



# A COMPARATIVE STUDY OF SOMATIC CELL COUNTS IN MILK FROM CROSS-BRED AND RATHI CATTLE WITH SUBCLINICAL MASTITIS

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## ABSTRACT

The somatic cell count (SCC) is a measure of the number of leukocytes and epithelial cells in milk. An increase in milk SCC is an indication of mammary gland inflammation hence SCC can be used as a screening test to identify intramammary gland infections (IMI). In the present investigation, 85 milk samples collected from (31) H-F crossbred and (54) Rathi cattle were subjected to somatic cell counting. Thirty eight samples (16 from H-F crossbred and 22 from Rathi cattle) which revealed presence of two lacs or more cells/ml were identified as cases of subclinical mastitis. The mean SCC in H-F crossbreds was higher (6.36 lacs/mL) as compared to that in milk from Rathi cattle (5.13 lac/mL). The range of SCCs varied between 2.07 - 22.56 lacs/mL in H-F crossbred cattle and between 2.56 - 13.21 lacs/mL in Rathi cattle. The data indicated lesser variations in the native breed than in the crossbred animals which may be considered as an index of higher resistance of native breeds towards change in SCC due to various reasons

**KEYWORDS:** somatic cell count (SCC), subclinical mastitis., cattle, milk.

## Introduction

Subclinical mastitis (SCM) does not lead to visible changes in the milk or udder and is characterised by reduced milk yield, altered milk composition and the presence of inflammatory components and bacteria in milk. About 75-80% mastitis is subclinical, characterized by a significantly increased leukocyte count in milk (Radostits et al., 2000; Bradley, 2002). The somatic cell count (SCC) in bovine milk is an indicator of udder health and milk quality (Schukken et al., 2003; Sharma et al., 2011) and an increase in SCC >200,000/ml suggests inflammation of the udder (Kelly et al., 2000; Paape et al., 2003).

In India, the losses due to mastitis in monetary terms were estimated to be INR1390 per lactation, among which around 49% was owing to loss of value from milk and 37% on account of veterinary expenses. Higher losses were observed in crossbred cows due to their high production potential that was affected during mastitis period (Sinha et al., 2014).

Subclinical mastitis (SCM) remains invisible and often leads to clinical mastitis which is then difficult to treat. Hence routine surveillance and monitoring is necessary for its detection. SCC is a useful predictor of intramammary infection (IMI), and therefore, an important component of milk in assessment of aspects of quality, hygiene and mastitis control (Sharma et al., 2011). Higher prevalence of SCM in crossbred breeds than in the indigenous zebu cattle has also been reported by many workers (Moges et al., 2011).

Hence the present study was undertaken to determine the somatic cell counts (SCC) of milk samples from Holstein-Friesian (H-F) crossbred and Rathi (a native breed) cattle from different locations in Bikaner (Rajasthan, India) to detect subclinical mastitis along with the comparison of SCC in milk from these two breeds.

## Materials and methods

### Ethical approval

This study was conducted following approval by the research committee and Institutional Animal Ethics Committee Guidelines were followed.

### Sampling

Eighty five milk samples (apparently normal with no physical changes) were collected during early morning hours in sterilized test tubes from Holstein-Friesian (H-F) crossbred (n=31) and Rathi cattle (n=54) from different locations in Bikaner (Rajasthan, India). The samples were immediately taken to the laboratory for further processing on ice

### Preparation of milk smears

A 0.1ml amount from each properly shaken milk samples was withdrawn with Pasteur pipette and spread evenly on a glass slide in an area of 1 cm<sup>2</sup>, dried in air and then few drops of xylene were poured on it and kept for 1 minute to dissolve out fat globules of milk. The smear was then fixed with methanol for 2 minutes, washed with distilled water and stained with Giemsa stain (1:10 dilution) for 30 minutes. The smear was washed with phosphate buffer saline solution (pH 7.0),

kept in a couplin jar for 10 minutes, blot dried and cell counting was done.

