Epidemiological aspects of surgical diseases of the genital tract in a population of 12,320 breeding bulls (1982-2007) in the state of Goiás, Brazil

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ABSTRACT

The genital tract of bulls might be affected by diseases that result in coeundi impotence leading to decrease of reproductive efficiency. Anatomic, breed and handling aspects are considered predisponent factors to genital injuries. In this study, it was considered 12,320 bulls evaluated between 1982 and 2007. From these, 898 (7.29%) bulls had some reproductive tract disease corrected surgically, diagnosed by specific clinical examination of the genitalia or service capacity test. At the same time, questionnaire was applied in order to obtain information related to genital diseases epidemiology. From 898 ill bulls, 741 (82.52%) were Bos indicus, 133 (14.81) were Bos taurus and 24 (2.67%) were crossbred bulls. It was observed that 570 (63.50%) were ≥60 months-old, 220 (24.5%) were between 40 and 60 months-old and 108 (12.0%) were ≤40 months-old. Among the diagnosed diseases, independent of breed, age and handling, it was identified 728 (81%) cases of acropostitis-fimosis, 46 (5.20%) penis deviation, 23 (2.60%) gland fibropapilloma, 14 (1.60%) preputial abscesses and 11 (1.20%) penile fractures. From 417 visited farms, 256 (61.50%) treated the disease empirically, ignoring previous diagnosis. Thus, it can be concluded that handling and breed characteristics were the main predisposing factors related for the etiopathogeny of reproductive tract diseases.

KEY WORDS: Bovine, epidemiology, reproduction.

RESUMO


O aparelho genital do touro pode ser acometido por enfermidades que resultam em impotência coeundi, levando à queda na eficiência reprodutiva. Aspectos anatômicos, raciais e manejo são considerados fatores predisponentes de injúrias à genitalia. Neste estudo, catalogaram-se 12.320 touros entre 1982 e 2007, sendo que, destes, 898 (7.29%) eram portadores de alguma enfermidade cirúrgica no aparelho reprodutor, diagnosticados pelo exame clínico específico da genitália ou por meio do teste de capacidade de serviço. Concomitantemente, aplicou-se questionário para obtenção de informações relacionadas à epidemiologia das enfermidades genitais. Dos 898 touros enfermos,
741 (82.52%) eram zebuínos, 133 (14.81%) taurinos e 24 (2.67%) mestiços. Observou-se que 570 (63.5%) possuíam idade igual ou superior a 60 meses, 220 (24.5%) entre 40 e 60; e 108 (12.0%) inferior a 40 meses. Dentre as enfermidades diagnosticadas, registraram-se 728 (81%) casos de acropostite-fimose, 46 (5.20%) desvios penianos, 23 (2.60%) fibropapiloma de glande, 14 (1.60%) abscessos prepuciais e 11 (1.20%) fraturas penianas. Dos 417 produtores rurais visitados, 256 (61.50%) efetuavam, empiricamente, tratamento das enfermidades, ignorando a importância do diagnóstico. Concluiu-se que o manejo e a característica racial foram os principais fatores predisponentes relacionados à etiopatogenia das enfermidades do aparelho reprodutor.

PALAVRAS-CHAVES: Bovino, epidemiologia, reprodução.

INTRODUCTION

The genital tract of bulls may be affected by diseases which lead to deficiency of sperm production (impotentia generandi), difficulty or inability to copulate and loss of libido (impotentia coeundi). These events result in low herd reproductive efficiency, causing damage mainly in extensive productive systems. Although the impotentia coeundi has not been frequently studied, HAFEZ (2004) pointed out that the decrease or loss of libido or ability to copulate are the main forms of bull infertility.

According to MEMON et al. (1988), DESROCHERS et al. (1995) and RABELO et al. (2006), pendulous prepuce and internal preputial sheath, a wide preputial orifice and agenesis or atrophy of the penis retractor muscle are considered to be predisposing factors related to the mechanism of male bovine genital diseases. PARKER et al. (1987) reported that the etiology of various injuries, mainly traumatics, of the bull reproductive tract, has been established. However, some epidemiological aspects need to be explained and require further research. Among the recently explained factors, the abovementioned demonstrated that handling and breed characteristics of bovines are relevant to the occurrence of male genital diseases.

