

Quantitative and qualitative parameters of cow milk, obtained from Romanian spotted breed - Simmental type, raised in Transylvania area

Grigore Onaciu, Eugen Jurco, Ovidiu N. Pentelescu, Octavian Negrea, Victor Bărbieru

Department of Bovine Breeding, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania. Corresponding author: G. Onaciu, gonaciu@yahoo.com

Abstract. The quantitative assessment of milk production is an important element which certifies the potential productive and efficient exploitation of dairy cows. On the other hand in qualitative milk's appreciation, mostly important is the hygienic and sanitary quality, expressed in total number of germs (TNG) and the somatic cells count (SCC). By evaluating the milk's quality on the basis of determining total germs number and the number of somatic cells, there were obtained very good values of these two indicators. At the same time were determined average milk production with the fat, protein, lactose and dry matter found in 100 grams of milk. The total number of germs (TNG) obtained in the 144 examined samples has values lower than $10 \times 1,000$ germs/mL, and the number of somatic cells has been situated between 17,000 SCC/mL and 483,000 SCC/mL.

Key Words: Hygienic quality, sanitary quality, dairy, total number of germs, somatic cells count.

Introduction. The Romanian Spotted Cattle in his native country was in attention of the researches for many years (Velea et al 1982, 2001; Georgescu et al 2001; Onaciu 2006, Onaciu & Jurco 2010; Onaciu et al 2012a,b; Pentelescu 2009; Pentelescu et al 2014). In the animal selection process, along with the milk's quantity obtained, an important part is quality, which is with a great influence in the recalculated milk's quantity and also in its nutritive, energetic and biological value of milk (Jurco & Onaciu 2006). Milk's quality is also influenced by a series of factors which depend on the animal's potential, its maintenance conditions (shelter, microclimate, food, water), and also the hygienic conditions during and after the milking process.

Starting with 1 January 2014, after a transition period (2007-2013), Romanian raw milk is now delivered to the processing units at European Union standards, having quality parameters for total number of germs (TNG) under 100,000/mL and Somatic Cell Count (SCC) under 400,000/mL, except the milk for consumption in households.

Material and Method. Animal health, stable hygiene, personal hygiene, milking area, storage and cooling of milk immediately after milking, are all important factors in quality management of raw milk. Considering the importance of these facts the research goal was the analysis and evaluation of the main components of dairy cows milk in the period 2008 – 2013 at the farm SC Agros S.R.L. Mures County. This farm raise Romanian Spotted breed cattle - Simmental type, managing a herd of 110 individuals of which 48 individuals are kept in Grebner system.

To assess milk production indicators, we studied the whole herd of cows from 2008 to 2013. The data were obtained from official control production (COP) records and milk quality control was performed thru laboratory methods validated by Romanian Accreditation Association (RENAR). Evaluation of the main milk components was based on analyzes carried out under a program with monthly sampling of two analyses between January 2008 and December 2013 (144 samples). Milk's samples were

collected from milk cooling tank, twice monthly, each sample being analyzed on the basis of eight quality parameters. Samples were examined in a laboratory of Milk's Quality Control Foundation from Florești, Cluj County.

Results and Discussion. Analysis was performed of the main production traits for the whole herd of cows with completed lactations. The milk production on the SC Agros S.R.L. farm were characterized by an average of $5,855 \pm 74.36$ kg milk for a lactation period of 291 days, with variations ranging from $5,429 \pm 69.08$ kg in first lactation with an average lactation of 285 days and $6,386 \pm 174.08$ kg in the third lactation, with a duration of 289 days of lactation.

