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Evaluation of buffalo milk depending on the content of somatic cells and the total number of germs

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Abstract. Milk quality subsequently affects the quality of milk products. Somatic cell count (SCC) and the total number of germs (TNG) from buffalo milk has been studied function of the lactation and seasonality (summer vs. winter). The lowest average values for SCC were observed in winter first lactation (I) 218.8±59 (x10^3 cells/ml) and higher values occurred in sixth lactation (VI) 331.2±64 (x10^3 cells/ml). In summer season SCC values showed higher values of 288.6±79 (x10^3 cells/ml) in first lactation and 407.4±53 (x10^3 cells/ml) in sixth lactation. The TNG presented a similar variation with higher values for summer season. Seasonal variation influences the somatic cell content and the total number of germs.
Key Words: Buffalo, somatic cell count, number of germs.

Introduction. International standards require a maximum range of germs number to 100,000/ml in raw milk. Higher values generate difficulties in preservation and therefore in processing of raw milk. A higher temperature pasteurization is required that implies additional expenses and a longer process of sterilization (Georgescu 2000).

SCC (Somatic Cell Count) from milk is considered an operating parameter in sense that SCC expressed buffaloes with mastitis, causing economic losses and also a general hygiene indicator (mastitis milk looks abnormal, altered taste and composition change) (Pucheanu 2000). EEC (European Economic Community) directive from 1992 provides that SCC in milk to be lower than 400,000 cells/ml. The total number of somatic cells is influenced by various factors such as season, lactation, hygiene and health (Velea & Zanc 2010; Khate & Yadav 2010; Chindriş 1998). A correct farm management alongside a good hygiene practice leads to mastitis and SCC reduction (Kelly et al 2009; Hutton et al 1990; Barkema et al 1998; Chassagne et al 2005). In general the SCC is higher in the first few days of post-partum (Schalm et al 1971). Contamination and storage temperature influences the microbiological quality of milk (Pece 2008). The purpose of this study is to determine the number of somatic cells and total number of germs (TNG) from buffalo milk function of season and lactation.

Material and Method. Biological material is represented by Romanian Buffalo breed from Mesendorf TNP farm, Braşov County. The study was conducted on a total number of 120 heads (20 buffaloes per lactation and six lactations). Milk samples were collected in sterile containers and analyzed immediately after harvest. Samples were collected individually. The devices used were BactoScan FC and Screening test BRT.

Results and Discussion. The SCC is mainly studied in respect of findings the factors which influence the critical values threshold. Here we analyzed the seasonal variation; summer season is rather associated with more factors which can lead in a higher SCC and TNG such temperature, microbiological status of milking machines and udder

cleanliness. Figure 1 presents the average values for milk SCC across two seasons (winter and summer). Buffaloes in third, fourth and fifth lactation presented higher average values for SCC compared to that ones from the first two lactations. In the winter season SCC has the lowest average values 218.8±59 ($x10^3$ cells/ml) in first lactation, while in summer season the average values are 288.6±79 ($x10^3$ cells/ml). Highest number of SCC in buffalo milk has been measured in sixth summer lactation, 407.4±53 ($x10^3$ cells/ml) compared to winter season for the same lactation 331.2±64 ($x10^3$ cells/ml). These values are similar to those reported by Syed et al (2009).

Similar data presented by Dohoo & Meek (1982) suggests a higher number of SCC in late lactation. Subclinical mastitis can lead to milk production reduction, changes of milk consistency and lower protein content (Sharma et al 2011). Significant changes in milk composition can be achieved only when SCC exceeds the limit allowed by current standards (Jolanta 2010). Bartlett et al (1990) observed an increase of SCC under the influence of animal age and lactation number but also because of previous infection.

Mastitis and a high SCC determine a decrease in lactose and fat in milk (Harmon 1994). Naiem et al (2009) studied the correlations between SCC, composition and properties of buffalo milk. Jolanta (2010) observed a seasonal variation of SCC in cow milk in respect of decreased values in winter season (P=0.021 – significant).

