

RESEARCHES REGARDING THE SEASON INFLUENCE ON SOMATIC CELL COUNT IN MILK DURING LACTATION IN ROMANIAN BLACK AND WHITE COWS

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Abstract

Research aimed at studying the influence of calving season on milk somatic cell count in the Romanian Black Spotted breed. The study was conducted on a total of 125 lactations from 92 cows. Somatic cell counts (SCC) of milk was transformed into somatic index (SI) under regulations DHIA (Dairy Herd Improvement Agency). Data were recorded and statistically analyzed by ANOVA/MANOVA method determining the means and dispersion indices. The results indicated that parturition season influenced significantly ($p < 0.01$) changes in the somatic index between summer and autumn season (-0.36), between winter and autumn (-0.44) and between spring and autumn season (-0.51). Milk produced from cows that have calved in the spring had the lowest initial somatic index (5.34), which corresponds to somatic cells 219,000 cells/ml. Cows calved in autumn had the highest value of the original somatic index by 5.86, which corresponds to a concentration of 724 000 somatic cells/ml. In conclusion, we demonstrated that the most accepted criteria for indication of udder health in a cattle ranch specializing in the direction of milk production are somatic cell counts and milk quality.

Key words: dairy cows, season influence, Romanian Black and White, somatic cell count

INTRODUCTION

Researches had shown that the incidence of clinical mastitis (udder infections with visible signs) is higher in the summer months in hot and humid environments where the number of pathogens is higher. Animals under stress, high temperatures and excess moisture are more susceptible to infections, having a greater number of somatic cells count in raw milk.

Harvest season has a significant influence on both the chemical composition and somatic cell count in milk. While dry matter concentration was lower in milk collected in summer and autumn, the number of somatic cells was higher in those seasons.

The chemical composition of milk collected has improved from one year to another, except the fat remained constant during the study. It was concluded that the county, harvest season and year had significant effects on the chemical composition and somatic cell count, with direct influence of

the breed structure and farm type from which the raw milk for processing was obtained (1). The most accepted criteria for indication of udder health in a dairy farm is the somatic cell counts and milk production quality. Milk containing about 200,000 SCC / ml in milk, meets all the conditions for granting financial bonuses. (2).

MATERIAL AND METHODS

The study was carried out in the didactical farm of USAMVB Timisoara, cows from Romanian Black and White breed were used in the research. Was pursued the influence of the cows age on the milk yield, fat and protein percentage during normal lactation, 125 lactations were registered. Data registered were the analyzed by ANOVA/MANOVA method in order to determine averages and dispersion indices. Based on the averages registered, parameters of the lactation curves were calculated by using the mathematic model first described

by P.D.P. Wood in 1967, named incomplete gamma function (3). In the current paper somatic cell score was used for logarithmic transformation of the real number of somatic cells count from the milk samples. This transformation was made in order to reduce variation of this character for a better statistic calculation, but also for the remaining of the

potential existent differences between the conditioning factors analyzed.

Number of somatic cells count (SCC) from milk has been transformed in somatic cell score (SCS) according to the DHIA regulations (Dairy Herd Improvement Agency). This transformation is presented in table 1 (4).

Table 1. SCC conversion (number of somatic cells count from milk) in SCS (somatic cell score)

SCC (umber of somatic cells count)	SCS(Somatic cell score)
12500	0
25000	1
50000	2
100000	3
200000	4
400000	5
800000	6
1600000	7
3200000	8

RESULTS AND DISCUSSION

In Table 2 are presented averages values and dispersion indices for incomplete gamma function parameters to the number of somatic cells count transformed in somatic cells score, based on the calving seasons influence, in Romanian Black and White cows taken into our study.

Daily milk somatic index (parameter a) was lowest in cows that had calved in spring season (5.34), followed by cows that have calved in winter (5.41). The largest milk somatic index was achieved by cows that calved in autumn (5.86), followed by cows that have calved in summer, which registered a somatic index of 5.49.

Daily rate decreased of the somatic index (parameter b) was minimal in cows that had calved in the spring (-0.000426), followed by cows that have calved in winter (-0.005894). The greatest value of this parameter has been obtained from cows that had calved in

autumn, namely -0.019416. Parameter b values, which describe somatic index decreasing rate until reaching the peak of the lactation curve, the cows that calved in summer was -0.00761.

The daily rate growth of the somatic index (parameter c) has the lowest value in the cows that have calved in the spring, just -0.000067, increasing gradually at the value of -0.000102 in cows that had calved in the summer. The highest decreasing rate of the milk somatic index after reaching the peak of the lactation curve was obtained from cows that had calved in autumn (-0.000130) and winter (-0.000114).

Wood's function for parameters change from one season to another, results' looking similar for all lactation curves in relation to calving season. Evolution of milk somatic index based on calving season is shown in Figure 1.

