Observations on the prevalence of caprine mastitis in relation to predisposing factors in Maiduguri

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Abstract

Mastitis in goats was investigated by a survey made in four locations of Maiduguri Metropolitan Council. A total of 300 goats were examined. The results of physical examinations of mammary glands by palpation and milk secretion were used to determine clinical mastitis. Bacteriological examination of milk samples was done in all milk collected from mastitic goats and some selected control animals. A total of 51 (17%) goats had mastitis; out of these 16 (31%) had both halves of the udder affected, whereas the remaining 35 (68%) had only one half of udder affected. Of the 50 samples from apparently normal goat udders, 20 (40%) had bacterial growth. There was no association between teat diameter, teat-end-to-floor distance and mastitis ($p > 0.05$). There was an association between teat injuries and mastitis ($p < 0.05$). Staphylococcus aureus and Escherichia coli were most commonly isolated from the mastitic goat udders. Other bacteria isolated were coagulase negative Staphylococci, Bacillus spp, Corynebacterium pseudotuberculosis, Pseudomonas aeruginosa, Klebsiella pneumoniae and Proteus mirabilis.

It is suggested that because of the prevalence of mastitis in this species, farmers should be made aware of the problem so as to institute preventive and control measures to reduce losses due to this condition in dairy goats.

Keywords: Caprine mastitis; Predisposing factors; Nigeria

1. Introduction

It has been established that mastitis is the most important disease in the dairy industry irrespective of species of the animal (Bozhilov, 1970). It is a disease that can cause devastating effects to a farmer because of serious economic losses. Previous studies on the disease in Nigerian breeds of goats (Addo et al., 1980; Ameh et al., 1993) showed that the disease is of economic importance in the small scale dairy industry in Nigeria. Because commercial dairy production in Nigeria is non-existent, problems associated with mastitis in goats are not appreciated by the small scale farmers (Addo et al., 1980).

Goats are widely distributed in Nigeria with about 25% being concentrated in the Maiduguri area. There are 21 million goats in Nigeria and if the production of goats is properly coordinated, the supply for animal protein requirements of consumers will be improved immensely (Ajayi et al., 1987).

Apart from being a good source of protein and calcium, goat milk has a high proportion of small fat globules facilitating easy digestion. It is said to be
less likely to cause milk allergy in infants than cow milk (Chineme and Addo, 1984).

Various factors predispose goats to mastitis (Mackenzie, 1976; Seykora and McDaniel, 1986). However, there were no reports on the role of teat end to floor distance, teat diameter and teat end shape (Inverted/pointed) on mastitis in Nigeria goats. Therefore, this paper reports on the prevalence of caprine mastitis in relation to these possible predisposing factors.

2. Materials and methods

2.1. Source of samples/study area

Milk samples were collected from does (at different stages of lactation) on goat farms located within and around Maiduguri.

2.2. Survey for clinical evidence

The breeds of goats sampled were Borno White, Borno red, Sahel and their crosses by hand milking. All the does in each farm were evaluated for clinical evidence of mastitis. The udder was subject to a thorough physical examination which consisted of visual observation and manual palpation of the individual half of the udder and the teats. Standardised forms were developed and used for all the flocks to record pertinent biodata on each doe. These were age, breed, teat lesions/injuries, teat end to floor distance, teat diameter, and state of the mammary glands. The goats sampled ranged from 1 to 5 years of age. Does were judged as mastitic by the results of physical examination of the udder, teat, milk quality and bacteriological examination of the milk. A total of 300 goats were examined for clinical evidence.

2.3. Bacteriological examination of milk

Milk samples were collected from clinically affected udders with mastitis and unaffected udders. Milk samples were obtained aseptically in sterilised sample bottles. Samples were brought immediately on ice (Coleman Flask) to the Veterinary Microbiology Laboratory, University of Maiduguri.

Prior to half sampling the initial stream of fore milk was discarded. 63 milk samples were collected from does with mastitis and examined bacteriologically. 50 milk samples from apparently normal goats and apparently normal udders were examined bacteriologically. A wire loop was used for milk inoculation into 5% human blood and MacConkey agars (Chineme and Addo, 1984). Plates were incubated aerobically at 37°C for 24–72 h, and examined every day for bacterial growth. Organisms were examined for their morphological, staining, cultural characteristics and their biochemical reactions according to standard methods (Cowan and Steel, 1974; King, 1983).

2.4. Statistical analysis

The significance of differences between means was determined by student’s t-test, and chi-square test was used to determine significant differences between different variables. Differences were considered significant at \( P \leq 0.05 \).

3. Results

3.1. Prevalence of clinical mastitis

Among 300 goats investigated, 51 were found mastitic. Of the 51 goats with mastitis, 16 (31%) had both udders affected. In the does with unilateral mastitis, the number of cases was significantly \( (P < 0.05) \) different between left and right udders (Figs. 1 and 2).

There was no significant difference between teat diameter, teat-end-to floor distance on mastitis (Table 1) \( (P > 0.05) \) and also the mean teat end to floor distance of the mastitic goats (28.44 cm) was similar to that of the apparently normal goats (29.128 cm).

