EVALUATION OF CLINICAL MASTITIS OCCURRENCE, TREATMENT PROTOCOLS AND PATHOGEN PREVALENCE IN A DAIRY HERD DURING 12 MONTHS

VAVROVA EVA[1], PALIK JIRI[2], SLADEK ZBYSEK[1]
[1]Department of Animal Morphology, Physiology and Genetics
Mendel University in Brno
Zemedelska 1, 613 00 Brno
[2]Farma Neuman Adolf, Ing.
Okresice 42, 674 01 Trebic
CZECH REPUBLIC

eva.vavrova.umfgz@mendelu.cz

Abstract: Data from a dairy herd (283 cows) in Czech Republic were analysed to find out the situation among clinical mastitis (CM), pathogen prevalence and combination of drugs used for treatment. The data show that heifers suffer from clinical mastitis at most (45% cases). The highest occurence of CM appeared in winter months with heifers´ calving. The prevalent pathogenes in this herd are *E.coli, Bacillus sp*. and *Staphylococci*. The cows are mostly treated with combination of antibiotics marbofloxacinum, flunixine and oxytetracycline.

Key Words: clinical mastitis, dairy cow, heifer, pathogene

INTRODUCTION

Clinical cases of mastitis are those where the cow displays definitive symptoms of the disease. These may be acute, where the disease flares up relatively suddenly in a formerly healthy cow; these cases may be further defined as per-acute**,** where the rapid onset of severe inflammation, pain and systemic symptoms results in a severely ill cow within a short period of time, or sub-acute mastitis, the most frequently seen instance of the disease, where the few symptoms tend to be mild inflammation in the udder and visible changes to the milk, such as small clots. Dairy cattle usually catch mastitis from lying in dirty conditions or from poorly clean milking equipment. Cows can be treated using antibiotics. During treatment the milk is withdrawn from human food chain and is either thrown away or given to calves. There are big penalties against farmers that allow treated milk into the bulk tank. As a measure of udder health, somatic cell count (SCC) is a very interesting and valuable measure. Somatic cell count is mainly determined by intramammary infection and is therefore an excellent proxy to measure prevalence and even incidence of IMI whether clinical signs of mastitis are present or not (Dohoo, Leslie 1991). In addition, SCC measurements can easily be obtained for research either from bulk milk **(**BMSCC**)** or as a herd average of individual cow measurements from dairy herd information (DHI) programs. Finally and most importantly, BMSCC is used internationally as a standard for milk quality. For dairy producers worldwide, SCC is not only a measure of herd udder health performance, it is also a determinant of the market-ability of their milk. This study aimed to evaluate clinical mastitis occurrence, treatment protocols and pathogen prevalence in a herd during 12 months.

MATERIAL AND METHODS

The present study was conducted in 2014 and 2015 on 283 cows. They were Holstein-Frisian, Czech Fleckvieh and their crossbreds. On the farm in Okřešice, modern management techniques and good hygiene standards were applied. The data obtained from farmer contained DHI (dairy herd improvement) and herd udder health data from last 12 months (October 2014-September 2015). The ages of the cows ranged between 2 and 13 years (1^{st}–9^{th} lactation). Milking was done mechanically twice a day on the farm. Milking personnel was familiar with the symptoms of clinical mastitis (warm, swollen udder and/or changes in milk). They were instructed by veterinarians to register all occurrences of CM in an internal database.

The SCC and pathogen data were obtained from Laboratory for milk analyse in Brno, Tuřany.

The data were processed using GraphPad Prism® - a commercial scientific 2D graphing and statistics software by GraphPad Software, Inc., California. The correlation of relationship between number of lactation and incidence of clinical mastitis was analysed.

RESULTS AND DISCUSSION

There were 150 cows treated in 175 clinical mastitis cases between September 2014 and August 2015. Most of the treated cows were heifers – 68 animals (45%) suffered from CM. Intramammary infections in heifers, defined as nulliparous animals at the time of calving (Piepers et al. 2011), have received increasing attention in recent years (De Vliegher et al. 2012, Santman-Berends et al. 2012, Archer et al. 2013). The prevalence of SCM in heifers in early lactation is 18.0-27.5% (De Vliegher et al. 2004, Svensson et al. 2006, Santman-Berends et al. 2012). Mastitis in heifers can result in a long term negative effect on udder health and is associated with an increased culling rate, thus increasing rearing costs (Samoré et al. 2003, De Vliegher et al. 2012). The results of CM cases during seasons are given in Figure 1.