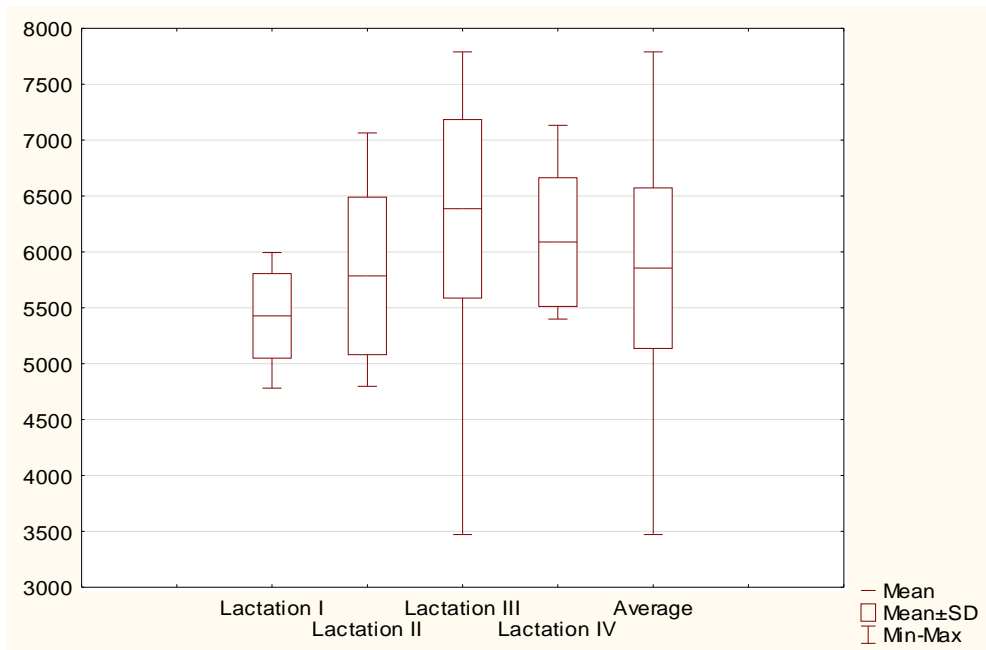


Figure 1. Box plot of milk production.

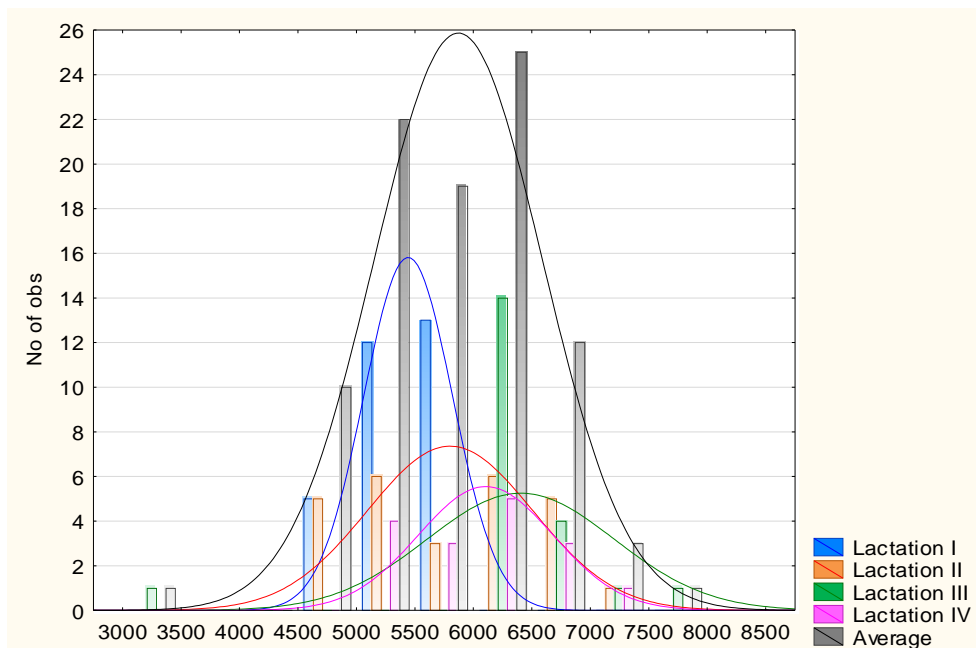


Figure 2. Histogram of milk production

As the main issues which must be listed in this case are on the one hand the satisfactory average milk yield of 20.12 kg milk and, regarding milk fat content with an average of 3.8 % and, on the other hand, differences between the four monitored lactates, is very low.

The results regarding the milk fat, protein and lactose content during 2008 - 2013, are presented in figure 3, which shows an expected uniformity. Thus, the average fat content is 3.79 % with a variation of 8.84 %, protein content is 3.40 % with a variation of 6.53 % and lactose content is on average of 4.73 % and with a variability of 2.18 %.

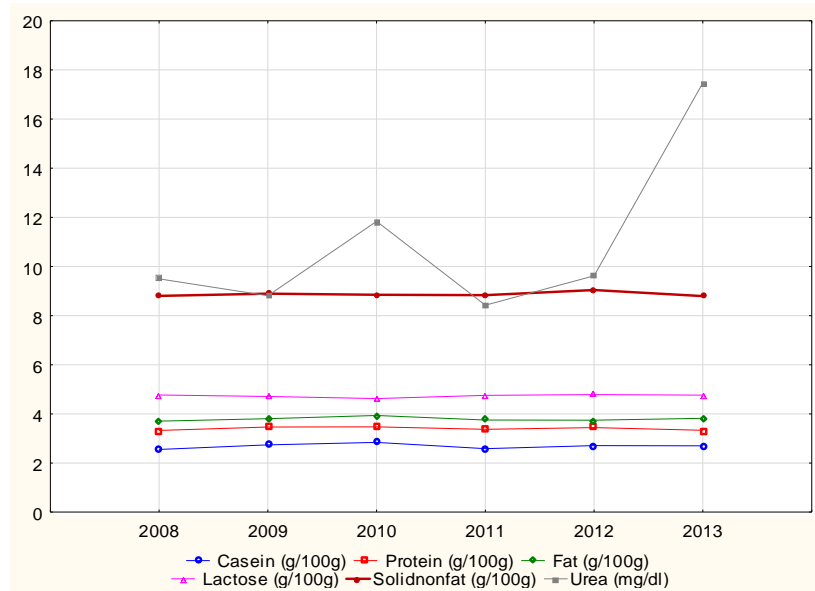


Figure 3. Average values of main milk qualitative characteristics.

