

COMPOSITIONAL QUALITY OF SOME DAIRY PRODUCTS FROM A COLD STORE

LAZ R CORINA DANIELA¹, G VAN CONSTANTIN², COL MUGUREL³

¹ Candidate for a doctor's degree, Faculty of Agriculture Craiova

^{2,3} Faculty of Agriculture Craiova

Keywords: compositional quality, yogurt, semi skimmed milk, soccer cream, Enterobacteriaceae

ABSTRACT

The objective of this study was to analyse compositional quality of semi skimmed milk (1,8% fat), sour cream (12% fat), natural yogurt (2,8% fat) and yogurt extra (3,5% fat) products from a cold store in the city of Craiova in 2013. Standards methods were used to test total solids and fat contents, titratable acidity and Enterobacteriaceae level. Results indicated that the mean level of total solid and fat contents, titratable acidity and Enterobacteriaceae level were found to be 11,27%, 2,86%, 86,36 °T and < 10 CFU/g respectively for natural yogurt and 11,54%, 3,52%, 83,078 °T and <10 CFU/g respectively for yogurt extra.

Solids nonfat and fat contents, titratable acidity Enterobacteriaceae levels were found to be 8,73%, 1,8%, 15,29 °T and < 10 CFU/ml respectively for semi skimmed milk. Fat content, titratable acidity and Enterobacteriaceae levels of sour cream were 13,12%, 75,31 °T and < 10 CFU/g respectively. These results are in good agreement with technical specifications of the food product and with Regulation (EC) 2073/2005.

INTRODUCTION

Analyzing foods from both the consumers and the manufacturers standard point is to ensure that they are saved.

The dairy industry is highly competitive and manufacturers are continually trying to increase their market-share and profits.

To do this they must ensure that their milk products are of higher quality, less expensive and more desirable than their competitors.

To meet these attributes, analytical techniques are used to analyse all dairy raw ingredients before, during and after the manufacturing process.

In a dairy factory production activity starts with analyzing the raw milk, processing the milk in a certain way (heating, cooling, mixing, enzyme treating) then packing for consumption and storing for safekeeping until it is sold.

It is very important for the manufacturers to produce a final product with the same overall properties.

Milk is a complex colloidal dispersion containing fat globules, casein micelles and whey proteins in an aqueous solution of lactose, minerals and a few other minor compounds [6]. The major chemical components of milk include water, fats, proteins, carbohydrates, minerals, organic acids, enzyme and vitamins. The combination of protein, lactose and minerals is called the solids non fat content, and when the fat is included it is called total solids content of milk.

Analysis using different methods are made as a means of predicting quality parameters of cow's milk or of dairy products. EU definitions and quality standards of identity specify the minimum levels of milk fat and solids non fat for various milk products. European regulations and recommendations are designed to maintain the general quality of the food supply, to ensure the food industry provides consumers with foods that are

wholesome and safe, to inform consumers about the nutritional composition of foods, to enable faire companies amongst food components and to eliminate economic fraud.

Milk is the ideal substrate for microorganism growth and can be a vehicle to spread food borne diseases (salmonellosis, brucellosis, listeriosis, tuberculosis).

The *Enterobacteriaceae* is a family of Gram-negative, non-spore-forming bacteria. This family includes a number of pathogens such as *Salmonella*, *Yersinia enterocolitica*, pathogenic *Escherichia* (*E. Coli* O157:H7) *Shigella* spp and *Cronobacter* spp.

Enterobacteriaceae are used in food microbiology as indicator organisms to indicate the hygiene status of a process and product.

Enterobacteriaceae are destroyed by pasteurization and their presence in pasteurized milk/cream indicates post heat process contamination.

The viability of bacteria in milk after pasteurization can be assessed by using three different viability indicators:

Colony forming unit (CFU) on plate count agar, de novo expression of a *gfp* reporter gene, and membrane integrity based on propidium iodide exclusion [3].

Quality is a term which relates to the chemical, physical, technological and microbiological characteristics of milk and milk products.

Quality Control concerns the procedure that ensures if the maintenance and continuity of the specifications and standards of the dairy products are within the tolerance limits during all stages of handling processing, preparation, packaging, storage and distribution.

The objective of this study was to analyse compositional quality of some dairy products from a selected cold store in Craiova, Romania.

MATERIALS AND METHODS

The cold stores (solutions for dry temperature controlled storage) in Craiova offers a wide range of dairy products to their customers. The investigators in the study selected and visited only one cold store. The investigated cold store has dairy products from different dairy factory. In this paper we present the compositional quality of some milk products stored from one modern dairy factory. The investigated dairy products were: semi skimmed milk (1,8% fat), natural yogurt (2,8% fat), yogurt extra (3,5% fat) and sour cream.

Quality control includes a wide range of and scope of activities to be carried regularly. One of this activities is laboratory quality control. The following quality parameters were analysed by the Sanitary Veterinary and Food Safety Laboratories Timisoara and Dolj: total solids, solids non fat and fat contents, titratable acidity and *Enterobacteriaceae* bacterial levels.

The methods used by laboratories were:

- for total solids and solids non fat - ISO 6731:2010
- for fat content – ISO 2446:2009
- for titratable acidity – ISO 11869:2000
- for *Enterobacteriaceae* levels – SR ISO 21528-2:2007

A total of 50 laboratory official samples from finish products were analysed between January to August 2013.

The data obtained were statistically analysed using Microsoft Excel 2003.

