

INFLUENCE OF MILKING HYGIENE ON PREVALENCE OF MASTITIS IN DROMEDARY CAMEL (*Camelus dromedarius*) IN AZARE, BAUCHI STATE, NIGERIA

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ABSTRACT

The study aimed at assessing the influence of milking hygiene on prevalence of mastitis in dromedary camel (*Camelus dromedarius*) in Azare, Bauchi State, Nigeria. A cross-sectional survey was carried out on 189 lactating dromedary camels in pastoral herds in Azare. Questionnaire and oral interview were used to generate data on pre milking udder preparation and hygiene, vaccination/medication, tick control, parity and stage of lactation. California Mastitis Test was carried out to evaluate the prevalence of mastitis in the pastoral herds. The results obtained showed only 10% of the herders wash their hands before milking and none washed hands between milking lactating camel. Only 10% of the herders practice tick control, while all herders cover/tie the udder/teat as anti-suckling device. Mastitis prevalence rate of 17.17% was recorded. Significant ($p < 0.05$) association was observed between parity and mastitis prevalence. General herd management and hygiene during milking should be improved to avoid transfer of pathogen from among animals.

Key word: Udder, Hygiene, Management, Mastitis, Camel

INTRODUCTION

Camel milk is one of the main components of diet of the nomads in semi-arid and arid zones and is an essential food for livelihood of people and it may be the only milk available in places where other milking animals cannot be maintained (Abdurahman 2006). Despite the environmental constraints, camel is known to meet the demands of the pastoralist in terms of milk. Wernery (2003) reported that a good milker produce 20-30 litres of milk daily. Average daily milk yield of the Somali breed camels was reported to range from 5-8 litres (Bekele *et al.*, 2002). Estimates of lactation periods vary from 9-18 months (Ramet 2001; Bekele *et al.* 2002).

Mastitis, an inflammation of the mammary gland caused by bacterial infection, trauma, or injury to the udder, remains the most common and most expensive disease affecting the dairy industries throughout the world. Micro-organisms invading the mammary gland via the teat cause 90-95% of mastitis problems in cows, while 5-10% of mastitis problems were due to injury (NebGuide 2003). Factors that predispose animals to mastitis include poor hygiene, poor animal husbandry, the malfunction of milking machines, and poor milking techniques.

Management plays a major role in the level of mastitis, which is evident on many dairy farms. Higher levels of mastitis usually occur on farms with a low level of sanitation, suboptimal teat dip application, inadequate dry cow antibiotic procedures, poor milking techniques, or inadequate machine maintenance (Costello 1998).

Improper milking practices may cause production of diseases of mastitis pathogen. Mastitis bacteria are spread from cow-to-cow at milking time by whatever touches the udder and teats, be it hands, udder cloths and teat cups (Billet 1995). Therefore, the aim of the study were to determine the influence of milking hygiene on prevalence of mastitis in dromedary camel in Azare

MATERIALS AND METHODS

Study area

This study was carried out in Azare, Katagum Local Government area of Bauchi State. Katagum lies between latitude 9.3° and 12.3°N and longitude 8.5° and 11.0°E (BASGD 2006). The research area lies within the Sahelian region, characterized by low rainfall (700mm in the extreme north). The rainfall in the area begins around June/July and lasted for 4-5 months. The vegetation of the area

consist of mainly short grasses, with shrubs and scanty trees. Ambient temperature fluctuates throughout the year and it reaches its peak around April/May.

Study animals

Lactating camels in pastoral herd of Arab under traditional management in Katagum Local Government area were used for the study. A total of 189 lactating camels were selected for this study accordingly.

Study design, Sampling and sample size

A cross-sectional epidemiological survey was conducted on 189 lactating camels, in which case study animals were visited once for data collection. Purposive sampling was adopted.

The desired sample size for the study was calculated using the formula given by Dahoo *et al.* (2003) for veterinary epidemiological research with 95% confidence interval and 5% desired absolute precision.

