

Benefits of bovine colostrum in nutraceutical products

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Abstract

Nutraceutical products are used to provide health and medical benefits, acting for prevention and treatment of different diseases. Colostrum is a natural product very rich in good quality macro- and micronutrients, and because of this, it is considered the best natural food supplement. In yogurt technology we can use milk and colostrum for increasing the biological and nutritional benefits. Nutraceutical yogurt with colostrums has very good benefits such as passive immunization because the colostrums is an excellent source of immunoglobulins and other high biological value proteins and lipids, carbohydrates, antioxidants, vitamins and minerals. Food products with colostrum are used in diet of children, adults, old people, in athletics diet, and also in patients' diet.

Keywords: nutraceutical products, bovine colostrums, yogurt

1. Introduction

Colostrum is considered the first milk produced by a lactating mammal and is secreted during the first days after birth or calving. Literature presents very many researches for bovine colostrums because cow is the most popular animal for milk and because the quantity of milk per a day is considerable. Colostrum contains macronutrients such as protein (immunoglobulins), carbohydrate (lactose), fat, vitamins, and minerals, and also bioactive components such as growth factors and antimicrobial elements [1, 2, 3].

In table 1 are presented the compared biochemical composition of colostrum (the first milking) with whole milk (the 11th milking).

Table 1. The approximate composition of bovine milk a the 1st and 11th milking [4].

Specification	Colostrum (1 st milking)	Whole milk (11 th milking)
Total solids (%)	23.0	13.0
Total Protein (%)	14.0	4.0
Casein (%)	4.8	2.5
Immunoglobulins (%)	6.0	0.09
Fat (%)	6.7	4.0
Lactose (%)	2.7	4.9
Minerals (%)	1.0	0.74

Thus, colostrum – as presented above in the table, is very rich in proteins, immunoglobulins and minerals, but has less lactose compared to the whole milk. About the lipid content, some researcher found a fewer quantum of fat in the first milk compared to the mature milk [1].

On the other hand, nutraceutical is a combination between nutrition and pharmaceutical domain, being a food product that with role in prevention and treatment of some diseases.

The term of nutraceutical products is often used for nutritional supplements that provide health and medical benefits.

Nutraceutical products are classified in dietary supplements, functional foods, medical foods, and pharmaceuticals or farmaceutics [5]. Thus, dietary supplements refer, most of the times, to concentrated micronutrients (vitamins or minerals) or concentrated essential nutrients (amino acids, essential fatty acids) as pills or liquids.

Medical foods are formulas that should be administrated under the attention of a physician, and have to be correlated with the other foods from the diet or with other medicals specific treatments. Pharmaceuticals, also called farmaceutics, refer to medically valuable compounds produced from modified agricultural crops or animals [6].

Functional foods are food products fortified (enriched) with important nutrients, after a manufactures process called nutrification. People prefer functional foods rather than nutritional supplements. One physiological advantage compared to dietary supplements is that the functional food product is presented to the consumer in a natural form not as a pill or syrup. Also, the functional foods can be consumed as diet, not as medicines.

Generally milk products can be fortified with bovine colostrum, and become very good nutraceutical food products. Thus, milk nutraceutical products can include ice-cream, yogurt, cheese – which, depending on the manufacturing technology, are dietary food products, indicated to all categories of people from babies to mature and olds.

2. Materials and Method

Nutraceutical food products, fortified with bovine colostrums have a lot of sensorial and nutritional benefits, such as: improving the texture and sensorial characteristics, nutritional enrichment, prebiotic and nutraceutical effect. Yogurt or ice/cream, manufactured with milk, microorganisms for lactic fermentation, and

colostrums; is a milk product very rich in good quality nutrients. Also, people prefer to eat for breakfast or dinner yogurt, or ice-cream for desert.

The manufactured companies developed their milk technology, so on the market we can find yogurt with different fat content (from 0.1% fat – extremely slim, to 5-7% fat – very fatty); added of different types of fruits or cereals, and maybe in the next future we will find yogurt with bovine colostrum.

The target of our study was to obtain a yogurt fortified with bovine colostrum, using bovine colostrum and yogurt Oke (Romanian Company) for lactic ferments, and to make some physical-chemical analysis.

The samples were constituted from yogurt Oke and bovine colostrum in equal quantities, such as:

Sample 1: yogurt Oke and bovine colostrum (Oke + BC-C 6 h) prelevated from a caw at 6 hours after calving, from Criciova, Timis County;

Sample 2: yogurt Oke and bovine colostrum (Oke + BC-C 16 h) prelevated from a caw at 16 hours after calving, from Criciova, Timis County;

Sample 3: Oke yogurt and bovine colostrum (Oke + BC-C 40 h) prelevated from a caw at 40 hours after calving, from Criciova, Timis County;

Sample 4: Oke yogurt. Physico - chemical characteristics of Oke yogurt are presented in table 2.

Table 2. Nutritive components in Oke yogurt

Nutrient specification	Measurement unit	Oke Yogurt
Proteins	%	3.3
Carbohydrates	%	4
Lipids	%	2
Calcium	Mg / 100 g	125
Energy	Kcal / 100 g	48.53

We analysed the samples of nutraceutical yogurt with bovine colostrum and determined the quantity of lipids, the titre protein, and salt (as NaCl) content.

The lipid concentration was performed with Gerber butirometer method; the titre protein was performed with Sorensen Method; and the salt content with Mohr Method. We used very good quality reagents, and the prepared solutions were fresh and respected the reagents indications concordant with the method. Every data presented as result is the average of three analyses.

3. Results and Discussion

The results of our study are presented in table 3, and the correspondence of the samples was presented in the precedent chapter.

