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THE USEFULNESS OF THE SOMATIC CELL COUNT INDICATOR IN THE EVALUATION OF MAMMARY GLAND'S HEALTH STATUS IN DAIRY COWS

UTILITATEA INDICATORULUI CELULE SOMATICE ÎN EVALUAREA STĂRII DE SĂNĂTATE A GLANDEI MAMARE LA VACILE DE LAPTE

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ABSTRACT | REZUMAT

In dairy farms health management, one of the major objectives should be the evaluation of the subclinical mastitis. One of the hygienic quality indicator that provides information on the health of the mammary gland at the individual or farm level is the somatic cell count (SCC), which is also known as the main indicator of milk quality together with the total number of germs (TNG). The purpose of the paper was to evaluate the indicators of the hygienic quality of milk and the usefulness of these parameters to identify the evolution of subclinical mastitis in dairy cows, in suppliers of one milk processing plant located in Teleorman County.

This study is based on the data provided by the milk processing plant, and covered the period between 2012 and 2015. During the analysed period, all milk samples had values of SCC≤ 400,000 cells/ml.

As a conclusion, the milk suppliers of the processing plant, delivered milk that corresponds to the standards of the EU regarding SCC, suggesting that major diseases of the mammary gland are not present in that area.

Keywords: SCC, somatic cell count, mammary gland health

În managementul sănătății fermelor de lapte, unul dintre obiectivele majore ar trebui să fie evaluarea mastitei subclinice. Unul dintre indicatorii de calitate a igienei care furnizează informații privind starea de sănătate a glandei mamare la nivel individual sau de fermă este numărul de celule somatice (NCS) din lapte, cunoscut ca unul din principalii indicatori ai calității laptelui, alături de numărul total de germeni (NTG) din lapte. Scopul lucrării a fost de a evalua indicatorii calității igienice a laptelui și utilitatea acestor parametri pentru detecția mastitelor subclinice la vacile de lapte deținute de ferme furnizoare de materie primă pentru o fabrică de prelucrare a laptelui din județul Teleorman. Acest studiu se bazează pe datele furnizate de unitatea de procesare și a acoperit perioada cuprinsă între 2012 și 2015. În timpul perioadei analizate, toate probele de lapte au avut NCS≤ 400.000 celule/ml.

În concluzie, furnizorii de lapte ai fabricii de procesare livrează lapte care corespunde standardelor UE în ceea ce privește NCS, ceea ce sugerează că fermele din această zonă nu se confruntă cu boli majore ale glandei mamare.

Cuvinte cheie: NCS, numărătoare celule somatice, sănătatea glandei mamare

In dairy herd health management, one of the major objectives should be the evaluation of the subclinical and clinical mastitis incidence (2, 5, 16, 17). Usually, clinical and subclinical mastitis have bacterial aetiology (e.g. *Staphylococcus aureus*, *Streptococcus agalactiae*, *Streptococcus dysgalactiae*, *Streptococcus uberis*, *Arcanobacterium pyogenes*, *Bacillus cereus*, *Escherichia coli*) (3, 4), but the list of ruminant pathogens involved in mastitis is much higher and include mycoplasmas, fungi, algae and viruses (4, 18).

Furthermore, the animal world is hosting many more pathogens, some of them "novel" infectious agents without current surveillance and/or diagnostic protocols (1).

The economic damages caused by subclinical mastitis are very high, because they have a higher frequency than clinical forms. It is generally accepted that on average about 50% of lactating cows have subclinical mastitis, but variations are very high: 10-15% in some herds and reach 75% in others (2).

One of the hygienic quality indicators that provides information on the health of the mammary gland at the individual or farm level is the somatic cell count (SCC), which is also known as the main indicator of milk quality and cow's udder health (5, 6, 7, 12, 13).

The indicators SCC and TNG can be also increased

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in milk samples with residues of fluoroquinolones, macrolides, tetracyclines and quinolones, while the milk samples without antibiotic residues presented quality indicators within the normal limits (12, 13). In the European Union, the somatic cell count shall be not more than 400,000 cells per millilitre (8).

The purpose of the paper was to evaluate the evolution of SCC, an indicator of the hygienic quality of milk, and its usefulness in identifying the evolution of subclinical mastitis in dairy cows.

MATERIALS AND METHODS

In order to evaluate the evolution of subclinical mastitis in dairy cows, the somatic cell count (SCC) method was used. This study is based on the data provided by a milk processing plant, and it included 835 raw milk samples collected from 126 milk suppliers (dairy cow farmers from Teleorman County, Romania). The period covered in this study was 2012-2015. The data have been statistically processed and interpreted.