Despite the relevance of epidemiological data for the understanding and control of diseases responsible for genital tract injuries in bulls, there is little up-to-date information of about it in either regional or national literature. Moreover, according to TROCÓNIZ et al. (1991) and FRENEAU & GUIMARÃES (2000), new studies deal mainly with questions related to impotentia generandi in male bovines and give less importance copulation as an important component of bull reproductive performance.

WALKER (1984) and KAMILOGLU et al. (2004) evaluated data concerning preputial and penile disorders affecting bulls on rural Turkish properties between 2000 and 2003. They showed the prevalence of certain diseases, the most affected breeds, prevention measure and the economic impact of these diseases on production systems. Besides epidemiology, WALKER (1984) also emphasized the importance of phases associated with copulation in subsidiary diagnosis. This study, carried out on North American herds, established that it is essential to observe of precoitus, preparation, service, trial, penis intromission and ejaculation to clearly understand the genital problems in breeding bulls.

Thus, the objective of this study is to provide a retrospective diagnosis and evaluate epidemiological aspects of surgically-treated external genitalia disorders of bulls of different breeds and ages in the state of Goias in a population of 12,320 male bovines between 1982 and 2007.

MATERIAL AND METHODS

This study was carried out between 1982 and 2007 on 417 farms in the state of Goias, Brazil. The properties were selected exclusively on the basis of the presence of bulls with external genitalia diseases which made it difficult or impossible for the animals to copulate or led loss of libido. The total herd population on all the farms was 12,320 animals, with 898 showing surgically treatable reproductive tract disease. These animals were from different breeds and their ages varied from 25 to 120 months.
All visits occurred at the request of the owner. The owners’ main complaint was the presence of reproductive abnormalities affecting one or more bulls which led to an inability to copulate. The animals were given a general clinical examination followed by a genital examination. Some bulls required loco-regional anesthesia for pudendal and hemorrhoidal nerves desensitization and penis exposition for diagnosis, in accordance with GILBERT (1989) and SILVA et al. (1998).

When these procedures failed, the service capacity test was performed as suggested by SANTOS et al. (2004). This test is based on observation of the bull’s sexual behavior in the presence of a female in natural or therapeutically induced estrus as proposed by CHAVES (2002). To induce estrus in a non-pregnant adult female bovine, intramuscular estradiol cypionate (ECP®- Merial Animal Health, Campinas-SP) was used on, at a dosage of 14mg/kg, in a single application. The female was used in the service capacity test from 18 to 24 hours after induction until the observation of the characteristic signs of receptiveness in the bull.

The bulls were tested individually for ten minutes each. The exposure and orientation of the penis during the test, lesions in penile and surrounding tissue, libido and coitus were observed, among others things. When possible, the animals were treated surgically according to TURNER & MCLWRAITH (1985), EURIDES et al. (1996), HOOPER (2004), SILVA et al. (2004), BENTO (2005) and GARNERO & PERUSIA (2006). In untreated cases, the animals were killed.

In addition, a questionnaire based on THRUSFIELD et al. (2005) was answered by the owner, manager or technical professionals. The main questions were related to breed and age of the sick bulls, the season of the diseases’ greatest incidence, pasture characteristics, reproductive handling, evolution of the disease, prevention and treatment, damage to the animal, what happened to sick animals and whether there was adequate technical support in the region to deal with these kinds of diseases.

The data were analyzed using descriptive statistics in the form of graphs and tables based on CURI (1997).

RESULTS AND DISCUSSION

Among the 12,320 bulls considered in this study, 898 (7.9%) showed injuries to external genitalia which interfered with coitus to differing degrees. Similar results were obtained by SAUNDERS & LADDS (1978) in an examination of 968 bulls at slaughterhouses, of which 68 (7.0%) showed lesions on reproductive organs.

