Streptococcus agalactiae infection in camels (*Camelus dromedarius*) in Kenya

M. Younan[1] Z. Ali[1] W. Müller[2] S. Bornstein[3]

Key words

Camelus dromedarius - *Streptococcus agalactiae* - Husbandry method - Kenya.

Summary

Subclinical mastitis in camels due to *Streptococcus agalactiae* (Lancefield type B) was studied in different camel management systems in Kenya (Somali, Pokot, ranch-camels). A presumed correlation between the *S. agalactiae* carrier status of the mother and performance of the calf was examined in ranch-camels. Possibilities for detection, treatment and control of *S. agalactiae* mastitis in camels are discussed.

■ INTRODUCTION

Many camels are kept solely or mainly for milk production (10). Generalized systemic diseases affect the overall performance of the lactating camel. General good health is reflected in a higher milk yield (7).

Apart from the general health status of the lactating female, mastitis, especially subclinical mastitis (5), and death of the suckling calf (7) have a major effect on camel milk yield.

Subclinical mastitis causes chronic inflammation in the mammary gland and leads to a decrease in milk yield. If uncontrolled, *Streptococcus agalactiae* (Lancefield type B) is the single most important infectious agent affecting productivity of dairy cows (3). While data on milk production losses due to *S. agalactiae* mastitis are not available for camel herds, the widespread occurrence of *S. agalactiae* has been documented in camel herds in Sudan (1, 2, 6).

Death of the suckling calf interferes with lactation, which cannot be adequately maintained in the absence of the calf (8). Loss in milk yield as a consequence of the early death of the calf was ranked higher by herdsmen than loss of the calf itself (personal observation).

Apart from the involvement in mastitis, *S. agalactiae* is also an important cause of pyogenic skin infections of camels (4). Findings on the involvement of *S. agalactiae* in udder, puerperal, skin, respiratory and joint diseases of camels are presented in this paper.

■ MATERIALS AND METHODS

Occurrence of *S. agalactiae* was investigated in nine different camel herds in the Baringo (herds G, H), Samburu (F), Laikipia (B, C, I), Kajiado (E) and Isiolo (A, D) districts of Kenya. The herds that were studied were all kept in semiarid areas and fed exclusively on naturally available browse and grazing. The animals were herded during daytime and kept in traditional enclosures (*boma*) overnight, and the calves were separated from the dams during the night. In herds A, B and C repeat visits were possible. All other herds were visited only once.

Visits for milk sampling took place during morning milking (6-7.30 a.m.). Milk let down was stimulated by the calf. Milking was then carried out by two herdsmen. In order not to disrupt milk let down, samples were drawn at the end of the milking procedure. All samples were drawn by the first author. Disinfection of the teat tip was achieved by spraying with Sterillium® (Bode Chemie Hamburg, Germany) from a small pump spray bottle. Milk samples were transported at +8°C in a portable fridge connected to the car battery and reached the laboratory within 48 to 72 hours. Quarter milk samples from a total of 183 lactating camels were examined.

Samples were also taken from pyogenic infections observed during herd visits. Materials from skin abscesses, nasal discharge, uterus and joints were either aspirated into a sterile syringe or collected on a sterile swab and transported in Stuarts medium (Oxoid CM 111) in the portable fridge. These samples were submitted to the same bacteriological procedure as outlined for milk.

Milk samples were cultured on blood agar (BA) (Base No. 2, Oxoid No. CM 271, with 5% defibrinated sheep blood) and inoculated in Todd Hewitt broth (Oxoid No. CM 189). After overnight incubation at 37°C, direct cultures on BA were examined and Todd Hewitt enrichment cultures were subcultured onto BA and Edwards agar (EA) (Oxoid No. CM 27, with 5% defibrinated sheep blood). Direct BA cultures showing no growth were reincubated for four days and examined daily. Subcultures on BA and EA were incubated for two days and examined daily. Colonies on BA were examined for purity, type of hemolysis and morphology followed by a first stage differentiation (Gram stain and catalase reaction). Catalase-negative Gram-positive cocci were subcultured onto EA. Bluish catalase-negative Gram-positive cocci

