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Foot and Mouth Disease-Mastitis Cascade in Dairy Cattle: A Field Study*

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Abstract: A field study was conducted in 6 cross bred dairy cows suffering from acute clinical mastitis preceded by FMD in all animals. After thorough clinical and laboratory examination of the affected animals were confirmed as the cases of clinical mastitis. Cows were diagnosed for mastitis by clinical examination and Modified California mastitis test, somatic cell count and cultural examination of milk. After confirmation of disease and antibiotic sensitivity test all cows were subjected to precise and supportive therapy. Out of 18 quarters only 2 quarters were positive to + and one quarter to trace reaction by MCMT after the completion of treatment (on 5th day) with enrofloxacin and melonex along with supportive therapy. Out of 18 quarters only 3 quarters showed 2.5×10^5 cells mL^{-1} to 3.25×10^5 somatic cells mL^{-1} of milk and remaining quarters showed $< 2.1 \times 10^5$ somatic cells mL^{-1} of milk. It is concluded that the result of enrofloxacin and mammitel are considerable in the treatment of clinical mastitis.

Key words: FMD, mastitis, MCMT, SCC, enrofloxacin, melonex

INTRODUCTION

Foot and Mouth Disease (FMD) is an extremely contagious, acute viral disease of all cloven footed animals and is characterized by fever and vesicular eruption in the mouth and on the feet and teats and it caused the loss in the production (Radostits *et al.*, 2000). Following a few days of viraemia, the virus appears in the milk and saliva for upto 24 h before the appearance of vesicle in the mouth. Mammary gland is another tissue in which persistence may take place, the FMD virus living in this tissue for 3-7 weeks. Vesicles may occur on the teats and when the teat orifice is involved, severe mastitis often follows. Mastitis, there is occurrence of physical, chemical and bacteriological changes in milk and development of pathological and inflammatory changes in the parenchyma and glandular tissue of mammary gland. Today mastitis is stands second to FMD as a most challenging disease in high yielding dairy animals in India (Varshney and Mukherjee, 2002). FMD followed by mastitis is a very rare event and scanty reports on it are available. The present study is providing the report on post-FMD mastitis complication in cross bred dairy cattle and treatment of mastitis affected cows.

HISTORY AND CLINICAL EXAMINATION

Six cross bred cows in 1 to 4 lactation on a private dairy farm in the vicinity of the College of Veterinary Science and Animal Husbandry, Anjora, Durg (CG), India were taken for this study. The history of swollen udder and abnormal milk with flaks or clots and watery milk from 6 quarters of

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3 cows. All the affected cows were anorexic, weak, dehydrated along with the history of FMD outbreak at the same farm 20 days back. As per the owner cows were not vaccinated against FMD. Out of 6, 2 cows were unable to stand without any manual support. All affected animals shows the open mouth breathing, loss of appetite and drastic reduction in milk yield (3 cows comes from 14-16 L milk per day to 2-3 L milk per day and an other 3 cows reduce milk yield up to 4-5 L per day. In case of FMD, lesions also occur on the teat, so through these lesions bacteria may get the opportunity to enter into the teat and cause mastitis. On physical examination two quarters of 2 cows were very swollen, hard and large amount of pus inside the quarters. The milk from the affected quarters was like custards, yellow coloration and with clots or flakes. These observations were in accordance to the findings of Sreeramulu (1993) and Sankaram and Kotaya (1977).

