

## ANALYSIS OF MASTITIS IN HOLSTEIN- FRESIAN COWS AND ECONOMIC EFFECTS OF MASTITIS

MYRTILL GRÁFF<sup>1</sup>- EDIT MIKÓ<sup>1</sup>

<sup>1</sup>University of Szeged, Faculty of Agriculture, Hungary

**Abstract:** The mastitis of cows causing the disease is one of the biggest economic damage by reducing the amount of milk produced and increase the medicine costs. The udder inflammation results the increase of the somatic cells (SCC) in milk. The experiments were performed on a cattle farm in southern Hungary, where we analyzed 4490 data of 860 cows. This study aimed to answer how changes the milk production, milk fat percentage and milk protein percentage in the effect change of the somatic cell count. The cows are grouped according to the number of somatic cells. The milk production decreased in the groups when were high the SCC but, the milk protein and milk fat percent increased. The SCC was the highest between the 400th and 500th day of lactation.

**Key words:** cow, somatic cell, milk protein, milk fat

### INTRODUCTION

The mastitis of cows causing the disease is one of the biggest economic damage by reducing the amount of milk produced. In addition, milk of ill cow, and milk of animals treated with antibiotics not be used for human nutrition, high the medicine costs these further increases the economic loss. Mastitis may be caused by mechanical effects (hitting, kicking) or pathogens (bacteria and fungi). Mastitis is the most prevalent production disease in dairy herds world-wide and is responsible for several production effects Seegers at all, 2003). According to Petrovski at all. (2006) The bovine mastitis is considered as the most costly production disease to the dairy industry worldwide. Estimating the costs associated with mastitis is notoriously difficult. It is even more difficult to quantify the losses associated with subclinical mastitis as they are not visible to the farmer.

Reduced indispensable casein for the manufacture of cheese in the mastitis milk, however, increases in it rate of the whey proteins sodium and chloride ion. These materials are not usable for the processing of milk even give rise to taste changes (Markus, 2001). The dairy cattle herd The Staphylococcus aureus is the most common udder pathogenic agent in the dairy cattle herds worldwide. But it can cause pyometra and dermatitis, too. Staphylococcus aureus is usually spread by the teat cup, the teat rubber, rarely by the milker or wipes from infected udders quadrant (Faragó, 2011). Healthy milk contains 20,000 to 100,000 cells per ml. The inflamed udder of milk this cell content is always greater (Haraszti- Zöldág, 1994).

Development of mastitis must be an adequate number of pathogens and different predisposing factors (external and internal factors) (Kató, 2005).

The cost of clinical mastitis in high-yielding dairy cows is different. Bar at all.() estimated the cost of genetic clinical mastitis. In their study the cost per case of CM was 18% higher with a 20% increase in milk price and 17% lower with a 20% decrease in milk price. The cost per case of CM was affected little by a 20% change in replacement cost or pregnancy rate. Cha at all (2011) estimated the cost of 3 different types of clinical mastitis (CM) (caused by gram-positive bacteria, gram-negative bacteria, and other organisms) at the individual cow level and thereby identify the economically optimal management decision for each type of mastitis. The main contributor to the total cost per case was treatment cost for gram-positive CM (51.5% of the total cost per case), milk loss for gram-negative CM (72.4%), and treatment cost for other CM (49.2%).

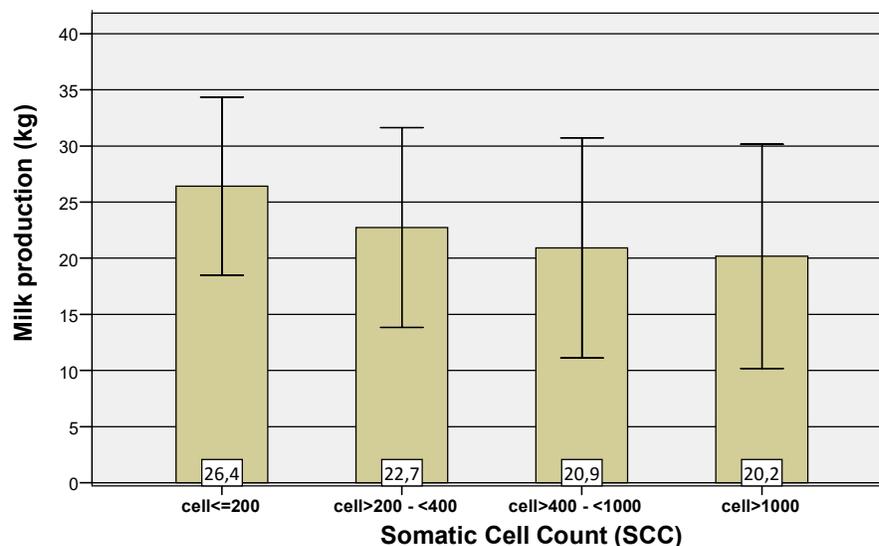
## MATERIAL AND METHOD

The experiments were performed on a cattle farm in southern Hungary, where we analyzed 4490 data of 860 cows. The udder inflammation results the increase of the somatic cells (SCC) in milk. We can infer the level of mastitis by the SCC. The permissible limit in the milk is 400.000 cell/cm<sup>3</sup>.

