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Original Paper

Evaluation of somatic cells in milk of ewes as possible physiological level

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The physiological values of SCC in sheep's milk are still under discussion. The aim of study was to describe the frequency of distribution of ewes on the basis of their individual SCC. The ewes were divided into the five SCC groups (somatic cell count) on the basis of individual SCC (G1 = SCC <200 × 10^3 cells.ml^{-1}, G2 = SCC between 200–400 × 10^3 cells.ml^{-1}, G3 = SCC between 400–600 × 10^3 cells.ml^{-1}, G4= SCC between 600–1,000 × 10^3 cells.ml^{-1} and G5 = SCC >1,000 × 10^3 cells.ml^{-1}). Totally 771 samples were collected from 90 ewes throughout both milking periods from one experimental herd with minimum four milking records per year in 2016 and 2017. On the basis of SCS throughout lactation the most ewes were in the first two SCC groups (below 400 × 10^3 cells.ml^{-1}) in 2016 and 2017 (78.89% and 83.33%, respectively). 13 animals (8 SD-Slovak dairy sheep, 5 LC-Lacaune) and 12 animals (4 SD, 8 LC) were in SCC groups over >600 × 10^3 cells.ml^{-1} in 2016 and 2017, respectively. Our results significantly contribute to the possible consideration of physiological limits for sheep milk because of the highest percentage of ewes was with less than 400 × 10^3 cells.ml^{-1}.

Keywords: ewe, milk, somatic cell counts

1. Introduction

A serious health and economic problem in dairy sheep is mastitis, which causes economic and breeding losses. SCC in the milk of individual dairy sheep can be used as an indicator of husbandry and milking hygiene, the welfare of animals, but especially the udder health and the presence of subclinical mastitis. In dairy sheep the mastitis leads to decrease in milk production and its quality, increase presence of pathogens inappropriate for consumption of dairy products and increase cost for treatment (Riggio and Portolano, 2015). The prevalence of subclinical forms of ewes mastitis ranges from 5 to 50% (Bergonier et al., 2003; Contreras et al., 2007; Olechnowicz and Jaskowski, 2014). From the preliminary results obtained in our dairy practice the incidence of subclinical mastitis ranged from 10–43% (Tančin et al., 2017b). In last mentioned work the criterion for subclinical mastitis was based on SCC (somatic cell count) over 400 × 10^3 cells.ml^{-1}.

The physiological values of SCC in sheep's milk are still under discussion. Pengov (2001) determined a limit value for physiological SCC in sheep milk of 250 × 10^3 cells.ml^{-1}. Leitner et al. (2008) established a limit for uninfected milk samples of sheep at 250 × 10^3 cells.ml^{-1}. As a limit value in determining the relationship to milk production, Arias et al. (2012) determined 300 × 10^3 cells.ml^{-1}. Tančin et al. (2017b) revealed that main part of individual milk samples had SCC below 600 × 10^3 cells.ml^{-1}. Despite non-pathogenic factors, intramammary infection is the main cause of SCC increase in sheep milk (Leitner et al., 2001; Bergonier et al., 2003; Paape et al., 2007; Souza et al., 2012).

The aim of study was to describe the frequency of distribution of ewes on the basis of their individual SCC per test day in selected SCC groups during whole lactation. Additionally if high level of somatic cells per lactation could affect somatic cells during following lactation.

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2 Materials and methods

This study was realized by the experimental herd of the NPPC Research Institute for Animal Production Nitra, Slovakia, during 2016 and 2017. Experimental ewes were in their first to third lactations of Slovak dairy sheep (SD) and Lacaune (LC) breeds. Machine milking was performed two times a day in milking parlour 1*16. During each milking the ewes received in parlour 0.1 kg concentrate per head. The milk yield recording and milk sampling were performed once a month during morning milking as a part of milk recording services. Samples of milk were taken in 2016 from April to September and in 2017 from April to August.

Laboratory analysis

Milk samples from each udder were transported to the certificated Central laboratory of Breeding services of the Slovak Republic (Plemenárske služby š.p. Bratislava) for milk analysis.

Categories of somatic cell count (SCC)

For evaluation only ewes with 4 and more sampling during lactation within both 2016 and 2017 were included into study. Thus minimum eight observations were available per animal. A total of 771 milk samples from 73 SD ewes and 17 LC ewes were individually collected. On the basis of individual SCC from milk recording the ewes were divided into the five SCC groups: G1 = SCC <200 × 10^3 cells.ml^{-1}, G2 = SCC between 200–400 × 10^3 cells.ml^{-1}, G3 = SCC between 400–600 × 10^3 cells.ml^{-1}, G4 = SCC between 600–1,000 × 10^3 cells.ml^{-1} and G5 = SCC >1,000 × 10^3 cells.ml^{-1} to evaluate the distribution of individual ewes into SCC groups in different months and years of study. Additionally animals were individually divided into above mentioned SCC groups on the basis of their SCS per lactation (somatic cell score) calculated as a mean from transformed individual SCC data into SCS obtained during milk recording throughout lactation. SCS was calculated according formula SCS = LOG_2(SCC/100)/0.693147 + 3. Thus distribution of ewes on the basis of SCS into SCC groups was done by conversion of linear scores to somatic cell counts. Mathematical analysis was done by Microsoft Excel program.

