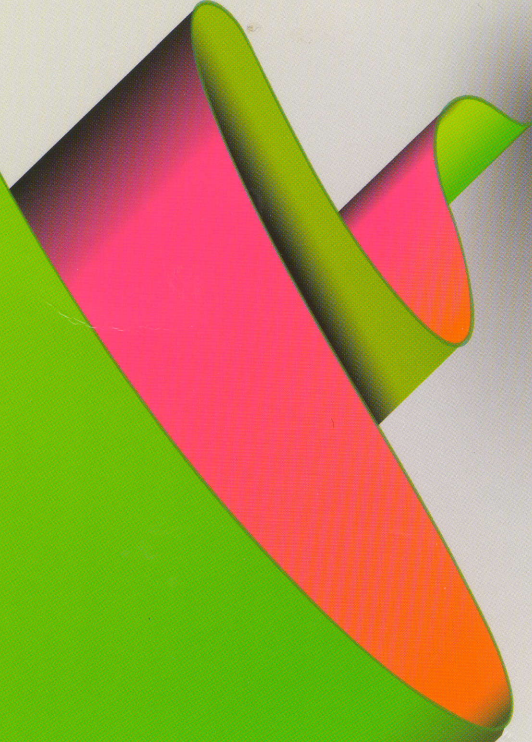


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decreased antioxidant activity compared with the one of hydroalcoholic vegetal extracts mixtures.

- It highlights the mouthwash (*batch D*) obtained from 10 % mixture of 50% hydroalcoholic extract BC:BM:CC (1:1:2), with the highest total antioxidant capacity and antimicrobial activity over microbial strains tested;
- The mouthwashes (*batches I - D*) based on selected hydro-alcoholic extracts from bitter cherry (BC) : black mulberry (BM) : cornelian cherry (CC) fruits extracts mixtures present a significant antioxidant and antimicrobial activity and could be recommended in the treatment of oral cavity affections, gum inflammations, stomatitis, dental pains, preventing of bacterial plaque formation, halitosis, as local antiseptic and anesthetic.

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## ASPECTS CONCERNING OBTAINING INNOVATIVE FERMENTED DAIRY PRODUCT

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## ABSTRACT

This paper proposes the obtaining of fermented dairy product without lactose and other ingredients for an improved taste and an increased nutritional quality of the finished product. The technological process of obtaining the products respects the classic process. The innovation consists in using enzyme lactase, to obtain a 100% lactose free product being the first Romanian yogurt to use this innovation. This procedure allows for lactose intolerant persons to consume 10% fat yoghurt with berries. Cranberries are an important amount of proanthocyanidins with anticancer effects that block bacteria and prevent infections. Cranberries are an important source of vitamins E, K, C and B. Bilberries contain anthocyanidins which help DNA repair and stimulates circulation, for which reason they are recommended to diabetics. The product is a natural organic food that uses no preservatives, additives or genetically modified ingredients. The product was subjected to sensory and physicochemical analysis for the estimation of its shelf life. Finally, a way of packaging and marketing the finished product was proposed.

**Keywords:** functional foods, eco-innovative product, lactose-free product, forest fruits

## INTRODUCTION

Belongs to the group of fermented dairy products that are obtained from the fermentation of lactose in milk by the lactic acid bacteria, resulting in lactic acid as the main product, which is responsible for increasing acidity in milk, leading to

improvement of the balance of microbial flora of the gut, having beneficial effect on the health and integrity of the human body, given the fact that over 80% of our population is concentrated in the gastrointestinal tract [4, 5].

Among the best known fermented dairy product with a high nutritional value because of the nutrients of the milk it was made of. Even more, economically it has the important advantage of having a longer shelf life than milk [6, 7, 8].

Among all these special qualitative features, fermented dairy products are considered to be a "fountain of health", with an important curative role. For this reason, they are recommended in the dietary treatment of various diseases such as diabetes, diseases of the liver and kidneys as well as obesity. They are recommended for daily consumption by children, youth and the elderly, as appropriate and complete nutrition that satisfies the physiological needs and maintains health [9, 10, 11].



Lactose intolerance, also referred to as lactase deficiency, is a condition that defines the fact that a person cannot digest foods containing lactose. Lactose is the sugar found in milk and foods made out of milk. The organism cannot digest lactose because it does not have enough lactase (an enzyme that aids the digestion of lactose). It is estimated that 75% of adults worldwide experience a decrease in the amount of lactase produced by the body in adulthood. In Europe, the percentage of population affected by such decrease ranges from 2% in Scandinavia to 70% in Southern Italy and Turkey and in Romania 30% of the population suffers from this intolerance. The problem behind lactose intolerance is lactase deficiency, an enzyme produced by the lining of the small intestine. If the body does not produce enough lactase, lactose cannot be absorbed and passes into the colon, where it causes specific symptoms of lactose intolerance [13, 14].

