

COUNTERFEITING DETECTION OF FERMENTED MILK PRODUCTS

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Abstract. About the appearance on the market of unqualified milk products, within Practical Scientific Institute of Horticulture and Food Technology (Food Technology Directorate) were initiated research and development works to establish counterfeit milk products and detection methods of them. Physico-chemical quality indices of fermented milk products were determined with the use of instrumental methods, Reichert-Meissl and Polenske method. In result of the investigation was established the existence of the Republic Moldova market – nonconforming fermented milk products and counterfeit, by substitution of lactic fat with vegetable fat (falsification of content). The absence of respective information on the product label is assigned to the category of informational falsification.

Key words: index of quality, fermented milk product, identification indices, monitoring

Introduction

The volume of counterfeit dairy products in many countries in recent years was 30-50% and it is assumed that in Republic of Moldova has created a similar situation so that the absence of a state system of dairy products quality control, as well as deficiency of qualified specialists, able to capitalize the materials and quality standards of EU countries.

This problem, unfortunately, not had an approach in some state programs involving scientific institutions in developing quality standards and methods for identifying counterfeit food, so the elaboration of authenticity/deceleration criteria of falsified food and representative index determination, specific besides those who are established in the standards for dairy products, is a vital issue at the moment with a significant economic and social impact, including on health [1].

In the production of fermented milk products are conventionally two groups: obtained only as a result of lactic fermentation (sour cream and cottage cheese) and obtained as a result of mixed fermentation (kefir and acidophilus, yogurt). We investigated the identification indicators of fermented milk products obtained as a result of lactic fermentation (sour cream and cottage cheese and).

Materials and methods

Was conducted the quality monitoring of fermented milk products (cottage cheese and sour cream), selected from the markets, manufactured in some industrial enterprises from Romania, Russian Federation, Ukraine and Belarus. In order to respect the confidentiality of information, may bring some harm producers/ importers, samples are coded without their names.

Laboratory investigations were carried out on the basis of physical and chemical indicators, which are: fat content, dry lactic skimmed residue, protein content, titratable acidity [2]. The lactic fat extracted in the milk samples was determined fatty acid composition by Reichert-Meissl and Polenske methods.

The Reihert-Meissl Index characterizes the content of lower fatty acids (capric and butyric acid). In dairy fat it is 20 to 30, and in sunflower, corn, soy and coconut oils the indices range from 0 to 8. Polenske characterizes the amount of lower insoluble fatty acids (caprine and caprylic) in 5 grams of fat. In dairy fat it is from 1.9 to 5 [3].

Results and discussions

The markets of the Republic of Moldova sale a sour cream with a fat fraction of 10-30%, as well as sour cream product with a fat fraction of 10%. Import sour cream has a longer shelf life, being pasteurized. We selected 8 samples from the market (different producers), 1 sample of control (from country farms) and 1 sample of sour cream product, see table 1.

Table 1. The quality monitoring of sour cream placed on Rep. of Moldova markets

Nr.	Country	Product name	Fat content, %	Shelf-life	Storage temp.
1.	R. Moldova	1.sour cream 2.sour cream product	15,20,25,30 10	7 days	up +1 ^o C to +6 ^o C
2.	R. Moldova	Sour cream	10,15,20,30	8 days	up 0 ^o C to +4 ^o C
3.	R. Moldova	Sour cream	15,20,25	7 days	up 0 ^o C to +6 ^o C
4.	R. Moldova	Sour cream	10,15,20	15 days	up 4 ^o C to +6 ^o C
5.	R. Moldova	Sour cream	10,15,20,30	7 days	up 4 ^o C to +6 ^o C
6.	Belorusia	Sour cream	15, 20, 26	25 days	up 2 ^o C to +4 ^o C
7.	România	Sour cream	20, 30	36 days	up 2 ^o C to +6 ^o C
8.	Ucraina	Sour cream	15, 20	15 days	up 0 ^o C to +6 ^o C

Counterfeiting of sour cream is frequently used by manufacturers. This is usually diluted with kefir, cottage cheese or water. Starch, egg white, chalk, various additives, vegetable oils and even hydrogenated fat can be added to the cream (table 2).