Teat injuries of one form or the other were recorded in 11 does of which 9 had mastitis. There was association between teat injuries and mastitis \( (P < 0.05) \). Similarly there was an association of teat end shape (inverted or pointed) and mastitis \( (P < 0.05) \). On the state of mammary gland, it was found that goats between the age of 2–5 years of age were prone to mastitis from one form or another (Table 2). Among the breeds, the Borno White with 25 (49%) had the greatest number of cases and this was followed by Borno Red 18 (35%) and the Sahelian crosses 8 (15%).
Among the 63 mastitic milk samples examined, there was no bacterial growth in 21 (33%). Thirty (48%) grew one bacterial colony while 12 (19%) showed mixed bacterial infections.

From the apparently normal milk samples, 20 (4%) yielded bacterial growth, 15 (30%) grew one bacterial pathogen and 5 (10%) yield mixed bacterial growth. 30 (60%) samples were negative for isolates on culture.

On the basis of frequency of isolation, Staphylococcus aureus (37%) occurred most commonly. Other bacteria isolated were coagulase negative Staphylococci (6%), Corynebacterium Pseudotuberculosis (4%), Escharichia coli (14%), Klebsiells pneumoniae (8%), Pseudomonas aeruginosa (8%), Proteus mirabilis (2%) and Bacillus spp (2%) from the affected goats.

4. Discussion

This study has shown that dairy goat at various ages were susceptible to mastitis. This study also revealed that, acute, subacute and chronic mastitis was more

Table 1

Means, ranges, standard deviations and test of significance of teat-end-to-floor distance and teat diameter on mastitic and apparently normal goats

<table>
<thead>
<tr>
<th>Udder measurement (cm)</th>
<th>Does with mastitis</th>
<th>Does without mastitis</th>
<th>P (α) = 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Range</td>
<td>SD</td>
</tr>
<tr>
<td>Teat-end-to-floor distance</td>
<td>28.51</td>
<td>19.0–35.1</td>
<td>3.41</td>
</tr>
<tr>
<td>Teat diameter</td>
<td>1.11</td>
<td>0.4–3.5</td>
<td>0.60</td>
</tr>
</tbody>
</table>

Fig. 1. Heavily affected right half of the mammary gland.

Fig. 2. Bilateral involvement of mammary gland with the left half been most affected.
prevalent in the does between the ages of two and five years than in goats between 1 and 2 years of age and this conforms with earlier reports (Dodd, 1985; East et al., 1987; Ameh et al., 1993).

The predominance of staphylococcal mastitis in does has been reported (Falade, 1977; Ajayi et al., 1987). The results of the present survey showed that *Staphylococcus aureus*, by far was the most frequently isolated bacterium from the does with mastitis. However, coagulase negative Staphylococci and coliforms were the most common bacteria isolated from the apparently normal udders of does in this study. This has been reported by Bozhilov (1970).

Previous communications are consistent with our findings that bacteria causing mastitis can be isolated from apparently normal ruminant mammary glands (Falade, 1977; Addo et al., 1980; Chineme and Addo, 1984; Ameh et al., 1993). The higher prevalence of *Staphylococcal (S. aureus)* intrammary infection can be a public health food safety problem.

Teat end to floor distance in the mastitic does was found to decrease with increasing prevalence of mastitis. This observation was not statistically significant (P > 0.05). This is in agreement with previous reports (Higgins et al., 1960; Seykora and McDaniel, 1986).

Similarly there was no association between teat diameter and mastitis (P > 0.05). This corroborates well with Seykora and McDaniel (1986).

Goats with inverted or pointed teat ends had more cases of mastitis than goats with normal teat end shapes. This difference in the number of cases was significant (P < 0.05) and has been reported earlier (Lojda et al., 1976). However, others (Neumann, 1975; Habel et al., 1979; Bakken, 1981), did not find any association between teat end shape and mastitis. We found in this study that there was association between teat injuries and mastitis (P < 0.05) and this supports the view of earlier workers (Ekesbo, 1966; Pearson and Mackie, 1979; Saloniemi and Roine, 1981).

In conclusion, our study has shown that goats were predisposed to mastitis from certain factors/causes. It is recommended that farmers should be aware of these causes and institute measures that will minimise losses.

**References**


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Table 2

Number of samples collected from 51 mastitic and 50 apparently normal goats grouped according to age and clinical state of the gland

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Apparently normal goat glands</th>
<th>Clinical state of the mammary gland</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Acute</td>
</tr>
<tr>
<td>1–2</td>
<td>6 (12.0)</td>
<td>2 (3.92)</td>
</tr>
<tr>
<td>2–3</td>
<td>13 (26.0)</td>
<td>3 (5.88)</td>
</tr>
<tr>
<td>3–4</td>
<td>17 (34.0)</td>
<td>5 (9.80)</td>
</tr>
<tr>
<td>4–5</td>
<td>10 (20.0)</td>
<td>7 (13.73)</td>
</tr>
<tr>
<td>≥5</td>
<td>4 (8.0)</td>
<td>1 (1.96)</td>
</tr>
</tbody>
</table>

Numbers in parentheses denote percentages.