The questionnaire revealed that 741 (82.52%) of the animals were zebus, 133 (14.81%) Bos taurus and 24 (2.67%) crossbred (Bos indicus x Bos taurus). The greatest frequency (54.70%) of lesions in the external genitalia of Zebu bulls was observed in Nellores (405 animals). Gyr, Tabapuã, Brahman, Indubrazil and Guzerath presented, respectively, 265 (35.76%), 29 (3.90%), 18 (2.43%), 15 (2.0%) and 9 (1,21%) sick animals (Figure 1-A). In the Bos Taurus group, the highest frequency of lesions (31.58%) was observed in Holsteins (42), followed by Santa Gertrudis, Simentals, and Brown Swiss totaled 26 (19.52%), 15 (11.30%), 11 (8.30%) and 39 (29,30%) sick bulls, respectively (Figure 1-B). In the crossbred group, the highest frequency of injuries (96%) was related in Giro-landos (23 bulls).

The higher occurrence of preputial diseases in Bos indicus bulls compared to Bos taurus, as observed in this study, may be related to anatomical characteristics, such as pendulous prepuce and inner preputial sheath and wide preputial orifice, which are inherited and characteristic of zebu breeds. MEMON et al. (1988), DESROCHERS et al. (1995) and VIU et al. (2002) referred to these characteristics and associated them with the etiology of such diseases as acroposthitis-phimosis and anterior preputial diverticulitis. In addition, the same authors reported that bulls with agenesis or atrophy of the prepuce retractor muscle may show chronic prolapse of the inner preputial sheath, predisposing them to injuries and consequently loss of service capacity. Therefore, it is important to relate these anatomic conditions to the genesis of acroposthitis-phimosis, which would explain the great number of cases observed in this study.
Another factor that could be related to the etiopathogeny of genital diseases are poorly maintained or weed-infested pastures that may cause preputial lesions, as observed by RABELO et al. (2006). Besides, according to SILVA et al. (1998), the contact with thorny plants is related to hemorrhagic fistulas and prepuce lesions. However, PARKER et al. (1987) did not observe the relationship between genital lesions and weeds in North American. This fact may be associated to appropriate management of animals and pasture.

The visits to 417 farms and questionnaire analysis established that 388 farms (93.04%) employed natural stud management, with or without a stud farm and without a controlled stud system. On these properties, animal grazing occurred on poorly maintained pastures with an excess of weeds such as “wolf apple” (*Solanum lycocarpum*), “unha de gato” (*Acacia plumosa*) and “malícia” (*Mimosa sensitiva*) among others, as also observed by MARQUES et al. (1988), VAN SAUN & CISZEWSKI (1989) and ISA et al. (2001). These authors added that poor bull prepuce hygiene is an important factor in the occurrence of genital diseases.

As far as age is concerned, 570 (63.5%) of the 898 affected bulls were 60 months old and older, 220 (24.5%) were between 40 and 60 months old and 108 (12.0%) were younger than 40 months old. A similar situation was described by RIET-CORREA et al. (1979), who observed the occurrence of lesions in 80.8% of bulls older than 36 months. BLOCKEY et al. (1984) noticed spiral-like penis deviation in beef bulls and reported that the prevalence of the disease increased significantly in older breeding bulls.

Independently of genital disease, it was observed that the highest occurrence of injuries was observed at the end of the breeding period. Acroposthitis-phimosis and penis deviation were the most prevalent of these diseases, affecting 81.5% and 5.2% of the bulls, respectively. In addition, SILVA et al. (1994) reported that controlled breeding or a long breeding periods were related to a large incidence of traumatic events in the course of copula, but did not specify the periods of greatest incidence of bull genital lesions.

The clinical genital examination using local anesthesia for pudendal and hemorrhoidal nerves desensitization proved to be an efficient procedure to diagnose most cases of such diseases as deep phimosis and penile fibropapilloma. In studies of bull genital tract illness in Brazil, SILVA et al. (1998), SIQUEIRA et al. (2000) and RABELO et al. (2006) highlighted the importance for diagnosis of a detailed clinical examination of the reproductive tract. The method of anesthesia employed in this study was recommended by WALKER & VAUGHAN (1980), GILBERT (1989) and GARNERO & PERUSIA (2006) for penis exposition to confirm diagnoses and proved to be efficient and safe.

During this study, in some cases, specific clinical examination did not permit identification
of the type of disease, even after the bull’s infertility was noted by the owner. In these cases, it was necessary to use the service capacity test based on SANTOS et al. (2004). This method was effective, since it permitted the diagnosis of bull genital abnormalities not detected during clinical examination. A similar procedure was recommended by MCDIARMID (1981) for detection of penile diseases, mainly in cases of penile deviation and rudimentary penis, which explains its use in this study.