This paper proposes the obtaining yogurt without lactose. The novelty of the product stands in the fact that it returns to the original packaging – the glass jar, but also in the lack of lactose, which will have been removed by the enzyme lactase. This places the yogurt in the category of lactose-free products. This product is the first yogurt with low fat content, with a rich and unique mix of autochthon fruits: cranberries and bilberries. In a subtle note we have selected one of the most precious elements from mother nature, milk. Always fresh and without additives, alongside with cranberries and bilberries, product offers a high input of nutrients and antioxidants that are beneficial to health. The product intends to engrain a touch of traditionalism through exceptional qualities such as: texture, taste, flavour and colour. For optimal use, it is recommended to mix the yogurt before consumption, in order to obtain a uniform distribution throughout the yogurt; the fruity flavour will be totally spread into the yogurt, giving it a specific taste.

## MATERIAL AND METHODS

The technological process for obtaining the novelty product follows the specific process of obtaining yogurt, the innovation in this case being its composition (added ingredients: forest fruits and enzyme lactase) and sensory qualities. This product is intended according to valid regulations that respect the food safety conditions imposed by ISO 22000: 2005. For the above product, the following manufacturing recipe is proposed:

**Table 1 Manufacturing recipe for 1000 g finished product**

Nr.	Raw material	Quantity/1000mL	Quantity
1	Cow milk with 3,5 % fat	580 mL	116 ml
2	Sour cream with 32% fat	170 mL	34 ml
3	Dried cranberries	90 g	18 g
4	Dried bilberries	90 g	18 g
5	Active yogurt cultures	50 mg	10 mg
6	Lactase	1 mL	0.3 ml

The raw materials used in yogurt are cow's milk, sour cream, cranberries, bilberries, active yogurt cultures and lactase. The cow's milk is the most complete food and the easiest assimilated by the body. It also helps us to maintain the health of our organism. It is one of the basic foods in our nutrition as it contains all the nutrients necessary for growth, development and the normal functioning of the body. For new product is used a cow's milk with the following chemical composition (table 2).

**Table 2 The chemical composition of milk**

Component	Quantity/100g	RDI [%]	Component	Quantity/100g	RDI [%]
Protein	8.1 g	11.09	Vitamin B1	0.04 mg	3.2
Lactose	8 g	15.86	Vitamin B9	0.005 mg	2
Calcium	11.4 g	11.82	Potassium	150 mg	9.56
Iron	2 mg	2	Chlorine	100 mg	2
Energy	120 mg	12	Sodium	50 mg	5

Sour cream is a dairy product enriched with fat, which, depending on the manufacture can be sour cream for cooking (12-35% fat), sweet sour cream (30-40% fat), or sour cream (minimum 55% fat), cured sour cream, fermented sour cream (30-40% fat). For the manufacture of this product it was used fermented sour cream with 35% fat.

**Table 3 Physico-chemical properties of sour cream – raw material**

Sour cream	
Protein, % min.	32±1
Protein, % max.	1
Carbohydrates, max.	20
Acidity, %	0.1
Acidity, %	0.2
Acidity, %	5
Acidity, %	0.5
Acidity, %	negative
Acidity, %	8

Cow and bilberry) contain 80% water and the rest are sugars, acids (citric, ascorbic, lactic), vitamins A, B1, B2, B3, also oil and minerals. They have numerous benefits for a long time their juice has been recommended in the treatment of various diseases. Cranberries contain proanthocyanidin, an antioxidant 20 times more than vitamin C, with significant anticancer benefits. Chemical analysis shows that they block the action of bacteria, thus preventing infections. Cranberries are rich in vitamins E, K and C that are excellent sources of dietary fiber. They also contain fats and cholesterol, having low sodium content.



#### Use of cranberries

Component	Quantity/100g	RDI [%]	Component	Quantity	[%]
Carbohydrates	12.2 g	12.65	Vitamin B5	0.3 mg	5
Of which : Fiber	4.6 g	25.42	Vitamin B8	5.5 mg	250
Sugars	4 g	8	Vitamin B5	0.3 mg	5
Fats	0.13 g	0.1	Betaine	0.2 mg	1
-fatty acids Omega - 3	22 mg	0.01	Potassium	85 mg	5.81
-fatty acids Omega - 6	33 mg	0.01	Calcium	8 mg	0.1
Proteins	0.4 g	0.1	Iron	0.3 mg	1.8
Vitamin C	13.3 mg	13.3	Magnesium	6 mg	1
Vitamin A	60 UI	1.19	Phosphorus	13 mg	1
Vitamin E	1.2 mg	8	Sodium	2 mg	0

