RESEARCH ON SUBLINICAL MASTITIS EFFECT ON MILK QUALITY

CERCETĂRI PRIVIND EFECTUL MAMITELOR SUBCLINICE ASUPRA CALITĂȚII LAPTELUI

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Having considered that mastitis are the most costly disease in dairy farms, the present study was conducted in order to emphasize the effect of subclinical mastitis on milk composition and hygiene. On this purpose, large amounts of statistical data were analyzed, including all three main bovine breeds in Romania. Firstly, mastitis causing factors have been studied (breed, age, season, milking system. Afterwards, comparative study was achieved on fat, protein, lactose, salts). A significant increase in salts concomitantly with decreasing lactose percent has been revealed. Pathogen involved in subclinical mastitis has been also analyzed. According to our research, defectuous mechanical milking is the most frequent cause of subclinical mastitis occurrence.

Keywords: subclinical mastitis, milk quality, milk chemical composition, salubrity

Materials and Methods

The present study included initially a large number of animals belonging from all three main breed in Romania – Romanian Spotted, Maramureș Brown and Romanian Black and White. Since Romanian Black and White presented the highest subclinical mastitis occurrence, further investigations were conducted on this breed only. Subclinical mastitis was detected using an electrical conductivity device. Milk sampling has been made on each quarter, using a special designed milking system. Milkoscan device was used to determine milk composition: fat, proteins, lactose and minerals. Classical methods were used for microbiological analyses. Comparative studies were made between healthy and infected quarters. Classical statistical method ANOVA was used for comparative purpose.

Results and Discussion

Biochemical alterations in mastitis milk are presented in Table 1. It is obvious that fat percent decreased in mastitis milk decreased from 3.9% to 3.5% what means an 11% decrease. Contradictory results are presented in the literature on this theme, numerous scientific reports indicating an increasing fat percent in mastitis milk.
As regards protein content, most of the scientific reports indicate an increase, concomitantly with decreasing casein content. Data presented in the table indicates a poor increase within total protein content (from 3.31% to 3.33%), as well as sharply decreasing in casein (from 2.8 to 2.2) e.g. 11.5%. Casein decreasing is a result of its alteration by enzyme proteinase, but also by reduction in casein secretion by mammary gland. Depression in casein secretion is a result of alveoli alteration by microbial toxin occurring during the inflammatory process. Casein depression involves a large spectrum of major damages and loss in dairy industry, especially by reduction in cheese production. Taking into account that mastitis is always involved in sharply Somatic Cell Count (SCC) increasing, problems occur in dairy process, through inhibitory capacity of somatic cells (1, 2, 3, 5).

As for lactose, literature unanimously recognizes mastitis depression capacity, concomitantly with minerals increasing especially chlorines. This is the reason for abnormal milk is salty tasted increased electrical conductivity. The principle of several mastitis detection devices is based on this physical property.

<table>
<thead>
<tr>
<th>Milk composition</th>
<th>Normal milk</th>
<th>Mastitis milk</th>
<th>Dif. %</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat %</td>
<td>3.9</td>
<td>3.5</td>
<td>-11</td>
<td>***</td>
</tr>
<tr>
<td>Protein %</td>
<td>3.31</td>
<td>3.33</td>
<td>0</td>
<td>n.s.</td>
</tr>
<tr>
<td>Casein %</td>
<td>2.8</td>
<td>2.2</td>
<td>-11.5</td>
<td>***</td>
</tr>
<tr>
<td>Lactose</td>
<td>5</td>
<td>4.20</td>
<td>-16</td>
<td>***</td>
</tr>
<tr>
<td>Minerals %</td>
<td>0.7</td>
<td>1.3</td>
<td>+85</td>
<td>***</td>
</tr>
</tbody>
</table>

![Figure 1. The effect of mastitis on milk components](image-url)

Our study indicates decreasing lactose content in abnormal milk, from 5% to 4.2%, as well as an 85% increase in minerals (from 0.7% in normal milk, to 1.3 in...
mastitis milk). The reason is alterations in lactose secretions, which determines a lowering osmotic pressure within mammary gland alveoli. To compensate lower osmotic pressure, higher amount of minerals penetrate cellular walls. Furthermore, specific salted taste mastitis milk occurs. A suggestive picture on this item is presented in figure 1.

Our research also investigated pathogens involved in mastitis. The highest occurrence was registered by *Str. Agalactiae* (37%), followed by *Staph. Aureus* (26%), *E. Coli* (3%), *Bacillus cereus* (2.5%), *Actinomicete* (1.5%), levures (12.5%).

![Figure 2 Pathogens involved in subclinical mastitis](image-url)

According to our research, udder inflammation is caused most frequently not by a single branch, several pathogens being involved in each case. This situation makes the treatment more difficult, emphasizing the key role of technological, preventive factors in mastitis prevention. Because *Str. Agalactiae* and *Staph. Aureus* presents high occurrence and *E. coli* occurs rather rarely it may suggests that hygiene within studied herds is satisfactory, while problems occurs in milking system.

**Conclusions**

Mastitis is recognized world-wide as one of the most costly disease in dairy farm. Mastitis failure occurs under several ways: loss in milk production, milk quality alteration from biochemical, physical, bacteriological point of view. Casein is the most affected, damaging dairy process, especially cheese making. Pathogens involved in mastitis occurrence within the studied exploitations reveal a satisfactory hygiene. The most involved factor in mastitis is improperly working of milking system (vacuum fluctuation, vacuum level, pulsation rate, cluster poor quality).
References

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