Figure 1 CM cases among months

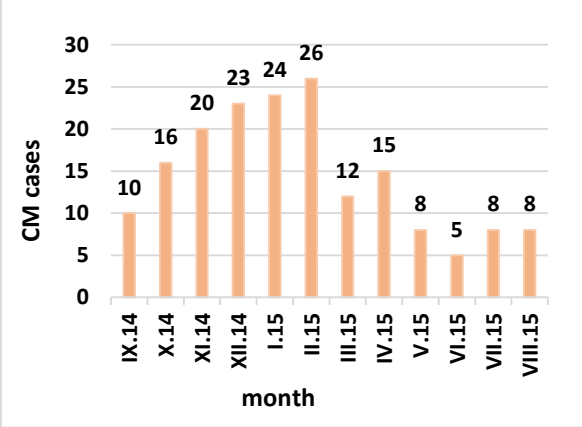


Figure 2 CM cases among number of lactation

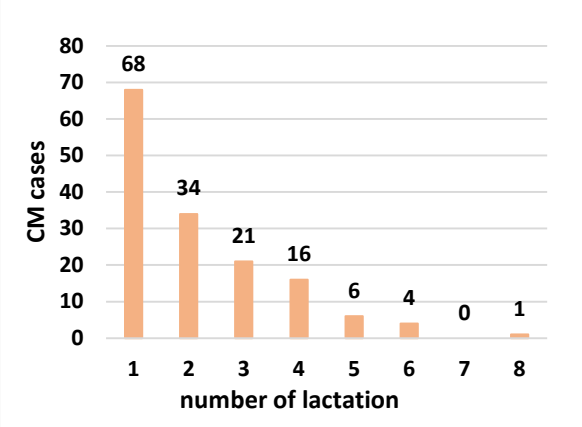
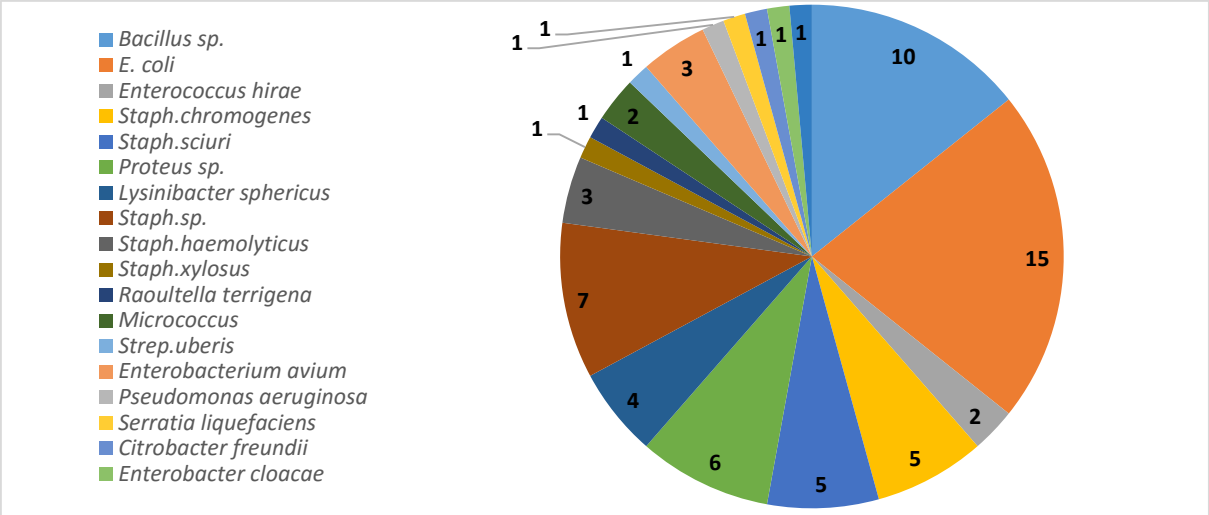


