

CHEESE – FACTS BETWEEN NUTRITION, HEALTH AND TRADITION

Mirela Ahmadi¹, Isabella Ciabrun², Camelia Tulcan¹, Oana Boldura¹, Cornelia Milovanov³ Dorel Dronca⁴, Florin Ciobanu²

¹*Department of Biochemistry, Faculty of Veterinary Medicine, Banat's University of Agricultural Sciences and Veterinary Medicine „King Michael I of Romania“ from Timisoara (USAMVB), Calea Aradului 119, Timisoara – 300645, Romania*

²*S.C. Lactitalia S.R.L., Izvin, DN 6, Jud. Timis, Romania*

³*Department of Animal Husbandry, Faculty of Veterinary Medicine, USAMVB, Calea Aradului 119, Timisoara – 300645, Romania*

⁴*Department of Animal Genetic Improvement, Faculty of Animal Sciences and Biotechnology, USAMVB, Calea Aradului 119, Timisoara – 300645, Romania*

e-mail: ddronca@animalsci-tm.ro

Abstract

Nowadays, people are more and more interested by their health status, about their diet and are looking for healthy products, less processed, and with moderate content of lipids and salt. Thus, cheese is a traditional, healthy, and varied product - that can be produced from cow, ewe, goat, or buffalo milk, fresh or matured dairy product. The water, dry matter and lipid content are very important for maturation degree of cheese and for preservation time. Lipid and salt content is important for the taste, and for flavor – lipids being responsible for creamy sensorial characteristics. Thus, we analyzed some physico-chemical characteristics (water, dry matter, lipid, salt content, and also the ratio between lipids and dry matter) and some microbiological characteristics for four types of Italian cheese: Pecorino, Basky, Magra and Ricotta. Pecorino presented the lowest water content (32.53%) and highest salt content (5.14%), being a matured cheese (60-70 maturation days). Basky presented low water content (39.06%) and low salt content (2.36%), but 24.3% lipids, and 39.84 lipid / dry matter ratio. Magra is a non-matured cheese, with 50.19% water, with very low content of lipids (1.47%), with low lipid/dry matter ratio (2.67) and no salt, being indicated in different diets. Ricotta is a cheese with highest water content (67.22%), with moderate lipid content (13.9%), with very low salt content (0.91%), and high lipid/dry matter ratio (42.43). Microbiologic tests were performed for all four Italian cheese and the *E. coli*, and *Staphylococcus* were under the maximum limits (<10 *E. coli*; <100 *Staphylococcus*), while the *Listeria monocytogenes* was absent. This study tries to demonstrate that if we know very well the cheese products and our health status we can choose the best product, depending on the water, lipid and salt content of the cheese.

Introduction

The tradition and nutritional facts of food are two very important challenge issues of the producers, consumers, and also of the government – considering the health status of people. Thus, cheese is a prehistoric technology to preserving the solid components from milk, being wide spread food product with great nutritive properties, made for consumption in all seasons. It can be salted or not, it can be soft pasta or hard, it can be short or long matured product, depending on the cheese technology specific for every cheese type (Hickey, 2017).

Cheese is a product rich in mature milk proteins, lipids, minerals (especially calcium), lipid-soluble vitamins; with low content of carbohydrates (mostly lactose) and hydro-soluble

vitamins. It has specific flavor, depending on milk type and technology – intended for all age. Cheese could be used as a base of probiotic and nutraceutical products. For example, Pecorino cheese was produced with ewe milk and encapsulated *Lactobacillus acidophilus*, and with a mixt of *Bifidobacterium longum*, and *Bifidobacterium lactis*. The results presented a good correlation between enzymatic activity and water soluble nitrogen; and of enzymatic activity and proteose-peptone. Also, there was recorded a higher content of conjugated linoleic acid in Pecorino cheese with encapsulated *Lactobacillus acidophilus* compared to Pecorino classic cheese and Pecorino cheese with encapsulated mixt of *Bifidobacterium longum* and *B. lactis* (Santilo et al., 2012).

Cheese consumption is also depended of brand and caloric information from cheese label. Kevin and his collaborators tested the food consumption related with brand and also caloric information on favor perception and the results proved that low caloric cheese can easily lead to a “halo effect” with could lead to over-consumption in restrained eaters (Kevin et al., 2014). Also, a similar study was performed having in consideration the United States Food and Drug Administration aspects regarding the serving size. The results suggest that serving size could be increased due to Nutrition Facts written on the cheese label, which is reflected in higher consumption compared to the needs, and finally lead to health problems and even obesity (Dallas et al., 2015).