RESULTS AND DISCUSSION

The mean levels of total solids, solids non fat, fat, titratable acidity and *Enterobacteriaceae* bacterial concentrations in the dairy products analysed are presented in table1.

Table 1

Total solids, solids non fat, fat, titratable acidity and Enterobacteriaceae bacterial concentrations in the analysed stamps

Dairy Products	Total solids		Solids non milk fat %	Fat %	Titratable Acidity °Thorner	<i>Enterobacteriaceae</i> concentrations Colony Forming Units (CFU)/ml or gram
	%	± s.d.				
Natural yogurt (2,8% fat)	11,27	± 0,14	ND*	2,86 ± 0,00	86,36 ± 2,22	<10
Yogurt extra (3,5% fat)	11,54	± 0,36	ND*	3,52 ± 0,00	83,07 ± 1,07	<10
Sour cream (12% fat)	ND		ND*	13,12 ± 0,54	75,31 ± 4,29	<10
Semi skimmed milk (1,8% fat)	ND		8,73 ± 0,22	1,8 ± 0,1	15,29 ± 0,3	<10

*ND = not determined
s.d. = standard deviation

Yogurt is a popular milk product produced by bacterial fermentation of milk. Fermentation of lactose by yogurt cultures produces acid lactic; which acts on milk protein to give yogurt its texture and its characteristic taste [1]. In general, the overall properties of yogurt, such acidity level, total solids and fat content, the production of aroma components and nutritional value are important traits of the product. These traits are influenced by the quality composition of the raw milk, processing conditions and the activity of starter culture during the incubation period [1].

The mean level of total solids in natural yogurt was 11,27 ± 0,14 % (variability 1,24 %) and in yogurt extra of 11,45 ± 0,36 % (variability 3,12 %). Total solids was not determined in sour cream and semi skimmed milk.

The solids non milk fat was determined only in semi skimmed milk and the mean was 8,73 ± 0,22 % standard deviation (s.d.).

Fat content was 2 ,86%, 3,52%, 13,12% and 1,8% in natural yogurt, yogurt extra, sour cream and semi skimmed milk (tabel 1).

The mean titratable acidity expressed in Thorner degrees for natural yogurt, yogurt extra, sour cream and semi skimmed milk was 86,36 ± 2,22 °Th., 83,07 ± 1,07 °Th., 75,31 ± 4,29 °Th. and 15,29 ± 0,3 °Th. respectively. The *Enterobacteriaceae* level in all dairy analysed products was under 10 CFU/ml or gram.

An overall measurement of total solids could be valuable as a check that the concentration has been carried out correctly and has the requirement limits of SR 143:2008. The yogurt with higher total solids has more nutritional values and significant effect on degree of syneresis [5].

The other significant component, namely fat, is of interest in relation to legal standards. Many yogurts are designated to be low fat or high fat and hence it is important that description should not be misleading. Also, fat content has a major impact on the mouth feel of yougurt, and around 1% is being regarded as the minimum to produce the desired response from the consumer [2].

The measurement of acidity is an important feature of milk products production. IDF [4] have suggested a minimum of 0,7 g acid lactic per 100 g of yogurt. In this study conversion of Thorner degrees % lactic acid results 0,777% lactic acid for natural yogurt and 0,747%lactic acid for yogurt extra.

Sour cream is a dairy product obtained by fermenting a regular cream with lactic acid bacteria. Consumers' desire for decreasing dietary fat content has created a market

for low fat sour cream. The lactic acid producers convert lactose into L-lactate and are responsible for up to 0,8% lactic acid (0,677% lactic acid in this study).

Semi skimmed milk is a heat treated milk whose fat content has been reduced to at least 1,5% and at most 1,8% and must have at least 8,25% solids non fat. In this study semi skimmed milk was with 1,8% fat and with 8,73% solid non fat.

CONCLUSIONS

The compositional and microbiological quality of the dairy product analyzed are in good agreement with technical specifications of the milk product and with Regulation (EC)2073/2005.

Adoption of certain sound practices at dairy plants will significantly aid the operators to manufacture more consistently, uniform high-quality stable dairy products.

REFERENCES

1. **Banu, C., Murgineanu, Gh., Pasat, Gh.D., Dorin, S.**, 2005 - *Cartea produc torului de lapte*, Editura Ceres București
2. *** food 5450 group B. wikispaces.com Yogurt science and technology (E book) 10 pdf. Quality control in yogurt manufacture
3. **Gunasekera, T.S., Sorensen, A., Atfield, P.V., Sorensen, S.J., Veal, D.A.**, 2002 - *Inductible Gene Expression by Nonculturable Bacteria in Milk after Pasteurisation*, Applied and Environmental Microbiology, 68 (4) :1988 – 1993, doi 10.1128/AEM.68.4.1988.1993.2002
4. **IDF (International Dairy Federation)**. International IDF standard 1992. In: *Yoghurt: Science and Technology*, second edition, Woodhead Publishing Limited, 1999, pp. 553
5. **Mahdian, E., Tehrani, M.M.**, 2007 – *Evaluation the effect of milk total solids on the relationship between growth and activity of starter cultures and quality of yoghurt*, American-Eurasian J. Agric. and Environ. Sci. 2(5): 587-592
6. **McCarthy, O.J. and Singh**, 2009 - *Physico-Chemical Properties of Milk*. In: *Advance Dairy Chemistry – volume 3*, Edited by Paul Mc Sweeney and P.F. Fox , 2009 pp.691-758
*** E C 2074/2005