RESULTS AND DISCUSSIONS

Mastitis is a serious health concern in dairy farms and can evolve either clinically or subclinically (2). While clinical mastitis can be easily identified, subclinical cases must be monitored by indirect indicators of evaluation. SCC is a hygienic quality indicator widely used to diagnose this condition considering its high sensitivity, and for its determination, various methods have been developed (9, 11, 14).

The minimum values of the somatic cell count in raw milk samples collected during 2012 varied between 56,166 cells/ml in the quarter May / June / July and 107,443 cells/ml in the quarter March /April /May. The maximum values of the somatic cell count in raw milk samples collected during 2012 varied between 197,080 cells/ml in the quarter May / June / July and 347,880 cells/ml in the quarter July /August /September (Fig.1).

During 2012, all values were within the normal range, according to the EU law.

The minimum values of the somatic cell count in raw milk samples collected during 2013 varied between 52,140 cells/ml in the quarter May / June / July and 131,932 cells/ml in the quarters September / October / November and October / November / December. The maximum values of the somatic cell count in raw milk samples collected during 2013 varied between 207,471 cells/ml in the quarter January / February / March and 295,620 cells/ml in the quarters September /October/November; October/November /December (Fig. 2).

During 2013, all values were within the normal range, according to the EU legislation in force.

The minimum values of the somatic cell count in raw milk samples collected during 2014 varied between 40,994 cells/ml in the quarter March / April / May and 131,046 cells/ml in the quarter June / July / August. The maximum values of the somatic cell count in raw milk samples collected during 2014 varied between 243,279 cells/ml in the quarter May / June / July and 295,620 cells/ml in the quarters January / February / March, February / March / April, March / April / May, April / May / June, June / July / August, July / August /September, August /September /October, September /October /November, and October /November / December (Fig. 3).

During 2014, all values were within the normal range, according to the EU legal framework.

The minimum values of the somatic cell count in raw milk samples collected during 2015 varied between 59,124 cells/ml in the quarter August / September / October and 140,199 cells/ml in the quarters April / May / June and May / June / July. The maximum values of the somatic cell count in raw milk samples collected during 2015 varied between 218,351 cells/ml in the quarter February / March / April and 286,495 cells/ml in the quarters August / September / October; September / October / November; October / November / December (Fig. 4).

During 2015, all values were within the normal range, according to the EU legislation.

During the analysed period, all milk samples had values of SCC≤ 400,000 cells/ml, and were within the normal range, according to the EU laws.

Simpson et al. (1995) classified the subclinical mastitis by using SCC values in two groups: cows with raw milk SSC below 2.92x10,000 cells/ml, cows with raw milk SSC above 2.92x10,000 cells/ml. They found that milk production was better in cows with low SCC (15).

O'Rourke and Bloweyin (2004) guidelines for interpretation of bulk milk cell counts consider that values below 200,000 cells/ml are slightly correlated with the mastitis problem and values of SCC between 200,000 and 400,000 cells/ml are averagely correlated with the mastitis problem. However, all values above 400,000 cells/ml are highly correlated with mastitis (10).

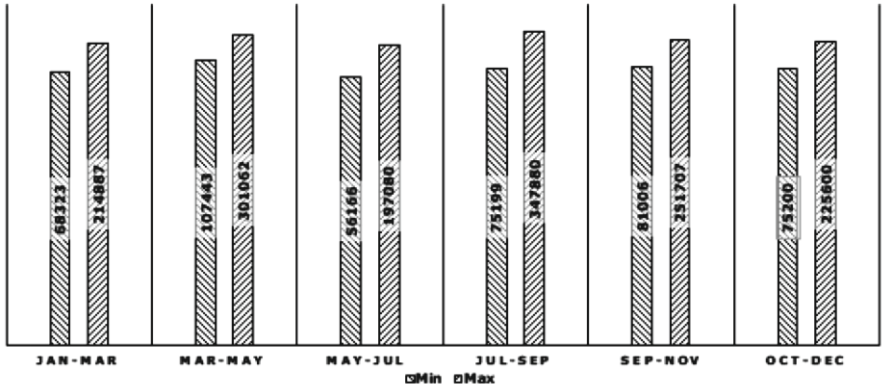

Fig. 1. Evolution of the somatic cell count values (cells/ml) in raw milk samples collected during 2012