Table 2. Tests used to detect the sour cream falsification

Nr. d/o	Samples	Fat content, %	Sour cream presence of:			
			Amidone (color)	Cottage cheese	mineral substances	Egg white
1.	Sample nr.1	10	yellow	protein flakes in all volume	without precipitation	on the filter are no traces of egg white
2.	Sample nr.2	30	yellow	a dense circle to the surface, formed by protein flakes	without precipitation	
3.	Sample nr.3	15	yellow	Protein flakes on 1/4 surface	without precipitation	
4.	Sample nr.4	10	yellow	Protein flakes on 1/3 surface	without precipitation	
5.	Sample nr.5	30	yellow	a dense circle to the surface, formed by protein flakes	without precipitation	
6.	Sample nr.6	-	yellow	omogenous solvation in water	without precipitation	
7.	Sample nr.7	15	yellow		without precipitation	

Nr. d/o	Samples	Fat content, %	Sour cream presence of:			
			Amidone (color)	Cottage cheese	mineral substances	Egg white
8.	Sample nr.8	15	yellow		without precipitation	
9.	Sample nr.9	15	yellow	protein flakes on surface	without precipitation	
Conclusions		-amidone is not added to a sample (lack of blue color); -in all types of sour cream there are elements which do not dissolve in water, except for samples no. 6, 7, 8; - Mineral substances lacking; - egg white is not present in the samples studied.				

Table 3. Physical and chemical indices in the sour cream samples, selected from the market

Nr.	Sample	Fat mass content, %	Mass content, %			Acidity °T
			fat	protein	Dry lactic skimmed residue	
Norm according RT „Lapte și produse lactate”			min 10,0	min 1,2	min 3,6	60-100
1.	Sample nr.1	10	10,0	2,8	6,0	72
2.	Sample nr.2	30	30,0	2,4	4,0	60
3.	Sample nr.3	15	15,0	2,9	5,2	76
4.	Sample nr.4	10	10,0	2,9	5,1	84
5.	Sample nr.5	30	30,0	2,4	4,4	60
6.	Sample nr.6	-	28,0	2,5	8,0	67
7.	Sample nr.7	15	15,0	2,7	5,3	76
8.	Sample nr.8	15	15,0	2,8	5,2	74
9.	Sample nr.9	15	15,0	2,8	5,0	78

According to the research of the physico-chemical indices, the studied samples correspond to the norms stipulated in the Technical Reglementation of R. Moldova.

The composition of fatty acids in milk fat (Reihert-Meissl and Polenski index), extracted from the samples examined, was studied. The results of the analyzes are presented in Table 4.

Table 4. Reihert-Meissl and Polenske indices in sour cream samples from milk enterprises of Republic Moldova

Nr.	Sample	Fat mass content, %	Indice Reihert-Meissl	Indice Polenski	lactic fat /veg. fat ratio
1.	Sample nr.1	10	10,96	1,3	50/50
2.	Sample nr.2	30	17,6	2,2	90/10
3.	Sample nr.3	15	16,3	2,0	80/20
4.	Sample nr.4	10	14,9	1,9	70/30
5.	Sample nr.5	30	17,8	2,3	90/10
6.	Sample nr.6	-	22,1	2,7	100/0
7.	Sample nr.7	15	21,9	2,5	100/0
8.	Sample nr.8	15	22,0	2,6	100/0
9.	Sample nr.9	15	15,1	1,9	70/30
Milk fat substituent SRL „Vegetal-Org			4,65	0,8	100 Vegetable fat

The results of the analyzes show that sample no. 6 (house cream) contains only pure dairy fat, but samples no. 1-5 have a substitute for lactic fat or vegetable oils.

In the Republic of Moldova only one producer manufactures the cream product, which is used in the culinary industry and in the preparation of the sauces. All investigated samples contain from 10% to 30% vegetable fat.

Table 5. *The quality monitoring of cottage placed on Republic of Moldova markets*

