

STUDY CONCERNING MICROBIOLOGICAL CONTAMINATION OF SOME CHEESE

**Lăcrămioara Istrati¹, Gabriela Ciobanu², Maria Harja², L. Gavrilă¹,
Roxana Ceaunaș¹**

¹University of Bacau, Mărășești street, no. 157, Bacău, 600115, Romania

²Technical University "Gh.Asachi" of Iasi, Mangeron Blvd., 71D, Iasi, 700050,
Romania

Abstract

The milk and dairy products are essential products in human nourishment, not as much for the energy amount they generate as for some nourishing substances they provide. From epidemiologic point of view, numerous researchers point on the possibilities of pathogenic germs transfer to humans, especially by consuming meat and dairy products. The cheese microflora has a great importance, because it influences the quality of the products by the pathogenic or conditioned pathogenic bacteria species as well as by the substratum degradation and by producing of some toxic products that distort the product and increase hygienic risk. The paper presents a study concerning microbiological contamination of some cheese types sold on Bacau district markets. The study has been made on products obtained from pasteurized milk, and non-pasteurized milk, from economical agents and from particular manufacturers.

Key words: *cheese, microbiological contamination, food safety, coliforme bacteria, E. coli*

Introduction

The milk and dairy products are essential products in human nourishment, not as much for the energy amount they generate as for some nutritive substances they provide. Mainly it's about calcium and significant quantities of proteins and vitamins (rhetynol, rhyboflavine, pirydoxine, panthothenic acid, thyamine, etc.) (Costin, 2003).

From epidemiologic point of view, numerous researchers point on the possibilities of pathogenic germs transfer to humans, especially by consuming meat and dairy products (Marth, 1998; Barzoi, 1999). The cheese microflora has a great importance, because it influences the quality of the products by the pathogenic or conditioned pathogenic bacteria species as well as by the substratum degradation and by producing of some toxic products that distort the product and increase

hygienic risk (Jay, 2000; Barzoi, 2002). The contaminated products may be from sick animals or contaminated later on during the fabrication process or when handled by workers, this indicating a poor hygiene (Faye, 2002).

In this context we considered opportune to make a study concerning microbiological contamination of some cheese types. It is important that economical agents and particular manufacturers to assimilate the concepts concerning food safety and to focus on the whole chain raw materials-finished product-commercialization. Only a dynamic analysis of the cheese will assure the commercialization of clean products that will totally keep their hygienic characteristics and will not represent a danger for the population. One of the main identifiers of cheese safety is the presence or absence of the pathogenic micro-organisms.

The paper presents a study concerning microbiological contamination of some cheese types sold on Bacau district markets. The study has been made on products obtained from pasteurized milk, and non-pasteurized milk, from economical agents and from particular manufacturers.

Experimental

The cheese samples were taken from different commercialization points in Bacau district looking for covering a wide range of product types from economical agents as well as from particular manufacturers, sold in different types of shops. The study was made considering opportune the monitoring of microbiological contamination of cheese obtained both from pasteurized milk and non-pasteurized milk. The study took place on a 2 months period (september, october 2004) analyzing a total number of 210 samples (36 samples of cheese curd, 48 samples of cow brine-ripened cheese, 66 samples of Romanian pressed cheese, 24 samples of process cheese, 36 samples of cow fresh cheese).

From these samples we considered as representative only 34 of them which are presented in table 1. Sample prelevation was made on types of cheese sold in Central Market of Bacau district in both specialized and non-specialized shops.

There were take samples of 200gr each from every type of cheese, the samples being kept in a refrigerator during the measurements. For each samples were determined the main microbiological and physico- chemical

characteristics, and the obtained results were compared with the admitted standards of consumption of the product.