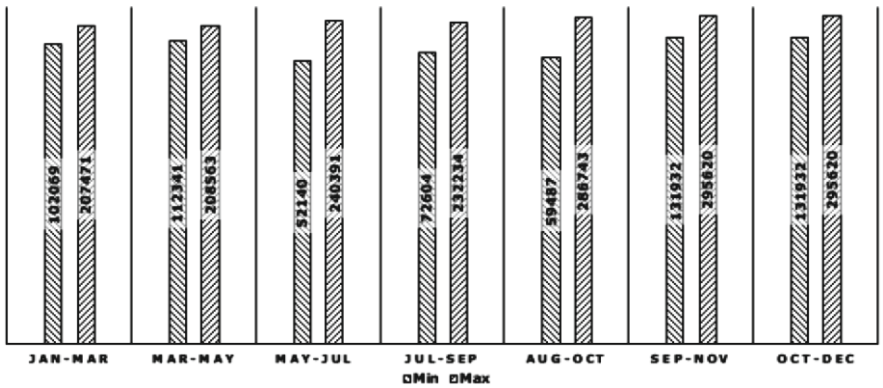

Fig. 2. Evolution of the somatic cell count values (cells/ml) in raw milk samples collected during 2013

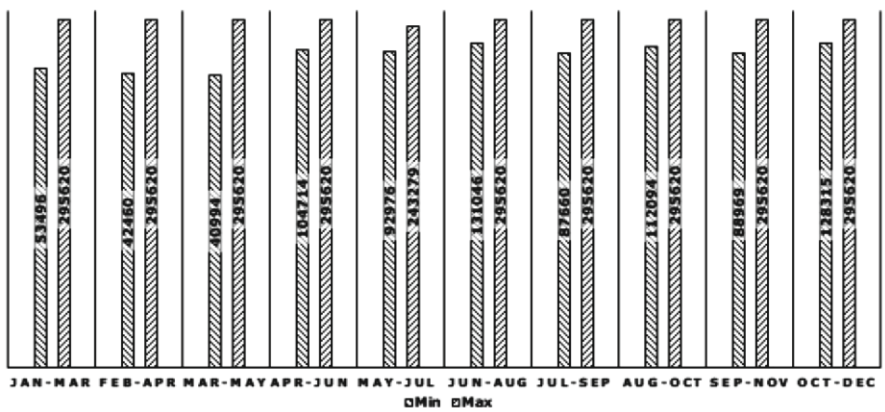

Fig. 3. Evolution of the somatic cell count values (cells/ml) in raw milk samples collected during 2014

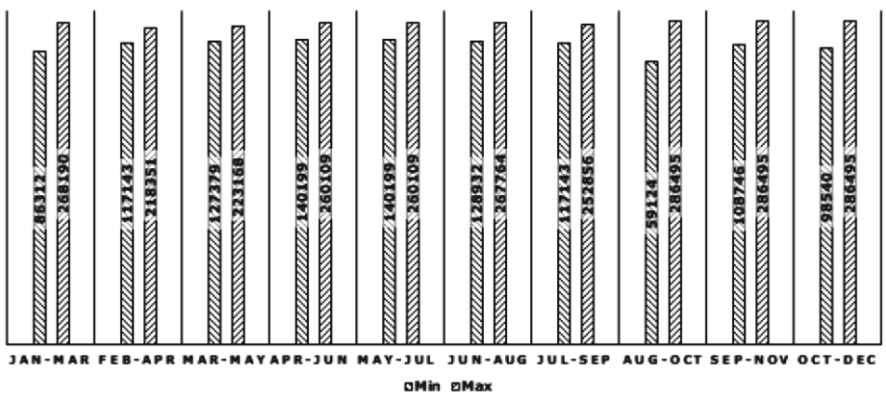

Fig. 4. Evolution of the somatic cell count values (cells/ml) in raw milk samples collected during 2015

The comparative analysis of our data with the Simpson et al. (1995) and O'Rourke and Bloweyin (2004) studies revealed the existence of several samples with subclinical mastitis suspicion (SCC values between 200,000 and 400,000 cells/ml), and for a better evaluation of subclinical mastitis prevalence, we recommend individual assessment of SCC.

CONCLUSIONS

The milk suppliers of the processing plant delivered milk that corresponds to the standards of the EU regarding the somatic cell count indicator, suggesting the absence of the major diseases of the mammary gland in the area. However, the SCC values between 200,000 and 400,000 cells/ml, could play a negative role in milk production.

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