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## CONTENTS

# Study of subclinical mastitis in milch breeds of cattle in Western India

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**ABSTRACT:** Subclinical mastitis (SCM) is an invisible infection of udder, mostly affecting milch animals. High milk yielding cattle are often more prone for SCM infection. When SCM infection remains untreated for long time it eventually ends up into chronic mastitis which causes huge fall in milk production. As SCM infection has many predisposing factors, in this present study breed wise prevalence of SCM was studied. On the basis of the results it was observed that crossbred cattle were found more affected in comparison to other cattle breeds.

**Key words:** California mastitis test, Milch breed, Subclinical mastitis

Sub-clinical mastitis (SCM) is an economically important condition for the dairy industry (Plozza *et al*., 2011). It is one of the major reasons of animal suffering, responsible for poor growth in young animals, reduced milk quality, poor product hygiene and undesirable changes in the milk's composition (Brightling *et al*., 1998; Seegers *et al*., 2003; Chagunda *et al*., 2006; Halasa *et al*., 2009). Mastitis is characterized by physical, chemical and bacteriological changes in the milk and pathological changes in the glandular tissue of the udder (Sharma *et al*., 2006; Sharma *et al*., 2007; Sharma *et al*., 2011). Effective mastitis control strategies depend on early and accurate detection, since proactive management of the condition can reduce the negative effects of the disease and achieve higher cure rates (Fricke 2002; Deluyker *et al*., 2005).

Symptoms visible to naked eyes like swelling of udder or redness are those of clinical mastitis infection whereas there is no visible change in udder appearance or milk in subclinical mastitis infection, makes it difficult to diagnose. The healthy cows produce more milk and higher milk components than cows suffering with mastitis (Martins *et al*., 2020). Hence, it is vital to diagnose SCM in early stage as the udder tissue start to get damage much earlier before they become visible. Mastitis occurs when any opportunistic microbe invade the teat canal. The prevalence of subclinical mastitis infected cows varies from 5%–75%, and quarters from 2%–40% in all dairy herds (Erskine *et al*., 2020). Very often subclinical mastitis persist and lead to development of clinical mastitis and a chance for contagious bacteria to spread from infected to uninfected mammary glands (Wu and Turashvili, 2020). The interspecies transmission of *Streptococcus agalactiae* has not been reported much. The species of *Streptococcus agalactiae* of human and cattle are differentiated on the basis of saline and lactose fermentation and bacteriocin and bacteriophage typing (Sukhnanand *et al*., 2005). Predisposing factors for mastitis incidence highly depend upon type of breed, stage of lactation, management practices, and awareness of the dairy farmers (Sinha *et al*., 2014).

Countries like India having wide spread geographical area is inhabited by variety of cattle breeds, hence, it is imperative to study the breed wise prevalence of SCM. The breed wise comparative study of SCM can also play an important role in designing the therapeutic, preventive, and control measure of SCM. The systematic study comparing prevalence of SCM among different cattle breeds is not available in literature. Therefore, in present study breed wise comparative analysis of SCM prevalence was conducted by using various methods of diagnosing SCM.

## MATERIALS AND METHODS

### *Collection of milk samples*

Milk samples were collected from 89 lactating cows comprising 31 Triple cross (Kankrej x Jersey x Holstein Friesian), 29 Kankrej, 17 Gir and 12 Holstein Friesian breeds. All these animals belonged to the dairy herd maintained at Livestock Research Station (LRS) {Triple cross, pure Kankrej breed and pure Gir breed}, HF farm {HF cows} and Instruction Farm {Triple cross} affiliated with College of Veterinary Science and Animal Husbandry, Anand Agricultural University, Anand Gujarat. These animals were housed, fed and managed under identical management practices as per the schedule followed at different farms.

Udder and teats were first properly washed with 0.01 per cent (1:1000) potassium permanganate solution. After washing, the udder and teats were wiped with tissue paper and subsequently teat and teat orifices were scrubbed with 70 per cent ethanol. After discarding first 2-3 streams of milk, approximately 30 ml foremilk samples were collected from each quarter in a separate sterile screw-capped vial on three consecutive days during the evening milking for conducting California mastitis test (CMT), Mastrip test and Electronic Somatic Cell Count (ESCC). The collected milk samples were transported on ice from the respective farms to the laboratory at Department of Veterinary Microbiology, Veterinary College, Anand, to conduct California mastitis test (CMT) and Mastrip test. Milk samples were preserved at refrigerator temperature after adding 0.05 per cent potassium dichromate for conducting Electronic Somatic Cell Count (ESCC) at the laboratory of ARDA (Amul Research Development Association), Anand.