California Mastitis Test (CMT)

Sub-clinical mastitis was diagnosed based on California Mastitis Test (CMT) results and the nature of coagulation (milk and CMT) showed the presence of the infection. A squirt of milk sample was placed in each well on CMT paddle and an equal amount of 3% CMT reagent was added to each well and mixed (Quinn *et al* 1999).

Data analysis

Data were recorded in Microsoft excel spread sheet for statistical analysis using Statistical Package for Social Sciences (SPSS) Version 21. Descriptive statistic using a simple percentage was used to evaluate the prevalence of mastitis and management technique while Chi-square test was carried to evaluate the strength of association between the potential risk factors with occurrence of mastitis in camel.

RESULTS

Characterization of camel management practices

Table (1) revealed the herd management practices. Based on observation while interacting with the herdsman in their herds early morning before milking, the results showed that, only (10%) of the herds visited washed/prepare the udder before milking the camels. They believed that the calf would clean the udder by suckling. So also none (0%) among the milkers washed their hands between milking the lactating camel. All (100%) the herders practiced the habit of covering/tying the teat while on grazing in order to prevent the calf from suckling the dam while on grazing. Only 40% of the herd visited vaccinate their camels annually. 40% of the herds visited during the study gave medication to their camels whenever their camels are sick and these happened to be the owners who give annual vaccination to their camel, while the remaining 60% do not care to treat camel with conventional drugs rather traditional or none at all. On tick control, the outcome of the research indicated that (90%) the herds visited do not practice any form of tick control. All (100%) herders around Azare gave mineral supplement (potash) to their camel, while none (0%) among the herders gives feed supplement to the camels.

Table 1: Camel Herd Management Practices Azare, Katagum Local Government Area, Bauchi State

Household Practices	Camel Herders Responses (%)	
	Yes	No
Washing udder before milking	10	90
Washing hand between milking	0	100
Cover/tie udder while on grazing	100	0
Vaccination	40	60
Medication	40	60
Tick control	10	90
Mineral supplementation	100	0
Feed supplementation	0	100

Prevalence of mastitis and its risk factors

Table (2) showed the distribution of CMT results in various locations in the study area. Of the 198 camels examine for sub-clinical mastitis through CMT, 34 (17.17%) showed positive reactions.

Among many mastitis potential risk explanatory variables, two were considered as potential risk factors for the occurrence of sub clinical mastitis in the study area. These were stage of lactation and parity of the lactating camels. Tables 3 showed that there was $p < 0.05$ association between parity and sub-clinical mastitis. While non significant $p > 0.05$ relationship were observed between occurrence of mastitis and stage of lactation.

Table 2: Overall Prevalence of Mastitis in Dromedary Herds in Azare, Katagum Local Government Area, Bauchi State

Location	California Mastitis Test		Total	Prevalence rate (%)
	Negative	Positive		
Katanaga	49	15	64	23.4
Ragwam	42	9	51	17.6
Buskuri	47	6	53	11.3
Magonshi	16	4	20	20
Barkeji	10	0	10	0
Total	164	34	198	17.17

Table 3: Association Between the Occurrence of Mastitis and Parity of Lactating Camels in Azare, Katagum Local Government Area, Bauchi State

Parity	Number	Positive	Negative	Prevalence (%)	p-value
1	36	1	35	2.8	0.011
2	46	9	37	19.6	
3	34	3	31	8.8	
4 and above	82	21	61	25.6	
Total	198	34	164	17.2	

$P < 0.05$

Table 4: Association Between the Occurrence of Mastitis and Stage of Lactating Camels in Azare, Katagum Local Government Area, Bauchi State

Stage of lactation	No. of Camel	Mastitis		Prevalence (%)	p-value
		No. Positive	No. Negative		
≤ 2 month	88	15	73	44.12	0.933
> 2 month	110	19	91	55.88	
Total	198	34	164		

$P > 0.05$

DISCUSSION

It was observed that majority of the herders do not wash hands before and between milking time of the lactating camels, the results indicated poor hygiene practices during milking of lactating camel. This practice may have spread of mastitis pathogen between camels in the camel herds. Agab and Abas (1999) reported that lesions due to ticks infestation and poor udder hygiene were serious problem to udder health, and recommended that milk hygiene should be improved. Hygiene during milking process, and presence of lesion on udder or teats were reported to be significant with the prevalence of mastitis in lactating camel (Husein *et al.*, 2013).

