Bulletin UASVM, Veterinary Medicine 67(1)/2010
ISSN 1843-5270; Electronic ISSN 1843-5378

Study on the Microflora of Some Types of Yogurt Marketed in North West of Romania

Nicodim FIŢ, Flore CHIRILĂ, Gheorghe Răpuntean, Sorin RĂPUNTEAN, George NADĂŞ, Cosmina CUC (BOUARI), Adriana CRISTE

University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca Romania, Faculty of Veterinary Medicine, 3-5, Manastur Street, Cluj-Napoca; E-mail: nfit@usamvcluj.ro

Abstract. From January to June 2010 within the Microbiology Laboratory of the Faculty of Veterinary Medicine Cluj-Napoca, 10 types of yogurts marketed in Romania were evaluated regarding the presence and evolution of microflora. Each sample was sowed on culture media specific to germ count. Germ counts in these samples were repeated 4 times every 3 days. We observed that for all types of yogurt the number of germs decreases in time from day 1 when the first TGN was determined until day 10. It is also evident that selected microorganisms normally found in yogurt are decreasing although the products are maintained at the recommended temperature and within validity term. Regarding the recontamination flora only in 3 types of yogurts were found other microorganisms (*Sacharomices* and *Geotrichum*) than selected cultures of *Lactobacillus delbruckeii* subsp. *bulgaricus* and *Streptococcus salivaris* subsp. *thermophilus*.

Keyword: microflora, yogurt, North West of Romania

INTRODUCTION

Quality of the dairy products is a priority requirement in the Romanian economy. In the dairy industry this requirement is becoming increasingly topical, first to meet export conditions, on the other hand to ensure domestic market products with impeccable quality, sanitary and free of risk of economic losses (Beshkova and Simova, 2002: Korn, 1989).

It currently considers that acidic dairy products technology can be considered a branch of applied microbiology. Given these issues we can say that defects in dairy products are mostly microbiological defects (Burrus, et al., 2001).

Considering the fact that a lactic acid product is good if is made of milk and selected cultures with enhanced quality along with a perfect observance of technological conditions. Moreover, milk and its derivatives are part of perishable foods. Rich in water content, proteins, carbohydrates, fats, minerals and vitamins is a very favorable environment for growth and development of microorganisms, some of which may have deleterious effects by producing very different organoleptic derivations (Costin et al., 2005; Guş, 1998).

Physicochemical and technological defects are quantitatively and qualitatively insignificant compared with the microbiological ones.

Considering these aspects, this paper aims the qualitative and quantitative study of microflora selected from 10 kinds of yogurt sold in Romania.

MATERIAL AND METHODS

The study was conducted during January to June 2010 in the microbiology laboratory of the Faculty of Veterinary Medicine Cluj-Napoca, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca and in some acid dairy products marketing networks.

Materials required for this experiment were represented by 10 types of yogurt purchased from stores maintained in freezers at 2-4°C. 10 kinds of yogurt with the following parameters present in Table 1 were purchased. To respect the confidentiality of items and manufacturers, we have assigned a number to each type of yogurt taken into study.

Other materials required for this experiment were specific to the microbiology laboratory with the possibility of selection and counting of microorganisms.

Table 1.

Chemical characters of the yogurt types according to the labels

Yogurt nr.	**Fat (**%)	**Proteins (**%)	**Calcium (**mg %)
1	2,8	3,7	-
2	4,1	3,2	120
3	3	3,2	118
4	3,5	3,1	136
5	2,8	3,2	-
6	3,5	3,6	125
7	3,5	-	-
8	2	3,3	124
9	4	3,5	125
10	4	-	-

For the first objective we considered sowing of each sample on culture media specific to germ counts. For this, stages of technique for determining the number of germs by growing on solid medium was followed (Quinn et al. 1994).

Germ counts in these samples were repeated 4 times every 3 days so that all yogurts are within the validity time during quantitative assessment of microbial flora.

Of each yogurt we sowed the mediums containing: dextrose agar and original medium with lactose and casein. After sowing, the plates were placed in thermostat at a temperature of 42°C and 28°C to allow the development of bacteria and mycetes. All colonies grown on these media after incubation were characterized morphologically and culturally, and identified up to the level of genus.

RESULTS AND DISCUSSIONS

Following the quantitative assessment of the microflora of the 10 types of yogurt have been obtained the following results (Table 2).