Experimental

We comparative analyzed some physic-chemical parameters (water, lipid, dry matter, lipid/dry matter ration, salt content), and some microbiological test (*Escherichia coli*, *Staphylococcus*, *Listeria*, yeast and molds, for different cheese types. The cheese samples were collected from a milk plant from Timis County – West of Romania. We tested 10 different cheese samples of Pecorino, Baski, Magra, and Ricotta. The samples were collected in sterile containers and the analyses were performed in the laboratory of the milk plant. The humidity (water content) was tested using the analytic Sartorius thermo-balance, the lipid content was performed using Gerber method, titrimetric method for salt content and specific microbiologic culture medium were used for identification and quantification of mentioned microorganism. The results were statistically presented as average and standard deviation.

Results and discussion

The results of our analysis are graphically presented in the figure 1. The physico-chemical characteristics presented for four types of Italian cheese are minimum analysis that any produces have to perform before comercial process. Humidity, dry matter and lipid content are parameters that define the maturation degree of cheese, and also is a quality index of commercial cheese.

The water and salt content are very important for preservation process. Usually hard cheese are perserved for a very long time, and there are some cheese products that have higher qualities if they are older (have long maturation). The salt content helps also in maturation and perservation process, but too much salt it is not healthy for human nutrition.

Water content varies very much due to the type of cheese. Thus, Picorino cheese is matured 60-70 days, so it is a hard cheese with long perservation time, while the Rocotta cheese is not matured cheese, is a soft cheese with a short perservation time. Lipid content is higher in Picorino cheese, and lowest in Magra cheese. So, Magra, Baski and Ricotta (from cow milk) cheese are products destined for low lipid diet. And also if we take in consideration the salt

content, we can say that these three cheese products are low caloric and low salt cheese good for children, athletes, and people with lipid and salt restriction.

Pecorino is a hard pasta cheese, matured, salted, and produced from ewe milk. It contains significant lipid quantities, and also cholesterol. It contains conjugated linoleic acid, known as ω -6 polyunsaturated fatty acid. It contains valuable proteins, retinols, riboflavin, niacin, vitamin B12, calciferols, calcium, zinc and phosphorus (Santillo et al., 2014).

