

## Prevalence of microorganisms associated with udder infections in dairy goats on small-scale farms in Kenya

E N Ndegwa<sup>a</sup>, C M Mulei<sup>b\*</sup> and S J M Munyua<sup>a</sup>

### ABSTRACT

Six hundred and thirty clinically-normal milk samples from dairy goat flocks comprising a mixed population of German Alpine, Toggenburg, Saanen and Galla crosses were examined over a 3-month period to determine the prevalence of bacterial organisms. Bacteria were isolated in 28.7 % of the milk samples (181/630) either singly (92.8 %) or in combination (7.2 %). The most prevalent bacterial organisms were *Staphylococcus* spp. (60.3 %), followed by *Micrococcus* spp. (17.7 %), *Acinetobacter* spp. (5 %), *Actinomyces* spp. (5%) and *Streptococcus* spp. (1.1 %). The *Staphylococcus* spp. were mainly coagulase negative (64.3 %). Coagulase-negative staphylococci and coagulase-positive staphylococci accounted for 37.5 % and 22.7 % respectively of the total bacteria isolated. The isolation of bacteria, some of which are important in clinical and subclinical mastitis, in apparently normal caprine milk, indicates that particular attention should be given to the management of these dairy goat flocks in order to avoid the development of cases of clinical mastitis.

**Key words:** dairy goats, Kenya, microorganisms, udder infection.

Ndegwa E N, Mulei C M, Munyua S J M Prevalence of microorganisms associated with udder infections in dairy goats on small-scale farms in Kenya. *Journal of the South African Veterinary Association* (2001) 72(2): 97–98 (En.). Department of Clinical Studies, University of Nairobi, PO Box 29053, Nairobi, Kenya.

This study was carried out to determine the prevalence of intra-mammary bacterial infections in healthy dairy goats in the central Kenyan highlands, where the highest density of dairy goats in Kenya occurs, in order to formulate mastitis control measures in the flocks.

The investigation was carried out in 7 dairy goat farmer groups. All the does that were in different stages of lactation from all the dairy goat groups were sampled once a month for 3 months. The number of does sampled were 130 in the 1st month, 108 in the 2nd month and 77 in the 3rd month. The decrease in the number of does sampled in the 2nd and 3rd months was due to drying off of some of the does. The does were mainly German Alpine crosses with a few Toggenburg, Saanen and Galla crosses. The mammary glands of the does were examined visually for any injuries or swellings and by palpation for consistency and warmth. The first streams of milk from each mammary gland half were macroscopically examined. After discarding the first 3 streams of the fore

milk, a 20 ml milk sample was collected aseptically from each mammary gland half into sterile Bijoux bottles. The milk samples were kept at 4 °C until bacteriologically processed in the laboratory between 3 and 6 h after collection. In the laboratory the milk samples were streaked onto sheep blood and MacConkey agar plates and incubated aerobically at 37 °C for 48 h. Significant bacterial colonies at 24 and 48 h were selected and sub-cultured for 24 h after which they were Gram-stained and biochemically tested and classified according to standard methods<sup>5</sup>. With a few exceptions, most organisms were identified to genus level. The data were analysed using Statistix (SX v. 4.0) (Analytical Software, St Paul).

Visual evaluation and palpation of the mammary gland halves and the macroscopic examination of the milk revealed no abnormalities. The prevalence of bacteria in the 630 clinically normal milk samples cultured was 28.7 % (Table 1). The prevalence of bacteria isolated from normal caprine milk varies among studies undertaken in different countries<sup>3</sup>. This has been attributed to the influence of factors such as differences in the time of sampling, the diagnostic criteria used, breed differences, different hygiene and management practices followed on each farm, age and parity of the animals, and

the milking method<sup>2-4,11</sup>. The goats used in this study were mainly stall-fed and were washed with warm water before being hand-milked. The does were milked twice a day, with no teat dipping after milking. Hand-milked goats have been found to have a lower prevalence of bacteria than machine-milked goats<sup>10</sup>. Hand milking of the does in this study may therefore have influenced the prevalence of bacteria. There were significantly ( $P < 0.05$ ) more bacterial organisms isolated from the left mammary gland halves (55.8 %) than from the right mammary gland halves (44.2 %). This was similar to observations by Boscos *et al.*<sup>2</sup>, who suggested that this was possibly related to the milking process. They observed that most milkers were right-handed and consequently milked the right mammary gland halves more efficiently than the left halves, hence predisposing the latter to a higher rate of bacterial infection.

