In the bull, efferent tubules have gray-green appearance and can be visually differentiated from the rest of the tissue in the epididymal. Often, some sperm are trapped and die, relieving mycolic acid to produce a granulomatous reaction. Spermiostasis and sperm accumulation a consequence of the distention of abnormal efferent or epididymal tubules, with secondary formation of sperm granulomas in the region of the epididymal head. This condition is common in male goats and perhaps in sheep, less common in bulls. This study aimed to describe the macroscopic, histopathological and ultrasound aspects of sperm cyst and granuloma in a Sindhi breeder in Belém, Pará.

**Keywords:** Bovine testes. Cyst. Epididymis. Spermatic granuloma.

**RESUMO:** No touro, os túbulos eferentes têm aparência cinza-esverdeada e podem ser diferenciados visualmente do resto do tecido no epidídimo. Frequentemente, alguns espermatozoides ficam presos e morrem, liberando o ácido micólico para produzir uma reação granulomatosa. A espermiostase e o acúmulo de espermatozoides são consequência da distensão de túbulos eferentes ou epididimários anormais, com formação secundária de granulomas espermáticos na região da cabeça do epidídimo. Esta condição é comum em caprinos e em ovinos, menos comum em touros. Este estudo teve como objetivo descrever os aspectos macroscópicos, histopatológicos e ultrassonográficos de cisto espermático e granuloma em um criador de Sindi em Belém, Pará.

**Palavras-chave:** Cisto. Epidídimo. Granuloma espermático. Testículos bovinos.

<sup>1</sup>Professor Titular. Setor de Reprodução Animal. Instituto de Produção e Saúde Animal. UFRA. Belém. Pará. Brasil, Médico Veterinário graduado pela Universidade Federal Rural da Amazônia Doutorado em Ciência Animal pela Universidade Federal de Minas Gerais. Orcid: 0000-0002-6706-2404.

<sup>2</sup>Professor Adjunto. Setor de Reprodução Animal. Instituto de Produção e Saúde Animal. UFRA. Belém. Pará. Brasil, Médico Veterinário graduado pela Universidade Estadual do Maranhão, Doutorado em Ciência Animal pela Universidade Federal do Pará. Orcid: 0000-0002-0478-9040.

<sup>3</sup>Médica Veterinária graduada pela Universidade Federal Rural da Amazônia, Mestranda em Reprodução Animal, programa ReproAmazon, pela Universidade Federal Rural da Amazônia. Orcid: 0000-0003-2002-8222.

<sup>4</sup>Médica Veterinária graduada pela Universidade da Amazônia, Mestranda em Reprodução Animal, programa ReproAmazon, pela Universidade Federal Rural da Amazônia. Orcid: 0000-0001-8480-4441.

<sup>5</sup>Médico Veterinário graduado pela Universidade Federal Rural da Amazônia Residente em Reprodução Animal, Comissão de Residência Multiprofissional em Saúde (COREMU), pela Universidade Federal Rural da Amazônia. Orcid: 0000-0003-1595-3616.

<sup>6</sup>Médica Veterinária graduada pela Universidade Federal Rural da Amazônia Mestranda em Reprodução Animal, programa ReproAmazon, pela Universidade Federal Rural da Amazônia. Orcid: 0000-0002-6675-1718.

## INTRODUCTION

The Sindhi breed originates from the region called Kohistan, in the northern part of Sindh Province, nowadays Pakistan. Sindhi has dairy and meat aptitude however dairy farming is the most used (IBGE, 2022). The creation of the Sindhi breed has proved to be a safe market, mainly in the dairy activity and in the differential of its genetic components, adding commercial value and attributing greater interest in the exploitation of the breed, in addition to its ability to tolerate climatic conditions in hot and humid environments such as Amazon, Brazil. A<sub>2</sub> milk has the characteristics of having its digestion facilitated by the absence of type A<sub>1</sub> beta-casein. Research shows that 90% of Sindhi cows are A<sub>2</sub>A<sub>2</sub>, indicating the breed's enormous genetic potential for producing A<sub>2</sub> milk (IBGE, 2022).

However, despite its proven importance, data related to male reproductive aspects are still incipient. Anomalies of the epididymis can be congenital or hereditary and that spermiostasis is a consequence of aberrant efferent tubule distention (Roberts, 1971). According to (Roberts, 1971), it is more likely that the enlargement of the epididymal head is due to secondary granulomas due to anomalies of the efferent conduits. The spermatic granuloma develops secondary to the stop of the sperm flow, due to blockage of the efferent ducts and accumulation of spermatozoa in the abnormal epididymis ducts, according to (Mcentee, 1990). The objective of this report is to describe a case of unilateral spermatic cyst and granuloma in the head of the left epididymis in a Sindhi bovine, in the city of Belém-Pará, Brazil. Used as a sire, with a dubious reproductive history.