This study aimed to answer how changes the milk production, milk fat percentage and milk protein percentage in the effect change of the somatic cell count. The cows are grouped according to the number of somatic cells. We examined the differences of milk yield and milk somatic cell counts between the groups, by analysis of variance method. After this we examined correlation of SCC between milk fat % and milk protein percent. Finally, we examined the changes in the number of SCC according to number of days in lactation.

## RESULTS

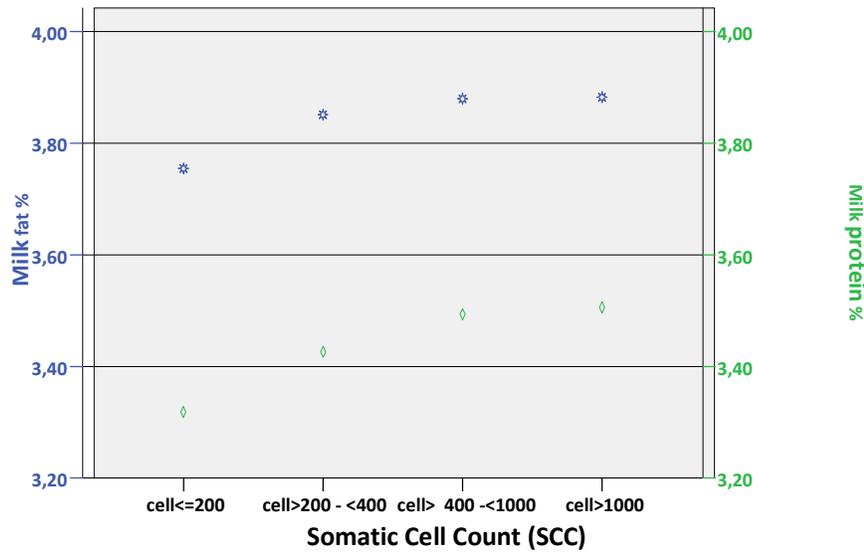
Figure 1 shows, the daily milk production decreased, while the somatic cell count increased (unit of somatic cell count: 1000 / cm<sup>3</sup>). Where the number of somatic cells was less than 200,000 pieces / cm<sup>3</sup>, there the amount of daily milk production was 26 kg, and wherein the number of somatic cells was greater than one million pieces / cm<sup>3</sup> the volume of milk hardly reached 20 kg. Nielsen (2009) tried to assess the economic loss associated with clinical (CM) and subclinical (SCM) mastitis under current Swedish farming conditions. Daily yield loss at an SCC of 500 000 cells/ml ranged from 0.7 to 2.0 kg milk in primiparous cows and from 1.1 to 3.7 kg milk in multiparous cows.



**Figure 1: Changes in the quantity of milk depending on somatic cell counts**

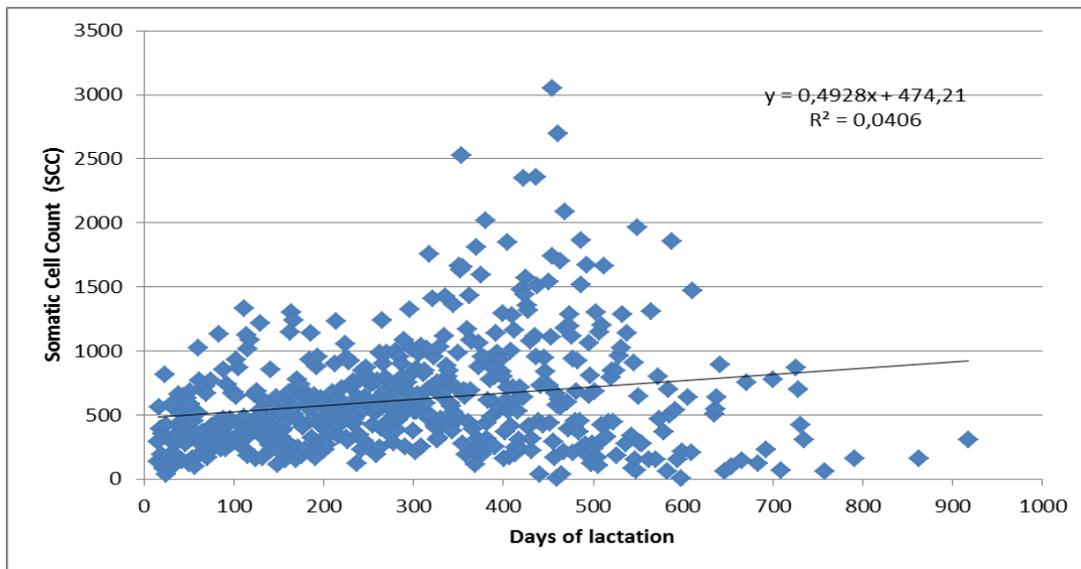
It was found that the quantity of milk is significantly different depending on the number of somatic cells. There was not significant difference only between the third and fourth groups in milk production. When the SCC increases, then the milk production decreases. We can see on Figure 2. the by the increase the number of somatic cells, increase the percentage of milk fat, and milk protein, although slowly. The increase in