1. Department of Animal Science, Egerton University, PO Box 536, Njoro, Kenya

2. Institute of Animal Hygiene, Free University Berlin, Luisenstraat 56, 10117 Berlin, Germany

3. National Veterinary Institute, PO Box 7073, 75007 Uppsala, Sweden

showing no esculin hydrolysis on EA were further differentiated by the CAMP-Test and examined for the presence of Lancefield group B antigen (Oxoid No. DR 587 Latex Grouping Reagent B, No. DR 593, No. DR 592).

Antibiotic sensitivity tests

Agar diffusion sensitivity tests for *S. agalactiae* isolates from camels were conducted on Mueller Hinton agar (Oxoid No. CM 337, with 5% defibrinated sheep blood). The sensitivity test was conducted according to standard procedures (10). Penicillin G 10 IU (Oxoid code P10) and tetracycline 30 µg (Oxoid code TE30) discs were used.

■ RESULTS

Results of the bacteriological examination of milk samples are shown in table I. *S. agalactiae* was found in udder infections in six out of nine camel herds from which milk samples were analyzed. *S. agalactiae* was isolated from milk as well as from non-milk specimens in three camel herds. Sources of these isolations are summarized in table II.

Herd A

This herd was visited four times. Five lactating females with *S. agalactiae* udder infections were identified. Two cases of septic arthritis were seen in calves about 6-7 weeks of age. The first calf had a pyogenic tarsitis resulting in complete destruction of the tarsal joint and was no longer able to stand normally. On close examination there were no signs of any wound infection, the skin being intact on the affected leg. There was also no evidence of navel infection. *S. agalactiae* was isolated in pure culture from the joint aspirate that contained white thick pus. This calf died later. The second calf had a pyogenic periarthritis of both carpal joints. Again, there were no signs of wounds or navel infection on clinical examination. *S. agalactiae* was isolated from aspirates taken from both joints. This calf was still able to walk and was treated with a long acting oxytetracycline. The abscess isolate was obtained from an old healing abscess on the lateral side of the neck, about 5 cm in diameter, in an adult female camel.

Table I

Streptococcus agalactiae isolation from camel milk

Herd	Num. of examined animals	Num. of identified carriers
A	76	5
B	42	3
C	29	-
D	10	5
E	11	-
F	7	1
G	1	1
H	6	-
I	1	1

Herd C

This herd was visited five times. No *S. agalactiae* udder infection was found. The herd was seen during an acute outbreak of respiratory disease affecting all age groups. The disease spread rapidly in the whole herd within 5-7 days causing high morbidity but no mortality. In most animals the disease produced serous nasal discharge, lacrimation and some coughing. The condition was self-limiting in most cases. Some animals developed thick white pyogenic discharge from the nostrils and were treated successfully with a long acting oxytetracycline. The herd had completely recovered at the next visit, two weeks later, without incurring any losses.

Four animals, two calves and two adults, showing signs of acute secondary bacterial infection (white thick discharge from the nostril) were swabbed before antibiotic treatment. *S. agalactiae* was isolated in direct culture from the nasal swab of one calf and one adult.

During a visit three months later, a fifteen-year-old female camel, three weeks *post-partum*, was slaughtered. According to the herdsmen she had been unthrifty ever since parturition and was too weak to join the herd during the day. The uterus was enlarged and full of brownish thick fluid. *S. agalactiae* was isolated in pure culture from the uterine contents and from the prescapular lymph node. The calf was in good condition.