Furthermore, herders do not practice any form of tick control in their herds. The ticks colonized mostly areas around the udder, particularly the teats, and this created lesions which may have probably given mastitis pathogen access to infect the udder. Amena *et al.* (2011) attributed the high prevalence of mastitis in camel to heavy tick infestation in Ethiopia. Megersa (2010) and Husein *et al.* (2013) reported that one of the factors that predisposed camels to mastitis was the lesions caused by ticks, which facilitate bacterial entry and cause permanent tissue damage, exacerbated by poor udder hygiene.

In this study, all herds visited practiced the tradition of covering the udder to protect the calves from suckling the dam. Similar outcome was reported by Abeer *et al.* (2016) which found out that all udders under his investigation showed marks of faulty anti-suckling devices. A studies carried out in Sudan by Abdurahman (2006) also explained that the use of device to prevent the calves from sucking their dams, together with heavy tick infestation of the udder was considered as the predisposing factor for camel mastitis.

In the present study the overall prevalence of mastitis in dromedary camel was 17.17%, which was significant to affect economic and public health in the study area. The overall prevalence rate reported in the present study was slightly above the values reported by Kalla *et al.* (2008) that the incidence of lactating camels having mastitis was 14.4% in Komodugu-Yobe River Basin, Nigeria. The prevalence rate observed in the present study was consistent with the findings of Al-Jaboory *et al.* (2013) which reported a prevalence rate of 18.5% in Abu-Dhabi, UAE. However, the findings was lower when compared with the findings of other authors in other countries like: Husein *et al.* (2013) 30.2% Ethiopia, Obeid *et al.* (1996) 66.8% Sudan and 29% by Osman *et al.* (1991) in Somali.

The differences in prevalence rate of mastitis in the present study and other reports could be attributed to unhygienic milking procedures and generally poor traditional management practices observed. Earlier work (Mungube *et al.* 2004) showed that animals were much more infected by mastitis causing pathogens, mainly in areas where hygienic conditions were poor and treatment of mastitis cases was not well pursued. So also differences in the methods and material employed by the investigators might have been contributed in the wide variation of the prevalence rate reported by different authors.

There were high occurrence of mastitis in dromedary camel with >4 calves than those with 1-3 calves. This is in accordance with the findings of Abera *et al.* (2010) who reported that the risk of clinical and sub clinical mastitis increases with advancing age or parity of the camel. Husein *et al.* (2013) also reported that incidence of mastitis is influenced by age and parity number of the camel. While prevalence of mastitis found to be non significantly ($p>0.05$) associated with the lactation stage of dromedary camel.

CONCLUSION

It could be concluded that mastitis was prevalent in camel pastoral herds in Azare and its environs, and there was poor general herd management and hygiene during milking in the herds. General herd management should be improved to checkmate the prevalence of mastitis in camel pastoral herds in Azare.

REFERENCES

- Abdurahman, O.A.S. (2006). Udder health and milk quality among camels in the Error valley of eastern Ethiopia. *Livestock Research for Rural Development* **18** (8):3-11. <https://irrd.cipav.org.co/irrd18/8/abdu18110.htm>
- Abeer, A. M., Zakia, A. M., Muna, E. A. and Sabiel, Y. A. (2016). Bacteriological and pathological studies of mammary glands affections in camels (*camelus dromedarius*) at Tumbool abattoir, Sudan. *British Microbiology Research Journal*. **15**(5): 1-8
- Abera, M., Demie, B., Aragaw, K., Regassa, F. and Regassa, A. (2010) Isolation and identification of *Staphylococcus aureus* from mastitic milk and their drug resistance patterns in Adama town, Ethiopia. *Journal of Veterinary Medicine and Animal Health*. **2**(3): 29-34
- Agab, H. and Abbas, B. (1999) Epidemiological studies on camel diseases in the Eastern Sudan. *World Animal Review* 92:42.

