QUALITY PARAMETERS MILK IN HOLSTEIN COWS MILLING WITH HIGH YIELDS MILK

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ABSTRACT

The aim of this study was to determine if season of the year influence the new milk quality parameters. The experiment was done on samples of milk collected from 50 high producing Holstein cows.The following parameters were determined: somatic cell count, fat and protein content, water added, freezing point and test for antibiotic or inhibitory substances.

The season of the year is influenced somatic cell count fat and protein content but not , freezing point. No water added and no antibiotic or inhibitory substances were detected.

INTRODUCTION

Consumers expect fluid milk products to be nutritions fresh-tasting and whalesome. To the consumer, —quality means that the product tastes good and that it keeps well in theirs home refrigerator. From a processor's regulatory point of view — quality may be more objectively measured by comparing product conformance to established standards.

Standards are generally high in developed countries and emerging markets can learn from them the best ways to saveguard their products.

Good- quality raw milk is required to make good- quality product. Many factors can influence the quality of new milk.

As a rule, unhealty dairy cows have the potential to give milk that is lower in quality.

Somatic cell are mostly cells of the immune system (80% in an infected quarters, 99% in mastitic quarters). These somatic cells are part of the natural defence mechanism and include lymphocites, macrophages, polimorphonuclear cells and some epithelial cells.

Somatic cells are therefore a reflection of the inflamatory response to an intramammary infection or another trriger of the imune system. Somatic cell count is often used to distinguish between infected and uninfected quarters. There is a general agreement between infection status and the inflammatory response to this infection as measured by an increased SCC.

Antibiotic and other drugs are used to treat cows with mastitis or other infection. When a cow is treated, its milk is generally withheld from the bulk tank until treatment stops and milk is free of drug sesidues.

The freezing point of milk depends upon the concentration of water soluble components. As milk is more diluted , the freezing point will rise close to zero.

The current official freezing point limit (-0.525) degrees Horvet (ºH) or 0.505 degrees C (ºC) was designed for whole herd, bulk tank samples or processed milk samples, and not for samples from individual cows or individual quaeters. Freezing point of milk is used for detecting added water the milk when water is added to milk, the freezing point increases aproximately 0.005 ºH for every 1% water added.

Many factors may affect freezing point of milk from individual cow. High producing cows might be expected to have higher freezing points than lower producing cows. Little work has been done to define freezing point of milk from modern high producing dairy cows.Milk fat can be degraded by enzyme action,exposure to light and oxidation. Enzymes that degrade fat are called lipases, and the proces is called lipolisis.

Milk lipases come from several sources: the native milk, airborne bacteria contamination, bacteria added for fermentation, or somatic cells present in milk.

Milk protein can be degraded by enzyme action or by exposure to light. The predominant cause of protein degradation is trough enzyme called proteases. Milk proteases come from several sources, the native milk, airborne bacteria contamination or somatic cells present in milk.

The objective of this study was to determinate if season of the year influences the raw milk quality parameters in high producing Holstein cows.

MATERIALS AND METHODS

The present study was conducted during October 2007 to October 2008 at Agricultural Research & Development Station Simnic- Craiova. The samples (n=156) were collected in sterile bottles directily from the bulk, tank supplying new milk to its one milk factoty. The new milk samples were randomly collected 3 times per week. The annual milk yield was 9 510 kg per cow. The herd was managed in tie stal barn under permanent veterinary supervision.

Somatic cells count (SCC) was estimated using Porta SCC milk test. Milk fat, protein, water added and freezing point were determined using ECOMILK (EON trading). Presence of antibiotics or other inhibitory substances was tested with EKOTEST (EON trading). Data were analysed statistically.

RESULTS AND DISCUSSION

Changes in the studied raw milk parameters are presented in table 1.