Table 3. Nutraceutical yogurt biochemical characterisation

Sample specification	Lipids [%]	Titre Protein [g subst proteice / 100 g produs]	NaCl [%]
Sample 1 Oke + BC 6 h	2.2	2.32	0.4569
Sample 2 (Oke + BC-C 16 h)	2.2	2.22	0.4713
Sample 3 (Oke + BC-C 40 h)	2.2	2.01	0.3922
Oke Yogurt	2.2	1.95	0.3894

As we can observe, the content of lipids is unchanged for all the samples, even for simple Oke yogurt.

But, bovine colostrum influences the titre protein of the samples and the salt content. Thus, the best protein content of samples is in the samples with yogurt Oke and bovine colostrum – at 16 hours after calving and the less content of proteins is for yogurt Oke and bovine colostrum – at 40 hours after calving. Generally, the protein content of samples decreases with the increasing the time after calving.

The salt content is greater for the yogurt with colostrums collected at 16 hours after calving. Thus, if the sodium chloride content of samples 2, with colostrums collected at 16 hours after calving has 0.4713 g NaCl, then the sodium content for this sample is 0.179 g Na (respectively 179 mg Na). Concordant with USDA recommendations for salt intake, the low sodium products contain less than 140 mg sodium or 5% of Daily Value [7]. So, our nutraceutical yogurt is medium salt content food product.

These nutraceutical products are very important in people diet because of their composition in very good nutrients [8, 9]. Because of their protein and immunoglobulins content, nutraceutical products can help different patients to get a rapid recovery, with a better health status and with lower costs for the hospitals [10]. Also, these products are very useful in athletic diets before, during and after competitions. The recovery after effort is better and quicker after a diet with colostrums fortified food products [3].

4. Conclusion

Nutraceutical products are high value nutritive products, because of their biochemical composition.

The protein content is very important in the first hours after calving, and thus, the bovine colostrums is very good for being used in fortified dietary products.

Technology for nutraceutical yogurt manufacture is not very different from the classical technology for yogurt.

Because of the health benefits, yogurt products fortified with colostrums are very good products for athletic diets, for different people with various diseases, for babies, children and adults.

The costs for manufactured nutraceutical yogurt are not very different for yogurt. Bovine colostrum is a product that can be obtained in the spring time, but it can be preserved in different ways and being used as raw material in diary products technology, as fortifying agent.

Because of bovine colostrums composition, the nutraceuticals products with colostrums are characterised as richer in proteins and immunoglobulins, and lower in lactose content compared to products manufactured from mature milk. Also, the nutraceutical yogurt with bovine colostrums is medium as the content of salt, and the content of lipids can be easily controlled.

References

- Eddleman H. *Composition of Human, Cow and Goats milk*, 2005, http://www.disknet.com/indiana_biolab/b120_a.htm.
- Haug Anna, Hostmark Arne T., Harstad Odd M., Bovine milk in human nutrition – a review, *Lipids in Health and Disease*, **2007**, 6(1):25, doi:10.1186/1476-511X-6-25
- Ahmadi Mirela, Ahmadi T., Ahmadi J. Colostrum as nutritional supplement in sport, *Symp. Scientifical Researches Agroalim. Processes & Technologies – Safe food al over Europe*”, Univ. „S.A.M.V.B.”, Ed. „Agroprint” Timisoara, **2005**, XI(1), 33-40.
- Rice D., Rogers D.G. *Colostrum quality and absorption in baby calves*, NebGuide, File G987, under BEEF, A-41, Feeding and Nutrition, Publ. by Cooperative Extension, Institute of Agricultural and Natural Resources, University of Nebraska-Lincoln, Issued May 1990

5. *Guidance for Industry on Complementary and Alternative Medicine Products and Their Regulation by the Food and Drug Administration U.S. Department of Health and Human Services*, Food and Drug Administration, December 2006, <http://www.fda.gov/downloads/RegulatoryInformation/Guidances/UCM145405.pdf>
6. CRS Report for Congress Received through the CRS Web, *Agriculture: A Glossary of Terms, Programs, and Laws*, pg. CRS 101, 2005 Edition, Updated June 16, 2005, <http://ncseonline.org/nle/crsreports/05jun/97-905.pdf>
7. Dietary Guidelines for Americans 2005, Chapter 8 Sodium and Potassium, <http://www.health.gov/dietaryguidelines/dga2005/document/html/chapter8.htm>
8. Ahmadi Mirela, Hărmănescu Monica, Gergen I., Velcirov Ariana-Bianca, Pup Mihaela, Ahmadi T. – Trace elements analysis in bovine colostrum – as food and nutritional supplement, *15th Symposium on Analytical and Environmental Problems*, SZAB
9. Ahmadi Mirela, Velcirov Ariana, Riviş Adrian, Traşcă Teodor, Hărmănescu Monica, Antoanela Cozma, Scurtu Mihaela – Physico-chemical and nutritional characterization of bovine colostrum, pp. 430-433, *16th Symposium on Analytical and Environmental Problems*, SZAB Szeged, Hungary, 28 september 2009.
10. Oh Young Kwon, Jong Seok Lee, Han Sung Choi, Hoon Pyo Hong, Ki-Hyo Jang, Ji Hoon Paek, Soon Ah Kang and Young Gwan Ko, Antioxidant and anticytokine effects of bovine colostrum in intestinal ischemia/reperfusion injured rat model, *Food Science and Biotechnology*, **2010**, 19(5), [doi: 10.1007/s10068-010-0185-9](https://doi.org/10.1007/s10068-010-0185-9)