



# Some Factors Influencing the Physiological Level of Milk Somatic Cell Count in Lactating Camels

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## Background

The milk somatic cell count (SCC) is an assessment criterion for the raw milk quality and udder health of dairy camels. Somatic cells are present as part of the udder's immune system and are protective mechanisms of the mammary gland. Camel milk contains the following somatic cells:

Macrophages (1), polymorphonuclear neutrophils (PMN) (2), lymphocytes (3), and epithelial cells (4) (Fig. 1).

(1) (2) (3) (4)

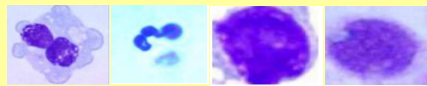


Fig. 1: Somatic cells in lactating camels

Physiologically, somatic cells are always present in the milk, but they change according to the physiological situation, or increase when an infectious agent enters the udder, or when the udder is injured. This means that many factors may influence the milk SCC in lactating camels.

## Goal

SCC is a very good parameter for indicating milk hygiene, milk quality and udder health in dairy camels. The aim of this study was therefore to shed light on some of the factors influencing the physiological milk SCC in lactating camels.

## Effect of infection on the physiological SCC in camel milk:

The most important factor is infection status. Two types of bacteria can be found in the mammary tissue of lactating camels. Contagious pathogens are transmitted from animal to animal, and environmental pathogens may be present in the surroundings of the camel herds (Fig. 2) A B

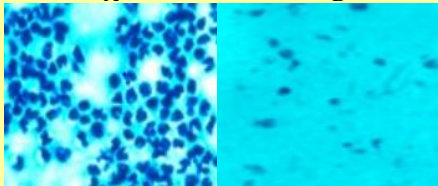


Fig. 2: SCC from inflamed (A) and uninfamed camel udder (B) (Abdurahman, 2006)

If the mammary gland is infected, higher mean SCC values may be found. However, in inflamed quarters PMN dominated the sample, and in non-inflamed quarters epithelial cells and cell fragments were dominant. Quarter diseases (mastitis) show not only a very high milk SCC, but also inflammation and swelling of the quarter (Fig. 3)

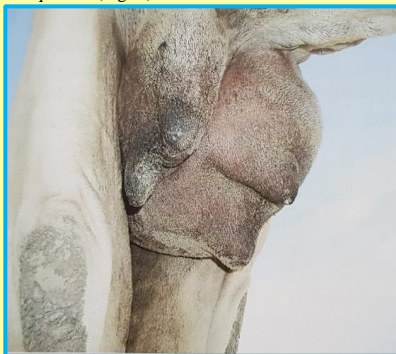


Fig. 3: Healthy and inflamed quarters (same camel) (Eberlein, 2007)

## Effect of milking procedures on physiological SCC in camel milk

It is known that, in the case of camels, SCC levels and milk quality depend mainly on milking management and routine. However, camels are hand-milked in most countries of the world with traditional farming systems, where poor management and insanitary milking practices are common. These are responsible for contamination of the udder and higher SCC values in the produced milk. As a consequence, it is important that the use of machine milking for camels should be more widespread. In order to maintain camel milk hygiene, efficient machine milking systems, such as "StimuLactor for Camels", must be used, especially in the case of intensive housing systems. "StimuLactor for Camels" was developed by Siliconform Germany (Fig. 4) (Kaskous, 2021)



Fig. 4: StimuLactor (ST-C) for Camels during milking

## Effect of lactation stage on physiological SCC in camel milk:

SCCs were found to be highest shortly after calving, falling rapidly afterwards and then rising slowly for the remainder of the lactation season (Fig. 5).

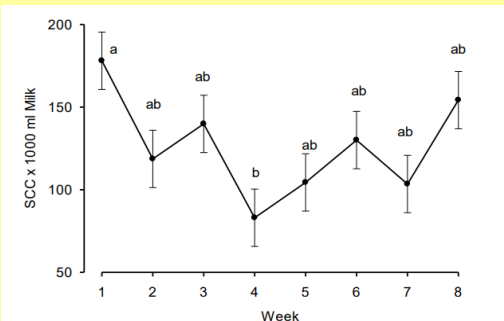


Fig.5: LSM±SE of SCC in camel milk during the end stage of lactation (Kaskous, 2019)

## Effect of season on the physiological SCC in camel milk:

A higher milk SCC was found in winter than in the dry season. However, the difference was not significant. (Hamed et al., 2017) (Tab. 1)

Tab. 1: SCC in camel milk in dry and wet seasons

Parameters	Wet Season	Dry Season	P-Value
SCC x 10 <sup>3</sup>	171.44±83.86	47.10±18.29	0.13
Log <sub>10</sub> SCC	2.23±1.92	1.67±1.21	0.97

## Effect of parity on physiological SCC in camel milk

The average SCC increased with parity, rising on average from 91 x 10<sup>3</sup> cells/ml in primiparous camels to 215 x 10<sup>3</sup> cells/ml for parity of more than 4, but the difference was not significant (Saleh et al., 2013) (Fig. 6)

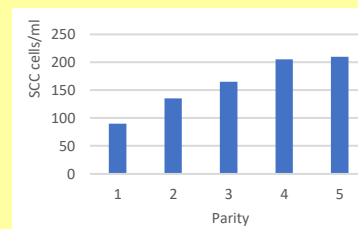


Fig. 6: Effect of parity on milk SCC

## Effect of the country of study on physiological SCC in camel milk

This effect depends on several factors within the country of study, such as e.g. animal performance, breed, housing conditions etc. (Tab. 2).

Tab.2: SCC in camel milk in several countries

Country	Source of milk sample	SCCx10 <sup>3</sup> cells/ml	Authors
Algeria	Animal	240	Hadef et al, 2016
Ethiopia	Animal	300-15000	Woubit et al, 2001
Germany	Animal	126	Kaskous, 2019
Iran	Animal	306	Niasari-Naslaji et al, 2016
Iraq	Animal	560	Abbood, 2016
Kenya	Animal	162	Tingren, 2019
Saudi Arabia	Animal	125	Saleh and Faye, 2011
Saudi Arabia	Animal	473	Aljumaah et al, 2020
Saudi Arabia	Animal	11-298**	Saleh et al, 2013
Tunisia	Animal	100	Hamed et al, 2012
UAE	Bulk milk	340	Wernery et al, 2008
UAE	Bulk milk	394	Nagy et al, 2013

\*: limit to subclinical, \*\*: machine milking, \*\*\*: hand milking

## Conclusions:

- ❖ In order to ensure camel milk for the use of consumers, camels must be regularly examined and hygiene measures maintained in all camel farm systems.
- ❖ The physiological SCC level in camel milk is 150 x 10<sup>3</sup> cells/ml, and this is the limit value for a healthy camel udder.
- ❖ We recommend that in intensive housing systems, proper machine milking equipment such as StimuLactor for Camels should mainly be used.
- ❖ An increase in the SCC above the physiological level not only points to a problem with the health of the udder, but also reduces milk production, changes milk composition, affects milk processing and alters the bioactive ingredients of camel milk.