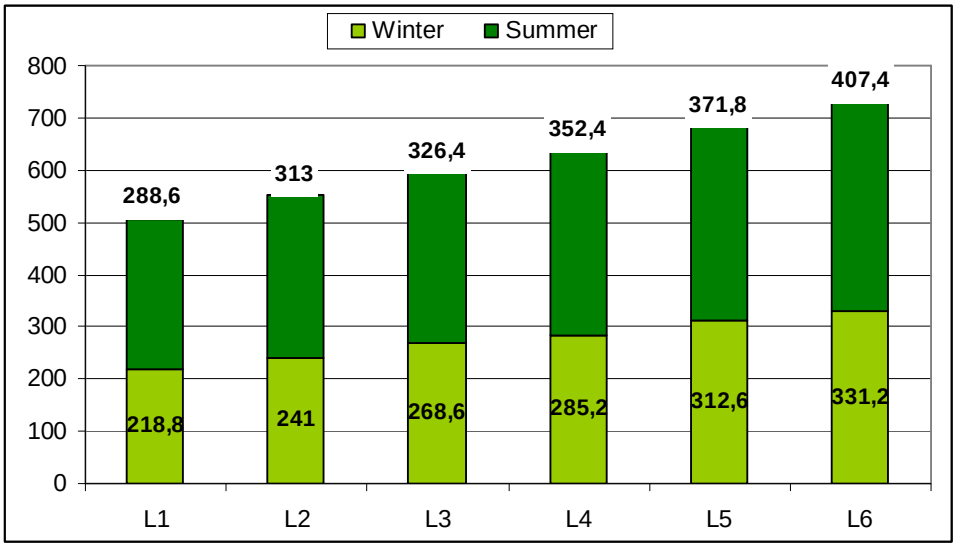

Figure 1. Average values for SCC ($x10^3$ cells/ml) in buffalo milk function of lactation and season (L1-L6 – lactation; SCC - somatic cell count; n=12/lactation).

TNG also represents an indicator key of milk status health. There are many ways of milk contamination, the most common being associated with summer season.

Figure 2 presents the average values of TNG in buffalo milk according to lactation and season. Similar seasonal variation associated with SCC results has been observed in TNG results; in summer the values are higher for all six lactations.

The TNG average values for all six lactations were 73.32±13.1 ($x10^3$ cells/ml) in summer season while for winter season the average concentration of TNG was 55.89±11.25 ($x10^3$ cells/ml) (P=0.2287 – significant). The highest average values for TNG have been recorded in sixth lactation for both seasons.

The results showed that TNG is an indicator influenced by the age of animal. Possible causes could be the mammary gland ageing as well as a lower general immunity of the body. High temperatures in summer are favorable for bacterial growth in bedding and shelter thereby increasing the total number of bacteria in milk (Harmon 1994).

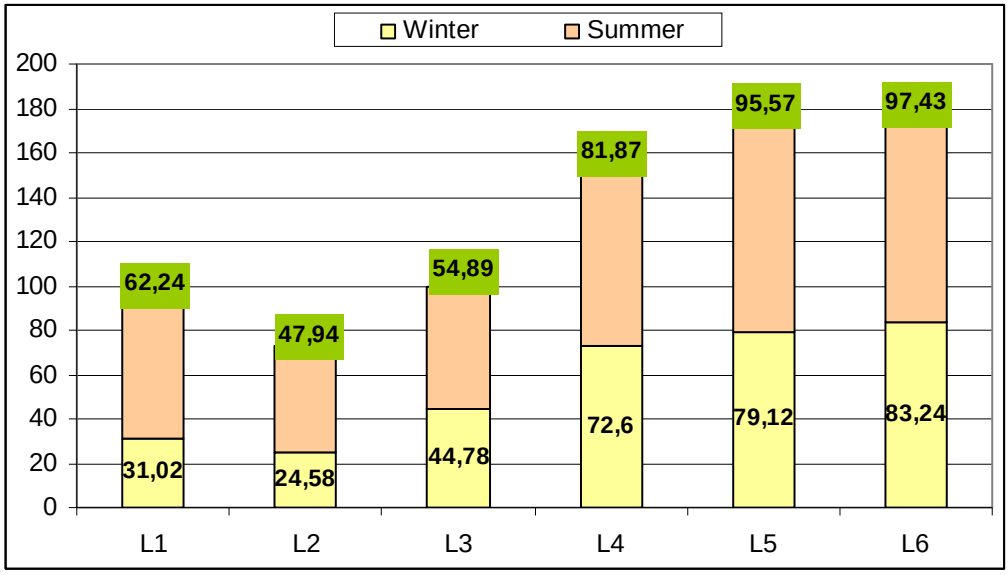

Figure 2. Average values for TNG (x10^3 cells/ml) in buffalo milk according to lactation and season (L1-L6 – lactation; TNG – total number of germs; n=12/lactation).

