

MODERN METHODS FOR PHYSICAL-CHEMICAL AND BACTERIOLOGICAL ANALYSIS OF RAW MILK AND FERMENTED MILK PRODUCTS

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Abstract

Considering the very actual problem concerning agriculture and production adaptation with European standards, the quality modern and rapid evaluation of raw milk and milk products comes natural. So, we've tried to compare classic methods of analysis with modern ones, which consist of single apparatus and the response is at the moment. These aspects take down on the present requirements concerning modern and "in time" solutions for controlling disagreements from food composition and also from production line.

Key words: *raw milk, fermented milk products, Lactoscope, Somascope*

Introduction

The people health is based on food quality. Food diet may produce physiological transformations, even chronic diseases both individual and people collectivities. Very actual and always in centre of specialists' attention in nourishment and nutrition, the interaction between nourishment and health, the aspects concerning the possible noxious character of food on organism and also, the ways and solutions of protection by nourishment.

The major reasons for elaboration of the scientific research strategy for food industry, generally and especially, for diary industry are:

- Research must sustain the elaboration of national strategy according to priorities, resources, necessities;
- They must be new solutions, performing technologies, efficient products with strategically importance and, of course, environment and people protection;

- Research must sustain our country integration through European structures;
- Researches must assure optimal capitalization for raw materials and agricultural resources (Costin, 1999).
- Dairy industry confronts also with special aspects generated by:
- Lack of concordance between existing capacities and redistribution of agricultural landings;
- Inadequate quality of raw agricultural materials;
- Using of old technologies and worn-out equipments;
- Introduction on the market of significant quantities of import food stuffs (Costin, 2001).

Based these aspects up-pointed out, we've processed the comparison of classic methods for physical-chemical and bacteriological analysis for raw milk and various processed products: fluid milk; fermented milk products- yogurt, sour milk, sana, kefir, etc., trying to underline the benefits of modern and versatile apparatus, for correcting some negative aspects concerning quality aspects in good time both for production continuity and maintaining a satisfactory report between feeding, nourishment and good people health state.

Experimental

It had processed samples from 4(four) commercial societies, which collect and process milk from people farms in Bacau county. Also, we have analyzed a series of various products they deliver on the market: fluid milk, yogurt, sour milk, sana, kefir.

It was proceed with classic methods of analysis:

- Humidity, respective dry substance by drying at 105-106°C in drying oven;
- Fat by butyrometric method of extraction, with sulfuric acid (d-1.817) and iso-amylic alcohol;
- Total protein by Kjeldhal method, with sulfuric acid (98% conc.) and potassium sulfate and copper sulfate as catalysts, using a complete installation Gerhardt with both digestion and distillation system;

- Non-fat substance, a vital parameter for milk characterization, by difference from dry substance and fat;
- Density by aerometric method;

For bacteriological parameters we proceed with classic methods: seeding on special culture media followed by incubation at characteristic temperatures and counting the developed colonies.

Major parameters, which are followed for raw milk, are: total germs number at 30°C, Somatic cells, *Bacillus cereus*, *Staphylococcus c.p.* and anaerobic spore-former

For fluid milk it had proceed following: total germs number, *Colibacteria*, and *Escherichia coli*.

The bacteriological parameters determined for fermented milk products are: *Salmonella*, *Colibacteria*, *Escherichia coli*, *Staphylococcus c.p.*, yeasts and moulds.

In the same time, we used Lactoscope apparatus for physical-chemical analysis of milk and milk products and Somascope for somatic cells determination in raw milk plus an automatic counting apparatus for 30°C developing germs and thus we compare the differences between values from classic methods and those from modern methods.

Results and Discussions

Experimental results are presented in tables 1 and 2 for raw milk.

Table 1. Classic methods for raw milk analysis

Physical-chemical parameters	Source of raw milk			
	1	2	3	4
Fat, [%]	3.70	4.15	3.85	4.70
Total protein, [%]	2.95	2.70	3.20	3.00
Total dry substances, [%]	12.30	12.50	12.40	12.60
Non-fat dry substances, [%]	8.60	8.35	8.55	7.90
Relative density	1.029	1.031	1.029	1.030

It can be observed that all samples of raw milk have a fat content over limit 3.20% accepted by standards and also have protein, with one exception, fewer than 3.20% - limit accepted by standards. Also, two

of them (nr 2 and nr 4) have non-fat dry substance content fewer than 8.50% - accepted limit.

