STUDIES CONCERNING CORRELATION BETWEEN RAW MILK'S TECHNOLOGICAL INDICATORS AND MILK ACID PRODUCTS' PHYSICAL-CHEMICAL PARAMETERS

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Abstract: *It is known that milk and milk products contains, with very few exceptions, all necessary elements for organisms maintaining and development, with remarkable morphogenetic and energetic effects. They are fundamental in small children's feeding and are also indicated to people of all ages, especially pregnant women. Lactic fermentation using lactobacillus and biphydus strains determine nutritional properties' increasing, and also facilitate digestion and regulate intestinal functions. There are numerous favorable consequences for human health and they have been shown through selected lactic bacteria species' fermentation, even though these aspects have already been revealed in literature.*
This study follows raw milk and milk products from some milk plants in the county BACAU between the years 2006-2008, from the viewpoint of the technological parameters of milk and the influence on milk acid products quality. The samples were analyzed both by classic methods for determining: fat, protein, dry substance, dry non-fat substance, density, acidity and by LACTOSCOPE- FTIR method. We also have tried to find some statistic correlations between major physical-chemical indicators in the idea to define a sort of recipe for the better technological destination of one sort of milk, for a better exploitation of its characteristic parameters.

Keywords: *fermented milk products, physical-chemical indicators, sensory aspects*

Introduction

It's pointed out that the contemporary human feeding risks to suffer unecological influences determined especially by nutritional absences from food products and also by their precarious hygienic quality. From a nutritional point of view the unecological elements are even from raw materials' field. Present agriculture, modern, intensive and more efficient, assures food for many people, but in essence with sensible modifications on raw materials' chemical composition and implicit their value modification.So, fertilizers' administrations have an influence on plants mineral composition and implicit on the animal products that concentrates these elements: meat, milk, etc. [Banu, C., *et al.*, 2000, Costin , G.M., *et al.*, 1999, Costin, G.M., *et al.*, 2001].

In the latest years there has been an important preoccupation for milk industry developing, one of the strongest branches in the food industry, with high technical level and a substantial material base. A rapidly developing rhythm was shown by the fermented milk products and especially by form of small capacity units. Thus, it intends the private producers sustaining by the viewpoint of the animal breeding activity, milk collection and processing and not in the last time increasing quantity and quality milk products on the market [Banu, C., *et al.*, 2003, Drury, P.J., Crawford, M.A, 1991, Packard, S.V., 1982, Sorensen, H., *et al.*, 1992].

In this study we've tried to follow the main technological parameters of raw milk and the quality indicators on fermented milk products in the 2006-2008 interval, especially by the point of view that this kind of foods are designated to children, ageing persons or people with medical problems.

Materials and methods

In the year 2006 and 2007 the analyses were made by classical standardized methods:

- Fat - Gerber method using centrifuge and butyrometers
- Protein- Kjeldahl method using classic distillation apparatus
- Non-dry fat substance by etuve drying method
- Density- by areometric measurement
- Acidity-by NaOH 0.1N titration

In the course of 2008 all analyses were made by Lactoscope-FTIR method, only the parameter-acidity remained at classical method.

The samples consist of raw milk from different farms or rural collection centers for milk and fermented milk products from three important processing plants from Bacau district that we symbolized *unit U_1*, *unit U_2* and *unit U_3*.

We have selected from the various types of these products: yogurt (fat-2.8%; 3.0% or non-fat-0.1%) sour milk-2.0% fat and sana-3.6% fat. Yogurt is fermented with a mixed culture: *Streptococcus thermophillus* and *Lactobacillus bulgaricus* and his quality appreciation consist of: flavor (taste and smell); acidity (pH, tartness), firmness, viscosity, texture (mellowness and granularity absence), homogeneity (gas-bubbles absence) and general aspect.

Sour milk and Sana are a type of fermented milk with a combination between *Streptoccocus lactis*, *Streptoccocus cremoris*, *Leuconostoc citrovorum* and *Leuconostoc dextranicum* or other combination: *Streptoccocus lactis*, *Streptoccocus cremoris* and *Streptoccocus diacetilactis* [Dan, V., 2001].

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Results and discussion

The standard parameters for raw milk accepted by actual legislation are:

- fat min. 3,2%;
- protein min. 3.2%;
- non-fat dry substance min. 8,5%;
- density min. 1,029;
- acidity max.19 ^{0}T.

The physical-chemical parameters followed by actual standards for fermented milk products are presented in table no.1.

We have made media value of physical-chemical parameters for samples analyzed in 2006, 2007, 2008 for each of three units monitories (tab. no.2, 3, 4).

We observed that for the year 2006 with the exception of U_1 – where non-fat dry substance is very low - the milk processed is integrated in the values accepted by the standard.