*Staphylococcus* spp. were the most prevalent micro-organisms, accounting for 60.3 % (109/181) of all the bacterial isolates. Within this group, the coagulase-negative staphylococci were the most prevalent and comprised 62.4 (68/109) of the staphylococcal organisms isolated and 37.6 % (68/181) of the total bacterial isolates. This was followed by coagulase-positive staphylococci, which accounted for 37.5 % (41/109) of the staphylococci and 22.7 % (41/181) of the total bacterial isolates. Staphylococci are the most frequently-isolated microorganism from milk samples from both infected and non-infected glands<sup>1-3</sup>, *Staphylococcus aureus* being the most commonly-isolated bacterium in clinically-infected caprine milk samples<sup>1-3</sup>. The high incidence of coagulase-negative staphylococci observed was similar to other observations on non-clinical intra-mammary infections of goats<sup>1-3,7,8</sup>. This bacterial organism, although not a major pathogen of clinical mastitis in goats, has been shown to persist throughout the lactation and dry periods, irritating the gland and causing a decrease in production and even clinical mastitis.

The second most common group of microorganisms was *Micrococcus* spp.,

<sup>a</sup>Veterinary Investigations Laboratory (Kabete), PO Kabete, Kenya.

<sup>b</sup>Department of Clinical Studies, University of Nairobi, PO Box 29053, Nairobi, Kenya.

\*Author for correspondence.

Received: May 2000. Accepted: March 2001.

Table 1: The prevalence of microorganisms isolated from normal caprine milk samples in Kenyan dairy goats.

Organism	1st sampling (n = 130) <sup>a</sup>		2nd sampling (n = 108) <sup>a</sup>		3rd sampling (n = 77) <sup>a</sup>		All samplings (n = 630) <sup>b</sup>
	Right	Left	Right	Left	Right	Left	
Nil	95 (73) <sup>e</sup>	82 (62)	81 (75)	76 (70)	59 (77)	56 (73)	449 (71.3) <sup>f</sup>
CNS <sup>c</sup>	15 (12)	16 (12)	12 (11)	9 (8)	9 (12)	7 (9)	68 (37.6) <sup>g</sup>
CPS <sup>d</sup>	6 (5)	7 (5)	7 (7)	9 (8)	5 (6)	7 (9)	41 (22.7) <sup>g</sup>
<i>Micrococcus</i> spp.	8 (6)	13 (10)	1 (1)	4 (4)	2 (3)	4 (5)	32 (17.7) <sup>g</sup>
<i>Acinetobacter</i> spp.	2 (2)	1 (1)	2 (2)	2 (2)	0 (0)	2 (3)	9 (5.0) <sup>g</sup>
<i>Actinomyces</i> spp.	0 (0)	3 (4)	1 (1)	3 (3)	2 (3)	0 (0)	9 (5.0) <sup>g</sup>
<i>Streptococcus</i> spp.	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)	2 (1.1) <sup>g</sup>
Other spp.	1 (1)	3 (4)	1 (1)	2 (2)	0 (0)	0 (0)	7 (3.9) <sup>g</sup>
CNS + <i>Micrococcus</i> spp.	1 (1)	1 (1)	1 (1)	2 (2)	0 (0)	0 (0)	5 (2.7) <sup>g</sup>
<i>Actinomyces</i> + others	1 (1)	1 (1)	1 (1)	0 (0)	0 (0)	0 (0)	3 (1.6) <sup>g</sup>
<i>Acinetobacter</i> + others	0 (0)	2 (2)	1 (1)	1 (1)	0 (0)	0 (0)	4 (2.2) <sup>g</sup>
CPS + others	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.5) <sup>g</sup>

<sup>a,b</sup>Number of quarter milk samples (a) for either (right or left) mammary gland half and (b) for all mammary gland halves.

