PREVENTION AND THERAPY OF MASTITIS IN COWS IN PURPOSE OF ACHIEVING HEALTHY AND QUALITY MILK

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ABSTRACT

Mammary gland in highly productive cows is exposed to great physiological demands, so it's important to remove all factors that could cause disturbance in gland function. Pathogenes are carriers of changes in disturbance health of gland. Wide-spread of udder infections depends and varies on season, region and measures of hygiene and prophylaxis. In herds with highly productive cows where eradication of *Streptococcus agalactiae* in gland was done came to increasing of number of newly infected udders with *Staphylococcus aureus*. Datas show that taken measures against infection have to be serious and primarily pointed to prevention and keeping them down. Approach to the therapy of mastitis depends on the form of their expression:
- clinical — they can be discovered by clinical examine with control of mammary gland secret;
- subclinical -they can be detected with tests and bacteriological examines.

In herds with numerous cows with infected udder treatment of all four quarters of gland is recommended in dry cows. In herds with small number of infected dry cows (udders), only the quarters that during milking period were bacteriologilay positive, CMT positive or with clinical mastitis are to be treated.

INTRODUCTION

Supervising the situation in herd of dairy cows considering udder infections is useful, because it enables evaluation of health condition and appliance of correctional measures on time. Udder infections are mostly inaparent and clinical examines of udder and milk are not good enough to give the right answer about this problem. Preventive measures and therapy of mastitis demand routine in their appliance, therefore different methods and programs are developed in purpose of keeping health of udder.

ORIGINATION AND INFECTION OF UDDER

Infections of udder in cows could be egzogene and endogene. Penetration of pathogenes in udder is most important process in development of egzogene infection. Microbs are penetrating into udder by propulsion, multiplication or by combination of these two mechanisms (1,5,9,30,36). Significant sources of mastitis are udders of earlier infected cows (4,10,11), colonization of ductus papilaris (17), by infected lesions on papillas, and as an extreme sources could appear tonsiles and vagina (18). Pathogenes are most frequently transported between quarters of udder or between cows during milking, thru the hands of milking workers, cloths for washing and preparing of udder for milking and milking equipment (29). Microorganisms from ordo *Staphylococcus* after entering the udder become "recognized" and removed by phagocitosis. However, some lineages of *St. aureus* could express resistance to phagocitosis if anti-phagocitosis substances are present on their surface. Lineages of *St.aureus* inlayed with immunoglobulines are more sensitive to phagocitosis by macrophagas and polymorphonuclear leucocytes (8). It is known that bovine IgM is opsonin for *St. aureus*. Coliformic mastitis induced by some serotypes of *E.coli*, capsular lineages of *Klebsiella pneumoniae* and *Enterobacter aerogenes* are most frequent right after the parturition (17). Infection after partuition is related to the depression in regrating polymorphonuclear leucocytes and decreased concentration of lactoferin. Seriousness of infection during the first couple of hours depends on response of udder. Weak reaction of udder during the critical phase brings to acute or peracute mastitis, and at the same time inflammation is intensified (plasmatic exudation and cell number). Coliformic mastitis are also under condition by hypersensitivity (21). Some difficulties are present in noticing differences between direct toxic effects of endotoxines and one component for immuno- interference. Because of this a small number of researches was conducted in that direction. Hypersensitivity is a problem that deserves proper study. Applying anti-inflamatory nonsteroids is one way of improving symptomatic therapy of mastitis.

CLINICAL FEATURES AND DISEASE PERIOD

Mastitis in cows appears in acute, peracute and chronic form. Sterptococcus and *Staphylococcus* species are dominant as an infection provocatives for a great number of herds (5,30,39). In herds
with *Strep. agalactiae* acute infections are very rare (28), disease appears commonly in a chronic form. Supervising the number of somatic cells in total milk samples, a great number of somatic cells was found and it goes up to several millions (even to countless). On the opposite side, in cases with chronic *Staphylococcus* infection of udder, number of somatic cells rarely goes over 200 000 (4). Some infections with *Str. aureus* occasionally brings to appearance of mastitis with gangrene (6). Appearance of gangrene form of mastitis is caused by high concentration of ?-toxin of *Str. aureus*. A- toxin causes vasoconstriction which brings to ischemia and tissues withering. Udder turns blue, animal is sleepy almost unconscious. At the begging a high temperature may appear which after few hours goes below normal temperature, udder becomes dark-blue almost black, cold and wet. Infected quarters of gland have very little secret and it is fibrinosis and bloody, often with small necrotic clots.

Animal dies within a few hours to couple of days after appearing first symptoms of disease.

**Table 1.** Categorisation of udder health based on quarter foremilk examination (DVG, 1994)

<table>
<thead>
<tr>
<th>Somatic cell count (SCC)</th>
<th>Udder pathogens</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCC/ml milk</td>
<td></td>
</tr>
<tr>
<td>&lt; 100 000</td>
<td>Normal secretion</td>
</tr>
<tr>
<td>&gt; 100 000</td>
<td>Unspecific mastitis</td>
</tr>
</tbody>
</table>

**Table 2.** Criteria for subclinical mastitis identification (Hamman, 1999)

Comparing to the *Staphylococcal* and *Streptococcal* mastitis, coliformic infections lasts much shorter. This kind of mastitis is significant only if it is harder form (considering frequency and intensity of clinical manifestation). Peracute form is the rarest and the most spectacular. Symptoms related to endotoxic shock are over ruling. With shock appearance comes to dropping of body temperature, heart bitting goes over 100 beats per minute, respiration is accelerated. There is a possibility of appearance of dispea and growling because of pulmonal congestion and lung edema. Acute form of coliformic mastitis is often and symptoms are not so alarming.