Table 1. Cheese samples used in measurements

Sample No.	Cheese type	Source	Source location
P ₁	<i>Cheese curd</i>	particular manufacturer	M
P ₂		particular manufacturer	M
P ₃		particular manufacturer	M
P ₄		particular manufacturer	M
P ₅		particular manufacturer	M
P ₆		particular manufacturer	M
P ₇	<i>Cow milk braine ripened cheese</i>	S.C. „Parimar” S.R.L.	SS
P ₈		S.C. „Aic Bac” S.A.	SS
P ₉		S.C. „Custara” S.R.L.	SS
P ₁₀		particular manufacturer	M
P ₁₁		particular manufacturer	M
P ₁₂		S.C. „Parimar” S.R.L.	NNS
P ₁₃		S.C. „Almera Internațional” S.A.	SS
P ₁₄		particular manufacturer	M
P ₁₅	<i>Romanian pressed cheese „Rucăr”</i>	S.C. „Your Friends” S.R.L	SS
P ₁₆		S.C. „Parimar” S.R.L.	SS
P ₁₇		S.C. „Prod Sec” S.R.L.	NNS
P ₁₈		S.C. „Parimar” S.R.L.	NNS
P ₁₉	<i>Romanian pressed cheese „Dalia”</i>	S.C. „Dorna Lactate” S.A.	SS
P ₂₀		S.C. „Almera Internațional” S.A.	SS
P ₂₁		S.C. „Almera Internațional” S.A.	NNS
P ₂₂		S.C. „Marlact” S.R.L.	SS
P ₂₂		S.C. „Marlact” S.R.L.	NNS
P ₂₃		S.C. „Custara” S.R.L.	NNS
P ₂₄		S.C. „Dorna Lactate” S.A	NNS
P ₂₅	<i>Process cheese</i>	S.C. „Almera Internațional” S.A	SS
P ₂₆		S.C. „Bucovina” S.A	NNS
P ₂₇		S.C. Prolabac S.A.	SS
P ₂₈		S.C. „Hochland România” S.R.L	SS
P ₂₉	<i>Pasteurized cow milk fresh cheese</i>	S.C. „Almera Internațional” S.A.	SS
P ₃₀		S.C. „Prod Sec” S.R.L.	NNS
P ₃₁	<i>Non-pasteurized cow milk fresh cheese</i>	S.C. „Aic Bac” S.A.	SS
P ₃₂		particular manufacturer	M
P ₃₃		particular manufacturer	M
P ₃₄		particular manufacturer	M

M – sold in market; SS – sold in specialized shops; NNS – Non-specialized shops;

The microbiological analysis consists in: determining Salmonella pathogenical germs according to STAS 6349/11-83; determining the number of coliforme and Escherichia coli bacteria according to STAS 6349/4-80;

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determining the *Stafilococ coagulazo-pozitiv*, pathogenical germs according to STAS 6349/12-83; determining the number of yeasts and moulds according to STAS 6439/6-80. The microbiological standards concerning cheese consumption (according to OMS 975/1998) for the analyzed types are presented in table 2.

Table 2. Microbiological characteristics imposed for cheese (max. admited no./g).

Food name	Cb ^a	Ec ^b	S ^c 25 gr	Sc-p ^d	YM ^e
Pasteurized cow milk fresh cheese	100	10	absent	10	-
Non-pasteurized cow milk fresh cheese	1000	100	absent	10	-
Green cheese (green pot, cottage cheese) from non-pasteurized milk	100	10	absent	100	300
Maturated cheese in brine (pot, cottage cheese) from pasteurized milk	10	absent	absent	10	1000
Maturated cheese in brine (pot, cottage cheese) from non-pasteurized milk	100	10	absent	100	2000
Smoke-dried and non-smoke-dried Romanian pressed cheese	10	absent	absent	10	1000
Process cheese	-	-	absent	10	-

^aCb - Coliform bacteria; ^bEc - *Escherichia coli*; ^cS - *Salmonella*; ^dSc-p - *Stafilococ coagulazo-pozitiv*; ^eYM - Yeasts and Moulds

Physico-chemical analysis of the samples consists in: determining the acidity according to STAS 6353-85; determining the dry substance and water according to STAS 6344-88; determining the fat percent according to STAS 6352/2-87; determining the fat percent related to the dry substance according to STAS 6352/2-73; determining the natrium chloride content according to STAS 6354-70.