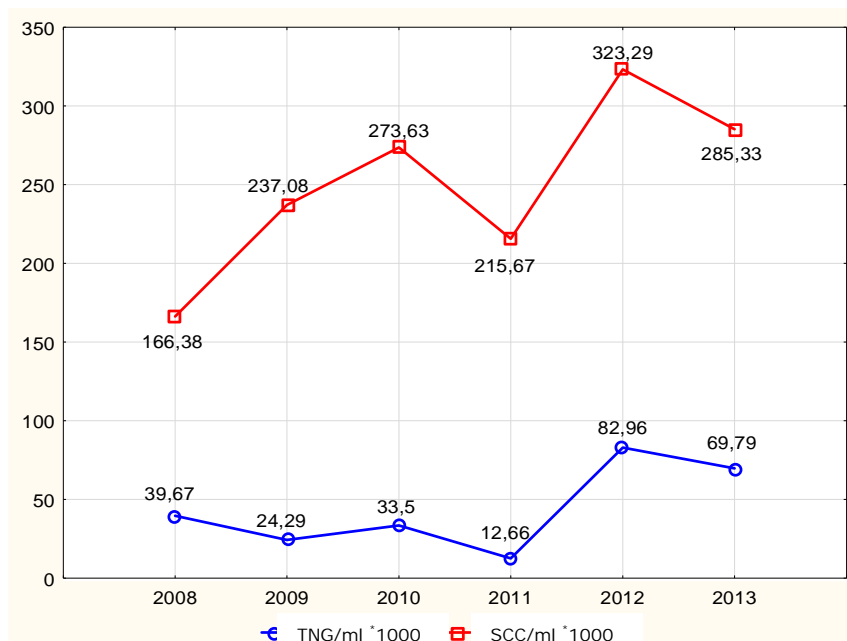


Figure 4. Evolution of the total germ number and somatic cell count of milk.

The milk from the tank tested for the number of somatic cells and the total number of germs is bringing valuable information about the current status of mastitis and sanitation in farm. Assessing milk quality determination based on the total number of germs and

somatic cell count were found enough good values of these indicators, the average annual limits ranged between 12.667 germs/mL (year 2011) and 82.958 germs/mL (year 2012) for the TNG respectively from 166.375 somatic cells/mL (year 2008) to 323.292 somatic cells/mL (year 2012) (Figure 4).

Analysis of the main components of milk depending on the season, showed higher values during autumn-winter, from September to February and lower values during spring-summer (Figure 5). Regarding milk somatic cell count (SCC) was lower in autumn-winter ranged from 38 to 450 cells/mL * 10³ and higher values during spring - summer (March to August). The same was observed for the total number of germs when the lowest values recorded in winter varies between 10 - 92 germs/mL * 10³ (Figure 6).

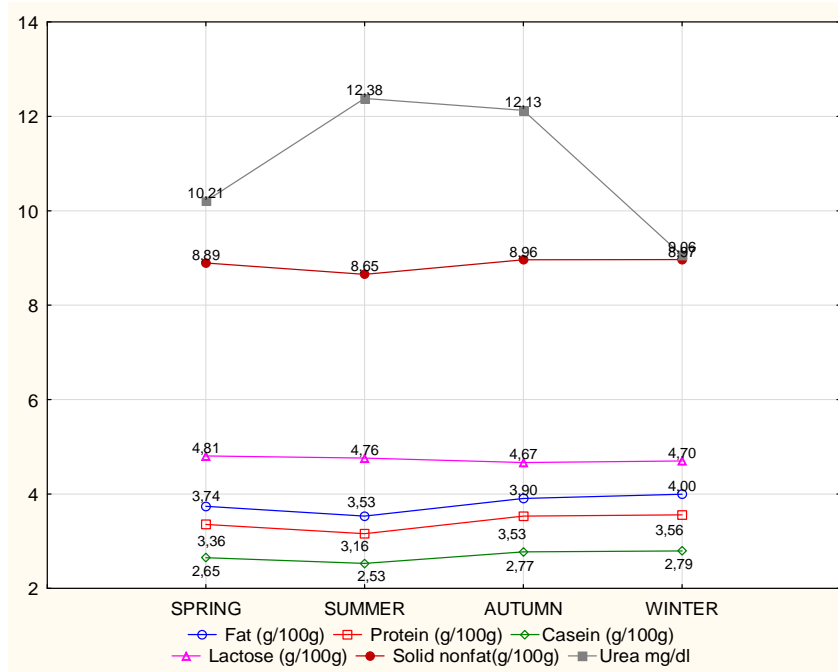


Figure 5. Season influence on the chemical composition of milk.

