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Making a Product from Donkey and Cow's Milk Using Blackcurrants, Birch Buds Extract and Blueberries

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Abstract

Donkey milk, cow's milk and three types of addition (black currants, birch buds extract and blueberries) were used to obtain yogurt. The milk used was characterized physico-chemically and in terms of the total number of germs and the number of somatic cells. Blackcurrants, birch bud extract and blueberries have been used due to the antioxidant and antimicrobial properties they hold. The yogurt most appreciated by consumers was the one with a proportion of 5% added black currants, followed by yogurt with blueberries and on the last place was the one with birch buds' extract. Yogurt was appreciated by people who tasted this product based on sensory characteristics.

Keywords: donkey, cow, yogurt, black currant, birch buds extract, blueberries.

1.Introduction

Donkey milk has high antimicrobial capacity [2] and is used in people with allergies and in atherosclerosis [3, 5]. Yogurt is a product highly valued by the consumer due to its properties and the addition of fruits with a high content of vitamins and flavonoids bring added value to these products. Black currant (*Ribes nigrum*) has a high nutritional capacity and is used in the medical field. It is used for the prevention and treatment of some diseases. They have a powerful immunomodulatory, antimicrobial, anti-inflammatory and neuroprotective effect. It helps prevent cancer and reduce cardiovascular disease. They are a rich source of vitamin C, flavonoids, anthocyanins and proanthocyanins [7,12, 13]. By incorporating all the features potentially beneficial for human health, black currants can be used for new foods [11]. Blueberries (*Vaccinium myrtillus*) are a valuable source of biologically active substances with beneficial properties for health. From a compositional point of view blueberries are rich in vitamin C, A, B1 and B2, dietary fiber, fatty acids and microelements [9].

They have a complex biochemical composition, rich in flavonoids, containing glycosides, quercetin and high content in anthocyanins [4, 9]. The complex composition of blueberries contributes to applications in the field of medicine, in the treatment of cardiovascular diseases, obesity and diabetes mellitus [8].

The consumption of blueberries outlines a prophylactic effect against urinary tract infections [6]. *Betula pendula*, known as birch, is of increasing interest in traditional [14, 15, 16]. Birch buds are a widely used remedy in the medical field for their detoxifying capacity. The chemical composition of birch buds is also represented by fatty acids and flavonoids. Birch buds extract is characterized as a powerful antioxidant, recommended for revitalizing the human body [1].

Black currant, birch buds extract and blueberries, in addition to biologically active compounds, also have superior nutritional and organoleptic properties. The purpose of this study is to carry out testing in order to obtain yogurt from donkey milk. As an addition, black currant, birch syrup and blueberries were used.

2. Material and Method

The milk used to make the product was initially physico-chemically analyzed also for the total number of somatic cells and total number of germs. Donkey milk and cow's milk were harvested from a family farm in Huedin, Cluj County. Milking was done by hand. The milk analysed and used to produce the product is harvested from lactation I and III. For the determination of the number of somatic cells, the Bentley SomaCount 150 apparatus was used and for the determination of the total number of germs, the Bentley BactoCount IBC-M apparatus was used.

FT-IR analysis. The analyzed samples were obtained from 0.2 ml of donkey milk from lactations 1 and 3. The spectra were purchased and processed in the OPUS version 6.0 software application provided by the equipment manufacturer by selecting the spectral domain where the peaks and the baseline correction existed. FT-IR spectra have been processed by removing co2 signal from the atmosphere, vector norming and baseline correction.

The analyzed blueberry samples were obtained by dissolving 0.20 mg of blueberry (dry and mortar) in 10 ml of distilled water. Spectra were purchased and processed similarly to milk samples. For the analysis of birch bud extract, an FT-IR/FT-Raman 4100 Jasco spectrometer with solid rock interferometer was used, the resolution of the spectra obtained was set to 4 cm-1. For FT-IR, a beam divisor from KBr and the method of pasting the sample in powder form (1 mg) with potassium bromide (300 mg) by pressing at 10 t/cm^2 and the MIR probe for non-destructive testing on the spectral range 650 – 4500 cm^{-1} were used.

3. Results and Discussions

Fig. 1 shows the FT-IR spectrum obtained for donkey milk from lactation 1 and 3.