From the table it appears that for all types of yogurt the number of germs decreases in time from day 1 when the first TGN was determined until day 10 when the last determinations were made. Is observed that in day 1 the number of germs obtained is lower the accepted standard by quality standards, this is the $20x10^8$ cells/ml. Also from all the 10 types, yogurt 5 had the highest number of microorganisms/ml (CFU/ml = 488 324 000), followed by nr. 6 with 158 962 500 CFU/ml, 1 and 7 each with 139 887 000 CFU/ml. On day 4 the number of germs for yogurt 5 remained the same in similar limits to day 1 (CFU/ml 483 246 000),

followed by 6 with 101 736 000 CFU/ml and 2 with 95 377 500 CFU/ml. On day 7 yoghurt 6 had the highest number of bacterial viable cells of 101 736 000 CFU/ml, being followed by two with 95 377 500 CFU/ml and 10 with 82 660 500 CFU/ml. In day 10 the yogurt with the highest number of viable microorganisms was number 2 with 15 253 000 CFU/ml, followed by 5 with 6 840 000 CFU/ml and 1 with 3 615 100 CFU/ml.

Table 2.

Total viable germs number as CFU/ml from the examined yogurts

Yogurts types	TGN expressed in CFU/ml from the yogurts taken into study			
	Day 1	Day 4	Day 7	Day 10
1.	139.887.000	92.198.250	75.360.000	3.615.100
2.	127.170.000	95.377.500	95.377.500	15.253.000
3.	50.868.000	42.311.500	2.520.000	30.000
4.	158.962.500	101.736.000	101.736.000	120.000
5.	139.887.000	38.151.000	23.079.000	30.000
6.	70.336.000	38.151.000	100.000	90.000
7.	488.324.000	483.246.000	7.200.000	6.840.000
8.	98.556.750	80.384.000	640.000	150.000
9.	24.617.600	24.617.600	70.000	10.000
10.	95.377.500	89.019.000	82.660.500	80.000

In terms of lowest number of germs number found in this period of observation for yoghurts taken into study we observed that in day 1 of TNG determination, Tnuva had the lowest number of viable cells/ml (24 617 600 CFU/ml), followed by Fulga with 50 868 000 CFU/ml and Napolact with 70 336 000 CFU/ml. In day 4 the same yogurt Tnuva had the lowest number of viable germs 24 617 600 CFU/ml, followed by Napolact and Müller, both with 38 151 000 CFU/ml. On day 7 Tnuva yogurt had the lowest number of viable microorganisms (70 000 CFU/ml) followed by Napolact 100 000 CFU/ml and Oke with 640 000 CFU/ml. On the 10th day the same yogurt Tnuva had the lowest number of viable microbial cells (10 000 CFU/ml) followed by Müller and Fulga with the same number of CFU/ml (30 000).

Performing a comparative overview on the total number of germs obtained we observe that selected microorganisms found in yogurt are falling steadily, although yogurt is stored at temperatures recommended by the manufacturer (2-4°C) and even when those products are within validity term.

The analysis of recontamination microflora proved that most types of yogurt studied contained only selected strains of *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus salivaris* subsp. *thermophilus* (Fig. 1. and 2). However for 3 of the yogurt samples studied contamination with *Sacharomices* (Fig. 3) was observed for 2 and 3 and *Geotrichum* (Fig. 4.) for 5.

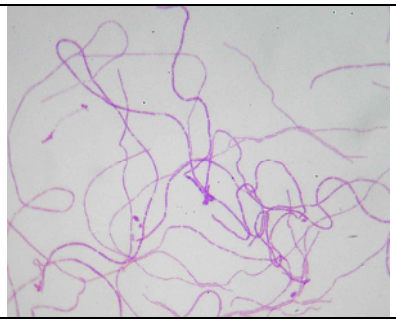

Figure 1. *Lactobacillus delbrueckii* subsp. *bulgaricus*, Gram staining from colonies (1000x)

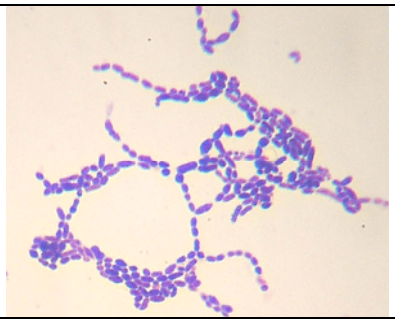

Figure 2. *Streptococcus salivaris* subsp. *thermophilus*: Gram staining from colonies (1000x)