Table 2. Averages and dispersion indices for gamma equation parameters incomplete function in somatic cells count from milk during normal lactation based on the calving season in Romanian Black and White cows breed

Calving season	n	Standard lactation					
		a		b		c	
		$X \pm S_x$	s	$X \pm S_x$	s	$X \pm S_x$	s
summer	34	5.498220±0.198415	1.156947	-0.007613±0.010072	0.058730	-0.000102±0.000070	0.000406
winter	19	5.411250±0.167691	0.730948	-0.005894±0.008747	0.038125	-0.000114±0.000090	0.000391
spring	35	5.343821±0.177000	1.047144	-0.000426±0.008397	0.049675	-0.000067±0.000065	0.000386
autumn	37	5.860070±0.221037	1.344517	-0.019416±0.010713	0.065163	-0.000130±0.000081	0.000495

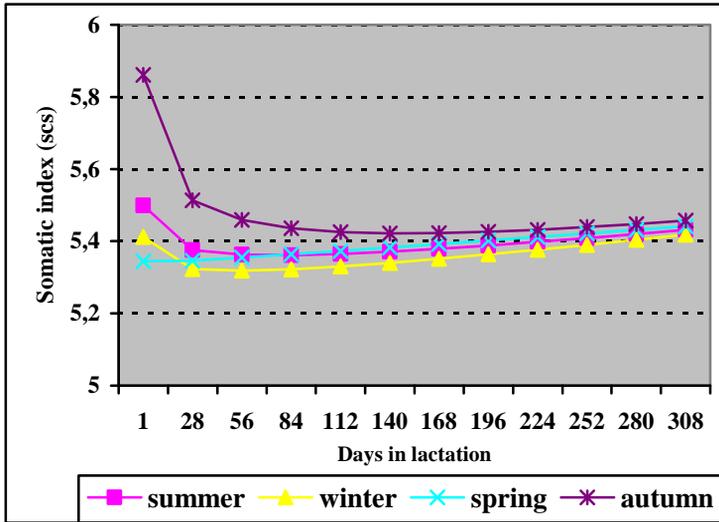


Fig. 1. Somatic index evolution during normal lactation based on calving season in Romanian Black and White cows breed

Cows that calved in winter, summer and autumn have made the lactation curve for somatic index closer to the ideal, in that the indicator values were higher in early lactation, decreasing sharply in the first month, then gradually increased until the end of lactation. Cows that calved in autumn showed the highest level of somatic cell count in early lactation milk, and while the highest rate of decline in the first month of lactation. However, the increase in milk somatic cells grew slowly until the end of lactation.

An atypical form of the lactation curve for somatic index were found in cows calved in the spring season. These cows have the lowest level of milk somatic cell count in early lactation compared with cows calved in the other seasons of the year. The appearance of the lactation curve was flattened and growing from birth until the end of lactation.

In Table 3, are shown the differences and statistical significance for the development of

incomplete gamma function parameters somatic index of milk during lactation in the seasons of calving in cows studied from the Romanian Black Spotted breed.

From the analysis of the table is apparent that the cows that calved in autumn had the parameters a and b separately significant ($p < 0.01$) compared with cows calved in summer ($a = 0.36$ and $b = -0.011804$), winter ($a = 0.44$ and $b = -0.013522$) and spring ($a = 0.51$ and $b = -0.018991$).

Cows that had calved in the spring had a decline rate of somatic index significantly higher ($p < 0.05$) than cows that calved in summer ($b = 0.007187$) and those that calved in winter ($b = 0.005468$). Also, these cows calved in the spring showed a growth rate of late lactation somatic index significantly higher ($p < 0.05$) than cows calved in summer ($c = 0.000035$), winter ($c = 0.000047$) and autumn ($c = 0.000063$).

Table 3. Differences and statistical significance gamma equation parameters incomplete in somatic index from milk evolution during different stages of lactation based on the calving season

Trait	Sezonul fătării	Parameter	Calving season		
			autumn	spring	winter
SOMATIC INDEX	Summer	A	-0.361850**	ns	ns
		B	0.011804**	-0.007187*	ns
		C	ns	-0.000035*	
	Winter	A	-0.448820**	ns	-
		B	0.013522**	-0.005468*	-
		C	ns	-0.000047*	-
	Spring	A	-0.516248**	-	-
		B	0.018991**	-	-
		C	0.000063*	-	-

ns – p>0.05; * - p<0.05; ** - p<0.01; *** - p<0.001

CONCLUSIONS

Calving season has influenced significantly ($p < 0.01$) the initial development of somatic index (parameter a) between the summer-autumn season (-0.36), between autumn-winter season (-0.44) and between season spring-autumn (-0.51).

There were distinct differences ($p < 0.01$) in terms of lowering the daily rate (parameter b) somatic index between the summer-autumn season (0.011804), between autumn-winter season (0, 013 522), and all distinct values significant ($p < 0.01$) between spring-autumn season (0.018991). The rate of decreasing of the somatic index (parameter b) has registered significant value ($p < 0.05$) between spring-summer season (-0.007187), between winter-spring season (-0.005468).

Evolution of somatic index growth rate (parameter c) has registered significant values ($p < 0.05$) between spring-summer season (-0.000035), between winter-spring season (-0.000047) and between season spring-autumn (0.000063).

Depending on the season of calving, milk obtained from cows that had calved in the

spring had the lowest initial somatic index (5.34), which corresponds to somatic cells 219,000 cells / ml. Cows that calved in autumn had the highest value of the original somatic index by 5.86, which corresponds to a concentration of 724 000 somatic cells / ml.

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