### *Mastrip Test*

Mastrip is a cellulose based Bromothymol blue (BTB) strip impregnated with stabilized ion sensitive indicator for detection of mastitis. The test was performed as follows.
One drop of milk was put on one strip of mastrip and change in colour of the strip was observed within 30 s. Separate strip was used for each quarter milk samples. The interpretation of the colour developed after the test was done as Yellow-Normal, Greenish yellow-Sub-clinical mastitis, Green-Advanced subclinical mastitis, Blue-Clinical mastitis.

### *California Mastitis Test (CMT)*

CMT was performed on foremilk samples as per the method described by Schalm and Noorlander (1957). About 3 ml of foremilk sample of quarter was taken into the cup of plastic paddle and equal amount of CMT reagent was added using a graduated glass pipette. The mixture of reagent and milk was made to swirl by a gentle circular motion of the paddle. Development of reaction was recorded and the milk samples given scores (Schalm and Noorlander, 1957).

### *Somatic Cell Count (SCC)*

Somatic cell count of foremilk samples was carried out by using Fossomatic Cell Counter (Foss Electric, Hillerod, Denmark).

### *Identification of infected quarters*

Each individual teat was examined by manual palpation and was clinically observed for atrophy, variation in size and position. Glands, udder and milk were also examined for any abnormality. By correlating the results obtained from samples collected for three days, SCC and bacteriological culture examination, infected quarters were identified following the IDF guidelines (Table 1).

### *Estimation of Prevalence*

The prevalence was expressed in percent by using the following formula:
Prevalence (%) =Number of animals positive/ Number of animals tested×100

**Table 1: Criteria for categorizing healthy / infected quarter**

| Sl .No. | Quarter health status | Culturing of milk samples | SCC of milk samples (Cells/ml) |
|---|---|---|---|
| 1 | Healthy | 2 times negative | All 3 times < 5,00,000 |
| 2 | Specific mastitis | 2 times positive | Minimum 1 time > 5,00,000 |
| 3 | Non-specific mastitis | 2 times negative | Minimum 1 time > 5,00,000 |
| 4 | Latent infection | 2 times positive | All 3 times < 5,00,000 |

## RESULTS AND DISCUSSION

### *Breed wise incidence*

Breedwise, 58.82 per cent (10/17) Gir cows, 27.58 per cent (8/29) Kankrej cows, 74.19 per cent (23/31) Triple cross cows and 50 per cent (6/12) HF cows were found to be positive for subclinical mastitis (Fig. 1).

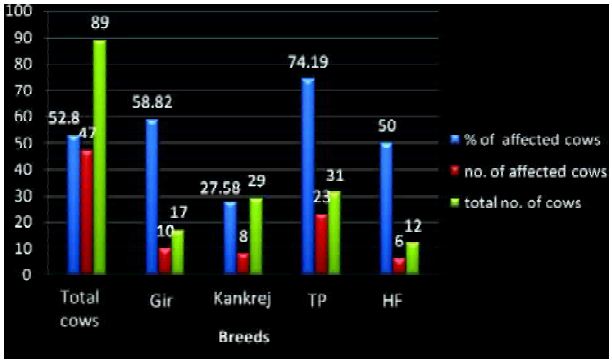


**Fig. 1: Breed wise incidence of subclinical mastitis in cows**

### *Quarter wise incidence*

Out of 349 quarters screened for subclinical mastitis, 30.66 per cent (107/349) quarters were found to be positive for subclinical mastitis. Quarterwise, 38.80 per cent (26/67) quarters of Gir cows, 15.04 per cent (17/113) quarters of Kankrej cows, 39.67 per cent (48/121) quarters of Triple cross cows and 33.33 per cent (16/48) quarters of HF cows were found positive for subclinical mastitis (Fig. 2).

