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Biotechnology of functional natural milk products with biologically active additives from marine algae

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Abstract

Considering the unfavourable ecological situation in the world and the acute deficiencies of macro-and micronutrients in both adults and children, leading to various diseases and as a result, reducing life expectancy, the development of functional products and their introduction into (large scale) production is currently relevant. Dairy products (milk, ice cream) are quite promising in this regard, as they are not only widely consumed by all sections of the population, but are also a source of riboflavin, retinol and also contain other vitamins and beneficial, biologically active substances: Enzymes, hormones, immune biological compounds and pigments (lacto Flavin). The aim of the work was the development of dairy products with the addition of polylobate, carrageenan and Fukolam from the Pacific shelf. The studied objects were, dairy drinks with the addition of biologically active substances, pasteurized milk, carrageenan, Fukolam C and polylobate a polysaccharide obtained by the esterification of pectin's from lime). The production technology of dairy drinks with polysaccharides of seaweed and terrestrial plant-based pectin's differed from the standard scheme of milk production by adding additives after the pasteurization stage, before cooling. The quality assessment of the developed dairy drink with the addition of functional ingredients from seaweed was carried out according to organoleptic, physio-chemical and safety indicators in accordance with the code of alimentation. Thus, a composition was developed for three new dairy drinks with an optimum ratio of components for organoleptic and health effects; new technologies for the production of milk drinks, enriched with seaweed polysaccharides and terrestrial plant-based pectin's have been described. The quality and safety of dairy products developed were studied. In general, milk shall not contain any additives. Additives or preservatives are added to the food for technological necessity, including enhancement of shelf-life. Many food additives are classified as GRAS [meaning 'Generally Regarded as Safe' additives. The GRAS additives as supposed to be causing no harm for longer periods.] Milk only may be subjected to pasteurization, boiling, sterilization or Ultra High Temperature (UTH) sterilization or Chilling for its stability because milk is generally prescribed for children, patients, and old persons. Dairy-based drinks, flavoured and/or fermented (e.g. chocolate, milk, cocoa, eggnog) UHT sterilized milk shelf life more than three months may contain Emulsifier/stabilizer in specified quantity as included under Appendix A of the Food Safety and Standards (Food …..Additives) Regulations, 2011.Further, Cheese/Sliced cheese, Processed cheese, Processed cheese spread, all types of yogurts and Evaporated milk may contain stabilizer/emulsifier, Thickener, and modifying agent, modified starch, flavour, colour, acidity regulator, surface treatment, anti-caking agent, anti-oxidants etc. Specific additives in specified amount may be used as under Food Safety & Standards Regulations, 2011 for the items Sweetened condensed milk, Butter, Milk fat/Butter oil & Anhydrous milk fat / Anhydrous butter oil, Milk power and Cream powder, Ice Cream, Dried ice cream mix, Frozen desserts (commonly confused by dishonest traders as Ice cream), Milk ice, Milk lollies, Ice candy, casein products, whey powder, / Paneer, Canned (the cans shall be internally lacquered with sulphur dioxide resistant lacquer), dry mixes of Ghee. However, it is to conclude that food without additives and preservatives is always better. Hence, the restrictions have been imposed by the regulatory authority on the commodity-wise and the quantity-wise use of additives, indispensable nowadays for the food industry. The use of additives in dairy products varies in different continental regions. Though the use of additives is regulated under Codex Aliment Arius, country-specific provisions must always be considered. In most markets, the use of additives in general is not usual in dairy products such as plain milk, whey, cream, and yogurt, whereas it becomes more frequent if other ingredients such as fruits, nuts, or vegetables are added or if the dairy products are processed as technological need increases. Also the use of additives in fermented milks and cheeses is more common, though still restricted. In accordance with the specific provisions laid down in the European Union and the United States, additives such as colours and sweeteners as well as stabilizers such as sodium and calcium phosphates, ascorbic acid and carrageenan, and calcium chloride are commonly used for dairy products except butter and unflavoured fermented milk products, for which the use of additives is not permitted or is restricted. The use of preservatives, antimycotics, and antioxidants in dairy products

is also subject to restriction and must be verified in accordance with national provisions for the products concerned. Important in any case is that the local or national legislation be verified before product launches in new markets. Emulsifiers refer to the food additives that have been applied in the foods to greatly reduce the interfacial tension between the oil (hydrophobic substances) and water (hydrotropic substance) and thus to form stabilized emulsion consisting of two substances that cannot dissolve each other. The frequently-used emulsifiers in the dairy products are mono-glyceride of fatty acid monoglyceride, glycerol fatty acid monoglyceride, tripolyglycerol monostearates, propylene glycol alginate, succinylated monoglycerides, sodium sterols lactate, calcium lactate stearate, spans, and sucrose fatty acid ester. Emulsifier plays an important role in improving emulsion stability and homogeneity, appearance stability, and taste of the liquid milk. Monoglyceride is the most widely used water-in-oil emulsifier, which also can be used as oil-in-water due to its strong emulsibility.

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