Table 1

Milk parameters

Month of lactation	Fat %	Protein %	Freezing point ^{o}C	Water added	Inhibitory substances	Somatic cells count/ ml
Oct. 2007	4.15	3.00	- 0.530	N. D.*	N. D.*	250.000
Nov. 2007	4.21	3.28	- 0.527	N. D.	N. D.	307.000
Dec. 2007	4.25	3.12	- 0.537	N. D.	N. D.	301.000
Ian. 2008	4.30	3.31	- 0.531	N. D.	N. D.	303.000
Feb. 2008	4.28	3.33	- 0.529	N. D.	N. D.	302.000
Mar. 2008	4.32	3.41	- 0.532	N. D.	N. D.	312.000
Cold season (mean)	4.25	3.24	- 0.531	N. D.	N. D.	295.000
April 2008	4.25	3.35	- 0.532	N. D.	N. D.	321.000
May 2008	4.05	3.27	- 0.533	N. D.	N. D.	328.000
June 2008	3.96	3.15	- 0.531	N. D.	N. D.	329.000
July 2008	3.95	3.10	- 0.530	N. D.	N. D.	330.000
Aug. 2008	3.97	3.10	-0.525	N. D.	N. D.	375.000
Sept. 2008	3.97	3.15	-0.535	N. D.	N. D.	379.000
Warm season (mean)	4.02	3.18	0.529	N. D.	N. D.	343.670
X.2007–X .2008 (mean)	4.13	3.21	- 0.530	N. D.	N. D.	319.740
Difference (cold season-warm season)	0.23	0.06	-0.02	N. D.	N. D.	47.870

During the examined period, the average fat and protein content was 4.13% and 3.21 respectively. The extreme levels of milk fat content were recorded in July (3.95%) and in January (4.30%).The extreme values of protein content 3.00% and 3.41 were in October and March respectively. Freezing point was -0.530 ºC with extreme values in December

and August 0.537 ºC and 0.525 ºC respectively. Mean somatic cell count was 319.740/ ml with extreme values in October (250.000/ ml) and September (339.000/ ml). No water added or inhibitory substances were detected in the studied sample. Probably this is a result of veterinary supervision.

In warm season, fat and protein content are lower (4.02% fat and 3.18% protein) han in cold season (4.25% fat and 3.24% protein). Bernabucci et all., 2002 reported a reduction of milk protein content in the summer due to the reduction in the cassein content.

Somatic cells count in our study is the highest in warm season (343.670/ml) anf lowest in cold season (295.800/ ml).

Acatincai et all., 2007, reported 259.000 cells/ml in cold season and 557.000 cells/ml in warm season.

Freezing point is one of the basic parameters of milk tehnological value. Troughout the year ranged between -0.525 ºC (warm season) and -0.537 ºC (cold season).

Average of bulk milk parameters during the period of this study were characterised by good fat (4.13%) and protein (3.12 %)content as a result of good feeding programme and from high producing dairy cows.

The result of this study demonstrate the variability of milk quality evaluated in diffrent seasons of the year.

***Table 2*.**

Seasonal variations of fat and protein content

	Spring	Spring	Summer	Summer	Diff.	Fat%	Diff.	Protein %
	Fat%	Protein%	Fat%	Protein%	±	P value	±	P value
Morning	3.91±0.44	3.40±0.11	3.51±0.66	3.16±0.31	+0.4	p<0.01	+0.11	p<0.05.
Evening	4.08±0.22	3.35±0.12	3.93±0.12	3.21±0.23	+0.15	p<0.05	+0.14	p<0.05

