

Seasonal variation in the fatty acid composition of cow milk in the mountain regions of the Czech Republic



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Introduction

The pasture elevates the proportion of unsaturated fatty acids (FAs) in cow milk fat on behalf of saturated FAs. While the consumption of saturated fat, mainly of C12:0, C14:0 and C16:0 FAs, is associated with cardiovascular diseases, the unsaturated FAs are regarded as beneficial for human health. The intake of a fresh grass elevates also the concentration of conjugated linoleic acid (CLA), which major 9-*cis*, 11-*trans* isomer was proved a biologically active compound with anticarcinogenic and effects. The aim of this study was to examine the effect of seasonal grazing of cows reared on Czech mountain farms on the FA profile of produced milk.

Methods

Three dairy farms located at an altitude of 575, 793 and 730 meters above sea level (farm 1, 2, 3 respectively) were selected for the examination. The herds consisted of Czech Fleckvieh and Holstein cows. The calving was applied continuously throughout the year. The herbage (grazed and cut) formed a majority of the feed ration in the pasture period (May – October). The vegetation of pastures appertained to the *Lolium-Cynosuretum* association. The fresh-cut herbage was offered to cows in the stalls during a milking twice a day. In the indoor period (November – April), cows were fed by the grass silage prepared from the pasture vegetation cut in late May and June. Bulk milk was collected once a month, four samples in the indoor period and five samples in the pasture period. Fatty acids were determined by a gas-chromatographic method (GLC) using an apparatus Varian 3800 (Varian Techtron, USA; Column Omegawax 250, 30m). The two-way ANOVA with factors of the farm and of the period of milk sample collection was used for the evaluation of variation in FAs concentration.



Conclusions

A higher ratio of unsaturated vs. saturated fatty acids and a higher concentration of CLA was found in milk fat in the pasture period (May – October) than in the indoor period (November – April). A more valuable milk fat composition as regards its potential impact on consumers' health was thus produced in the pasture period than in the period of indoor silage feeding.

Results

	Farm			Period		Total	SEM	P		
	1	2	3	Indoor	Pasture			Farm	Season	F*S
C14:0	10.53	9.80	9.52	10.73	9.17	9.86	0.29	0.275	0.006	0.671
C16:0	30.51a	26.86b	26.89b	30.74	25.43	27.79	0.79	0.007	<0.001	0.025
C18:0	10.93a	12.51b	12.47b	11.05	12.89	12.07	0.32	0.012	<0.001	0.028
9- <i>cis</i> C18:1	19.73	23.00	23.00	20.51	23.32	22.07	0.63	0.022	0.011	0.191
C18:2 /9,11/ (CLA)	0.78	0.89	1.08	0.74	1.09	0.93	0.06	0.029	0.001	0.452
C4 – C11	8.21	7.73	7.63	7.69	8.02	7.88	0.16	0.260	0.898	0.968
C12 – C16	48.66a	43.45ab	43.22b	48.91	41.31	44.69	1.17	0.030	<0.001	0.195
C17 – C24	41.84a	47.50ab	47.88b	42.25	49.22	46.12	1.21	0.022	0.001	0.234
SAFA	67.47a	63.38ab	63.13b	67.16	62.16	64.38	0.88	0.029	0.001	0.453
MUFA	26.99a	30.79ab	31.08b	27.55	31.69	29.85	0.79	0.023	0.002	0.363
PUFA	4.24	4.50	4.51	4.15	4.69	4.45	0.09	0.288	0.004	0.425

SAFA – saturated fatty acids; MUFA – monounsaturated fatty acids; PUFA – polyunsaturated fatty acids; ^{a,b} Different superscripts indicate differences between farms (differences within rows)