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IMPROVING THE FATTY ACID PROFILE OF DAIRY COW'S MILK USING THE PREPARED INNOVATIVE FEED

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Abstract: This study investigated the effects of prepared innovative feed (PIF) on the saturated and unsaturated fatty acid profiles of dairy cow milk. PIF was composed of rape seed meal, sun flower meal, protected fat, source of conjugated linoleic acid (CLA), calcium carbonate, monocalcium phosphate (MCP), sodium bicarbonate, and vitamin mineral premix. Dairy cows were divided into two groups (10 cows/group) including a control group (CG) fed basal diet without any nutritional supplements and experimental group (EG) fed basal diet + 1.5 kg PIF/cow/day of the new products. The PIF resulted to change the overall fatty acid content of the milk from the experimental cows and raised the levels of UFA from 64.164% to 73.229%. The SFA content slightly decreased from 35.607% to 26.910%. Furthermore, the PUFA content has elevated from 37.824% (CG) to 45.415% (EG). Not significant difference was recorded for n3, n6 and the n6/n3 ratio ($p \geq 0.05$). In conclusion during the experimental period the content of SFA tended to decrease, while the amount of UFA has increased notably ($p \leq 0.05$). Similar observations were also noticed for PUFA and MUFA. The inclusion of PIF as dietary supplement in dairy cows modified the fatty acid profile of milk, with major impact on consumer health.

Keywords: *milk fatty acid composition, Romanian spotted cattle, feed supplementation, unsaturated fatty acid (UFA), polyunsaturated fatty acids (PUFA)*

• Introduction

Milk is a very complex fluid, with major impact on consumer health. The milk chemical composition varies according to several factors such as: species, breed, diet, age, state of health, stage of lactation etc. In addition to variations in the concentrations of the composition of the fatty acid profile is strongly influenced by diet.

• Material and method

A total of 20 dairy cows were equally distributed into two groups: the control group (CG) and the experimental group (EG). Both groups received balanced rations according to the INRA recommendations. The CG group received in diet a mixture of farm-produced feed concentrates (FC), while the EG received an FC including the prepared innovative feed.
To determine the milk chemical constituents: dry matter, protein, lipids, ash, and fatty acid profiles, standardised methods were used.
The primary data obtained were processed by statistical methods with the help of Microsoft Excel calculation application and for the statistical significance of the differences between the means of the studied characters, the Student test was used.

• Results and discussions

The results regarding the impact of the incorporation of PIF in the diet of dairy cows on milk chemical composition are shown in Figure 1, while the content of fatty acids in milk are presented in Table 1 .

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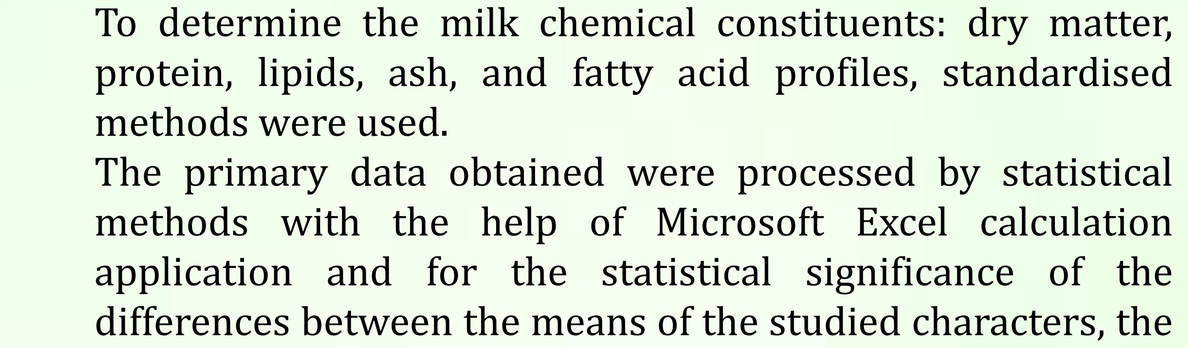

