APPLICATION POTENTIAL OF MILK WHEY PROCESSED WITH ELECTRICAL SPARK DISCHARGES

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Manufacture of whey-based beverages provides an opportunity to obtain dietary, preventive and therapeutic food products, ensures waste-free production, and extends a line of the products.

To ensure appropriate organoleptic properties, a significant range of whey-based beverages are manufactured from the whey purified from protein particles. Using the traditional methods of whey purification (separation, filtration, settling, membrane methods, etc.), the whey is separated into clarified whey as a basis for beverages and protein concentrate. After when the protein component is removed from it, a biological value of the beverages decreases. Therefore, new method should be sought to process the whey that would allow to preserve protein composition and, at the same time, to ensure a system stability for sediments.

The whey was exposed to processing tests at the laboratory-based electro-hydraulic facility (Ukrainian Patent # 22033 dated 10 April 2007). The processing was carried out using voltages of 30, 35, 40, and 45 kV and discharges ranging from 5 to 30, at a pitch of 5.

Test samples were exposed to a dispersion analysis of the protein particles carried out using Zetasizer Nano ZS device (Great Britain), electrophoresis was performed using Hoefer Mighty Small device (Amersham Biosciences, USA), and ion-exchange chromatography using the T 339 automatic amino acid analyzer (Microtechna, Czech Republic), while microbiological data were received using standard approaches.

The dispersion of protein particles was found to be positively effected by electrical sparkling processing; in particular, particles were ground by 1.5.....10.0 times depending on the number of the discharges. The best result was obtained when processing patterns by 20 discharges at the voltage of 45 kV, with the average size of particles ranging from 89 nm to 100 nm.

The obtained results evidenced that the whey processed by electrical spark discharges contained α-casein and β-casein in the quantity of 20...25% and 16...18%, respectively, which precipitated upon storage, and α-lactalbumin (11...12%), β-lactoglobulin (72...85 %), immunoglobulin (4...6 %) retained in the solution.

The next stage of the research proved a positive impact of this type of processing on the microbiological indicators of milk whey, in particular, a total composition of microorganisms.

It is proved an inactivation influence of the electrical sparking processing on microorganisms, including yeast and mould. The most efficient inactivation of microorganisms in milk whey was observed when processed by 15...25 discharges of 45 kV voltage, with their total quantity decreasing by average of 50...55%.

KEY WORDS: milk whey, electrospark discharge, inactivation

EXPANSION OF ASSORTMENT OF BEVERAGES WITH USE OF NATURAL UNCONVENTIONAL RAW MATERIALS

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Nowadays producing beverages on the basis of natural raw materials is perspective. Natural raw materials should be accessible and include biologically active substances. In our researches it was offered to use such raw materials as sweet sorghum. Sweet sorghum is a perspective crop for Ukraine. There are some main advantages of sweet sorghum in beverage industry: sweet sorghum has a great tolerance to a wide range of climatic and soil conditions; it has short vegetative period; sweet sorghum has high and stable productivity. Producing fermented beverages on the basis of sweet sorghum will expand assortment of the existing market of beverages. Sweet sorghum juice which is offered to use in technology of fermented soft drinks, is characterised by revitalizing action as contains essential macro- and microcells, such as iron, calcium, potassium.

Defining of suitability of sweet sorghum juice to use in the beverage industry was the purpose of our researches. Qualitative characteristics of sweet sorghum juice and wort made on its basis have been studied. Qualitative characteristics such as pH, total soluble solids, reducing sugars, total sugars, amine nitrogen, total nitrogen content, and starch content were defined. All qualitative characteristics of juice and the wort were measured with the help of standard test procedures. In our studies the basic technological parameters of preparation of wort for its further fermentation by yeast are investigated and defined. Wort preparation carried out by means of hydrolysis of starch of juice with use thermostable alpha-amylase (Termamyl 120L) at the first stage which brought in juice and maintained it at temperature 80°C within 30 minutes. And at the second stage of hydrolysis gluco-amylase (SAN Super 240L) was added after wort cooling to temperature 55°C and then maintained juice within 15 minutes.

It has been estimated and optimised quantity of the enzyme preparation necessary for carrying out of hydrolysis of starch. It has been established, that for the achievement of full hydrolysis of starch of raw materials under certain conditions it is necessary to bring to 0.34...0.45 unit AA/g of raw starch of enzyme Termamyl 120L and 9...10 unit GAl/g of raw starch of enzyme SAN Super 240L. It is possible to recommend the received wort to use in technology of fermented beverages.

KEY WORDS: sweet sorghum juice, fermented beverages