Nr.	Country	Cottage type	Fat content %	Package and weight	Storage temperature and shlef-life
1.	R. Moldova	1. Granulated	4, 6,0, 5	Plastic box 200g,400g	up +1°C to +6°C, 96 hours
		2. Brick	2, 5, 18	paper 250g	
		3. Fresh cow cheese	18	polyeth.500g	
2.	R. Moldova	1. Granulated	4	plast. cup 350g	up 0°C to +4°C, 6 days
		2. Fresh cow cheese	0, 5, 9	box 350g	up 0°C to +4°C, 96 hours up 0°C to +4°C, 6 days
		3. Brick	5, 9, 18 0, 5, 9	paper 250g polyeth.500g	
3.	R. Moldova	Brick	5	paper 250g	up 0°C to +4°C, 96 days
4.	R. Moldova	Fresh cow cheese	0, 9	box 250g	up 0°C to +4°C, 96 hours
5.	R. Moldova	Fresh cow cheese	0, 9, 18	polyeth.500g	up 0°C to +6°C, 96 hours
		Brick	5, 18	paper 250g	
6.	R. Moldova	Brick	2	paper 250g	up 0°C to +6°C, 96 hours
7.	România	Granulated	15	pastl.cup 300g	up 2°C to +6°C, 25 days
8.	Rusia	Granulated	1	box 220g	up 2°C to +6°C, 34 days
9.	Belorusia	Granulated	5	plast.cup 250g	up 2°C to +6°C, 25 days
10	Ucraina	Brick	0, 2	Box, 250g	up 2°C to +6°C, 34 days

The Moldovan market sale cottage cheese with a fat mass fraction of 0% to 18% with the shelf life of 96-144 hours (4-6 days) at 0 ° C to +6 ° C. The import cheese has a longer shelf life of 25-34 days at a temperature of + 2 ° C to + 6 ° C.

Table 6. *Physical and chemical indices in the cottage samples, selected from the market*

Nr.	Sample	Fat mass content, %	Mass content, %			Acidity °T
			Fat,	Protein,	Dry lactic skimmed residue	
Norm according RT „Lapte și produse lactate”			0,1-35,0	min 8,0	min 13,5	200-270
1.	Sample nr.1	4	4	17,0	21	220
2.	Sample nr.2	4	4	16,4	24	240
3.	Sample nr.3	5	6	21,5	26	200
4.	Sample nr.4	5	5	15,0	25	200
5.	Sample nr.5	2	2	18,5	26	220
6.	Sample nr.6	-	17	15,5	18,5	220
7.	Sample nr.7	15	15	16,0	21	200
8.	Sample nr.8	5	5	15,0	25	200
9.	Sample nr.9	0,2	0,2	12,5	28	220

8 cheese samples from the trade network (different producers) and 1 house sample (from country farm) were selected.

The composition of fatty acids in milk fat (Reihert-Meissl and Polenske index), extracted from the samples examined, was studied. The results of the analyzes are presented in Table 7.

Table 7. Reihert-Meissl and Polenske indices in cottage samples from Moldovan enterprises

Nr.	Sample	Fat mass content, %	IndiceReihert-Meissl	Indice Polenski	lactic fat /veg. fat ratio
1.	Sample nr.1	4	16,2	2,1	90/10
2.	Sample nr.2	4	16,8	2,3	90/10
3.	Sample nr.3	5	12,9	1,8	70/30
4.	Sample nr.4	5	15,4	1,9	85/15
5.	Sample nr.5	2	14,7	2,0	75/25
6.	Sample nr.6	-	22,1	2,7	100/0
7.	Sample nr.7	15	21,9	2,4	100/0
8.	Sample nr.8	5	21,2	2,2	100/0
9.	Sample nr.9	0,2	13,8	1,8	75/25
Milk fat substituent SRL „Vegetal-Org			4,65	0,8	100 Vegetable fat

The results of the analyzes show that sample no. 6, 7, 8 contains only pure dairy fat, but samples no. 3, 5, 9 are substituted for lactic fat or vegetable oils.

Conclusions

1. The monitoring of fermented milk products produced in the Republic of Moldova and imported (sour cream and cottage cheese) placed on the market, have been made.
2. According to the physical and chemical indices were found added foreign substances in sour cream samples 1-5, was replaced the lactic fat by vegetable fat.
3. According to the physical and chemical indices was found in cottage cheese the substitution of lactic fat by vegetable fat in sour cream samples 3, 5, 9.

References

1. Hotărîre de Guvern № 611 din 05-07-2010 despre aprobarea Reglementării Tehnice “Lapte și produse lactate”.
2. SM ISO 11870:2014 (Anexa)
3. GOST R 52100-2003 “Spredy i smesi toplenyye”. Obshchiye tekhnicheskiye usloviya.
4. Iorga E., Voitco E., Achimova T., Rabotnicova L., Arnaut. S., „Viziuni asupra produselor lactate 2. Lapte”.