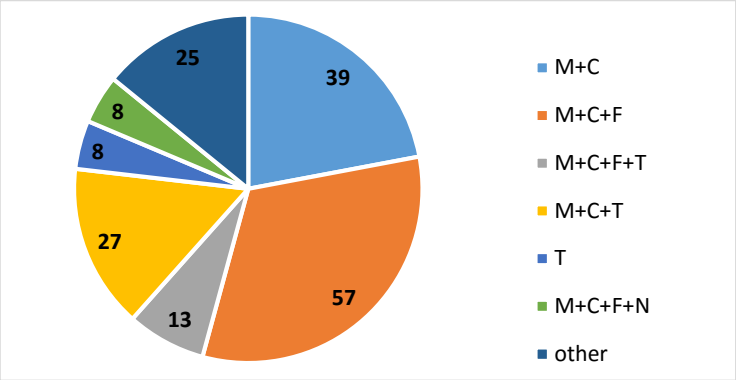
Figure 3 Pathogenes isolated from CM



Our findings do not correspond with Costa (1998), who describes summer as the rainy season and winter as the dry season, and the highest incidence of mastitis occurs in summer. This may be due to calving season and heifers´ start of lactation in the analysed herd. Milk production can be affected by several bacterial pathogens that cause disease in dairy animals. Transfer of mastitis relevant pathogens can be through cross-sucking among young heifers, presence of flies, keeping heifers with dry cows and a lack of environmental hygiene (De Vliegher et al. 2012). Other risk factors identified

for heifer mastitis are climate, season, geographical location, suboptimal nutrition and genetic background (De Vliegher et al. 2012, Archer et al. 2013).

Figure 4 Combinations of CM antibiotic treatment



Legend:
M - Marbofloxacinum
C - Cefaximin
F - Flunixin
T - Terramycin (oxytetracycline)
N – Noroclav (amoxicillinum)

The period, season and age at calving, lactation number, log-transformed SCC, and a joint effect of age and log SCC affect the status of mammary gland (Rodriguez-Zas et al. 1997). We found high correlation coefficient (r= - 0,886, P<0,05) between the incidence of mastitis and number of lactation in this herd – the higher lactation, the lower incidence of clinical cases. This can be due to culling chronic animals or self-curing mechanisms of the udder. Nevertheless we recommend paying attention to prevent clinical mastitis in heifers.

The data obtained from laboratory cultivation show that the majority of CM is caused by gram-negative *E.coli* and gram-positive *Bacillus sp*. As for contagious pathogenes, the *Staphylococci* (*haemolyticus, xylosus, chromogenes,* etc.) are most prevalent in this herd (Figure 3). There are many treatment protocols with various antimicrobial combinations. The summary of them is given in Figure 4. The use of antibiotics and the development of resistant strains of bacteria have been discussed and reported since antibacterial drugs were accepted for use in both human and veterinary medicine. Antimicrobial susceptibility is an important area in mastitis diagnostics since mastitis is one of the most common diseases in many dairy farming, and the single most common cause for antibacterial use in lactating dairy cows (Kaneene et al. 1992). To determine if the resistance is emerging, the resistance observed historically should be compared with that of present. In veterinary medicine, bovine mastitis is considered one of the most common and economically important diseases affecting dairy herds worldwide. It causes significant economic loss (Seegers et al. 2003). In clinical mastitis, the abnormalities in the milk can easily be observed and the milk has to be discarded by the producer. This milk would not normally enter the food chain.

The economic impact of mastitis is usually due to increased milk SCC, decreased milk production, increased costs of veterinary treatment, and premature culling of infected animals (Vink 1995, Seegers et al. 2003). Mastitis represents 21% of reported diseases in dairy cattle, with an annual prevalence of 37% (Miller and Dorn 1990). The incidence of CM is associated with many risk factors. The sampling unit in risk factor studies can vary from quarter level to herd level (Leelahapongsathon 2014). Cow-specific risk factors are related to the difference in CM incidence among cows. Parity, month of lactation, season of the year, somatic cell count in previous lactation and CM history are the cow-specific risk factors, which are currently known (Olde Riekerink et al. 2008, Steeneveld et al. 2008, Breen et al. 2009).

CONCLUSION

In this study, DHI and herd udder health data from a dairy farm in Okřešice 283 dairy cows were investigated with regard to the presence of clinical mastitis, CM cases among number of lactation, pathogen prevalence and treatment protocols.

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