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Mastitis with air in cows- Field report

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Abstract
Fifteen per-acute and acute mastitis cows showed purging of air from affected teats. Culture of the milk samples revealed *K.aerogenes* found sensitive to enrofloxacin. 53% and 34% cows showed good recovery from 48 hours and 72 hours respectively. Remaining 13% cows died. There is no previous literature available about mastitis with air.

Keywords: cows, mastitis with air, *K.aerogenes,* enrofloxacin.

1. Introduction
Mastitis is an economically important and highly disease of dairy cows and also highly fatal. It is a complex disease involving many factors, which is mainly caused by bacteria and there is no simple model that encompasses all possible facets. In field condition mastitis, is of great magnitude permit time for laboratory finding to institute appropriate treatment based on its result. So there is alwas a need ofr a quick and successful treatment with a better drug (Umakanthan *et al.*, 1996) [1]. Though mastitis is very common, mastitis with air while stripping is not recorded so far in dairy industry. In this field study such type of mastitis has been studied for 10 years and treated.

2. Material and Method
Fifteen cross bred cows, 2 to 5 calvings, were presented with one or more swollen quarters, limping of the affected side, purging of air and straw coloured secretion on stripping. Two cows had unsuccessful local treatment.
Twelve random milk samples from the affected quarters collected. All samples *in vitro* revealed *Klebsiella aerogenes* and found sensitive to enrofloxacin. In 15 cows the affected quarters were completely stripped off and infused 250mg enrofloxacin (K-flox –Karnataka antibiotics Ltd) intramammary every 24 hours.

3. Result
Eight and five cows showed cessation of air purging in 48 and 72 hours respectively. But the milk quantity was greatly reduced to 10 ml to 250 ml. The milk yield was not recovered even upon treatment with ayurvedic and allopathic galactogogues. Further infusion of enrofloxacin resulted in haemorrhage. Already treated 2 cows died after 5 days of treatment. All the successfully treated animals showed usual habits.

4. Discussion
Klebsiella is ubiquitous in nature and can be found in surface water (Hogeveen, 2005) [2]. Falkow *et al*., 2006 [3], cited, Podschun and Ullmann, 1998a, widely recognized *Klebsiella* as important opportunistic pathogens in human patients, representing 3 – 8% of all nosocomial bacterial infections and ranking second as a cause of nosocomial gram – negative bacteraemia. They are mostly associated with infections of the urinary and respiratory tracts, as well as wound and soft tissue infections, and can cause fatal septicaemia. Also cited, Hart, 1993, *Klebsiella* strains have extensive ability to spread among patients.
In this study, it is suspected that mastitis with air in cows is an anthroponotic disease spread caused by *K. aerogenes*. Mastitis caused by *Klebsiella aerogenes*, a gram negative aerobe, causes air accumulation in teat cisternae and purging of air with sound which is evident on stripping the affected quarter.
Enterobacter aerogenes is lactose fermenting bacillus (Dudek, 2007) [4]. Both *K. pneumoniae* and *Aerobacter aerogenes* ferment many carbohydrates, often with gas production (Falkow loccit). Intra – lesional gas formation is more consistent with Klebsiella infection (Mirvis *et al*., 2015) [5]. Because of this gas producing property, *K.aerogenes* by fermenting the lactose present in milk caused mastitis with the air accumulated inside teat canal.
Hogeveen loc cit, discussed that, *Klebsiella* usually originates from the environment, particularly from wet or green sawdust. In recent years, *Klebsiella* mastitis has become an increasingly common problem in herds including that do not use wood – based products as bedding material. In humans, gastro – intestinal Klebsiella carriage occurs. Re – use of sand contaminated with Klebsiella of faecal or environmental origin may play a role in Klebsiella mastitis in herds that use inorganic bedding materials. In addition, contagious transmission of Klebsiella may take place.

Intramammary infections with Klebsiella respond very poorly to treatment, and most Klebsiella infected animals are culled prematurely because of high somatic cell count and continued clinical flare-ups (Hogeveen loc cit).

Strains of *Klebsiella* are naturally resistant to amino penicillins and carboxypenicillins and other penicillins but susceptible to most other β- lactam antibiotics. But there reported the emergence of resistant strains to third generation cephalosporins (Falkow loc cit). The optimum treatment regimen of *Klebsiella* mastitis remains unknown and there are essentially no studies providing evidence of an effective treatment against *Klebsiella* clinical mastitis (Pamela L. Ruegg, 2012) [6].

Falkow loc cit, cited that, at present, carbapenems are very active invitro against the vast majority of *Klebsiella* strains. Also cited, Watanabe *et al*., 1980, *Klebsiella* isolates remain generally susceptible to quinolones. Intramammary enrofloxacin have good distribution, while penicillin G, cephalosporin, ceftiofur have intermediate distribution and aminoglycosides have poor distribution (Divers at al., 2008) [7]. Enrofloxacin affords good or excellent udder penetration after parenteral administration. (Smith *et al*., 2011) [8]. Milk does not significantly interfere with the antimicrobial activity of enrofloxacin in vitro (Fang and Pyörälä, 1996) [9]. Fluoroquinolones can have positive immunomodulatory effects by increasing the killing ability of neutrophils (Hoeben *et al*., 1997) [10]. In this study, milk samples are invitro found been sensitive to enrofloxacin and thus treated effectively with intramammary infusion of enrofloxacin.

The pathogenesis of mastitis, in many cases, includes damage to secretory tissue and its replacement with fibrous tissue leading to a permanent decrease in milk yield from the affected quarter. The decrease of the milk production is due to an increased demand for energy by the immune system, a decreased appetite associated with the inflammatory process and lowered feed intake due to pain and decreased mobility (Petrovskia, 2006) [11].

Mastitis with *Klebsiella* infection origin usually is of longer duration and also duration of milk production loss is substantially longer and severe (Ynte Schukken, 2012) [11]. Because of this, the milk yield could not be recouped despite animals' complete recovery from the clinical infection.

5. Summary

Mastitis with air in cows caused by *Klebsiella aerogenes* treated successfully with intramammary infusion of enrofloxacin.

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