Results and Discussions

Obtained results for each sample after microbiological and physico-chemical determination were compared with microbiological limits and physico-chemical characteristics imposed and were concluded if this maybe admitted for the consumption. These results

are presented in the tables 3, 4, 5, 6, 7, 8 and 9. The significance of the notations from these tables is: PCM – The sample is good from microbiological analyzed parameters point of view; PCFC – The sample is good from chemical-physical analyzed parameters point of view; PNCM – The sample is NOT good from microbiological analyzed parameters point of view; PNCFC – The sample is NOT good from chemical-physical analyzed parameters point of view

Conclsions

From the analisys of the obtained results we can conclude that at the majority of the microbiological contaminated samples we noticed an increase in the number of coliforme bacteria and Escherichia coli. Also It has been found that there's a higher degree of contamination in the unpacked green cheese and the cheese from particular manufacturers. The cheese obtained from pasturized milk are less probable to get contaminated than the ones obtained from non-pasteurized milk. It has been found that part of cheese both from particular manufacturers and commercial societies do not correspond from chemical-physical point of view. The possible microbiological contamination sources might be: the use of contaminated milk; the use of milk from sick animals; contamination during manufacturing or handeling by workers; the use of contaminated water; the non-observance of hygiene rules and cheese storing condition by commercial agents.

References

- Costin, Gh. M., ș.a. (2003). *Știința și ingineria fabricării brânzeturilor*, Editura Academica, Galați;
- Bărzoi, D., Meica, S., Neagu, M. (1999). *Toxiinfecțiile alimentare*, Editura Diacon Coresi, București;
- Marth, E. H. (1998). Microbiological quality and safety, *Food Technonogy*, 52(2) 57-62
- Jay, M. J. (2000). *Modern food microbiology*, 6th Ed., Chapman & Hall, New York;
- Bărzoi, D., Apostu S. (2002). *Microbiologia produselor alimentare*, Ed. Risoprint, Cluj-Napoca;
- Faye, B., Loiseau, G. (2002). *Sources of contamination in dairy supply chains and approaches to quality control*, Food safety management in developing countries, CIRAD-FAO, Montpellier, France;

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Table 3. Microbiological and physico-chemical characteristics of „Cheese curd” product

No.	Tests made									Tests results
	Microbiological				Chemical-physical					
	Salm. 25 g	Bact. colif./g	E. coli/g	Staf. cp./g	Acidity [°T] %	Water [%]	D.S. [%]	Fat [%]	F/D.S. [%]	
P ₁	abs	>11000	<10	<10	131.0	50.82	49.18	26.0	52.87	PNCM; PNCFC
P ₂	abs	240	9	<10	143.0	45.03	54.97	38.0	69.13	PNCM; PCFC
P ₃	abs	930	12	<10	141.0	47.75	52.25	42.0	80.38	PNCM; PCFC
P ₄	abs	240	9	<10	138.0	45.08	54.92	40.0	72.83	PNCM; PCFC
P ₅	abs	240	9	<10	147.0	47.10	52.90	40.0	75.61	PNCM; PCFC
P ₆	abs	930	9	<10	129.0	49.24	50.76	28.5	56.15	PNCM PNCFC

Table 4. Microbiological and physico-chemical characteristics of „Maturated cow milk cottage cheese in brine” product

No.	Tests made										Tests results
	Microbiological					Chemical-physical					
	Salm 25 g	Bact colif/g	E coli/g	Staf cp/g	D+M/g	Water [%]	D.S. [%]	Fat [%]	NaCl [%]	F/D.S. [%]	
P ₇	abs	93	<10	<10	300	60.88	39.12	17.0	3.36	43.46	PCM; PNCFC
P ₈	abs	93	<10	<10	<1000	51.70	48.70	23	5.63	48.80	PCM; PNCFC
P ₉	abs	93	9	<10	250	60.63	39.97	17.0	4.27	43.18	PCM; PNCFC
P ₁₀	abs	93	<10	<10	450	59.29	40.71	15.51	8.03	38.07	PCM; PNCFC
P ₁₁	abs	240	<10	<10	250	41.93	58.07	26.0	4.01	44.77	PNCM; PCFC
P ₁₂	abs	240	<10	<10	500	55.53	44.47	20.0	4.08	44.97	PNCM; PCFC
P ₁₃	abs	93	9	<10	300	56.94	43.06	17.0	4.07	39.47	PCM; PCFC
P ₁₄	abs	240	23	100	>1000	55.16	40.91	18.0	2.68	43.99	PNCM; PCFC

Table 5. Microbiological and physico-chemical characteristics of „Romanian pressed cheese «Rucar»” product