Conclusions. The season is an important factor to be considered in total number of germ and somatic cell counts management in buffalo farms. The age of buffaloes also influence these two parameters; the buffalo cows from the first two lactations had a lower content of SCC and TNG, while the age and lactation number (fourth to sixth) increasing determine the higher values for these milk hygiene indicators. The higher temperatures during summer season lead to a rapid multiplication of microorganisms in milk. The general microbiological status of the mammary gland also badly decreases with temperature increases. Somatic cell count and total number of germs are very important because most dairy processors offer price based on its bacteriological quality.

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References

Barkema H. W., Schukken Y. H., Lam T. J., 1998 Management practices associated with low, medium, and high somatic cell counts in bulk milk. J Dairy Sci 81:1917-1927.

Bartlett P. C., Miller G. Y., Anderson C. R., Kirk J. H., 1990 Milk production and somatic cell count in Michigan Dairy Herds. J Dairy Sci 73:2794–2800.

Chassagne M., Barnouin J., Le Guenic M., 2005 Expert assessment study of milking and hygiene practices characterizing very low somatic cell score herds in France. J Dairy Sci 88:1909-1916.

Chindriş V., 1998 [Hygienic qualities of buffalo milk and it's implication upon milk products]. PhD thesis, Cluj-Napoca. [In Romanian].

Dohoo I. R., Meek A. H., 1982 Somatic cell counts in bovine milk. Can Vet J 23(4):119-125.

EEC (European Economic Community), 1992 Council Directive 92/46/EEC. Commission Document 39L0046. EEC, Brussels Belgium.

Georgescu G., 2000 [Milk and milk products]. Ceres Publishing House, Bucureşti. [In Romanian].

Harmon R. J., 1994 Physiology of mastitis and factors affecting somatic cell counts. J Dairy Sci 77:2103-2112.

Hutton C. T., Fox L. K., Hancock D. D., 1990 Mastitis control practices: differences between herds with high and low milk somatic cell counts. J Dairy Sci 73:1135-1143.

Jolanta K., Brodziak A. Florek M., Litwińczuk Z., 2010 Effect of somatic cell counts in milk on its quality depending on cow breed and season. Annales Universitatis Mariae Curie-Skłodowska Lublin – Polonia, xxviii:9-17.
Kelly P. T., O'Sullivan K., Berry D. P., More S. J., Meaney W. J., O'Callaghan E. J., O'Brien B., 2009 Farm management factors associated with bulk tank somatic cell count in Irish dairy herds. Ir Vet J 62:45-51.
Khate K., Yadav B. R., 2010 Incidence of mastitis in Sahiwal cattle and Murrah buffaloes of a closed organized herd. Indian J Anim Sci 80(5):467-469.
Naiem M. A., Taleb A. T. M., Hattem H. E., Ishak S., 2009 The relation between somatic cell count, composition and properties of buffalo milk. Egypt J Dairy Sci 37(1):23-28.
Pece A., 2008 [Research concerning some qualitative indicators of buffalo milk for industrial processing], PhD thesis, Cluj-Napoca. [In Romanian].
Pucheanu C., 2000 [Research concerning some morphological, physiological and productive parameters at buffaloes in relationship with different influencing factors]. PhD thesis, Bucureşti. [In Romanian].
Schalm O. W., Carroll E. J., Jain N. C., 1971 Bovine Mmstitis. Lea & Febiger, Philadelphia USA.
Sharma N., Singh N., Bhadwal M. S., 2011 Relationship of somatic cell count and mastitis. J Anim Sci 24(3):429–438.
Syed A. M, Digraskar S. U., Awaz K. B., 2009 Evaluation of buffalo milk with reference to somatic cell count and antitrypsin. Vet World 2(7):267-268.
Velea C., Zanc C.A., 2010 [Buffalo breading]. Texte Publishing House, Dej. [In Romanian].

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