RELATIONSHIP OF SELECTED PARAMETERS OF DAIRY COW'S REARING ENVIRONMENT TO THE CONTENT OF MINOR COMPONENTS IN THEIR MILK

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Abstract

The aim of this research is to compare the performance of Czech fleckvieh cattle cows at the 1st to 5th lactation. The group of cows on the 5th lactation includes animals on the 5th and higher lactation. In dairy cows, parameters such as: fat, protein, lactose, somatic cells, citric acid, urea, etc. are evaluated. The data were obtained from approximately 770 cows of the Czech fleckvieh cattle. A total of 5944 samples from the performance check have been evaluated so far.

Keywords: Czech fleckvieh cattle, lactation, minority components in milk, dairy cows, milk

INTRODUCTION

In livestock breeding, "functional longevity" is very important. Longevity influences milk production and therefore the profitability of livestock farming. Longer production life allows to have more cows in the herd at higher lactations (Vukasinovi *et al.*, 1997). With longer milk cow life, savings can be made on the eventual purchase of new animals (Sewalen *et al.*, 2008).

The greatest changes in metabolic balance in dairy cows occur in the first part of lactation (Duchacek *et al.*, 2012). This period is characterized by a lower feed intake, which is insufficient for reproduction and milk production (Reist *et al.*, 2000), for this reason cows are in a negative energy balance. (Walsh *et al.* 2011). Therefore, it is important that dairy cows have optimal fat reserves from which to draw during this period (Bauman *et al.*, 2006). Optimal use of fat reserves has an impact on milk composition, such as fatty acid content (Duchacek *et al.*, 2014).

RESULTS

The data for the research were obtained from the performance control from March 2020 to February 2021. The data were obtained from the performance control of Czech spotted cows from GenAgro Říčany a. s. The monitored parameters were statistically evaluated in the Anova program where the statistical significance of the difference was $p < 0.05$. The dairy cows were divided into groups according to the order of lactation.

For acetone, there was a statistically significant difference between the first and second lactation and then also between the first and fourth lactation. When comparing the mean values for protein, there was a statistically significant difference between the second and third lactations and between the second and fifth lactations. When monitoring ketones, no statistically significant difference was found between lactations. For citric acid, there was a statistically significant difference between almost all lactations except for a statistical difference between the second and third, third and fourth and fourth and fifth lactations. For myristic acid, there was a statistically significant difference between first and second, first and third, first and fifth, second and third, fourth and fifth, third and fifth, and fifth lactation had a statistically significant difference with all lactations. Palmitic acid had

I: *Comparison of average values for selected minor constituents in milk*

	1. lactation	2. lactation	3. lactation	4. lactation	5.+ lactation
N	1975	1546	945	705	775
Milk fat	4,121^{A}	4,090^{A,B}	4,029^{B,C}	4,039^{A,B,C,D,}	3,887^{E}
Protein	3,756	3,787^{A}	3,732^{B}	3,752	3,724^{B}
Lactose	5,035^{A}	4,933^{B}	4,853^{C}	4,849^{C,D}	4,812^{D,E}
TPS	9,479^{A}	9,405^{B}	9,270^{C}	9,285^{C,D}	9,219^{C,E}
Somatic cells	163,555^{A}	285,072^{B}	396,130^{B,C}	371,418^{B,D}	486,943^{C,D,E}
Urea	28,515	29,145	29,200	28,836	29,065
HFA	5,340^{A}	4,911	5,121	4,880	4,744^{B}
Citric acid	0,071^{A}	0,076^{B}	0,063^{B,C}	0,067^{C,D}	0,065^{B,D}
Ketones	0,033	0,033	0,036	0,034	0,036
Acetone	0,053^{A}	0,046^{B}	0,049	0,045^{B}	0,048
Myristic acid	0,486^{A}	0,474^{B}	0,465^{B,C}	0,474^{A,B,C}	0,451^{D}
Palmitic acid	1,120^{A,C,D}	1,109^{C,D}	1,082^{B,C,D}	1,100^{D}	1,047^{B}
Stearic acid	0,382^{A}	0,372	0,374	0,365^{B}	0,360^{B}
Oleic acid	0,874^{A}	0,828^{B}	0,836	0,817^{B}	0,790^{B}
LCFA	1,356^{A}	1,301^{B}	1,290^{B,C}	1,269^{B,C,D,E}	1,221^{E}
MCFA	1,634^{A}	1,635^{A,C}	1,591	1,619^{A,C,D}	1,538^{B}
SCFA	0,459^{A}	0,438^{B}	0,448	0,445	0,439^{B}

Statistically significant difference is indicated by different letters A, B, C, D, E. Where the letters are the same or not at all, there is no statistically significant difference. HFA (higher fatty acids), LCFA (long chain fatty acids), MCFA (medium chain fatty acids), SCFA (short chain fatty acids).

a statistically significant difference with first and third, first and fifth, second and fifth, fourth and fifth lactations. Stearic acid showed a statistically significant difference between first and fourth lactation and between first and fifth lactation. A statistical difference for lactose came out for almost all lactations except third and fourth and fourth and fifth. For LCFA, no statistical difference came out between the second and third lactations, the second and fourth lactations and between the fourth and fifth lactations. For SCFA, only the difference between the first and fifth lactation and between the first and second lactation came out. When looking at MCFA, there was a difference between second and fifth lactation, first and fifth, and fourth and fifth lactation. For somatic cells, the conclusiveness came out between first and second lactation, between first and third, first and fourth, first and fifth, and second and fifth. When comparing the mean values for TPS, there was a statistically significant difference between almost all lactations except the third and fourth and third and fifth lactations. For milk fat, there was a statistical difference between the first and third lactations, the first and fifth, the second and fifth, the fourth and fifth, and the fifth lactation had a statistically significant difference with all lactations. There was no statistically significant difference for urea. For HFA, only the first and fifth lactations showed a difference.

DISCUSSION

Most of the observed dairy cows were on their first, second and third lactation. At higher lactations there were not as many cows, which corresponds to the trend of herd composition (Kopecký *et al.*,1981).

Comparing the fat content of the individual lactations, the highest fat content was found to be 3.887% in the fifth and higher lactation. The protein content was highest in the second lactation. When comparing the ratio of fat to protein content, the ratio was 1 : 1,097 on the first lactation and 1 : 1,080 on the second lactation. For the third lactation the ratio was 1 : 1,080. For cows on their fourth lactation the ratio came out to 1 : 1,076 and for cows on their fifth and higher lactation the ratio between fat and protein came out to 1 : 1,044. This shows that the highest fat/protein ratio was in the first lactation dairy cows. As stated in the breed standard for Czech fleckvieh cattle, the fat to protein ratio should be 1 : 1,15–1,20 (Cestr, 2007). When comparing the results with Maňoušková's research, the highest amount of fat was on the fourth lactation (4.00%). In my work, the highest fat content in cows came out at the first lactation at 4,121%. The lowest amount of fat was on the fifth and higher lactation. My protein content was highest in cows on the second lactation. In Maňoušková's work, the highest protein content was in cows on the fifth and higher lactation. Lactose content was highest on the first lactation and gradually decreased on the higher lactations.

The aim of further research could be to compare the performance of Holstein dairy cows and Czech fleckvieh cows. Further research could be aimed at evaluating the performance of specific dairy cows on individual lactations. Subsequently, environmental parameters will also be included in the research.

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