One study (7) shows that acute phase of mastitis together with subacute, ends lethaly in about 7% of infected cows. *E. coli* is succesfully removed from infected quarters of udder with 66% and most of quarters stays in milk secretion function during that day or following week, and only a few of them are functional in next lactation.

**MEASURES FOR REPRESSION OF MASTITIS**

Main measure for preventing udder from exposition to a provocatives of mastitis is hygiene. However, new infections appear during the dry period because of developing of those infections that were not seen during lactation or because of decreasing concentration of bacterialic and bacteriastatic substances in milk (28). To prevent spreading of udder infection in herds during the milking and between two milkings, and for preventing colonization of ductus papilaris and lesions on papilas in use are:

- udder desinfection before milking
- desinfection of clusters between two milkings
- papilas desinfection after milking.

Effects of desinfection are much better as well as prevention if clots with desinfection medium are used. Desinfection of papilas of udder after milking, decreases number of infections in herd (24). For papilas desinfection after milking is recomended to use desinfection medium with repelant against insects that keep up the skin on papilas, helps reorganizing lesions, destroying microbs,
they affect on insects, have prolong effect and prevent contamination of udder without affecting an milk quality. With applying this methods it is possible to reorganize current infections and to prevent from appearance of new ones (4,28). Main reason for appearance of subclinical mastitis (24) is wrong usage of milking machines. Improving of machines could affect on decreasing of rate of mastitis appearance in herd (21). For desinfection of machines is possible to use some of these methods:

1. conventional method — washing of clusters and inundation in desinfection mediums;
2. sinking clusters in hot water (76 - 82 °C), for 100 seconds - efficient but slow;
3. retractable washing with water on temperature of 85 °C for 5 seconds.

Desinfection of clusters and separat milking of cows, number of infected quarters could be decreased even to 50 % (21).

**MASTITIS THERAPY**

Antibiotic therapy decreases possibility of infection from intramammar source. Aim of antibiotic therapy is to destroy pathogens without causing destruction of udder. Elimination of microbes from gland depends on concretion and kind of antibiotics as well as on the way and time of application. To prevent from spreading of mastitis, under treatment comes clinical and subclinical forms of mastitis. While treatment of clinical mastitis is always neccessary, subclinical mastitis is more frequent and it's therapy causes enormous production losts because of antibiotics in milk. Therefore, it is for the best that subclinical mastitis are treated during the dry period. This period achieves better results then in a case of treating subclinical mastitis during milking period (18, 24,30,35). Udder is very sensitive on mastitis provocatives in early dry period. Inside first two weeks of dry period about 24% new udder quarters have been infected with Str. agalactiae and Staph.aureus. About half of these infections persists until next lactation. Therapies during dry period reduce appearance of new infections (9, 24,36), decreases appearance of clinical mastitis in next lactation and also decrease exposition of other cows in herd to the mastitis provocatives, without losts caused by antibiotic residues in milk.

Base for prophylaxis of mastitis stays in therapy during the dry period together with sinkingf teats after each milking. Systematic treatment of all cows during dry period stays the most accepted method in in herds with great number of clinical and subclinical mastitis (4,13). Selective treatment is justified in herds with low percentage of infection and high milking hygiene. Double treatment, during dry period and right before parturition with drug that stay in udder for a short time is recomended in just a few situations:

- infections with *Str. uberis* and *Actynomices pyogenes* provocatives,
- clinical mastitis before parturition
- or therapy of cronicly infected cows which are about to be replaced.

Therapy demands an extreme hygiene to avoide new infections at the time when udder is most sensitive to the infection with microbes from surroundings (*Nocardia, Pseudomonas, mycoplasmas, yeasts*). Hygiene is neccesary because all these microbs are vital in udder even when antibiotics are present. Therapy thru diatelic way during lactation as well as in dry period demand fulfilling several conditions:

- sinking teats in desinfection medium before treatment;
- cleaning and desinfection of distal parts of teats with alcohol before cateterization
- for each teat it's recomended using needle and injector for one use only;
- washing and desinfection of workers hands after each treatment.

**IMUNOPROPHYLAXIS**

Imunoprophylaxis is a way of defence of udder from new infections. Different kinds of vaccines are in use for imunization: thermicly and formolic treated suspensions of bacterial cells, cell and capsular antigenes, leucocydines, protein A and other virulent factors. Some of these vaccines caused increasing of immunoglobulines and chemotactical factors but clinical effects were not achieved each time. Good applying autochtonous vaccines (6). Increasing doses of antigenes doesn't always get to the increasing of imuno response (40). According to some authors imunologic response lasts longer if cows are vaccinated in regional lymphatic knotte with optimal dose of antigen (33). Some authors say that *Staphylococcus aureus* expresses adherency on epithel of ductus papilaris and that adherency is related to appearance of mastitis.
HERD REPAIR

Repair of a herd of milking cows is necessary to eliminate chronically infected cows which represent reservoirs of infection. Persistence of clinical mastitis with recidives and constantly presence of great number of somatic cells in milk shows that last therapies are nonefficient and most of them guide to the decision about repair. Repair of chronically infected cows should be related to untreatable *Staphylococcus* mastitis infections. First result about number of somatic cells after parturition must be lower then last control before dry period (39). If that is not the case, it is justified revision of guidance of dry period. Therefore, it is necessary to run a program with aim to get just a little increased number of somatic cells, decreased number of infections that would lead to subclinical and clinical mastitis.

Literature