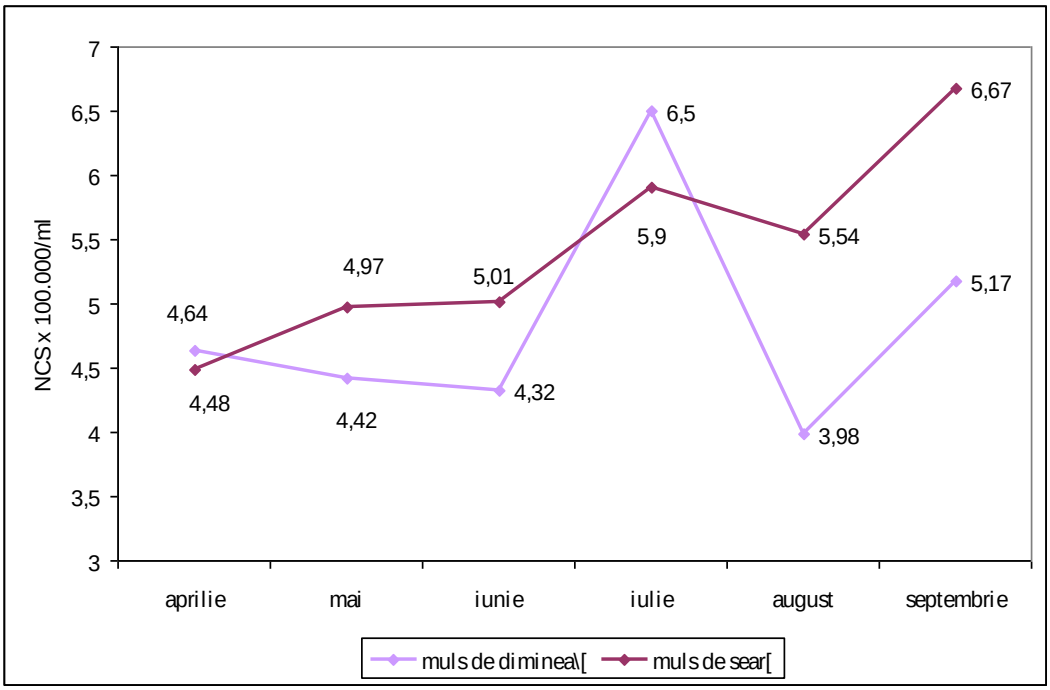

***Figure 1* Variations of somatic cell count x 100.000/ml from milking to milking**

Average seasonal differences for fat and protein followed the expected seasonal trend with the highest value for fat 0.4 % in spring and for protein 0.14% in summer (Table 2). It has been found in the present study that the content of protein is rather constant throughout the seasons. This agrees with other studies that have shown that protein composition is influence by feeding practices only to a small extend (Schopen *et al.,* 2009; Heck *et al.*, 2009; Coulon *et al.*, 1998; Ozrenk and Selcuk Inci, 2008).

The SCC results (Fig. 1) illustrate that throughout the studied period, no consistent milking-to-milking variations were present; however, evening milkings had the highest value each day. A programme of monitoring udder health was introduce in September because of the high SCC registered in the morning (599 000 cells/ml). The animals with subclinical mastitis were isolated for treatment. Subclinical mastitis was diagnosised by using California Mastitis test. As a result, SCC from morning milking was only about half the value from the evening milking (235 000 cells/ml comparing with 599 000 cells/ml). A recent study with 15 milking samples collected consecutively over 3 day reported no consistent milking-to-milking variation and was always lower at the morning than the evening milking (Quist *et al.*, 2008). Producers should not rely on a single test day SCC when managing mastitis.

Somatic cell counts are particularly useful to follow individual quarters or cows over a season. Only quarters and cows with long term high cell counts are indicators of a chronic infection and require further management attention. Short term high counts are not necessarily a reason for concern since an apparent immediate cure occurred.

CONCLUSIONS

1. Season of the year influenced bulk milk parameters but not freezing point;
2. Composition of milk as well as its hygienic quality fell within the standards applicable for raw milk;
3. The results of this study demonstrate that obtaining high quality milk from high producing cows in the studied farm is feasible;
4. Samples analysed in our study showed quite a small variability in milking-to-milking fat and protein content.
5. SCC fluctuation from milking-to-milking was not high, except for September evenings when SCC decline dramatically as a result of detecting animals with subclinical mastitis.
6. Further study is required to understand how season influence fat, protein and SCC, and the possibility to manipulate independently the mean concentrations of fat, protein and SCC.
7. Understanding the variability in milk fat, protein percentages and SCC is important when making management decisions and in milk-recording programs

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