No.	Tests made										Tests results
	Microbiological					Chemical-physical					
	Salm 25 g	Bact colif/g	E coli/g	Staf cp/g	D+M/g	Water [%]	D.S. [%]	Fat [%]	NaCl [%]	F/D.S. [%]	
P ₁₅	abs	<10	abs	<10	<1000	47.15	52.85	24.0	2.28	45.41	PCM; PNCFC
P ₁₆	abs	<10	abs	<10	500	43.83	52.17	24.0	2.56	46.00	PCM; PCFC
P ₁₇	abs	24	abs	<10	<1000	33.84	66.16	33.0	2.24	49.88	PNCM; PCFC
P ₁₈	abs	<10	abs	<10	800	43.25	56.75	26.8	2.19	47.22	PCM; PCFC

Table 6. Microbiological and physico-chemical characteristics of „Romanian pressed cheese «Dalia»” product

No.	Tests made										Tests results
	Microbiological					Chemical-physical					
	Salm 25 g	Bact colif/g	E coli/g	Staf cp/g	D+M/g	Water [%]	D.S. [%]	Fat [%]	NaCl [%]	F/D.S. [%]	
P ₁₉	abs	<10	abs	<10	<1000	36.69	63.31	30.0	1.20	47.39	PCM; PCFC
P ₂₀	abs	<10	abs	<10	500	40.14	43.43	26.0	0.93	59.86	PCM; PCFC
P ₂₁	abs	<10	abs	<10	>2000	41.25	58.75	27.0	1.07	45.96	PNCM; PCFC
P ₂₂	abs	<10	abs	abs	<1000	44.82	55.18	27.5	2.27	49.84	PCM; PCFC
P ₂₃	abs	14	abs	<10	500	44.91	55.09	27.0	2.25	49.01	PNCM; PCFC
P ₂₄	abs	10	<10	<10	<1000	54.68	45.32	23.0	1.07	50.75	PNCM; PNCFC The cheese sample presents consistency problems

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Table 7. Microbiological and physico-chemical characteristics of „Proces cheese” product

No	Tests made									Tests results
	Microbiological				Chemical-physical					
	Salm 25 g	Bact colif/g	E. coli/g	Staf cp/g	Water [%]	D.S. [%]	Fat [%]	NaCl [%]	F/D.S. [%]	
P ₂₅	abs	<10	abs	<10	61.86	38.14	18.0	0.41	47.20	PCM; PCFC
P ₂₆	abs	<10	abs	<10	63.81	36.19	18.5	0.73	51.12	PCM; PCFC
P ₂₇	abs	<10	abs	<10	65.12	34.88	17.0	0.49	48.74	PCM; PCFC
P ₂₈	abs	<10	abs	<10	64.15	35.85	18.0	0.65	50.21	PCM; PCFC

Table 8. Microbiological and physico-chemical characteristics of „Cow pasteurized milk fresh cheese” product

No	Tests made									Tests results
	Microbiological				Chemical-physical					
	Salm. 25 g	Bact. colif./g	E. coli/g	Staf. cp./g	Acidity [°T]	Water [%]	D.S. [%]	Fat [%]	F/D.S. [%]	
P ₂₉	abs	93	<10	<10	185.14	62.63	54.86	20.5	37.67	PCM; PCFC
P ₃₀	abs	240	<10	<10	148.0	68.15	31.85	11.0	34.54	PCM; PCFC

Table 9. Microbiological and physico-chemical characteristics of „Cow non-pasteurized milk fresh cheese” product

No.	Tests made									Tests results
	Microbiological				Chemical-physical					
	Salm. 25 g	Bact. colif./g	E. coli/g	Staf. cp./g	Acidity [°T]	Water [%]	D.S. [%]	Fat [%]	F/D.S. [%]	
P ₃₁	abs	93	9	<10	132.0	78.10	21.9	15.0	68.49	PNCM; PCFC
P ₃₂	abs	93	9	<10	121.0	69.70	30.3	17.0	56.09	PCM; PCFC
P ₃₃	abs	93	<10	<10	129.0	74.67	25.33	5.0	19.74	PNCM; PCFC
P ₃₄	abs	93	<10	<10	144.7	79.29	20.71	4.0	19.31	PNCM; PCFC