From table 2 it can be observed some differences between fat values and protein values, but the differences subscribe with limits accepted. Besides, with this method we have an assembly image about milk composition by point of view lactose content and freeze point.

Table 2. Modern methods for raw milk analysis

Physical-chemical parameters	Source of raw milk			
	1	2	3	4
Fat, [%]	3.80	4.25	3.90	4.75
Total protein, [%]	3.00	2.85	3.25	3.15
Lactose, [%]	4.65	4.40	4.60	4.00
Total dry substances, [%]	11.85	11.60	12.05	12.10
Non-fat dry substances, [%]	8.05	7.35	8.15	7.35
Relative density	1.030	1.030	1.029	1.031
Freeze- point, [°C]	- 0,507	- 0,512	- 0,480	- 0,522

By classic method fat values are easy higher than recommended values: 2.8 %, 3.2 %. The total proteic content are with one exception fewer than standard accepted values: 3.20%. This explains also the low values for total dry substances that should be minimum 11.5% for fermented milk products with fat content over 2% (table 3).

Table 3. Classic method – fermented milk products

Physical-chemical parameters	Assortments:					
	Yogurt var.1	Sana	Yogurt var.2	Kefir	Yogurt var.3	Sour milk
Fat, [%]	3.18	3.50	2.80	3.10	2.8	2.00
Total proteic substances, [%]	3.00	3.00	3.08	2.95	3.20	2.90
Total dry substance, [%]	10.90	11.00	11.20	11.05	11.00	8.50

By modern method with Lactoscope we can see some differences in comparison with classic method, due to spectrometric method of measuring which compares milk products spectrum with memory ones (setted matrix) (table 4).

For bacteriological analysis (results in table 5), modern Somascope helps to win time for knowing the results and the same time the results are more accurate and repeatable. For other parameters the methods remains the same: seeding and incubation but the automatic counting apparatus helps to find the correct results.

Table 4. Modern method – fermented milk products

Physical-chemical parameters	Assortments:					
	Yogurt var.1	Sana	Yogurt var.2	Kefir	Yogurt var.3	Sour milk
Fat, [%]	3.28	3.70	3.00	3.25	2.95	2.10
Total proteic substances, [%]	3.15	2.90	3.20	2.80	3.20	3.00
Total dry substance, [%]	11.00	11.70	11.50	11.25	10.85	8.75

Table 5. Bacteriological parameters for raw milk

Bacteriological parameters	Source of raw milk			
	1	2	3	4
NTG	1,768,000	1,420,000	1,220,000	1,580,000
Bacillus cereus	12	<10	<10	11
Staphylococcus c.p.	11	<10	<10	12
Anaerobic	absent	absent	absent	absent
Somatic cells	1,326,000	1,407,000	1,445,000	1,350,000

Conclusions

It may consider that, generally, contemporary human feeding risks suffering unecological influences determined especially by nourishing deficiencies of foods and their precarious hygienic quality. Unecologic elements appear even from raw materials field: modern agriculture, intensive, produces more food but simultaneous with chemical composition modification and, of course, their value transformation.

Implicit, the food characteristics are influenced by industrial processing: heat treatment used by point of view its favorable effects on quality and stability; food refinement sacrifices valuable components biological active - vitamins, essential aminoacids, minerals.

It appears following directions:

- Raw materials production orientated through raising nourishing potential;
- Suppliers preoccupations to furnish agricultural food stuffs for food industry with higher nourishing potential, using all required ways;
- Redirection of processing technologies.

After 1990, there were established in Bacau County, as in other counties from country, private economic agents that process agricultural products, respective milk, in our case, thus appearing competition background.

From presented data it may conclude the importance of modern and rapid apparatus for checking the quality parameters of raw materials and processed products, in our case: raw milk from county Bacau farms and fermented milk products obtained by some private economic agents.

Even there are some insignificant differences between values obtained with classic methods and those with new methods, it is important rapidity and repeatability of response, for production continuity and “in time” intervention for correction of disharmonies.

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