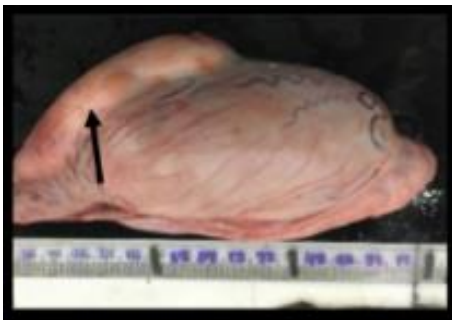
## CASE REPORT

10-year-old Sindhi cattle, weighing 480 kg, used as a breeding bull, in the city of Belém, (01°27'20" south latitude and 48°30'15" west longitude of Greenwich), state of Pará. The examination showed asymmetry of the scrotum and increased size of the head of the left epididymis. From the history, he had excellent libido, however, notes of repeating heats of cows in the herd. Semen was collected by electro ejaculation the volume measured in a graduated test tube was 1.0ml. On a slide heated to 37°C, a drop of semen was observed using a biological microscope with a 10x objective to measure the turmoil with a coverslip previously heated on a slide with a drop of semen diluted in saline, we observed motility with a 20x objective. By the Neubauer camera the concentration was  $9 \times 10^6$  ml. We performed a smear and stained with the rapid panoptic and observed 200 sperm with a 100x objective. The morphology was 10.5% major defects and 16% minor. Doppler ultrasound

examination was performed with a microconvex transducer (frequency 5.0 Mhz) of the testicle and epididymis in a longitudinal and transversal manner. Then bilateral and epididymal orchiectomy. To evaluate spermatogenesis by means of a histopathological slide of the testicular parenchyma, epididymal and testicular fragments were collected these fragments were fixed for 24 hours in Bouin's liquid, washed in water and ethanol (70%) and kept in ethanol (70%). Subsequently, the samples were placed in paraffin, sectioned with 5.0µm thickness and stained with hematoxylin and eosin.

Clinical examination revealed asymmetry between the epididymis with prominent enlargement and flaccid consistency of the head of the left epididymis (Figure 1)

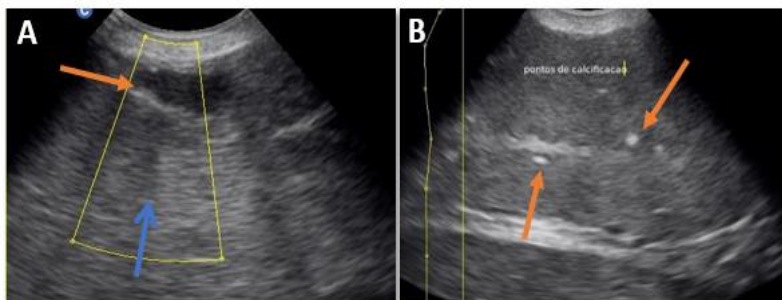
Figure 1- Increase in the head of the left epididymis. Granulomatous appearance (arrow).



Authors (2022)

Ultrasonography in the left epididymis revealed a cystic cavity and irregular parenchyma with anechoic and hypoechoic images. In the testicular parenchyma, we observed focal and diffuse hyperechoic points, characterized as moderate to severe degenerative lesions, compromising spermatogenesis (Figure 2)

Figure 2 - (A) Image of the epididymis showing cystic cavity (orange arrow) and testicular parenchyma (blue arrow); B - Image of the left testicle with several hyperechoic points of severe degenerative lesions. (Orange Arrow).

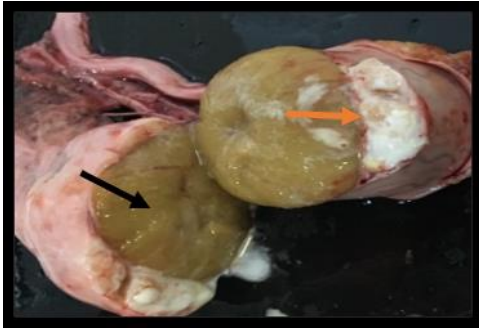


Authors (2022)

According to the spermogram, the color of the ejaculate was translucent, the whirlwind score was 1.0, the motility was 50%, the concentration was 9 x 10<sup>6</sup> ml, and the morphology was 10.5% of major defects and 16% of minor defects. After orchiectomy to

remove the epididymis and testicles from the scrotum, in cross-section, we observed a whitish creamy exudate on the head of the left epididymis (Figure 3).