- Al-Juboory, A. A., Kamat, N. K. and Sindhu, J. I. (2013) Prevalence of some mastitis causes in dromedary camels in Abu Dhabi, United Arab Emirates. *Iraqi Journal of Veterinary Sciences*, **27**(1): 9-14. <http://www.vetmedmosul.org/ijvs>
- Amena, M. I., Al-Humiany, A. A., Ahmed, M. A. M. and Hoda, M. Z. (2011) Epidemiological and microbiological studies on mastitis in she-camels. *International Journal of Microbiology Research*. **2**:18-27.
- BASGD (2006). Bauchi State Government diary Published by (BREPOL) www.brepols.com.77
- Bekele, T., Zekele, M. and Baars, R. M. K. (2002). Milk production performance of the one humped camel (*Camelus dromedarius*) under pastoral management in semi-arid Eastern Ethiopia. *Livestock Production Science*, **76**: 37-44.
- Billet, R. (1995). Combat mastitis losses. In: *Farmer's Weekly*, 85044, pp 44- 49.
- Costello, S. (1998). The role of trace minerals and vitamins in bolstering resistance to mastitis. In: *Dairy Feed Facts*. 18 March, pp 20-23.
- Dahoo I., Martin W., and Stryhn H. (2003). Veterinary Epidemiology research; AVC.
- Husein, A.,Haftu1, B., Hunde A. and Tesfaye, A. (2013).Prevalence of camel (*Camelus dromedarius*) mastitis inJijiga Town, Ethiopia. *African Journal of AgriculturalResearch*,**8**(24):3113-3120, <http://wwwacademicjournals.org/AJAR>
- Kalla, D. J. U., Zahraddeen, D. and Yerima, J. (2008). Reproductive performance of one-humped camel (*Camelus dromedarius*) at the Komodugu-Yobe River Basin, Nigeria. WBC / ICAR 2008 satellite meeting on camelid reproduction, Budapest, Hungary
- Megersa B (2010). An epidemiological study of major camel diseases in the Borana Lowland, Southern Ethiopia. Dry lands Coordination Group Report No. 58, 09, 2010. pp. 32-33.
- Mungube, E.O., Tenhagen, B.A., Kassa, T., Regassa, F., Kyule, M.N., Greiner, M. and Baumann, M.P.O. (2004).Risk factors for dairy cow mastitis in the central highlands of Ethiopia. *Tropical animal health and Production***36**(5); 463-472.
- NeGguide. (2003). *Basic principles of mastitis control*. [online] University of Nebraska. Available from: <http://www.ianr.unl.edu/pubs/dairy/g1253.htm>>
- Obeid, A. I., Bagadi, H. O. and Mukhtar, M. M. (1996). Mastitis in *Camelus dromedarius* and the somatic cell content of camels' milk. *Research in VeterinaryScience* **61**:55-58.
- Osman, K. H., Abdi A. M., Abdurahman, O., Bornstein, S., Zakrisson, G. (1991). Prevalence of mastitis among camels in Southern Somalia: A pilot study. Camel forum, working paper 37:1-9.
- Quinn, P. J., Carter, M. E., Markey, B. and Carter, G. R. (1994). Clinical Veterinary Microbiology, (Wolf publishing, London, England). P. 327.
- Ramet, J. P. (2001). The technology of making cheese from camel milk (*Camelus dromedarius*), FAO Animal Production and Health Paper 113. Food and Agriculture Organization (FAO) of the United Nations, Rome, Italy.62p.
- Wernery, U., Juhasz, J., Johnson, B. and Nagy P., (2006). Milk production of dromedaries milked with an automatic milking machine: milk yield, quality control and udder hygiene. In: Proceedings of the International Scientific Conference on Camels, Qassim, K.S.A., 2006, Part 2, 833–842.