The presence of absorption strips in the area of large wavelengths suggests the presence of OH, NH, or Csp-H groups in the structure of an alcohol (νOH=3200-3600 cm^{-1}), an amine or imine (νNH=3300-3500 cm^{-1}), an amium (νNH=3400-3460 cm-1), or a terminal alkyne (νCH ≈ 3300 cm^{-1}). In our study, measurements were made on donkey milk (lactations 1 and 3), they contain proteins, which can be seen their presence by analyzing the FT-IR spectrum (Figure 1) in which the presence of the high intensity band from 3434 cm -1 is due to amamide A attributed to N-H deformity (from proteins). Making a comparison between the spectrum obtained from donkey milk, lactation 1 and 3 it can be seen that in both cases the protein concentration is very high.

The broadband aspect of absorption indicates the association through hydrogen bonds. Also in the same figure, the "fingerprint" region makes a comparison between the two spectra, the ammonium band I and II appears at 1643 cm^{-1}, this band being more intense in the case of lactation 3. Also, a difference can be observed in terms of intensity and in the band from 1572 cm-1 vibrationally attributed to the amides. Fig. 1 shows the FT-IR spectrum obtained for donkey milk from lactation 1 and 3.

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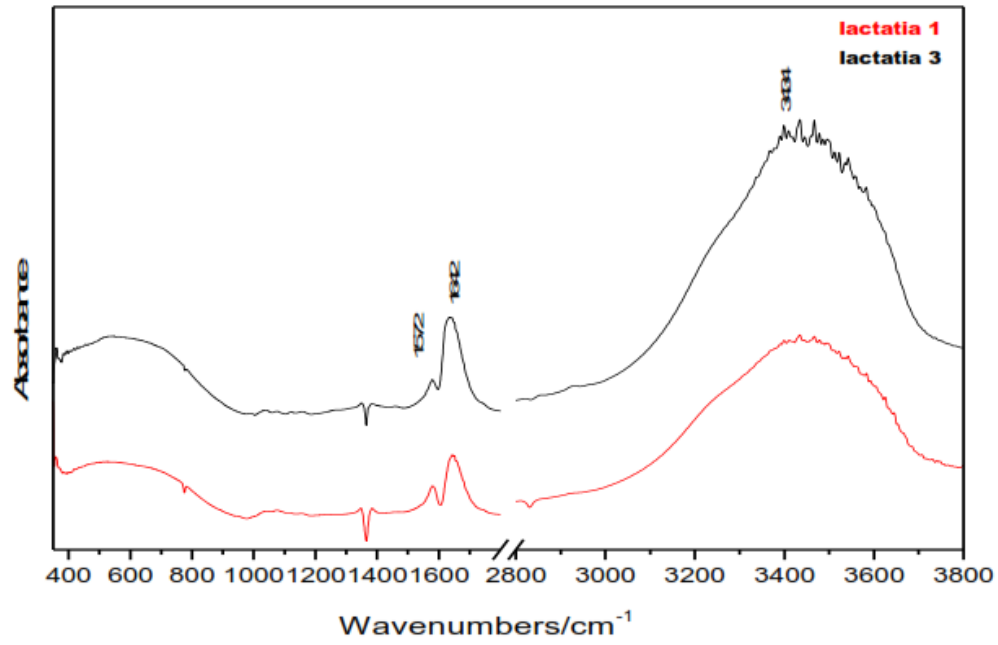