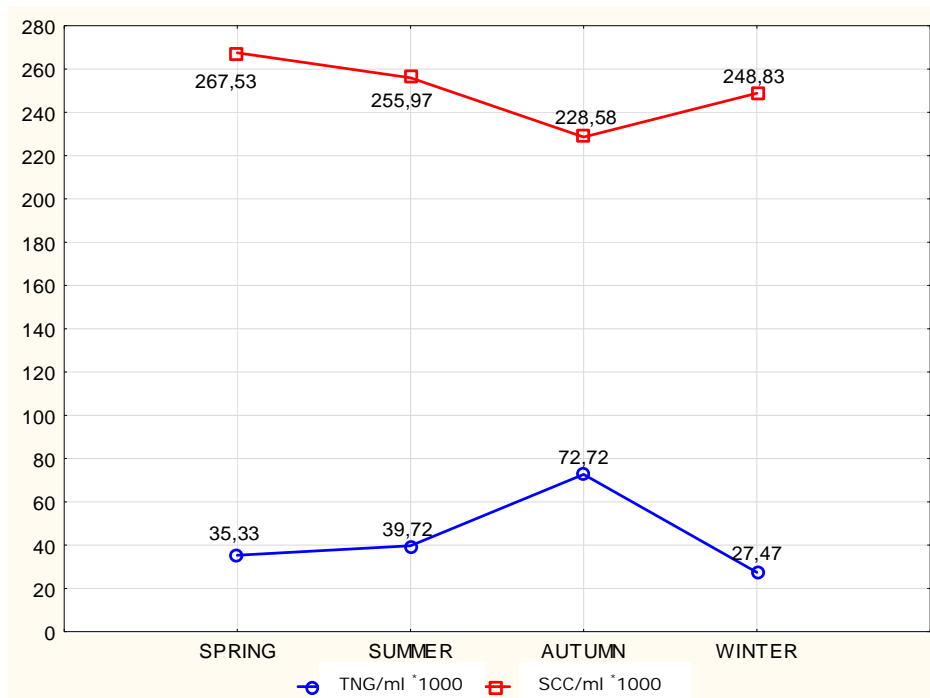


Figure 6. The mean values of the total germ number and somatic cell count according to the season.

Conclusions. Our research proved that to obtain raw milk at European quality standards, that could be commercialized circulate in the UE territory, needed quality control of milk production in each farm, but on the other hand associated with milk quality control quantity is an absolutely crucial factor in the work of improving the productive performance of dairy cows in Romania.

Average milk production of $5,855 \pm 74.36$ kg milk in a lactation period of 291 days, is a production over productive potential of Romanian Yellow Spotted- Simmental type, but with the mention that, while the data compared to the average race, duration of lactation is shorter by 4.81 % compared to normal lactation and 13.4 % compared with the total lactation.

Total number of germs with variations between 166.38×1000 germs/mL and 323.29×1000 germs/mL, and the somatic cell number with limits between 12.66 cell/mL NSC/mL and 82.96 cell/mL demonstrated that animal health and milking practices are in good condition at the farm level. The milk tested samples are having values acceptable for EU requirements which are revealing the application of an adequate technology in animal breeding.

The quantitative and qualitative milk monitoring is very important for every farmer who would like to achieve economic efficiency in dairy cattle operations, also necessary for the Romanian milk market know part of EU market.

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Authors:

Grigore Onaciu, University of Agricultural Sciences and Veterinary Medicine, Romania, Cluj-Napoca, Calea Manastur 3-5, 400372, e-mail: gonaciu@yahoo.com

Eugen Jurco, University of Agricultural Sciences and Veterinary Medicine, Romania, Cluj-Napoca, Calea Manastur 3-5, 400372, e-mail: jurco_eugen@yahoo.com

Ovidiu Nicu Pentelescu, University of Agricultural Sciences and Veterinary Medicine, Romania, Cluj-Napoca, Calea Manastur 3-5, 400372, e-mail: pentelescuovidu@yahoo.com

Octavian Negrea, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Animal Science and Biotechnology, Romania, Cluj-Napoca, 400372, Calea Mănăştur Street, no. 3-5, Onegrea50@yahoo.com

Victor Bărbieru, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Animal Science and Biotechnology, Romania, Cluj-Napoca, 400372, Calea Mănăştur Street, no. 3-5, e-mail: barbieru@iname.com

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