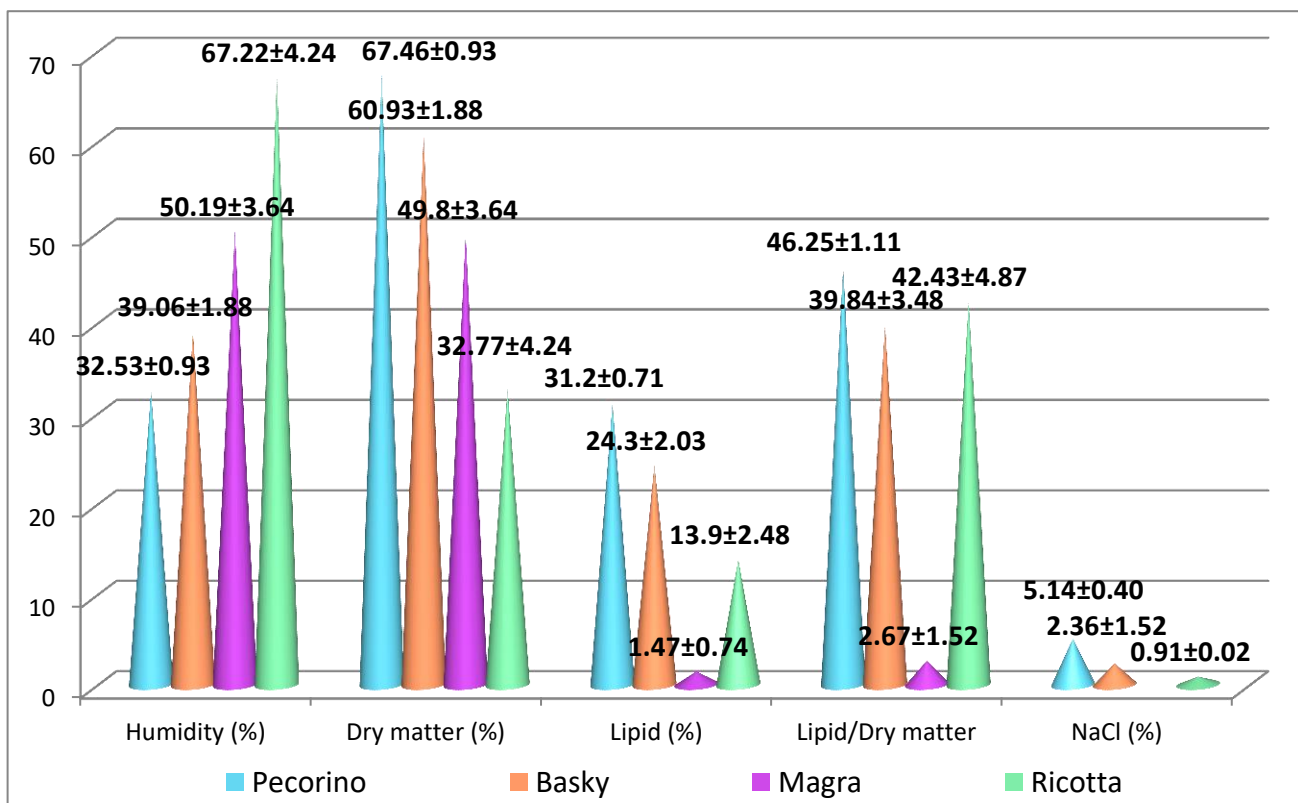


Figure 1. Physico-chemical characteristics of some Italian cheese

Ricotta is a soft pasta cheese, non-matured, low in lipids (contain also cholesterol), salt and calories. It is a very common product preferred by peoples with low caloric and salt restriction. It is low in carbohydrates, but rich in calcium, phosphorus, zinc, riboflavin, vitamin B12, and retinols (Carota et al., 2017).

Generally cheese is a valuable source of proteins, one slice of common cheese (approximate 25g) contain a similar quantity of protein from a glass of milk. The main protein from cheese is casein proteins, and the rest of proteic content is represented by valuable amino acids – with very good digestibility. The α -casein – the main casein from milk and cheese, is known as promoter of lowering the blood pressure, increasing the absorption process of minerals in the digestive tract. The lipid content is varied very much being depending of the cheese type, brand, maturation process, and stage of maturation. Thus, the main carbohydrate from milk is lactose, but during the preparation or maturation process the lactose (disaccharide) can be broken down forming glucose and galactose (monosaccharides). Cheese is usually rich in minerals such as: calcium, sodium, phosphorus, selenium, zinc, and also rich in vitamins such

as: vitamin B12, riboflavin, retinols and calciferols (Cashman, 2002; Lancet, 2006; King, 2011; Rayman, 2012; Beulens et al., 2012; Calvo and Uribarri, 2013).

Due to its nutritional benefits and its composition, cheese is good for bone health, osteoporosis prevention, and heart health. However, because its lipid and salt content, but also due to lactose, cheese can be a food product hard tolerated or not recommended in some health situations or some population categories.

Conclusion

Cheese are food products found in different types, matured stages, and brands – being characterized by varied nutritional composition and health benefits. Usually, hard pasta cheese, matured, like Pecorino, has low water, moderate lipid, and high salt content. Basky, Magra and Ricotta are cheese with soft pasta, moderate in lipids and salt, with exception of Basky for lipids.

Cheese consumption is a very good diet product, and if the consumers respect the normal size for consumption, the benefits of proteins and amino acids, lipids and fatty acids, minerals, and vitamins can be an alternative in diet and can be helpful for a better health status.

References

- [1] J.W. Beulens, S.L. Booth, E.G. van den Heuvel, E. Stoecklin, A. Baka, C. Vermeer, *Br. J. Nutr.*, 110(8) (2013) 1357-68.
- [2] E. Carota, S. Crohnale, A. D'Annibale, A.M. Gallo, S.R. Stazi, M. Petruccioli, *Science of The Total Environment*, 584-585 (2017) 554-560.
- [3] M.S. Calvo, J. Uribarri, *Am. J. Clin. Nutr.* 98(1) (2013) 6-15.
- [4] K.D. Cashman, *Br. J. Nutr.* 87(Suppl 2) (2002) S169-77.
- [5] S.K. Dallas, J. Peggy, P. Liu, A. Ubel, *Appetite*, 95 (2015) 577-584.
- [6] M. Hickey, Chapter 30: Legislation in Relation to Cheese, in *Cheese – Chemistry, Physics and Microbiology* (P. McSweeney, P. Fox, P. Cotter, D. Everett – Editors), 4th edition, Academic Press, 2017, 757-778.
- [7] V. Kevin, B. Cavanagh, C. Kruja., A. Forestell, *Appetite*, 82 (2014) 1-7.
- [8] J.C. King, *Am. J. Clin. Nutr.* 94(2) (2011) 679S-84S.
- [9] M.P. Rayman, *The Lancet*, 379(9822) (2012) 1256-1268.
- [10] E. Reynolds *Lancet Neurol.*, 5(11) (2006) 949-60.
- [11] A. Santillo, M. Albenzio, A. Bevilacqua, M.R. Corbo, A. Sevi, *Journal of Dairy Science*, 95(7) (2012), 3489-3500.
- [12] A. Santillo, A.B. Bevilacqua, M.R. Corbo, A. Sevi, M. Sinigaglia, M. Albenzio, *Innovative Food Science and Emerging Technologies*, 26 (2014) 389-396.