Vol 15 No 2, p 159-161

THE MOST IMPORTANT DROMEDARY MASTITIS ORGANISMS

U. Wernery, B. Johnson and S. Jose
Central Veterinary Research Laboratory, P.O Box 597, Dubai, UAE

ABSTRACT

Mastitis pathogens of the dromedary are the same as cultured from the bovine mammary gland. When 84 dromedary mastitis cases were investigated from 2 herds, *Streptococcus agalactiae* (43%), coagulase negative *Staphylococci* (17%), *Staphylococcus aureus* (13%) and *Streptococcus bovis (9.5%)* were isolated. In 4 (4.8%) cases no bacteria were cultured. All 84 mastitis cases were also examined with the CMT and for SCC. A very good correlation between these 2 tests were observed. Of the 84 mastitis cases 60 (71.4%) had a CMT score of 3+ and a mean SCC of $2.2 \times 10^6 \pm 1.4 \times 10^6$ cells/ml, whereas, 24 (28.6%) had a CMT score of 2+ and a mean SCC of $3.0 \times 10^5 \pm 6.7 \times 10^4$ cells/ml. The authors recommend to use the same standards for camel milk which are applied for cow milk.

Key words: CMT, dromedary, mastitis, pathogens, SCC

Reports of inflammation of the dromedary udder have appeared from various countries (Wernery and Kaaden, 2002), but there are divergent opinions which bacteria species are the primary organisms of clinical mastitis in camels. Barbour *et al* (1985) views *Micrococcus* spp. as an important causative agent of mastitis, whereas, Obied (1963) did not consider this bacterium as a mastitis pathogen. Obied *et al* (1996) found *Streptococcus* (Str.) spp., *Staphylococcus* (St.) spp., *Micrococcus* spp., *Aerobacter* spp., and *E. coli* to be the main bacterial species causing mastitis. Al Ani and Al – Shareefi (1997) found that *St. aureus* and *Corynebacterium pyogenes* were the main causes of chronic mastitis in Iraq, whereas *St. epidermidis*, *Str.* spp., *Pasteurella haemolytica, E. coli* and *Micrococcus* spp., were responsible for subclinical mastitis. Numerous authors consider *St. aureus*, *P. haemolytica* and *Streptococcus* spp. to be the primary causative organisms for camel mastitis (Barbour *et al,* 1985; Ramadan *et al,* 1987; Hafez *et al,* 1987). Younan *et al* (2001) and Kinne and Wernery (2002) also isolated *Str. agalactiae* and *P. haemolytica* from dromedary mastitis cases.

With this study we investigated the most prevalent mastitis pathogens isolated from the dromedary udder in the Dubai Emirate. Parallely, we tested all mastitis cases with the California Mastitis Test (CMT) and the Somatic Cell Count (SCC), and compared these results with our microbiological findings.

Materials and Methods

Milk samples were collected aseptically from 84 individual dromedaries from 2 different farms. On these farms, the dromedaries were hand milked. Unfortunately, no information was received if the tested camels suffered from clinical mastitis, but results from CMT and SCC of all investigated cases proved them in retrospective as mastitis cases. Before sampling, the teats of each quarter were cleaned with a soft paper tissue containing a mild disinfectant (Wernery *et al,* 2002). The first milk streak was discarded before approximately 5 ml of milk of each quarter were milked into a sterile 30 ml plastic container.

The samples were cooled down and dispatched to the laboratory where they were examined at the same day. All 84 samples were bacteriologically tested as described by Wernery *et al* (2002) as well as examined with the CMT and for SCC (Wernery *et al,* 2008).

Results

The bacteriological results of the pooled quarter samples from 84 individual mastitis cases were compared with the results obtained with the CMT and SCC (Table 1). Forty three percent (36 cases) of 84 dromedary mastitis cases confirmed by CMT were caused by *Str. agalactiae*, followed by *coagulase negative staphylococci* (CNS, 16.7%), *St. aureus* (13.1%) and *Str. bovis* (9.5%). In 4 cases (4.8%) no bacteria were isolated from the milk samples.

SEND REPRINT REQUEST TO U. WERNERY email: cvrl@cvrl.ae

When the different CMT scores were compared with the SCC results, the following values were achieved. Of the 84 mastitis cases, 60 (71.4%) samples had a CMT score of 3+ and a mean SCC of $2.2 \times 10^6 \pm 1.4 \times 10^6$ cells/ml, whereas, 24 (28.6%) had a CMT score of 2+, and a mean SCC of $3.0 \times 10^5 \pm 6.7 \times 10^4$ cells/ml.

Discussion

Mastitis occur when the udder becomes inflammed because leukocytes are released into the mammary gland, generally due to invasion of the teat canal by bacteria. The bacteria multiply and release toxins that damage the milk secreting tissue and duct in the mammary gland. Elevated leukocytes, or somatic cells (SC) and the inflammed mammary tissue cause a reduction in milk production and alter milk composition. These changes in turn, adversely affect quality and quantity of the milk, a process which applies to any milk producing animal species including camels.

The most common mastitis pathogens are found either in the udder (contagious or cow-associated pathogens) or in the animals surroundings (environmental pathogens) such as bedding, manure or soil. In bovines contagious mastitis pathogens are *St. aureus* and *Str. agalactiae* which are spread from infected to un-infected udder during milking process, contaminated teat cup liners, paper towels, milkers hands and possibly by flies, whereas the environmental mastitis pathogens are other streptococci than *Str. agalactiae* such as *Str. uberis, Str. dysagalactiae,* and coliforms like *E. coli* and *Klebsiella.* Over the last years, the bacterial spectrum in the occurrence of mastitis in bovine dairy herds has changed. In the past mainly cow-associated pathogens were responsible for udder infections, whereas nowadays, environmental associated and opportunistic microorganisms are the front runners of bovine mastitis. The reason for this shift is associated with the introduction of comprehensive preventive measurements over the last years such as teat disinfection, drying off cows under antibiotic protection, optimising machine milking and others.