Figure 1. FT-IR spectrum obtained for donkey milk from lactation 1 and 3

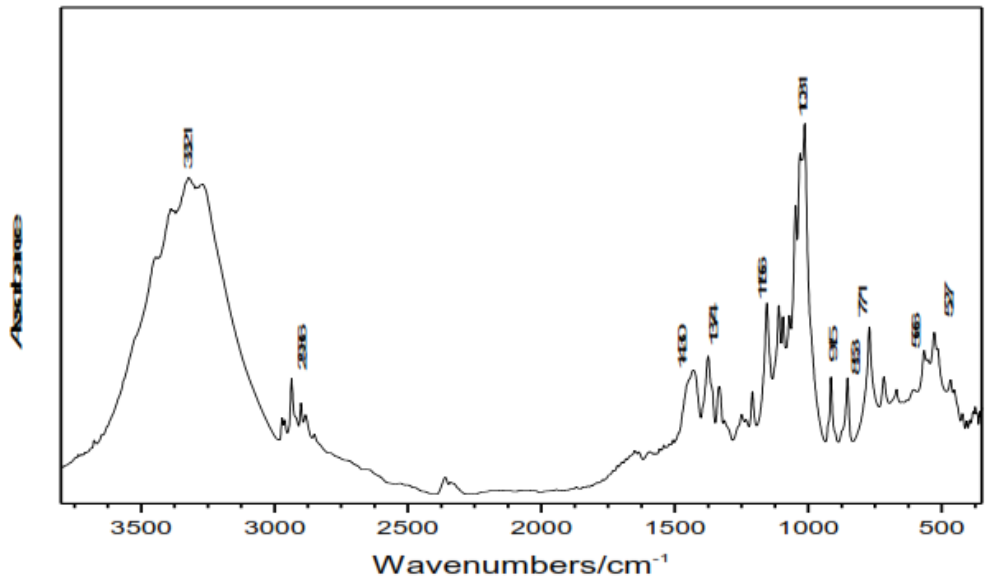

Figure 2. FT-IR spectrum for blueberries

In Fig. 2 (blueberries), a band intensity can be observed in the region of long wavelengths. The band from 3321 cm-1 has the attribution of the elongation vibration ν OH associated –OH, at 2936 cm^{-1} this band corresponds to the deformation vibration in the plane δ CH. Ethers are derivatives of alcohols in which the hydrogen from the hydroxyl group is replaced by a rest of the hydrocarbon. In IR spectra the absorption band from 1156 cm^{-1} and the high intensity band from 1031 cm^{-1} are due to the presence of ethers and correspond to the C-O bond in them. The deformation vibration outside the plane at ω CH occurs at 771 cm^{-1}, and the band from 527 cm^{-1} is assigned to the deformations in the plane δ CCC.

Spectroscopy is an important analytical

method and in this work was applied fourier transformation vibration spectroscopy, in order to characterize and identify the main components that birch buds extract can have.

The FT-IR spectrum contains information on the presence of functional groupings/types of bonds in the molecules of the studied sample. From the qualitative point of view, the antisymmetric vibration modes due to the polar links O-H, N-H, C=O generally have protruding ir bands.

Analyzing the FT-IR spectrum obtained from birch bud syrup, shown in Fig. 3, a high pick intensity of 1043 cm^{-1} can be observed. This intensity may be due to the C-O link.

The preence = C– H (deformation outside the plane) can be evidenced by the presence of peacks from 877 cm^{-1} and 993 cm^{-1}, and the intensity of the bands from 1644 cm-1 and 1630 cm-1 is due to the vibration C =C.

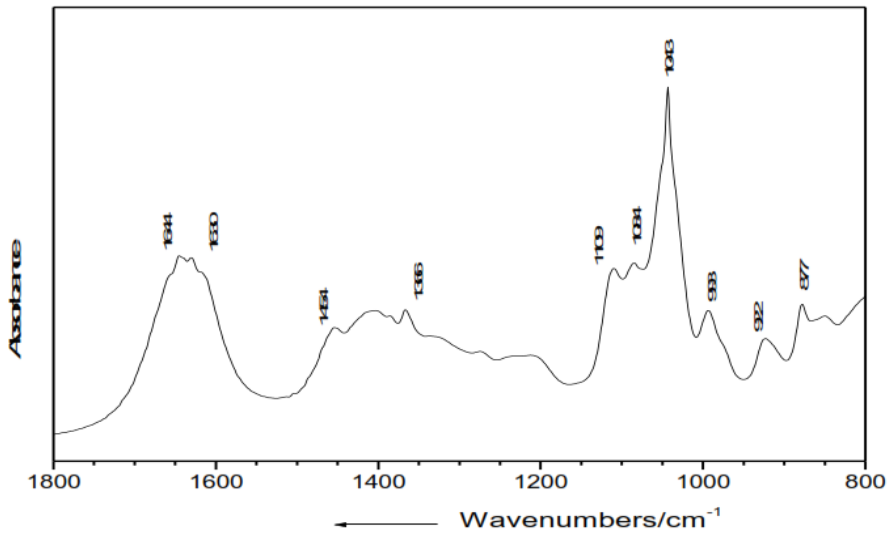

Figure 3. FT-IR spectrum of birch extract

Because ethyl alcohol is a product of the fermentation of various cereals or fruits and is the best solvent used to obtain herbal extracts, having the ability to extract a wide range of herbal compounds, from those with hydrophilic character (soluble in water) to those with lipophilic character (insoluble in water), it was also used in the preparation of birch buds' extract. The presence of ethyl alcohol from cereals can be highlighted by the presence of peak from 1366 cm^{-1} of medium intensity, and which belongs to -C - O. Physico-chemical paramters total number of germs and total number of somatic cells in donkey and cow's milk.

