Study on Gross Testicular Disorders of Bulls Slaughtered at Addis Ababa Abattoirs Enterprise

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Abstract: A cross-sectional study using systematic random sampling was conducted on ante mortem and postmortem examination of 384 intact bulls slaughtered at Addis Ababa Abattoirs Enterprise (AAAE) from November, 2009 up to April, 2010 to identify different types of testicular disorders of the bull presented to the abattoir and to determine the rate of occurrence of each disorder and also to assess the associated risk factors. Out of 384 intact bulls examined 337 were local, 29 cross and 18 exotic breeds brought from different market areas in the country, of which 117 (30.4%) have scrotal and testicular disorders. During study time various testicular defects such as scrotal torsion, scrotal wound, orchitis, epididymitis, testicular hematoma, testicular degeneration, testicular hypoplasia and cryptorchidism with the prevalence of 1%, 4.7%, 4.4%, 3.4%, 2.1%, 8.1%, 3.6% and 2.6% respectively were identified. Only testicular degeneration has significant association with age ($\chi^2 = 8.9$, $P < 0.05$).

Key words: Addis Ababa Abattoirs Enterprise · Intact Bull · Testicular Disorder

INTRODUCTION

Agriculture (mainly crop and livestock production) is the mainstay of the sub-Saharan countries and for 85% of Ethiopian population. Livestock production accounts for approximately 30% of the total agricultural gross domestic production and 16% of national foreign currency earnings. The population of cattle in the country is estimated at 41.5 million comprising 99.4% indigenous (zebu), 0.5% cross and 0.1% exotic breeds which are mainly kept under smallholder subsistence farming [1] from this 43.12 million cattle population are for the rural sedentary areas of, of which 55.41% are females and 44.59 are males [2].

In Ethiopia the productivity like meat, milk, cheese, butter, export commodities (live animals, hide, skin) and draught power of livestock does not commensurate with the large size due to various reasons such as occurrence of diseases, poor management systems, inadequate nutrition and animal health services, selection and improvement for productivity [1].

Reproductive performance is one of the major determinants of cattle productivity in any production systems. The contribution of the bull either through the natural mating or artificial insemination (AI) is the determinant factor, because each bull represents half of the genetic composition of its progeny and many cows can be inseminated with the semen of a single bull [3].

Failure of many bulls to breed consistently and efficiently has been reported to be associated with the production of poor quality semen due to the pathology of testes and accessory glands. Gross testicular pathology is classified as congenital causes like hypoplasia and cryptorchidism and acquired causes like testicular degeneration, orchitis, calcification, testicular hematoma and epididymitis. All of the abnormalities have a negative effect on productivity and fertility of the bull [4].

Pathologic condition of testes, epididymis and seminal vesicle have been recognized to interfere with fertility by disturbing spermatogenesis or sperm maturation, leading to abnormal semen characteristics or preventing the passage of spermatozoa from testes to...
urethra [5]. Some of such disease conditions include: testicular degeneration, orchitis, hematoma and epididymitis. The possible causes of these acquired testicular abnormalities are infectious agents, nutrition, management factors, thermal influence and age [4, 6].

Infertility is a global problem, but the highest prevalence is within low resource countries, particularly in sub-Saharan Africa where infection related tubal damage is the commonest case. Acute or chronic, localized or systemic infectious diseases are common causes of bull infertility and testicular degeneration in Ethiopia due to wide spread presence [7].

Bulls which are older than seven years have 0.3 to 0.5% reductions in fertility due to lower sperm production owing to higher incidence of lesions such as testicular fibrosis and tubular calcification that develops testicular degeneration [8]. Testicular disorders of bull has a great economic effect due to reduction in fertility rate of cows in Ethiopia because most of the people are dependent on pastoral and agro pastoral practices and this practice is mostly extensive farming system [2, 9]. The farmers didn’t use artificial insemination rather they use their bulls for natural mating without selecting healthy, good sexual desire or good fertilization capacity bulls. The objectives of this study were: (1) to identify the different types of gross testicular disorders of the bull presented to Addis Ababa Abattoirs Enterprise, (2) to determine the rate of occurrence of the observed disorders and (3) to examine the associated risk factors.

MATERIALS AND METHODS

Study Area: The study was conducted in Addis Ababa, the capital city of Federal Republic of Ethiopia, at Addis Ababa Abattoirs Enterprise. Addis Ababa is located at an elevation of 2020-2500 meters above sea level.