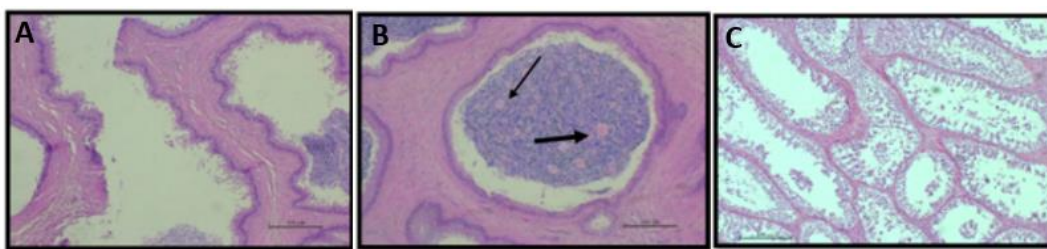
Figure 3 - Cross section of the Testis (black arrow) and spermatic granuloma in the epididymal head (Orange arrow).



Authors (2022)

In the histopathological examination of the epididymis, we observed a thick intertubular space, dilated lumen, forming cystic cavities of the efferent ducts with accumulation of sperm (spermiostasis). In the testes, an advanced degenerative process of the seminiferous tubules, marked loss of the germinal epithelium, abundant pyknotic and necrotic cells, vacuolated sertoli cells and a thickened basement membrane (Figure 4).

Figure 4 - (A) Cystic dilatation of the efferent duct lumen in the epididymis head. 10.0x objective. HE; (B) Intratubular spermatic granuloma and formation similar to Langhans cells (arrows). HE 10.0 x objective; (C) Severe degenerative process, seminiferous tubules without germ cells, thick intertubular space. 10 x objective. HE.



Authors (2022)

## DISCUSSION

Anomalies of the epididymis can be congenital or hereditary and that spermiostasis is a consequence of aberrant efferent tubule distention (Roberts, 1971). According to Roberts (1971), it is more likely that the enlargement of the epididymal head is due to secondary granulomas due to anomalies of the efferent conduits. In this etiopathological context, McEntee (1990) mentions that the spermatic granuloma develops secondary to the stop of

the sperm flow, due to blockage of the efferent ducts and abnormal accumulation of sperm in the epididymal ducts.

The typical sterile granuloma develops in the head of the epididymis and is a frequent cause of sterility in male sheep and goats (Buergelt, 1997). Researchers reported an occurrence of 21.6% of lesions, including spermatic static, granuloma and scarring, due to sperm arrest in the efferent tubules of cattle (Wu, 1981). Ultrasound showed a cystic cavity with an anechoic image. As the study reported that sperm cysts and granuloma are rare; however, it has been described in all domestic species (Williams et al., 2010).

The authors reported a case of a cyst on the head of the epididymis of a Holstein bull. By histopathology we diagnosed the presence of sperm granuloma. In this aspect, Ali et al. (2011) studied ten cases of infertility in buffalo bulls and observed one case of spermatocele (cyst) with the presence of sperm granuloma in the epididymal head. Examined 59 Nellore's bulls, two cases (3.3%) of cysts in the testicular parenchyma were found and nine cases (14.7%) of testicular calcification, characterized by hyperechoic points (Sousa et al., 2015). The spermogram revealed low motility (50%) and a high percentage of major pathologies (10.5%). According to Ahmad e Noakes (1995) and McEntee (1990) cited definite evidence of alterations in sperm due to problems in the epididymis, resulting in reduced or absent motility, necrospermia associated with bent or curled tails.

The bull in this report was 10 years old and with a history of repeated heats. Colin et al (1962) and Dawson (1938) respectively, have reported on a decline in fertility as bulls aged. In one survey reported a decrease in fertility of 0.31 to 0.51% per year in more than 150 bulls used in A.I. based on the rate of non-return (Colins et al., 1962). Sonographic changes were visualized in the left epididymal head and in the testicular parenchyma.

The lesions caused by the age of the animal, associated with spermiostasis are similar to those described by Ahmad e Noakes (1995) in Goats and Sheep with chemically induced testicular and epididymal lesions, where the tail of the epididymis presented with anechoic areas with well-defined hyperechoic edges along the ultrasound. Studies have observed similar hyperechoic areas in the parenchymal testis of infertile goats and being diagnosed as testicular degeneration presenting a characteristic similar to the present study. The sonographic findings found in the present study are also consistent with those found by Karaca et al. (1999) in animals with spermatic granulomas in the tail of the epididymis due to interruption of semen flow. Ultrasonography and histopathology showed a severe degenerative process. Testicular degeneration is an important cause of infertility among

males of all species. This disorder tends to develop progressively with age. Establishing the cause in most cases is difficult. There are several specific causes, including obstruction of sperm flow Buergelt (1997). In a study by Cardilli et al (2009) in 114 Nelore bulls, the authors reported, that three animals showed ultrasound-diagnosed hyperechoic calcification spots.