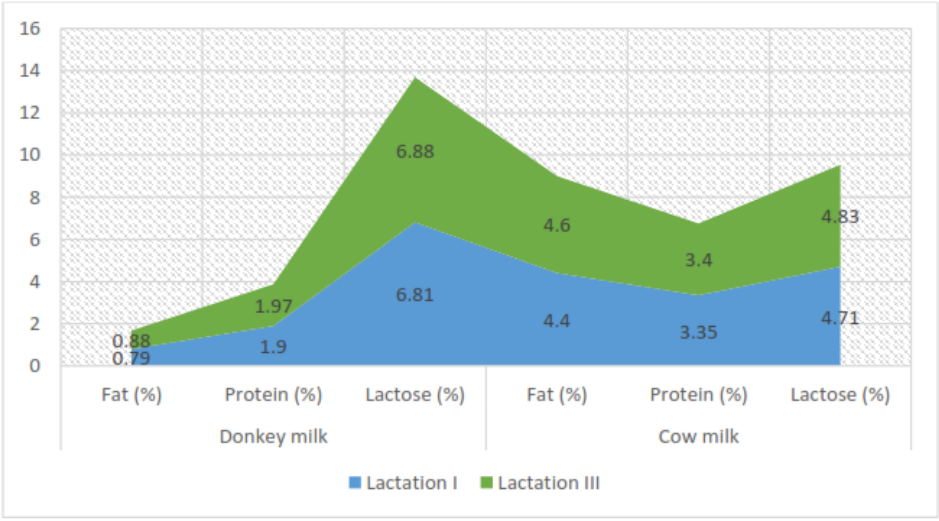

Figure 4. Fat, protein and lactose from donkey and cow's milk, used to make the product

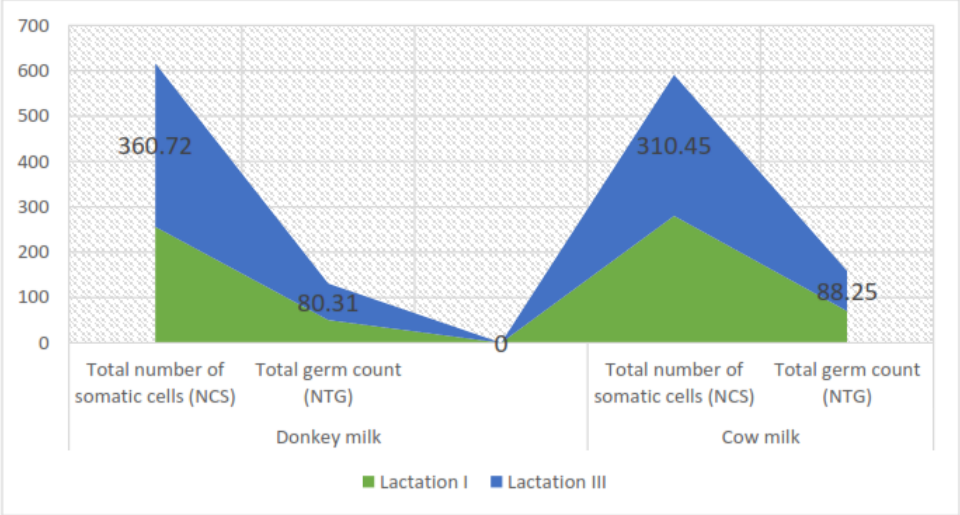

Figure 5. Total colony count (NTG) and total somatic cell count (NCS) in donkey and cow's milk used to produce the product

Figs. 4 and 5 show that milk, the raw material used to make yoghurt, corresponds to total germ count (NTG) and total somatic cell count (NCS) and from a physico-chemical point of view.Lactose reflects a major importance in donkey milk, due to its high values compared to other animal species, representing the most important parameter. The amount of lactose is influenced by lactation, by the time of milking, by nutrition [10]. Getting yogurt. Donkey milk has a low fat content and the possibility of getting a yogurt only from this species is difficult. I used 80% donkey milk and 20% cow's milk. The process of obtaining yogurt is similar to the classic one with the difference that the types of addition (blueberries, black currants and birch extract) are added. Tests were carried out with different percentages of fruit (1, 5, 10 % types of addition). Following the sensory assessments, we considered the most successful option with 5%.

Figure 6. Yogurt with the addition of extaract of birch buds blueberries and blackcurrants

The sensory characteristics of yogurt have an influence on consumer preferences, and the health benefits are also appreciated.