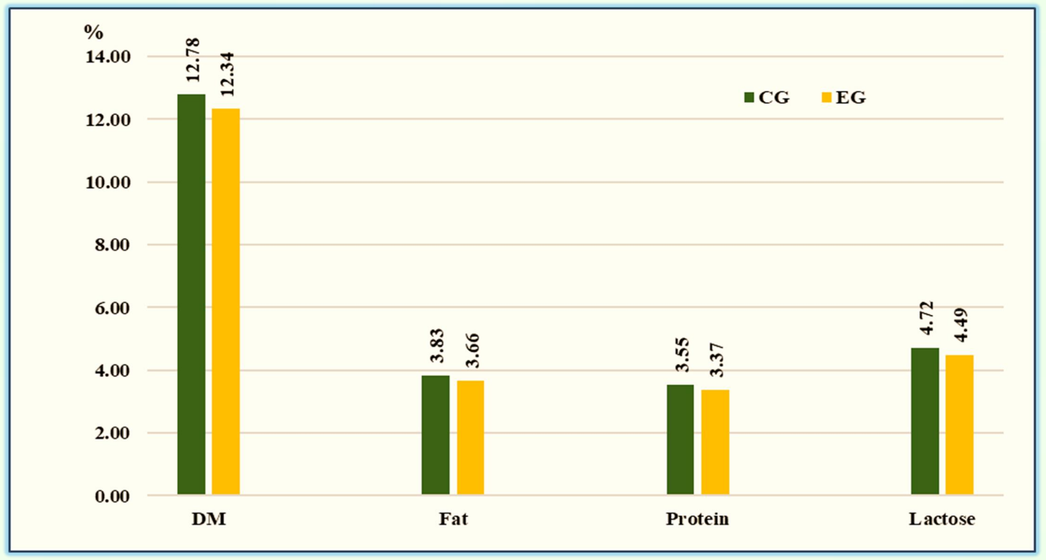

Figure 1. Milk chemical composition from experimental cows

Table 1. Fatty acid content of the milk from experimental cows

Specification	Fatty acid	n	Control Group $\bar{x} + SD$		n	Experimental group $\bar{x} + SD$		p value
	C4:0 butyric acid (%)	8	1,596	0,705	8	1,339	0,246	0,346
	C6:0, caproic acid (%)	8	0,865	0,347	8	0,709	0,200	0,287
	C8:0, caprylic acid (%)	8	0,554	0,210	8	0,516	0,213	0,723
	C10:0, decanoic acid (%)	8	1,628	0,622	8	1,197	0,346	0,109
	C11:0 acid undecanoic	8	0,397	0,186	8	0,561	0,281	0,189
	C12:0, lauric acid (%)	8	1,918	0,711	8	1,363	0,301	0,062
	C13:0 acid tridecanoic (%)	8	0,721	0,311	8	1,113	1,032	0,322
	C14:0 C14:0, myristic acid (%)	8	6,416	2,514	8	4,400	1,125	0,057
	C15:0 C15:0 pentadecanoic acid (%)	8	0,908	0,303	8	0,672	0,199	0,087
	C16:0 C16:0, palmitic acid (%)	8	14,261	4,818	8	9,869	3,186	0,049
	C17:0 C17:0 heptadecanoic acid (%)	8	0,481	0,171	8	0,377	0,129	0,192
	C 18 acid stearic (%)	8	4,328	2,385	8	2,837	0,509	0,106
	C20:0 acid eicosanoic (%)	8	0,125	0,083	8	0,167	0,131	0,453
	C22:0 acid behenic (%)	8	0,127	0,292	8	0,039	0,037	0,415
	C23:0 acid tricosanoic(%)	8	1,128	0,558	8	1,131	0,416	0,989
	C24:0 acid lignoceric (%)	8	0,485	0,243	8	0,617	0,109	0,184
ΣSFA (%)		**8**	35,607	11,228	**8**	26,910	4,052	0,058
	C14:1, acid myristoleic(%)	8	0,675	0,242	8	0,661	0,132	0,885
	C15:1, acid pentadecenoic(%)	8	0,197	0,072	8	1,006	2,324	0,342
	C16:1, acid palmitoleic(%)	8	0,871	0,277	8	0,818	0,179	0.656
	C17:1, acid heptadecenoic(%)	8	0,238	0,096	8	0,211	0,054	0,502
	C18:1C+T, acid oleic (%)	8	9,490	6,176	8	8,815	2,368	0,777
	C20:1n9, acid eicosenoic (%)	8	0,262	0,065	8	0,283	0,048	0,479
	C22:1n9, acid erucic(%)	8	0,244	0,122	8	0,287	0,079	0,417
	C24:1n9, acid nervonic(%)	8	14,362	7,315	8	15,732	2,871	0,629
ΣMUFA (%)		**8**	26,340	6,273	**8**	27,813	4,514	0,598
	C18:2C+T, n6, acid linoleic(%)	8	1,333	0,477	8	0,965	0,289	0,083
	C18:3n6, γ -Linolenic(%)	8	0,098	0,060	8	0,095	0,031	0,902
	C18:3n3, α-Linolenic(%)	8	0,533	0,246	8	0,384	0,067	0,120
	C20:2, n6, acid eicosadienoic(%)	8	7,556	2,468	8	8,339	2,103	0,506
	C20:3n6+C21:0 Homo- γ -Linolenic(%)	8	0,489	0,191	8	0,749	0,175	0,013
	C20:3n3, acid Eicosatrienoic(%)	8	0,328	0,126	8	0,382	0,123	0,404
	C20:4n6, acid arahidonic(%)	8	0,674	0,272	8	0,877	0,152	0,086
	C20:5n3, Acid eicosapentaenoic(%)	8	1,776	0,842	8	1,838	0,263	0,845
	C22:2, n6, acid Docosadienoic(%)	8	24,775	10,118	8	31,376	2,919	0,098
	C22:6n3, acid docosahexaenoic (%)	8	0,260	0,141	8	0,409	0,172	0,079
ΣPUFA (%)		**8**	37,824	12,082	**8**	45,415	4,890	0,122
ΣUFA (%)		8	64,164	11,055	8	73,229	3,987	0,047
ΣFA (%)		8	100,008	0,093	8	100,139	0,323	0,291
n3		8	2,897	0,804	8	3,013	0,367	0,716
n6		8	34,926	11,400	8	42,402	4,759	0,109
n6/n3		8	12,032	1,737	8	14,757	3,295	0,058

•Conclusions

As a general conclusion, it was observed that over the entire experimental period of administering PIF, the amount of SFA decreased while the amounts of UFA ($p \leq 0.05$), specifically PUFA and MUFA, increased.