### Somatic cell counting (SCC)

The modified technique of leukocyte count described by Prescott and Breed (1910) was followed for total somatic cell count in which a total of 20 fields selected randomly, were examined under oil immersion objective. The total numbers of cells counted in 20 fields were multiplied by a common factor 3246.75 to determine the total somatic cell count per mL of milk sample.

### Results

In the present investigation, the milk samples collected from H-F crossbred and Rathi cattle were subjected to somatic cell counting. The samples which revealed presence of two lacs or more cells/ml were included in the present investigation as per the IDF (2005) criterion. Of the 85 animals from which samples were collected, 38 were diagnosed to suffer with subclinical mastitis based on somatic cell count. Out of 31 H-F crossbred cattle, 16 animals were detected with SCM (51.61%). From 54 Rathi milk samples, 22 were detected with SCM (40.74%).

The milk samples were collected from two locations from H-F cross-bred and from four locations from Rathi cattle. The average SCCs varied among locations (Tables 1 and 2). Overall the mean SCC in H-F crossbreds was higher (6.36 lacs/mL) as compared to that in milk from Rathi cattle (5.13 lac/mL). In the present investigation, the range of SCCs varied between 2.07 and 22.56 lacs/mL in crossbred animals where as it was between 2.56 and 13.21 lacs/mL in Rathi cattle.

### Discussion

The SCC has been detected to be the most reliable test and closest to the bacteriological results for SCM in dairy cows by Sharma et al. (2010). On the basis of somatic cell counts, crossbred cattle having more SCCs than the Rathi cattle is suggested to be more susceptible to SCM than the native breeds which is in conformity to the earlier report by Kataria and Kataria (2006) from the same area of study. A lower SCC was recorded in Rathi as compared to H-F cattle denoting adaptability of Rathi cattle to desert environs and natural resistance towards infections.

The data indicated lesser variations in the range of SCC in the native breed than in the crossbred animals. This finding may also be considered as an index of higher resistance of native breeds towards change in SCC due to various reasons. The lesser increase in the SCC may be considered a good trait for the native breed of cattle as the quality of milk is found to be directly associated with changes in SCCs, higher the SCC lower the quality (Shitandi et al., 2005; Sharma et al., 2011). The range of SCC in crossbred cattle observed in the present study is comparable to that reported by Elango et al. (2010).

Various studies have been carried out to see the effect of different parameters viz. hygiene, stage of lactation, age, breed, season, management factors, nutritional status and the pathogen involved on SCC (Sheldrake et al., 1983; Harmon, 1994; Skrzypek et al., 2004; Sharma et al., 2011). The variations in the somatic cell counts in the milk samples collected from animals at different locations may be

result of one or more factors as studied by the above workers.

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In conclusion, somatic cell count (SCC) is a reliable tool for detection of subclinical mastitis in dairy cattle. This along with other indirect screening tests such as California Mastitis test (CMT), sodium lauryl sulphate test, electrical conductivity (EC) tests etc along with cultural isolation can help in early detection of subclinical mastitis in cattle. Further the indigenous breeds have been found to show lower SCC than the crossbred cattle attributable to many environmental and host factors.

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**Table 1: Number of somatic cells in milk samples from H-F crossbred cattle with subclinical mastitis**

S. No.	Location (Bikaner)	No. of samples	SCC Average ( Range) per mL of milk sample (in lacs)
1.	Veterinary College Dairy Farm	6	3.2 (2.6 - 4.02 )
2.	Old Ginnani	10	8.2 ( 2.1 - 22.5)
	Total	16	Mean SCC= 6.36

**Table 2: Number of somatic cells in milk samples from Rathu cattle with subclinical mastitis**

S. No.	Location (Bikaner)	No. of samples	SCC Average ( Range) per mL of milk sample (in lacs)
1.	Veterinary College Dairy Farm	8	5.5 (2.56 - 13.2)
2.	Old Ginnani	10	5.3 (4.4 - 7.6)
3.	Bhinasar	2	3.6 (3.2 - 3.9)
4.	Tilak Nagar	2	4.65 ( 3.8 - 5.4)
	Total	22	Mean SCC= 5.13

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