3 Results and discussion

On the basis of SCS throughout lactation the most ewes were observed in first two SCC groups (below 400 × 10^3 cells.ml^{-1}) in 2016 and 2017 (78.89% and 83.33%, respectively) (Figure 1). In 2016 13 animals (8SD, 5LC) were in SCC groups over >600 × 10^3 cells.ml^{-1}, however in next lactation only 6 of them did not improve SCC in next lactation (2017) during dry period, where 5 of them belonged to Lacaune breed. Based on these results, it would be possible for farmers to select such animals for culling from the herds on the SCC data. In 2017 12 animals were in above mentioned SCC groups (4SD, 8LC).

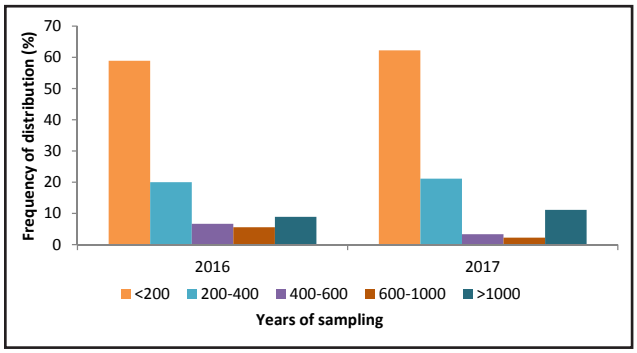

Figure 1 Frequency of ewes in SCC groups (× 10^3 cells.ml^{-1}) based on SCS per lactation in 2016 and 2017

Data shown in figure 2 presents frequency of distribution of animals in different months of milk recording in 2016 and 2017, respectively. In both years the most of the ewes were in SCC group below 400 × 10^3 cells.ml^{-1} indicating a good individual udder health of studied ewes. On the other side the percentage of ewes in both last SCC groups (mainly over 1,000 × 10^3 cells.ml^{-1}) is relatively low and thus could be considered as health problem of udder. Our data contribute to the findings of Leitner et al. (2008) and Arias et al. (2012) related to physiological level of SCC in ewes.

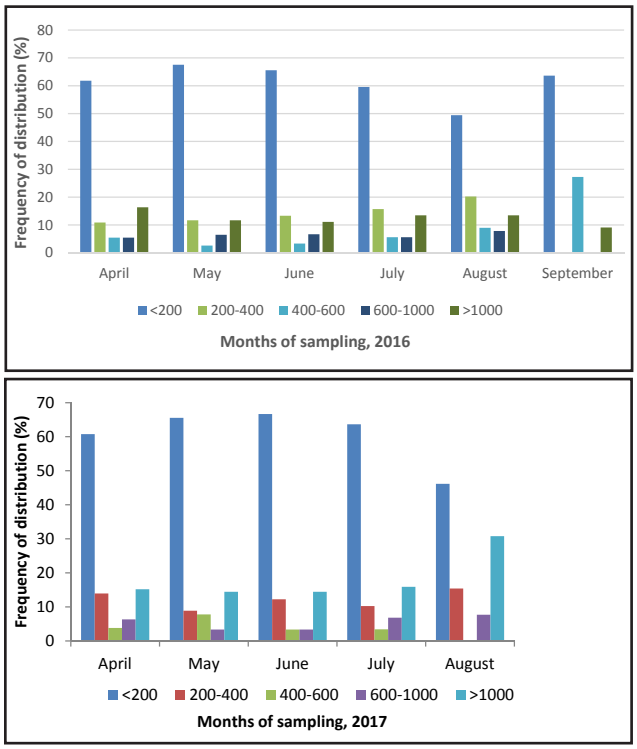

Figure 2 Frequency of ewes in SCC groups (× 10^3 cells.ml^{-1}) based on individual SCC in different months of sampling and year

In our previous studies, Idriss et al. (2015) concluded that 78% of the samples were below 600 × 10^3 cells.ml^{-1}. In the sample group, up to 100 × 10^3 cells.ml^{-1}, the largest percentage of Tsigai and Improved Valachian (Idriss et al., 2015) were found out. Vršková et al. (2015) found that 76% of Tsigai had SCC below 300 × 10^3 cells.ml^{-1}. Tančin et al. (2017a) in their study found that 82.03% of the milk samples were below the 400 × 10^3 cells.ml^{-1}, 71.79% of the milk samples were below the 200 × 10^3 cells.ml^{-1} and only 8.89% of the samples were above 1,000 × 10^3 cells.ml^{-1} with the possible effect of breed and farm.

4 Conclusion

The results our study indicated that the most of the animals were in SCC group below 400 × 10^3 cells.ml^{-1}. In some ewes the high SCC during whole previous lactation negatively influenced SCC in following lactation which could be used in culling program. Possible physiological level of SCC could be taken into account but more data in dairy practice should be evaluated. Thus regular milk recording should include also SCC analysis.

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