**Bilberries** are classified as a Class 1 herb by the American Association. Bilberry has higher anthocyanin content compared to other types of berries. The most important being cyanidins and delphinidins which (300-700mg/100g), the most powerful antioxidants to involve DNA are likely to extend beyond simple antioxidant action to have antibacterial effects and stimulates insulin secretion, which is why are recommended for diabetics. Bilberries are rich in resveratrol, considered the most powerful antioxidant so far. Vitamins A, E, F, PP and B (B1 and B2) are more easily known so far. As chemical composition of bilberries are found in natural form in fruit. Because they contain 5-10% tannins that precipitate milk protein and give the sensation of weight. 2-3 hours and are one of the reasons why bilberries are recommended for weight.

### Production of bilberries

Table 5: Chemical composition of 0.2 %			RDI	Chemical composition	Quantity/100g	Quantity/100g
Chemical composition	Quantity/100g	RDI	Chemical composition	Quantity/100g	Quantity/100g	Quantity/100g
Potassium	65 mg	4.14	Vitamin E			0.2
Carbohydrates	8 g	8.3	Calcium			10 mg
Proteins	1 g	2	Phosphorus			29 mg
Fats	0.6 g	1	Sodium			1 mg
Vitamin C	20 mg	33.3	Magnesium			6 mg
Vitamin A	280 UI	5.5	Manganese			3 mg
Vitamin B3	0.2 mg	1	Iron			1 mg
Vitamin B1	0.02 mg	0.13	Copper			0.11 mg
Vitamin B2	0.02 mg	1.53	Cyanidin			54 mg

[illegible]

suitable for the yogurt with milk. **Lactase** is an enzyme preparation which hydrolyses lactose into glucose and galactose. Lactase can be used to generate a variety of products, such as milk, cream, fermented milk products, cheese, milk beverages, ice cream and other desserts. The use of lactase-treated milk in the preparation of yogurt with milk.

between the addition of active cultures and getting of the desired pH is shorter. In addition, yogurt is sweeter. In the case of yogurt with fruit, the amount of sweetener can be reduced, resulting in a final product with fewer calories.

**the qualitative and quantitative reception** consists of organoleptic and physico-chemical examination and is performed at each of the raw and auxiliary material. For the organoleptic analysis aims the impurities, the color, the viscosity, the smell and taste. The physico-chemical analysis aims to determine the density, humidity and fat

**Normalization.** To obtain a 10% fat yogurt, milk is subjected to normalization by the addition of sour cream. The receiving milk has a 3.5% fat percentage and it is mixed with sour cream with 32 % fat percentage.

Homogenization aims to increase the dispersion of fat in milk and prevent fat separation at the surface of the finished product.

tion is performed at a high temperature or pasteurized regime, between 71-80°C for 30-60 seconds in order to destroy the existing microflora in milk. The short time and its safe is terms of destruction of pathogenic bacteria and ensure a reduction in proportion (around 99.5-99.9%) of contained microflora, thus ensuring a good keeping of the manufactured product. This method of pasteurization is applied in pasteurizers with tiles, technically advanced installations that are running at a high flow, with high productivity. Furthermore they have the advantage of a thermal treatment process with minimal influence on milk components, its natural properties mostly unchanged.

After homogenization the milk is heated to 40–45°C, temperature at which it is made with lactic acid bacteria culture and enzyme lactase. The following thermophilic lactic acid bacteria: *Streptococcus thermophilus* and *Lactobacillus bulgaricus*.

to retail packages. In term of packaging, glass jars will be used with a **vacuum analysis of inoculated milk**. This step is carried out at a temperature of 4°C for 3 hours. This step of the process involves the fermentation of milk by *L. acidophilus* and *L. bulgaricus* followed by probiotic cultures.

The cooling process is divided into 2 phases: pre-cooling at 20°C for 10-12 hours to strengthen the curd; cooling for 2-8°C for the rest of the product.

to be stored at temperatures between 2-8°C in refrigerated rooms for a day will be sent for distribution.

is a yogurt with implacable coagulum, containing 10% fat, and the raw and auxiliaries materials: cow milk, sour cream, dried whey (lactone), active yogurt cultures (*Lactobacillus bulgaricus* and *Streptococcus thermophilus*) and enzyme lactase.

perceived by consumers as being folding in specific forest flavors



During the manufacturing of this yogurt, legislation and regulations in place are respected. Organoleptic, physico-chemical and microbiological properties are presented in the tables 6, 7 and 8.