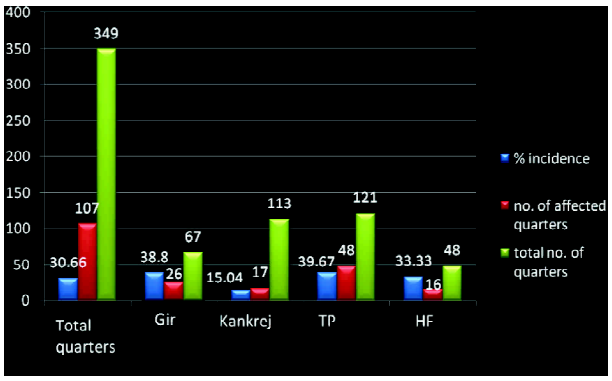


**Fig. 2: Quarter wise incidence of subclinical mastitis in cows**

Amongst the four quarters of cows, the highest incidence of subclinical mastitis was found to be 28.03 per cent (30/107) in fore left (FL) quarter (Gir 7 +Kankrej 5 + TP 14 + HF 4), followed by 27.1 per cent (29/107) in hind left (HL) quarter (Gir 8 + Kankrej 4 + TP 12 + HF 5), 24.29 per cent (26/107) in fore right (FR)quarter (Gir 4 + Kankrej 6 + TP 12 + HF 4), and 20.56 per cent (22/107) in hind right (HR) quarter (Gir 7 + Kankrej 2 + TP 10 + HF 3) (Fig. 3).

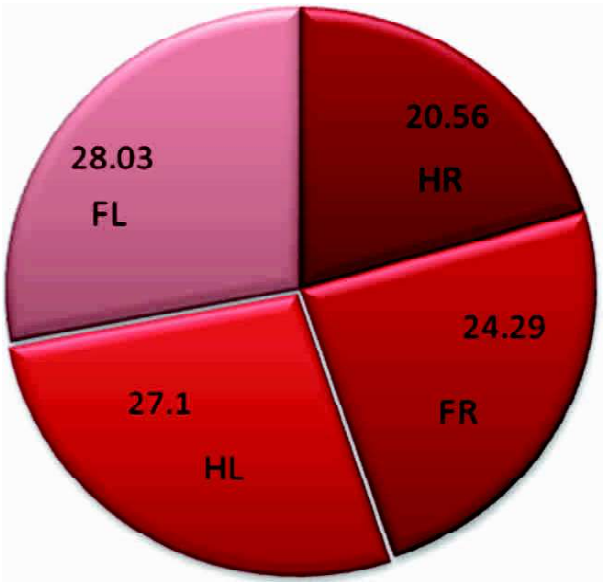


**Fig. 3: Incidence of subclinical mastitis in cows based on quarter position**

Following the guidelines of IDF, the present study was carried to identify breed wise prevalence of SCM among different cattle breeds and also to identify quarters infected for subclinical mastitis in cows. In present study, out of total 89 cows screened,

52.8 per cent (47/89) cows were found to be positive for subclinical mastitis infection in one or more quarters. The probable reasons incriminated for such a variable incidence of subclinical mastitis are many including the establishment of various pathogens in various farms and the managemental conditions followed. Looking to the occurrence of SCM with respect to breed in present study, 58.82 per cent (10/17) Gir cows, 27.58 per cent (8/29) Kankrej cows, 74.19 per cent (23/31) Triple cross cows and 50 per cent (6/12) HF cows were found to be positive for subclinical mastitis. The highest incidence was found in Triple cross cows while lowest incidence was in Kankrej cows analogous to the study of Maheshwari and co- workers 2016 (Maheshwari *et al.*, 2016).

Kurjogi and Kaliwal (Kurjogi and Kaliwal, 2014), has concluded in their study that exotic breeds like HF are more suspect able for SCM then indigenous cattle breeds. Sinha and co-workers (Sinha *et al.*, 2014) also observed in their study that crossbred cow suffers higher loose of milk production due to SCM. The significant difference in prevalence of SCM among different breeds of cattle is mainly depend on their milk yield as high yielding cattle are more susceptible due to high stress which make them more vulnerable to opportunistic pathogens.

In present study, quarter wise incidence of subclinical mastitis was found to be 30.66 per cent (107/349). Amongst the four quarters of cows, the involvement of fore left quarter and hind left quarter was highest and almost similar (28.03% and 27.1 respectively) followed by, fore right quarter (24.29%) and hind right quarter (20.56%). According to guide line of IDF (1987), 47 animals (52.8%) and 107 quarters (30.66%) were positive for subclinical mastitis, but when compared with CMT and Mastrip, 39 (82.97%) animals and 82 (76.63%) quarters were positive by CMT and, 27 (57.44%) animals and 56 (52.33%) quarters were positive by Mastrip. This endorses the better efficiency of IDF guidelines in detecting sub clinical mastitis as they give weightage to SCC and cultural isolation.

## CONCLUSION

High yielding cattle are more susceptible and indigenous breeds are more resistant to mastitis. Therefore, to increase the overall yield of the farm as well as individual milk production, rearing of indigenous breeds in production should be encouraged as they are well acquainted to the Indian climate.

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