protein content causes increase in the number of immunoglobulin, that results of the immune response.



**Figure 2: Changes in the percentage of milk fat and milk protein due to increase of SCC count**

First, aimed to answer the question that which between the groups there are significant differences in the milk fat content. Increase of SCC resulted milk fat content increase. Examination of the milk fat content showed a significant difference between the results of 1-2, 1-3 and 1-4 groups. In other cases, we have not received a significant difference. The milk protein content showed a significant difference between the groups too. Only there was no significant difference between the 3 and the 4 groups.



**Figure3: Changes of SCC according to lactation days (The dots represent SCC of 1-1 cow in milk)**

Ideally, if the cow is pregnant at the time, the length of lactation is about 360 days. If the cow is not fertilized, then milked on. This is not economical, because in this case it produces little milk. The next problem is that in a lot's of cow's milk increased the SCC (Figure 4). Such high values indicate mastitis (figure 4) clearly. In this case, the drug cost increases, the milk should be discarded, because the sick animal's milk is not suitable for human nutrition, and even it contains antibiotics, too. Therefore, further increasing the economic damage. The SCC was the highest between the 400th and 500th day of lactation.

## CONCLUSIONS

At the examined dairy farm the milk production decreased in the groups when were high the SCC in the milk. The high SCC increases in proportion to mastitis. If, were high the SCC in the milk, than increased the milk protein content too. The reason for number of immunoglobulin (proteins) increase in the milk. This is a natural immune response to inflammation. We found that at high SCC the milk fat percentage also increased in the milk. The udder health problems should be paid more attention to higher milk production and the economy. After the 360th day of lactation milk SCC increases significantly, and therefore the number of mastitis as well. Cows are milked after 360 days it if were not fertile again. All of these problems can be traced back to reproductive reasons too. The economy is largely dependent on the health of the animal.

## BIBLIOGRAPHY

1. **BAR D., L.W. TAUER, G. BENNETT, R.N. GONZÁLEZ, J.A. HERTL, Y.H. SCHUKKEN, H.F. SCHULTE, F.L. WELCOME, Y.T. GRÖHN (2008):** The Cost of Generic Clinical Mastitis in Dairy Cows as Estimated by Using Dynamic Programming, *Journal of Dairy Science*, 91,6, 2205-2214,
2. **CHA E., D. BAR, J.A. HERTL, L.W. TAUER, G. BENNETT, R.N. GONZÁLEZ, Y.H. SCHUKKEN, F.L. WELCOME, Y.T. GRÖHN (2011):** The cost and management of different types of clinical mastitis in dairy cows estimated by dynamic programming, *Journal of Dairy Science*, Volume 94, Issue 9, September 2011, Pages 4476-4487
3. **FARAGÓ, ZS. (2011):** Magyar mezőgazdaság (14. Sz.) 26-28
4. **HARASZTI, J. – ZÖLDÁG, L. (1994):** A háziállatok szülészete és szaporodásbiológiája
5. **KATÓ, ZS (2005):** A tőgygyulladás megelőzése Őstermelő: gazdálkodók lapja (9. Évf.) 3. sz 89-90
6. **MARKUS, G. (2001):** A tejlő tehének tőgygyulladása (<http://mezohir.hu/mezohir/2001/07/a-tejlo-tehenek-togygyulladasa-i-resz/>)
7. **NIELSEN, CHRISTEL (2009).** *Economic impact of mastitis in dairy cows*. Diss. (sammanfattning/summary) Uppsala : Sveriges lantbruksuniv., Acta Universitatis agriculturae Sueciae, 1652-6880 ; 2009:29
8. **PETROVSKI K R, M TRAJCEV AND G BUNESKI (2006):** A review of the factors affecting the costs of bovine mastitis *Tydskr.S.Afr.vet.Ver.* (2006) 77(2): 52–60
9. **SEEGERS H, FOURICHON C, BEAUDEAU F. (2003):** Production effects related to mastitis and mastitis economics in dairy cattle herds. *Vet Res.* 2003 Sep-Oct;34(5):475-91.