**Table 6 Organoleptic properties of novelty yogurt**

Characteristics	Conditions for eligibility
Aspect	Homogeneous and monophasic
Color	White with slight purple tint
Consistency	Compact coagulum with a suitable consistency
Smell	Pleasant, specific to cow's milk yogurt Not allowed foreign smell
Taste	Flavored, pleasant, sour Not allowed foreign flavor

**Table 7 Physico-chemical properties of novelty yogurt**

Characteristics	Value	Analyze method
Total dry substance, % min.	18.0	SR ISO 6731/2010
Fat/S.U. % min	10.0	SR ISO 9262/3/2009
Protein substance, % min	3.2	SR EN ISO 8068/2008
Acidity, °T max	120	SR ISO 57651/2008
Carbohydrates, % min	4.0	SR ISO 17818/2010
- lactose, % max	0.01	

**Table 8 Microbiological properties of novelty yogurt**

Microorganisms	Allowable number of microorganisms ufc/g	Analytical methods
Yeasts and molds	<10 ufc/g	Regulation 1441/2007
Coliform bacteria	<10 ufc/g	
<i>Staphylococcus aureus</i>	<10 ufc/g	
<i>Salmonella</i>	negative in 25 g	
<i>Listeria monocitogenes</i>	negative in 25 g	

**Sample collection.** For laboratory examination, samples are harvested on the batch is meant the amount of up to 1000 kg. 1% of packages are collected in a batch, in case of small packages (not less than two and no more than five) and in case of large packages, samples are harvested from 10% of the batch with a sample of about 50 mL.

**Shelf life.** The shelf life is 21 days from the date of manufacture.

**Packaging.** Yogurt packaging was made using ecological glass jars with a capacity of 200 mL. The packaging used can be reusable, returnable and recyclable, ensures the preservation of the components and the stability of the product, is chemically inert. The packaging shows a suggestive image of the product, combining modernism and the market nowadays with traditionalism, placed on grounds on the label. The packaging is characterized by a pleasant and original both in form, use, concept and image.

**Storage.** Storage is allowed only in refrigerated places that are specially designated for this purpose, in terms of food safety, at a temperature ranging between 2-8°C.

**Transportation.** The product will be distributed only with refrigerated or isothermal vehicles, specially designated for this purpose, authorized, properly equipped, cleaned and sanitized.

The marketing strategy is innovative, aiming the implementing of new distribution channels for fermented dairy products. The distribution will be made in private supermarkets, bistros, hotels, restaurants, stands on the beach (in summertime) and vending machines placed in universities, railway stations. Yogurt vending machines will be a huge step forward in dairy product distribution, easily ensuring the purchase by consumers. The recovery of packaging will be ensured through partnerships with recycling companies. Family packs are designed to gather people together and to ensure the consumer through magnets with positive quotes.

The novelty yogurt is carefully produced in accordance with current legislation and principles of good hygiene and working practices. This yogurt is "environmentally friendly" because it doesn't provide waste pollutants, on the contrary, it turns them to an advantage providing resulting benefits for both the consumer and the environment.

#### CONCLUSION

The production of dairy products in Romania is steadily increasing; manufacturers are diversifying product assortments, especially healthy products.

With special care to detail, using raw materials of the highest quality, this paper presents an eco-innovative product designed to please all

consumers. Yogurt is an eco-innovative product, being a concept that provides the benefits of the body. The composition and recipe make a very interesting and bold product on the fruit yogurt market, being the first Romanian lactose-free yogurt with added cranberries and bilberries with 10% fat content. The fruits are local, being easily available in Romania. The selection of the fruits aims to bring out the best in the product and to further exploit this sector.

The product is made with dried cranberries and bilberries, 10% fat was made from a blend of yogurt, with added cranberries and bilberries obtaining a product with superior quality and nutritional psycho-sensorial properties.

The element proposed in the paper is the use of glass jars for packaging. The paper is based on the acknowledgement of the multiple advantages of glass when packaging. To name one, the use of this type of packaging increases the



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Other wastes are considered to be one of the important of an effective and environmental solution still remains a challenge. Usage of bioremediation may be one of the effective ways.

In our study, we estimated the changes of the structure of bioremediation of the oily sludge samples by means of compost prepare from municipal solid-waste, wastewater sludge and compost were mixed in a 1:1:1 ratio. Total petroleum hydrocarbon (TPH) are reported to be a drive factor of the structure of bacterial community of soil (15th day) of bioremediation (mainly, *Delfia* and *Alpha*) were all samples except oily sludge samples, while in the compost *Bacteria* (mainly from B4M79) analysis, bacterial community of the compost's one but not to the other samples (*Paracoccus*, *Atheromonas*, *Paracoccus* and *Atheromonas*) bioremediation mixtures disappear community structure after 42 day in the compost and in the 1st-day in the compost.

As a bioremediation, bacterial community of the compost