Six of the diseases diagnosed had the highest incidence irrespective of breed, age or type of management. In 898 male bovines with genital diseases, acroposthitis-phimosis was detected in 728 (81%), penile deviation in 46 (5.20%), glans fibropapilloma in 23 (2.60%), preputial abscesses in 14 (1.60%), penile deviation in 11 (1.20%) and other diseases in 76 (8.4%) animals (Table 1). In Figure 2 (A and B), percentages of penile and preputial lesions in certain bovine breeds are shown. These results were different from those of KAMILOGLU et al. (2004), who found penile fractures in 42 (28%), glans fibropapillomas in 29 (19.30%), acroposthitis-phimosis in 22 (14.60%) and phimosis in 22 (14.60%) of the bulls.

In 728 bulls with acroposthitis-phimosis, six breeds were most affected: Nellore, Gyr, Tabapuã, Santa Gertrudis, Brahma and Indubrazil with 380 (52.20%), 252 (34.60%), 22 (3.0%), 19 (2.60%), 15 (2.05%) and 11 (1.50%) of the diseased bulls, respectively. These results confirmed the predisposition of zebus and some Bos taurus breeds to this illness, considering their anatomical characteristics, as observed by GIBBONS (1956), SILVA et al. (1998) and RABELO et al. (2006).

Forty-six cases of penile deviation diagnosed. Six (13%) were observed in Holstein bulls, five (10.80%) in Gyr and Santa Gertrudis and four (8.7%) in Nellore or Brown Swiss bulls. Thirty one (67.5%) bulls were under 60 months of age. The owners reported that of these animals, mainly the Holsteins, showed adequate libido. The incidence of penile deviation was different from that of other genital diseases reported in this study, since older and zebu bulls were most affected. Based on this finding, it could be inferred that early and inappropriate breeding and a height disproportion between young bulls and females could compromise penile penetration. These factors, when they cause injuries to tunica albuginea or dorsal apical ligament of the penis, could promote acquired penile deviation or penile fractures as described by ASHDOWN & SMITH (1969) and BENTO (2005).

**TABLE 1.** Absolute numbers and percentages reproductive tract diseases in 898 bulls of different breeds and ages on 417 farms in the state of Goias, Brazil, between 1982 and 2007

<table>
<thead>
<tr>
<th>Reproductive tract diseases</th>
<th>Affected bulls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escrotal abscess</td>
<td>03 0.30</td>
</tr>
<tr>
<td>Preputial abscess</td>
<td>14 1.60</td>
</tr>
<tr>
<td>Acroposthitis-phimosis</td>
<td>728 81.0</td>
</tr>
<tr>
<td>Balanoposthitis</td>
<td>02 0.20</td>
</tr>
<tr>
<td>Penile deviation</td>
<td>46 5.20</td>
</tr>
<tr>
<td>Preputial dilaceration</td>
<td>02 0.20</td>
</tr>
<tr>
<td>Anterior preputial diverticulitis</td>
<td>05 0.60</td>
</tr>
<tr>
<td>Posterior preputial diverticulitis</td>
<td>03 0.30</td>
</tr>
<tr>
<td>Glans fibropapilloma</td>
<td>23 2.60</td>
</tr>
<tr>
<td>Preputial fibropapilloma</td>
<td>03 0.30</td>
</tr>
<tr>
<td>Phimosis</td>
<td>19 2.20</td>
</tr>
<tr>
<td>Fistula hemorrhagic</td>
<td>02 0.20</td>
</tr>
<tr>
<td>Penile fracture</td>
<td>11 1.20</td>
</tr>
<tr>
<td>Persistent frenulum</td>
<td>07 0.80</td>
</tr>
<tr>
<td>Inguino-escrotal hernia</td>
<td>01 0.10</td>
</tr>
<tr>
<td>Umbilical hernia</td>
<td>01 0.10</td>
</tr>
<tr>
<td>Orchitis</td>
<td>03 0.30</td>
</tr>
<tr>
<td>Paraphimose</td>
<td>11 1.20</td>
</tr>
<tr>
<td>Bifid penis</td>
<td>01 0.10</td>
</tr>
<tr>
<td>Rudimentary penis</td>
<td>04 0.50</td>
</tr>
<tr>
<td>Traumatic testicle</td>
<td>04 0.40</td>
</tr>
<tr>
<td>Testicle tumor</td>
<td>05 0.60</td>
</tr>
<tr>
<td>Total</td>
<td>898 100</td>
</tr>
</tbody>
</table>
The service capacity test cited by MARTINS (2002) and SANTOS et al. (2004) was essential in order to confirm and classify penile deviation. However, SILVA et al. (1998) and GARNERO & PERUSIA (2006) found that local anesthesia of the pudendal and hemorrhoidal nerves was more efficient in diagnosing other disorders. MCGOWAN et al. (2002) evaluated 473 Santa Gertrudis bulls without local anesthesia and reported that the principal lesions were persistence of frenulum, 20 (4.23%), chronic epididimitis, 14 (2.95%) and balanoposthitis, 8 (1.79%). Using the service capacity test as employed in this study, on 179 Red Belmont bulls, these authors observed four (2.23%) animals with lateral or ventral penile deviation. In a study of 1,083 British beef bulls, BLOCKEY et al. (1984) reported that 60% of the herd was affected by spiral penile deviation in various degrees, confirming the importance of this test in diagnosing reproductive tract diseases.