On clinical examination, temperature was 102.5°F to 104°F, pulse 75 to 90 per min and respiration 26 to 31 per min. Indirect mastitis test e.g., Modified California Mastitis Test (MCMT) was carried out as per the method of Devi (1997), out of 22 quarters (2 quarters filled with pus) of 6 cows, 18 quarters were found positive to CMT, out of which 7 quarters show +++ reaction, 5 ++, 3 ++ and one trace reaction. After proper disinfection of teat surface with 70% ethyl alcohol, 15 mL of milk sample from each quarter's viz. Left Fore (LF), Left Hind (LH), Right Fore (RF) and Right Hind (RH) of all animals was collected aseptically after squirting few streams, in sterile vials and processed within 1 h of collection. Milk samples were presented for Somatic Cell Count (SCC) by the method of Schalm *et al.* (1971), revealed that the average SCC of MCMT positive quarters were $16.72 \pm 2.16 (\times 10^5)$ cells mL^{-1} of milk and ranges from 5×10^5 to 36×10^5 cells mL^{-1} , while in MCMT negative quarters average SCC were $0.98 \pm 0.18 (\times 10^5)$ cells mL^{-1} of milk and ranged from 0.5×10^5 to 1.30×10^5 cells mL^{-1} . On isolation as per the method of Cruickshank *et al.* (1975), *Staphylococcus* spp. and *Streptococcus* spp. were the chief causative agents of mastitis. The findings were in agreements with the Sharma (2003). After isolation and identification the bacterial isolates were subjected to *in vitro* antibiotic sensitivity test by disc diffusion method (Bauer *et al.*, 1966). All isolates were sensitive to enrofloxacin (++++) followed by Amoxicillin and Cloxacillin (+++) and oxytetracycline (+++). Sharma (2000), Sahay (2000) and Prasad (2001), also showed maximum sensitivity to enrofloxacin in cases of mastitis. No single isolate was sensitive to penicillin.

TREATMENT

All the affected cows were treated for 5 days with intramammary infusion with Mammitel -10 g, one tube/quarter twice in a day, Inj Enrocin (Enrofloxacin) at the rate of 5 mg kg^{-1} body weight i/m, Inj. Melonex (Meloxicam) at the rate of 0.5 mg kg^{-1} body weight i/m, Inj. Belamyl -10 mL i/m and Inj. E-Care-Se 15 mL i/m (Alternate day) three shots. Owner was advised to frequent milking (at every 3-4 h) of severely affected quarters and try to complete removal of pus from the quarters and proper disposal of it.

RESULTS AND DISCUSSION

On 7th day after treatment pus was completely stopped from all the quarters but 2 quarters fibrosed and blind permanently. Only 2 quarters were positive to + and one quarter to trace reaction by MCMT after the completion of treatment (on 5th day). Only 3 quarters showed 2.5×10^5 cells mL^{-1} to 3.25×10^5 somatic cells mL^{-1} of milk and remaining quarters showed $< 2.1 \times 10^5$ somatic cells mL^{-1} of milk. All systemic reactions disappeared after the completion of treatment and increase the appetite of animals. The high cure rate by enrofloxacin after intramuscular administration may be due to the high bio-availability and high tissue concentration exceeding Minimum Inhibitory

Concentration (MIC) values for most pathogens (Gatne *et al.*, 1997). Present treatment schedule is in agreement of Akhtar *et al.* (2003) also used the enrofloxacin and 3-D vet for the treatment of clinical mastitis, the difference is that in the present study Meloxicam was used as anti-inflammatory agent instead of Diclofenac sodium (3-D Vet). Meloxicam is a potent anti-inflammatory and 12 times more selectively inhibits COX-2 than COX-1. Jones (1990) has also been reported the same type of episode. It is concluded that the result of enrofloxacin and mammitel are considerable in the treatment of clinical mastitis. E-Care-Se used as immuno-potentiator to increase the functional capabilities of neutrophils, macrophages and plasma cells. Immuno-potentiators also enhance the phagocytic and bactericidal activity of neutrophils at mammary glands and shorten the duration and severity of post FMD mastitis challenge (Markandeya *et al.*, 2005). The present findings are also in conformity of Markandeya *et al.* (2005), they reported that herbal immune-potentiator coupled with antibiotics can be used for the effective treatment of post-FMD mastitis. The FMD virus replicates in the secretory epithelium of bovine mammary gland. The acini and ducts in the necrotic areas contain mainly sloughed epithelial cells, cellular debris and small number of leukocytes, which leads to reduced milk yield in the affected animals (Jubb *et al.*, 1983).

Finally, it is concluded that occurrence of mastitis may be followed by mastitis and effective treatment of mastitis with enrofloxacin and meloxicam and supported with immuno-potentiators like vitamin E and selenium.

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