Study-Animals and Sampling Strategy: A cross-sectional study design was employed to identify major testicular disorders and possible risk factors on intact bulls. The study was conducted on intact bulls slaughtered at Addis Ababa Abattoirs Enterprise from November, 2009 to April, 2010. The study animals comprise of male indigenous, exotic and cross breeds of cattle which brought from different areas of the country like Harare, Jima, Nazreth, Wolayta and others. Age of the animal was estimated by dentition [10].

To determine gross testicular disorders of bulls, ante mortem and postmortem examination were employed. During examination attention was given to the scrotum and testes of intact bulls to identify scrotal defects and gross testicular disorders by careful visualization and palpation followed by postmortem examination by making lateral dissection to visualize the cut surface whether it bulges out or not according to [4]. Accordingly; 384 intact bulls were selected and examined using systematic random sampling technique with 95% confidence interval; at 5% desired absolute precision and 50% expected prevalence to give maximum sample size [11].

Data Management and Analysis: Data generated from ante mortem and postmortem inspection was recorded in the Microsoft excel 2007 program and analyzed by using SPSS version 17. The significance of association among the risk factors and the case was determined by Chi-square test at p ≤ 0.05.

RESULT

Prevalence and Proportion of Ante Mortem and Postmortem Examination Disorders: The possible defects of the scrotum on ante mortem examination were scrotal torsion and scrotal wound with the prevalence of 1% and 4.7%; and 3.4% and 15.4 % case proportion respectively. Among the lesions on postmortem examination testicular degeneration, orchitis, testicular hypoplasia, epididymitis, cryptorchidism and testicular hematoma were identified with 8.1%, 4.4%, 3.6%, 3.4%, 2.6% and 2.1% prevalence and 26.5%, 14.4%, 12%, 11%, 10.3% and 6.8% case proportion respectively (Table 1).

Ante Mortem Examination Disorders

Postmortem Examination Disorders: Among the postmortem examination disorders, age has significant association with testicular degeneration ($\chi^2 = 8.9$ and $P = 0.012$) (Table 3).

DISCUSSION

The prevalence of gross testicular disorders from ante mortem and postmortem examination during the study period was 30.4% (117 cases from 384 intact bulls examined). This result is not far below with the report of 41% in UK [12]. Out of this 18.8% (22 out of 117 cases) were scrotal defects found during ante mortem examination which is not far below from 28%. This variation might be due to the exclusion of penile disorders in this study. These scrotal defects were scrotal torsion (1%) and scrotal wounds (4.7%) are similar with 1.03% and 4.3% respectively [13] in Canada. None of the scrotal defects have significant association ($p > 0.05$) with the risk factors.
Table 1: Prevalence and case proportion of ante mortem and postmortem examination disorders

<table>
<thead>
<tr>
<th></th>
<th>Ante mortem</th>
<th>Post mortem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ST</td>
<td>SW</td>
</tr>
<tr>
<td>Frequency</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>Prevalence</td>
<td>1</td>
<td>4.7</td>
</tr>
<tr>
<td>Case proportion</td>
<td>3.4</td>
<td>15.4</td>
</tr>
</tbody>
</table>

Table 2: Ante mortem examination defects based on breed, age and origin of bulls

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total examined</th>
<th>Scrotal Torsion (%)</th>
<th>Scrotal Wound (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>337</td>
<td>4 (1.1)</td>
<td>17 (5.1)</td>
<td>21 (6.2)</td>
</tr>
<tr>
<td>Cross</td>
<td>29</td>
<td>0 (0)</td>
<td>1 (3.4)</td>
<td>1 (3.40)</td>
</tr>
<tr>
<td>Exotic</td>
<td>18</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>4 (1)</td>
<td>18 (4.7)</td>
<td>22 (5.7)</td>
</tr>
</tbody>
</table>

$\chi^2 = 0.56$, $P = 0.75$

Table 3: Summary of postmortem examination gross testicular disorders based on breed, age and origin of bulls slaughtered in Addis Ababa Abattoirs