In farms where penile or preputial fibropapilloma was detected, the farm owners observed that the disease was observed in other animals in cutaneous form. This fact suggested the possibility of a relationship between the two forms of disease. Of 26 cases of penile or preputial fibropapilloma, only two (7.7%) were not accompanied by cutaneous papillomatosis. FERREIRA et al. (1983) and SILVA et al. (2002) described this possibility. Sodomy, specially when detected in young bulls, could be the cause of traumatic glans lesions, favoring infection of the penile epithelium by the agent according to these authors.

In spite of the small number of cases of persistence of preputial frenulum in this study, this disease was detected in four (57.15%) of seven animals with low efficiency on the libido test. Young animals presented a less marked attraction to females in comparison to others bulls. For this
reason, it is reasonable to consider that sexually
cold bulls masturbated infrequently, contributing
to the persistence of preputial frenulum after pu-
berty.

Of the 14 cases of preputial abscesses, nine (64.28%) were found in *Bos Taurus* and six (36%) in Holstein bulls. External parasites such as the flea larvae *Dermatobia hominis* and the *Boophilus microplus* tick or a lack of hygiene in
the shearing of preputial hairs were the mainly
causes. Inadequate acclimatization to warm and
rainy weather, particularly in Center West of
Brazil, undoubtedly facilitated infestation. The
great degree of parasitism, inappropriate treat-
ment and an excess of mud in corrals favored dirt
accumulation in the prepuce and, consequently,
the appearance of preputial abscesses as repor-
ted by FIGUEIREDO et al. (1999). To support
this theory, six (42.86%) animals were observed
to have mucosal ulcers near the preputial ostium
and mycosis prior to the formation of preputial
abscess.

The preputial lacerations observed during
the study were related to injuries caused by bar-
bed wire when animals jumped over run through
fences, behavior considered typical of irascible
or poorly managed animals. SILVA et al. (1998)
also considered barbed wire accidents, swine bi-
tes and poultry pecks in the etiopathogeny of pre-
putial injuries

An important finding was that, of the far-
mers 256 out of 417 (61.50%) treated genital di-
seases empirically and rejected adequate clinical
examination. This situation condemned a large
number of animals to slaughter, including valu-
able bulls. A similar situation was described by
KAMİOĞLU et al. (2004), between 2000 and
2003, in 150 cases of penile and preputial disor-
ders. Twenty five (16.70%) bulls were discarded
without clinical evaluation or therapeutic and/or
surgical treatment.

These results showed the importance of
this research, particularly because it involves an
understanding of the etiopathogeny, risk factors
and preventive procedures for diseases which
affect external male bovine genitalia, as well as
their economic impact in the production system.

CONCLUSIONS

On the basis of this study, it can be con-
cluded that: (1) epidemiological factors were re-
lated to a high occurrence of reproductive tract
diseases in bulls with multifactorial origin; (2)
Handling and breed characteristics of the bulls
were decisive in the etiopathogeny of bull geni-
tal diseases.

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