<sup>c</sup>CNS = coagulase-negative *Staphylococcus*.

<sup>d</sup>CPS = coagulase-positive *Staphylococcus*.

<sup>e,f,g</sup>Number in brackets is percentage (e) of the number of the quarter milk samples, (f) total quarter milk samples (630), and (g) of the total bacterial isolate (181).

which accounted for 17.7 % of all bacterial isolates. The other bacterial organisms isolated were *Acinetobacter* spp. 5 %, *Actinomyces* spp. 5 %, *Streptococcus* spp. 1.1 % and mixed bacteria (7.2 %). *Actinomyces* spp. and *Streptococcus* spp. are important causative organisms of bovine mastitis<sup>6,9</sup>. The absence of infected cattle in the environment of the does may thus have contributed to the low prevalence of these organisms in the dairy goats examined. The high prevalence (28.7 %) of bacterial isolates from apparently normal milk samples indicates a high percentage of subclinical infections in these dairy goat flocks. It also demonstrates that presence of bacterial organisms in the mammary gland halves of dairy goats does not necessarily result in clinical mastitis. However, the isolation of microorganisms from apparently normal caprine milk, some of which are important in clinical and subclinical mastitis (especially *Staphylococcus* spp.), indicates that particular attention should be given to the management of these dairy goat flocks to avoid cases of clinical mastitis. This also emphasises the need for

adequate pasteurisation of the milk before consumption.

#### ACKNOWLEDGEMENTS

We thank DAAD for financial support, Integrated Small Livestock Project (ISLP) farmers for allowing us access to their goats, the laboratory staff of the Veterinary Investigation Laboratory, Karatina, and the Department of Clinical Studies, University of Nairobi, for technical assistance.

#### REFERENCES

1. Ameh J A, Addo P B, Adekege J O, Gyang E O 1993 Prevalence of clinical mastitis and of intramammary infections in Nigerian goats. *Preventive Veterinary Medicine* 17: 41-46
2. Boscors C, Stefanadis A, Alexopoulos C, Samartzi F 1996 Prevalence of subclinical mastitis and influence of breed, parity, stage of lactation and mammary gland bacteriological status on the counter counts and California mastitis test in the milk of Saanen and autochthonous Greek goats. *Small Ruminant Research* 21: 139-147
3. Contreras A, Correlas J C, Sierra D, Marco J 1995 Prevalence and etiology of non-clinical intra-mammary infection in Murciano-Granadian goats. *Small Ruminant*

*Research* 17: 71-78

4. East N E, Birnie E F, Farver T B 1987 Risk factors associated with mastitis in dairy goats. *American Journal of Veterinary Research* 67: 63-67
5. Holt J G, Krieg N R, Sneath P H A, Staley J T, Williams S T 1994 *Bergeys manual of determinative bacteriology*. Williams and Wilkins, Baltimore
6. Jain N C 1979 Common mammary pathogens and factors in mastitis. *Journal of Dairy Science* 62: 128
7. Kalogridou-Vassiliadou D, Manolkidis K, Tsigoidia A 1992 Somatic cell counts in relation to infection status of goat udder. *Journal of Dairy Research* 159: 21-28
8. Manser P A 1986 Prevalence, causes and laboratory diagnosis of sub-clinical mastitis in the goat. *The Veterinary Record* 118: 552-554
9. Radostitis O M, Blood D C, Gay C C 1994. *Veterinary medicine* (8th edn). Bailliere Tindall. London
10. Sheldrake R F, Hoare R J T, Woodhouse V E 1981 Relationship of somatic cell count and cell volume analysis of goat's milk to intramammary infection with coagulase negative staphylococci. *Journal of Dairy Research* 48: 393-403
11. Smith M C, Rogoinsky M 1977 Mastitis and other diseases of goat udders. *Journal of American Veterinary Medical Association* 117: 1241-1246