<table>
<thead>
<tr>
<th>Enterprise</th>
<th>Total No (%)</th>
<th>Hypoplasia (%)</th>
<th>Cryptorchidism (%)</th>
<th>Orchitis (%)</th>
<th>Epididymitis (%)</th>
<th>Hematoma (%)</th>
<th>Degeneration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>337 (87.8)</td>
<td>13 (3.8)</td>
<td>11 (3.3)</td>
<td>16 (4.75)</td>
<td>12 (3.6)</td>
<td>7 (2)</td>
<td>28 (8.3)</td>
</tr>
<tr>
<td>Cross</td>
<td>29 (7.6)</td>
<td>1 (3.4)</td>
<td>1 (3.4)</td>
<td>0 (0)</td>
<td>1 (3.4)</td>
<td>1 (3.4)</td>
<td>2 (6.8)</td>
</tr>
<tr>
<td>Exotic</td>
<td>18 (4.7)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (5.6)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (5.5)</td>
</tr>
<tr>
<td>Total</td>
<td>384 (100)</td>
<td>14 (3.6)</td>
<td>12 (3.1)</td>
<td>17 (4.4)</td>
<td>13 (3.4)</td>
<td>8 (2.1)</td>
<td>31 (8.1)</td>
</tr>
</tbody>
</table>

$\chi^2 = 3.94$, $P = 0.42$

$\chi^2 = 4.39$, $P = 0.355$

$\chi^2 = 3.94$, $P = 0.42$

$\chi^2 = 4.39$, $P = 0.355$

$\chi^2 = 0.39$, $P = 0.582$

$\chi^2 = 1.2$, $P = 0.56$

$\chi^2 = 0.4$, $P = 0.82$

$\chi^2 = 1.09$, $P = 0.582$

$\chi^2 = 0.56$, $P = 0.75$

$\chi^2 = 0.84$, $P = 0.65$

$\chi^2 = 0.4$, $P = 0.82$

$\chi^2 = 0.84$, $P = 0.65$

$\chi^2 = 0.4$, $P = 0.82$

$\chi^2 = 0.84$, $P = 0.65$

$\chi^2 = 0.4$, $P = 0.82$

$\chi^2 = 0.84$, $P = 0.65$

$\chi^2 = 0.4$, $P = 0.82$
Fig. 1: Testicular calcification

Fig. 2: Unilateral testicular degeneration

Fig. 3: Testicular abscess

Fig. 4: Unilateral hypoplasia of testes

All pictures taken from bulls slaughtered at Addis Ababa Abattoirs Enterprise (Migbaru, 2010)

During postmortem examination of 384 intact bulls 95 bulls have gross testicular disorders that are 24.7% from the total (384) and 81.2% of the total cases (117) of both ante mortem and postmortem defects. In this study testicular degeneration was the most frequently encountered (8.1%) testicular disorder which is comparable with the report of 7.6 ± 1.9% in Belgian Blue bulls and 10 ± 4% in Holstein Frisian bulls in Belgium [14]. This is because most adverse conditions like high ambient temperature or pyrexia from disease stress due to excessive physical work and also produced by other gross lesions like orchitis, epididymitis. Orchitis and epididymitis were the second and third prevalent defects with 4.4% and 3.4% prevalence respectively [15]. The rest were testicular hypoplasia 3.6% which has a negative effect on semen quality and volume [5] and Cryptorchidism with the frequency of 3.1% which affects spermatogenesis by inhibiting testicular thermoregulation [16] and also testicular hematoma with 2.1% prevalence.

In this study only testicular degeneration had significant association ($\chi^2 = 8.9, p < 0.05$) with the age but not to the other risk factors. The absence of significant association between the ante mortem and postmortem examination defects with the risk factors except testicular degeneration might be due to different possible reasons, considered as limitations of this study. These are low number of young bulls came to the abattoir, management (farming) system variation and difficulty to know the specific environmental conditions even if in the same source. Therefore, to know the effect of these risk factors on reproductive organ disorders of intact bulls needs farther research by taking proportional samples from each type of management system, age group, breed and also environmental conditions [17]

CONCLUSION AND RECOMMENDATIONS

The result of this study indicates that high number of intact bulls have gross testicular disorders which can affect the fertilization capability of breeding bulls. From this study antemortem disorders are due to poor management like scrotal trauma by noxious agents and kick wounds and also ectoparasite infestation around the scrotum that causes scrotal dysfunction. Postmortem disorders may be due to localized/ systemic diseases and congenital defects like cryptorchidism and testicular hypoplasia. Also the study indicates that high rate of gross testicular disorders were on aged intact bulls (≥6 years).

Based on the above conclusion the following recommendations are forwarded:

- Selected breeding bulls must be kept in good management system and should not be aged.
- Research must be done routinely on the problem regard to the reproductive performance of bulls in farm level.
ACKNOWLEDGMENT

The researchers are greatly indebted to Haramaya and Addis Ababa Universities for financial support and also their thanks extend to Addis Ababa abattoirs enterprise for permission to conduct the research there.

REFERENCES