Our investigations showed that 4 main mastitis pathogens from 2 dromedary herds were *Str. agalactiae* (43%), CNS (16.7%), *St. aureus* (13%) and *Str. bovis* (9.5%). Similar findings are reported from bovines worldwide with *Str. agalactiae* being the main bovine intramammary pathogen, followed by streptococci other than *Str. agalactiae, St. aureus* and CNS (Wilson *et al,* 1997). In our investigation both contagious and environmental mastitis pathogens were isolated.

Although no information was available if the 84 dromedaries suffered from clinical mastitis, the CMT and SCC results indicated that the milk was altered. This was mainly due to a bacterial infection, but from 4(4.8%) milk samples, no bacteria were cultured. Inflammation of the mammary gland can also be caused by several types of injury, physical trauma or chemical irritants. The determination of milk SCC is widely used to monitor udder health and, thus, milk quality. When combined with bacteriological culture and CMT, comprehensive treatment of mastitis can be carried out. As revealed by Wernery *et al* (2008), SCC and CMT technology can also be applied to the camel. The authors also showed that SCC values laid

Table 1. Comparison between bacteriological, CMT and SCC results of 84 dromedary mastitis cases.

Pathogen	No of cases	%	CMT 3+	SCC	CMT 2+	SCC
Streptococcus agalactiae	36	42.9	29	$3.4x10^6$	7	$3.9x10^5$
Coagulase negative staphylococcus sp.	14	16.7	11	$8.8x10^5$	3	$2.9x10^5$
Staphylococcus aureus	11	13.1	3	$3.9x10^6$	8	$2.8x10^5$
Streptococcus bovis	8	9.5	6	$1.4x10^6$	2	$3.8x10^5$
Streptococcus dysagalactiae	2	2.4	2	$1.5x10^6$	0	0
Corynebacterium bovis	2	2.4	2	$2.1x10^6$	0	0
Moraxella phenylpyruvicus	2	2.4	0	0	2	$2.5x10^5$
Pseudomonas mendocina	2	2.4	2	$1.9x10^6$	0	0
E.coli	1	1.2	1	$4.5x10^6$	0	0
Pasteurella haemolytica	1	1.2	0	0	1	$2.5x10^5$
Pseudomonas cepacia	1	1.2	0	0	1	$2.2x10^5$
No pathogens isolated	4	4.8	4	$4.5x10^5$	0	0
Grand Total	**84**		**60**		**24**	
Mean ± SD				**$2.2x10^6 \pm 1.4x10^6$**		**$3.0x10^5 \pm 6.7x10^4$**

down by the EU for bovines are very similar found in camels. This is again confirmed by our current investigations.

In general, it can be stated that techniques applied to evaluate bovine udder health can also be used for the dromedary mammary gland. Furthermore, microbiological findings, SCC and CMT values are very similar to bovine values. Therefore, we recommend to use the same standards for camel milk which are in use for cow milk.

Further research should concentrate now on the role of subclinical mastitis in dromedaries.

References

Al-Ani FK and Al-Shareefi MR (1997). Studies on mastitis in lactating one humped camels (*Camelus dromedarius*) in Iraq. Journal of Camel Practice and Research 4(1):47-49.

Barbour EK, Nabbut NH, Frerichs WM, Al Nakhli HM and Al Mukayel AA (1985). Mastitis in *Camelus dromedarius* in Saudi Arabia. Tropical Animal Health and Production 17(3):173-179.

Hafez AM, Fazig SA, El-Amrousi S and Ramadan RO (1987). Studies on mastitis in farm animals in Al-Hasa. First analytical studies. Assiut Veterinary Journal 19:140-145.

Kinne J and Wernery U (2002). Mastitis caused by *Pasteurella haemolytica* and *Streptococcus agalactiae*. Journal of Camel Practice and Research 9(2):121-124.

Obied AI (1983). Field investigation, clinical and laboratory findings of camel mastitis. M.V.Sc. Thesis, University of Khartoum, Sudan.

Obied AI, Bagadi HO and Mukhtar MM (1996). Mastitis in Camelus dromedarius and the somatic cell content of camels' milk. Research in Veterinary Science 61(1):55-58.

Ramadan RO, El-Hassan AM, El-Abdin Bey R, Algasnawi YA, Abdalla ESM and Fayed AA (1987). Chronic obstructive mastitis in the camel, a clinical pathological study. Cornell Veterinarian 77(2):132-150.

Wernery U and Kaaden OR (2002) Infectious Diseases in Camelids. Blackwell Science, Berlin, Vienna, 2nd Ed. pp 149-153.

Wernery U, Bobby Johnson, Becker H and Maertlbauer E (2002). Microbiological status of raw dromedary milk. Journal of Camel Practice and Research 9(1):1-4.

Wernery U, Fischbach St, Kletzka S, Johnson B and Jose Sh (2008). Evaluation of some camel milk parameters used in mammary health. Journal of Camel Practice and Research 15(1):49-53.

Wilson DJ, Gonzalez RN and Das HH (1997). Bovine mastitis pathogens in New York and Pennsylvania: prevalence and effects on somatic cell count and milk production. Journal of Dairy Science 80(10):2592-2598.

Yuonan M, Ali Z, Bornstein S and Mueller W (2001). Application of the California masitits test in intramammary *Streptococcus agalactiae* and *Staphylococcus aureus* infections of camels (*Camelus dromedarius*) in Kenya. Preventive Veterinary Medicine 51:307-316.