Herd I

In this herd *S. agalactiae* infection of the udder was confirmed in one lactating female. An adult castrate male riding camel showing multiple abscesses and periarthritis of the front left carpal joint was examined. *S. agalactiae* was isolated in pure culture from the pus aspirated from the abscess and the joint. Twenty-five *S. agalactiae* isolates from camel mastitis (herds A to I) and 10 non-milk isolates, including double isolations from one animal and an extra skin abscess isolate from a non listed herd without lactating females, were tested for antibiotic sensitivity. The numbers of sensitive, intermediate (reduced sensitivity) and resistant isolates are shown in table III.

Table II

Streptococcus agalactiae isolation from milk and non-milk specimens from camels

Herd	*S. agalactiae* isolation from				
	Arthritis	Skin abscess	Nasal swab	Puerperal inf.	Mastitis
A	2	1	-	-	5
C	-	-	2	1	-
I	1	1	-	-	1

Table III

Antibiotic sensitivity of different *Streptococcus agalactiae* isolates from camels

	Mastitis isolates			Non-milk isolates		
	S[1]	I[2]	R[3]	S	I	R
Penicillin G	25	0	0	10	0	0
Tetracycline	14	1	10	5	0	5

1. Sensitive
2. Intermediate (reduced sensitivity)
3. Resistant

Tetracycline resistant *S. agalactiae* were found in herds A, C, D and F. The only two tetracycline resistant *S. agalactiae* isolates that were found in herd C originated from the case of puerperal infection (uterus, lymph node) about fifteen weeks after the outbreak of respiratory disease.

■ DISCUSSION

This is the first report the authors can find of the involvement of *S. agalactiae* in respiratory infections of camels and in septic arthritis of camel calves.

Somali herdsmen are familiar with pyogenic joint infections of young camel calves. The condition is called *anow* in Somali and the herdsmen blame "milk infection" as the cause of the problem. Herdsmen did not believe that this particular form of arthritis could have been acquired through wound or navel infection. The examination of further cases of septic arthritis in young camel calves is needed to gain an understanding of the origin of these lesions and to verify the etiological role of Lancefield Type B streptococci.

The observation that *S. agalactiae*, apart from causing mastitis and skin infections, is involved in joint infections, secondary respiratory infections and puerperal infections in camels, indicates a more complex epidemiology for *S. agalactiae* in camels than in cattle. Further phenotypic, serological and genetic examinations of the isolated *S. agalactiae* are currently being conducted. Preliminary results show that camel strains are clearly different from bovine strains and seem to be closely related to human *S. agalactiae* strains.

Oxytetracycline is the most widely used antibiotic by camel herdsmen in Kenya. This may be one explanation for the isolation of tetracycline resistant *S. agalactiae* from four camel herds.

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Résumé

Younan M., Ali Z., Müller W., Bornstein S. Infections à *Streptococcus agalactiae* chez des dromadaires au Kenya

Les mamites subcliniques des dromadaires dues à *Streptococcus agalactiae* (Lancefield type B) ont été étudiées dans différents systèmes d'élevage camelin (Somali, Pokot, *ranching*). Une corrélation présumée entre le statut de porteur de *S. agalactiae* chez la mère et la performance du jeune a été examinée dans les ranchs. Les possibilités de détection, de traitement et de contrôle des mammites à *S. agalactiae* chez le dromadaire sont discutées.

Mots-clés : *Camelus dromedarius - Streptococcus agalactiae* - Méthode d'élevage - Kenya.

Resumen

Younan M., Ali Z., Müller W., Bornstein S. Infección por *Streptococcus agalactiae* en camellos (*Camelus dromedarius*) en Kenia

Se estudió la mastitis subclínica en camellos, causada por *Streptococcus agalactiae* (Lancefield tipo B), bajo diferentes sistemas de manejo en Kenia (Somali, Pockot y camellos de rancho). Se examinó una posible correlación entre el estado portador de *S. agalactiae* de la madre con el rendimiento del camello joven en ranchos de camellos. Se discuten las posibilidades de detección, tratamiento y control de *S. agalactiae* en camellos.

Palabras clave: *Camelus dromedarius - Streptococcus agalactiae* - Metodo de crianza - Kenia.

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