They are determined by both donkey milk and addition (black currants, blueberries, birch bud extract) (Fig. 6). Important factors in choosing a food product are: color, taste and aroma, factors that determine the consumer to choose a product.

If the consumer is informed about the added compounds (compounds with higher biological value), then it is almost certain that the product will be in the preferences of the modern consumer.

Table 1. Organoleptic characteristics of yogurt with the addition of currants, blueberries and birch extract

Organoleptic characteristics	Yogurt		
	Black currant	Blueberries	Birch buds extract
Appearance and consistency	fine, compact		
Texture	Smooth, firm, homogeneous		
Amount of whey	Whey at the surface of the curd 2%		
Color	White with red shades	Pale purple	White, uniform throughout the table
Degree of graininess	Small		
Taste	Pleasant, sweet-sour, refreshing, associated with the aroma of currants	Sour, associated with the aroma of blueberries	Astringent
Smell	Specific to yogurt, without a foreign smell		

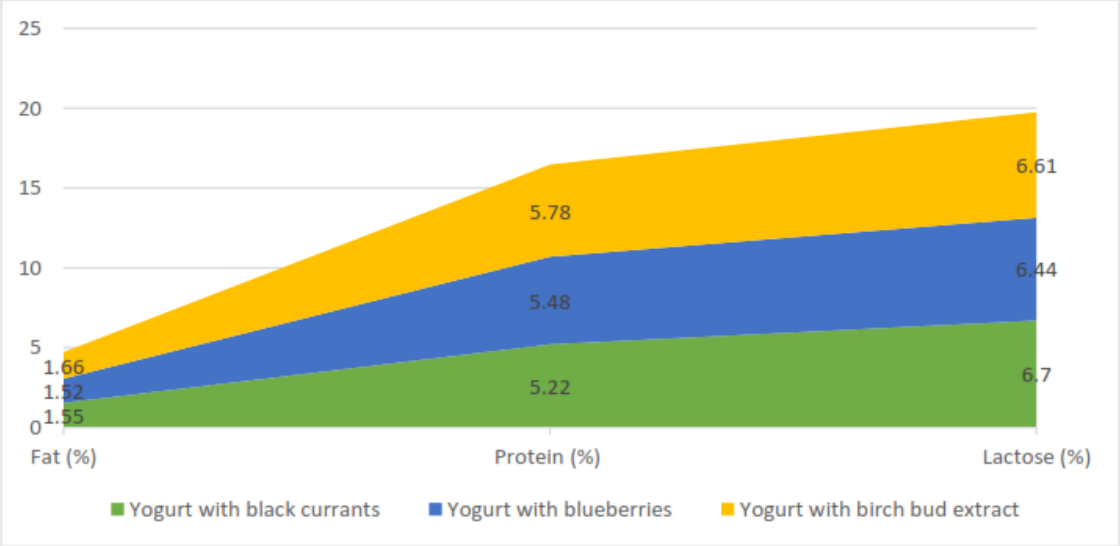

Figure 7. Fat, protein and lactose from yogurt with blackcurrants, blueberries and birch bud extract

The purpose of obtaining such a yogurt is to make a product with beneficial properties for people with reduced immunity. Thus, we performed tests in order to obtain the optimal variant regarding the content and the type of addition used. Of the three types of additions used, we can say that the donkey lactate product with the addition of black currant has organoleptic characteristics that satisfy the requirements of taste, aroma, consistency and appearance. With regard to the yogurt with the addition of birch bud extract, it presented an astringent taste mixed with the donkey's milk. Regarding the product with the addition of blueberries, in terms of appearance, color and consistency, it corresponded, but in terms of taste, the one with the addition of black currant is preferred. In order to obtain these products, we performed tests in order to choose the optimal variant, regarding the optimal addition. We conducted the following tests regarding the addition: 1%, 5% 10% (black currant, birch bud extract and blueberries). The optimal product variant was with an addition of 5% in the composition of the product. The assessment of the organoleptic characteristics was made by a number of 30 people, who specified that the product with the addition of black currant is preferred, followed by the one with the addition of blueberries and on the last place was the one with the addition of birch buds extract (Table 1).

4. Conclusions

Using the FT-IR technique, a comparison of the essential components contained indonkey

milk can be made, but also a comparison between these elements depending on the lactation. Thus, it was fo und that in lactation I the protein content is lower compared to lactation III. Of the three types of additions used, we can say that the dairy product from donkey milk with the addition of black currant has organoleptic characteristics that satisfy the requirements of taste, aroma, consistency and appearance.

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