Table 1 Physical-chemical parameters of fermented milk products

Physical-chemical parameters	Fermented milk products			
	Yogurt		Sour milk	Sana
	light	extra		
Fat, [%]	-	min. 2.8	min. 2.0	min.3.6
Non fat - dry substance, [%]	min.8.5	min.11.5	-	-
Acidity, [^{0}T]	max.120	max.120	max.120	max.120

Table 2 Physical-chemical parameters of raw milk 2006

Processing unit	Physical-chemical of raw milk				
	Acidity [^{0}T]	Fat [%]	Non fat d.s., [%]	Density	Protein [%]
U_1	18.2	3.20	8.11	1.028	3.0
	16.32	3.90	8.29	1.030	2.39
	16.32	3.50	8.16	1.029	3.20
U_2	17.28	4.40	8.56	1.029	3.39
	18.12	3.10	8.22	1.0286	2.85
	17.08	3.70	8.59	1.0278	3.09
U_3	18.24	3.60	8.61	1.030	3.34
	17.94	4.00	9.05	1.031	3.27
	18.0	3.40	8.52	1.029	3.22

Table 3 Physical-chemical parameters of raw milk 2007

Processing unit	Physical-chemical of raw milk				
	Acidity [^{0}T]	Fat [%]	Non fat d.s., [%]	Density	Protein [%]
U_1	18.25	3.00	7.60	1.0258	2.92
	18.32	3.94	7.20	1.0288	2.95
	17.66	3.82	7.85	1.0299	3.24
U_2	17.28	3.37	7.58	1.0318	2.80
	16.60	4.04	7.33	1.0281	3.03
	16.80	3.48	7.42	1.030	2.85
U_3	15.12	3.84	8.50	1.030	2.84
	18.24	5.16	8.52	1.029	3.59
	17.11	4.35	8.58	1.030	3.24

Table 4 Physical-chemical parameters of raw milk 2008

Processing unit	Physical-chemical of raw milk				
	Acidity [°T]	Fat [%]	Non fat d.s., [%]	Density	Protein [%]
U_1	17.23	3.82	7.92	1.029	2.87
	18.25	5.57	7.89	1.029	3.12
	18.50	4.59	8.32	1.029	3.32
U_2	18.70	4.26	8.51	1.0289	2.80
	18.42	3.65	8.52	1.0305	3.04
	17.12	3.30	8.47	1.0315	3.11
U_3	17.0	4.20	8.80	1.030	3.14
	18.14	3.40	8.12	1.0304	3.19
	17.02	5.20	8.57	1.030	3.27

In 2007 only U_3 processed milk with standard values for all parameters.

U_2 has processed milk worse than 2006 even the non-fat dry substance that is important for assuring consistency in the final products.

For 2008 it is pointed out the low values for indicator "protein" that means bad technological conditions for storage behavior.

The balance between fat, proteins, non-fat dry substance is also the result of animal feeding and as a conclusion there are many private farmers that furnish milk with low level of protein and non-fat dry substance.

In the following tables' no. 5, 6, 7 we present physical-chemical parameters for fermented milk products.

Table 5 Physical-chemical parameters for fermented milk products 2006

Processing unit	Milk product assortment	Physical-chemical parameters		
		Acidity [°T]	Fat [%]	Dry substance [%]
U_1	Yogurt extra	79.68	2.8	11.33
	Sour milk	76.80	2.0	-
	Yogurt light	110.40	-	10.40
U_2	Yogurt extra	81.36	2.8	11.48
	Sana	72.96	3.6	-
	Sour milk	75.84	2.0	-
U_3	Yogurt cream	77.2	3.0	10.87
	Yogurt light	84.14	-	8.39
	Yogurt extra	81.59	2.8	11.46

Table 6 Physical-chemical parameters for fermented milk products 2007

Processing unit	Milk product assortment	Physical-chemical parameters		
		Acidity [°T]	Fat [%]	Dry substance [%]
U_1	Sana	79.83	3.6	-
	Sour milk	81.68	2.0	-
	Yogurt cream	76.96	3.0	10.60
U_2	Yogurt drink	91,13	1.60	10.60
	Sour milk	103.68	2.62	-
	Sana	104.64	4.52	-
U_3	Sana	70.08	3.76	-
	Yogurt extra	89.28	2.82	10.24
	Sour milk	82.56	2.19	-

Table 7 Physical-chemical parameters for fermented milk products 2008

Processing unit	Milk product assortment	Physical-chemical parameters		
		Acidity [^{0}T]	Fat [%]	Dry substance [%]
U_1	Sour milk	91.3	2.19	-
	Yogurt extra	77.13	2.81	10.29
	Sana	78.23	3.79	-
U_2	Sour milk	78.40	2.0	-
	Sana	76.44	6.68	-
	Yogurt extra	73.50	2.80	10.45
U_3	Yogurt extra	85.0	2.82	12.87
	Sana	94.0	3.60	-
	Sour milk	90.0	2.05	-

Conclusions

Out of the many and various data presented in this study results a very large interval of values for the main parameters of raw milk and especially it is pointed out the low level of non-fat dry substance and protein for many samples.

The four factors that determine food value for one product are: flavor, aspect, texture and nourishing value. The importance of texture as acceptability factor for a group of food products alternates very much. By this point of view the foods are grouping in three categories:

- extremely important meat, snack type products;
- important diary products, fruits, vegetables, bread, etc.;
- no important drinks.

For the fermented milk products analyzed in this study another important things are the texture, the aspect, the consistency, formed in the course of technological processing. And for this it is compulsory the relation between initial parameters of raw milk and physical-chemical indicators and sensory aspects of final products.

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