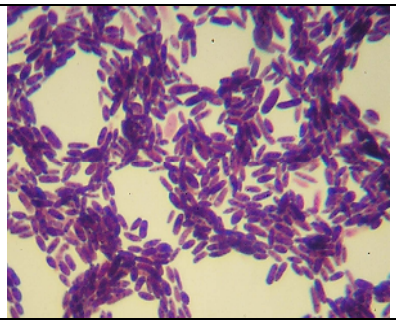

Figure 3. *Sacharomices* cells, microscopic image, Gram staining (1000x)

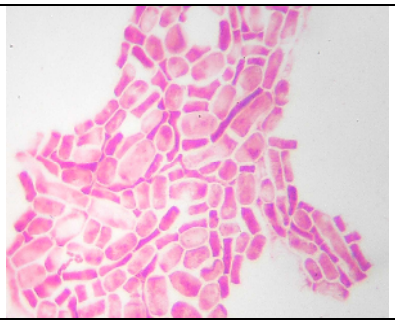

Figure 4. Smear from colonies of *Geotrichum* stained with Fuchsine (1000x)

Table 3.

Microbial flora isolated from yogurt types taken into study

Yogurt types	**Microorganisms types isolated from yogurt samples**
1	*Lactobacillus delbruckeii subsp. bulgaricus, Streptococcus salivaris subsp. thermophilus*
2	*Lactobacillus delbruckeii subsp. bulgaricus, Streptococcus salivaris subsp. thermophilus Sacharomices*
3	*Lactobacillus delbruckeii subsp. bulgaricus, Streptococcus salivaris subsp. thermophilus Sacharomices*
4	*Lactobacillus delbruckeii subsp. bulgaricus, Streptococcus salivaris subsp. thermophilus*
5	*Lactobacillus delbruckeii subsp. bulgaricus, Streptococcus salivaris subsp. thermophilus*
6	*Lactobacillus delbruckeii subsp. bulgaricus, Streptococcus salivaris subsp. thermophilus*
7	*Lactobacillus delbruckeii subsp. bulgaricus, Streptococcus salivaris subsp. thermophilus Geothricum*
8	*Lactobacillus delbruckeii subsp. bulgaricus, Streptococcus salivaris subsp. thermophilus*
9	*Lactobacillus delbruckeii subsp. bulgaricus, Streptococcus salivaris subsp. thermophilus*
10	*Lactobacillus delbruckeii subsp. bulgaricus, Streptococcus salivaris subsp. thermophilus*

CONCLUSIONS

The comparative study on microflora from acids dairy products marketed in Romania lead to the following conclusions:

- We observed a constant decrease in the number of viable germs in yoghurt examined within their validity term of 10 days, from values of hundred million CFU/ml thousands CFU/ml after 10 days.
- Regarding the recontamination flora is evident that only in 3 of 10 types of yogurt other microorganisms other than selected were found (*Sacharomices* and *Geotrichum*), from the other yogurts were only isolated selected cultures of *Lactobacillus delbruckeii* subsp. *bulgaricus* and *Streptococcus salivaris* subsp. *thermophilus.*

REFERENCES

1. Beshkova D.M., E.D. Simova (2002) -Effect of oxygen on batch yogurt cultures - World Journal of Microbiology and Biotechnology (Vol 18), Nr. 4, 365- 369.
2. Burrus, V., C. Bontemps, B. Decaris, and G. Guédon. (2001) Characterization of a novel type II restriction-modification system, Sth368I, encoded by the integrative element ICESt1 of Streptococcus thermophilus CNRZ368. Appl. Environ. Microbiol. 67:1522-1528.
3. Costin G M şi colab (2005): Produse lactate fermentate, Ed. Academica, Galaţi
4. Guş Camelia (1998): Ghid practic de control a calităţii laptelui şi a produselor lactate, Ed. Risoprint, Cluj-Napoca
5. Quinn, P.J.; Carter, M.E.; Markey, B.K. and Carter (1994): Clinical Veterinary microbiology. Mosby–Year Book Europe Limited London England 1st Ed.