## CONCLUSION

This study concluded that the ultrasonography is valid for diagnostic complementation of the testes and epididymis and is an indispensable tool in the investigation of subclinical pathologies of the male reproductive system. In addition, the age, spermatic granuloma and testicular degenerative process were the causes of the animal's reproductive incapacity.

## REFERENCES

AHMAD N. & Noakes D.E. 1995. A clinical and ultrasonographic study of induced testicular and epididymal lesions in goats and ram. **Animal Reproduction Science**, 39(1): 35-48. DOI: [https://doi.org/10.1016/0378-4320\(95\)01378-D](https://doi.org/10.1016/0378-4320(95)01378-D).

AHMAD N., England G.C.W., Noakes, D.E. 2000. Ultrasonography of spontaneous lesions of the genital system of three rams, and their influence on semen quality. **Veterinary Record**, 146(1): 10-15. DOI: <https://doi.org/10.1136/vr.146.1.10>.

ALI K.M., Ahmad N., Akhtar N., Ali S., Ahmad M. & Younis M. Ultrasound imaging of testes and epididymides of normal and infertile breeding bulls. **Pakistan Veterinary Journal**, 31(4) p. 345-350. 2011.

BUERGELT C.D. Chapter 5. Accessory Male Sex organs. In, Color Atlas of Reproductive Pathology of Domestic Animals. Ed. Mosby. St Louis Missouri. p. 60-61. 1997.

CARDILLI D.J., Toniollo G.H., Pastore A.A., Canola J.C. & Mercadante M.E.Z. Alterações do padrão ultrassonográfico do parênquima testicular em bovinos jovens da raça Nelore, jovens da raça Nelore. **Acta Scientiae Veterinariae**, 37(4) p. 367-370. 2009

COLLINS W.E., Inskeep E.K., Dreher W.H., Tyler W.J. & Casida I.E. Effect of age on fertility of Bulls in Artificial Insemination, **Journal of Dairy Science**, 45(8) 1005 DOI: [https://doi.org/10.3168/jds.S0022-0302\(62\)89545-9](https://doi.org/10.3168/jds.S0022-0302(62)89545-9). 1962.

DAWSON J.R. The breeding efficiency of proved Aged Sires, **Journal of Dairy Science**, 21(11): 725. DOI: [https://doi.org/10.3168/jds.S0022-0302\(38\)93027-9](https://doi.org/10.3168/jds.S0022-0302(38)93027-9). 1938.

IBGE. 2022 – Instituto Brasileiro de Geografia e Estatística. Censo Brasileiro de 2020. Rio de Janeiro.



KARACA F., Aksoy M., Kaya A., Ataman M.B. & Tekeli T. Spermatic granuloma in the ram: Diagnosis by ultrasonography and semen characteristics. **Veterinary Radiology and Ultrasound**, 40(4): p. 402-406. 1999. DOI: <https://doi.org/10.1111/j.1740-8261.1999.tb02132.x>.

MCENTEE K. Chapter 16. Efferente ductules, Epididymis and deferent duct. In, **Reproductive Pathology of Domestic Mammals**. Academic press, Inc. New York. p.316-318. 1990.

ROBERTS S.J. 1971. Infertilidad en animales macho. Capitulo XVIII. In, "Veterinary Obstetrics and Genital Diseases (*Teriogenology*). 2<sup>sd</sup> edition. Ithaca, New York (distributed by Edwards Brothers, Michigan). p. 903-909.

SOUSA K.C., Rolim Filho S.T., Ribeiro H.F.L & Vale W.G. Ultrasound as tool for diagnosis of diseases of the reproductive tract bulls. **Archives of Veterinary Science**, 20(3): p. 89-99. 2015.

WILLIAMS H.J., Revell S.G., Scholes S.F.E., Courtenay A.E & Smith R.F. Clinical, Ultrasonographic and Pathological Findings in a Bull with Segmental Aplasia of the Mesonephric Duct. **Reproduction in Domestic Animals** 45(1): p. 212-216. 2010.

Wu F. Sperm stasis and related lesions of the ductuli efferents in the epididymis of the bull- A study of 953 cases. **Journal of the Chinese Society of Veterinary Science**, 7 (1) p. 95-102, 1981.