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Functional dairy foods. A review

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Abstract

Milk and milk products play an important role in the production of functional foods because they contain bioactive peptides, probiotic bacteria, antioxidants, vitamins, specific proteins, oligosaccharides, organic acids, highly absorbable calcium, conjugated linoleic acid, and other biologically active components with a variety of bioactivities. Fermented dairy products have traditionally been thought to have health benefits such as modulating digestive and gastrointestinal functions, hemodynamics, controlling probiotic microbial growth, and immunoregulation, which have been linked to health benefits for many years. However, most foods, including fruits, vegetables, and grains, as well as milk, produce functional dairy foods. Functional dairy products have recently become more widely available in everyday life, and they have grown in popularity in recent years. Consumers' concern about their personal health is one of the driving forces behind the establishment of markets for functional dairy products. So, expanding the product line to include other types of health-promoting products is quite natural for the dairy industry.

Keywords: milk, milk products, functional foods, bioactive components.

Introduction

Milk is a composite physiological fluid that helps the newborn adjust to life after birth by facilitating digestion and maturation while also delivering bioactive components and nutrients. It promotes the growth of lymphoid tissue and the creation of symbiotic microflora. The significance, potency, and quantity of milk bioactive chemicals are likely to be greater than previously thought [1, 2]. The distribution and occurrence of important components in diverse animal milks have been described in several research studies [3]. Indeed, dairy consumption has recently been linked to health benefits that are the polar opposites of the diseases and complications associated with being overweight or obesity.

Dairy consumers, for example, are more likely to be underweight, have lower blood pressure, and have a lower risk of stroke, colon cancer, and osteoporosis. Dairy products include a unique combination of key nutrients (proteins, fatty acids, vitamins, and minerals) that are critical for the health of the blood, nervous and immunological systems, eyesight, muscle and nerve function, good skin, energy levels, and overall body growth and repair.

They can also be used as a vehicle for the release of bioactive chemicals. Furthermore, these products can promote health or well-being, with benefits such as increased immune system function, reduced risk of cardiovascular disease, reduced risk of bone mass loss, and protection against free radical damage when eaten at prescribed levels [4, 5,6].

Fruits and vegetables, in various forms (fresh, dried, powder, juices, puree, pulp, fibre, and extract), present producers with opportunities to improve the health advantages of their products [7, 8, 9, 10]. It has been investigated whether these items or their by-products can be used in dairy products such as yoghurts, ice creams, and cheeses [11].

Functional Yoghurt:

Yoghurt is a functional dairy product that is distinguished by its nutritional, medicinal, and microbial properties. It's made by fermenting milk with *Streptococcus thermophilus* and *Lactobacillus delbrueckii ssp. bulgaricus*, two thermophilic homofermentative lactic acid bacteria (Ozcan-

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Yilsay, 2007) [12]. Recently, there has been a surge in interest in foods that have a good impact on health due to their nutritional worth.

Probiotics and dietary fiber-rich diets have received a lot of attention among these functional foods (Blades, 2000 and Trepel, 2004) [13, 14].

Elkot (2017) reported that supplementation of yoghurt with 3 and 5% of JAT powder in yoghurt improved the viability and metabolic activity of *L. acidophilus, L. casei,* and *Bif. bifidum*, respectively, by displaying a prebiotic effect and can be an alternative for the development of functional dairy products.

Yoghurt is one of the health-functional foods, and adding natural fruit can boost its nutritional content. Using the *Bifidobacterium longum* strain and white sapote fruit pulp at levels of 5, 10, and 15%, Khalil et al. [16] created a unique functional probiotic yoghurt. Physicochemical, microbiological, and sensory assessments of flavoured yoghurt samples were conducted over a 21-day period at 5°C. The flavoured probiotic yoghurt had higher total solids, protein, ash, and carbohydrate content than the control sample, according to the findings. Supplementation with white sapote fruit pulp impacted the syneresis and water holding capacity levels of flavoured yoghurt, whether in fresh or preserved samples. Furthermore, ascorbic acid, antioxidant activity, total phenols, vitamins, and minerals all increased significantly. Molds and yeast were not found in any of the samples, with the exception of the control and probiotic yoghurt samples, which appeared 14 and 21 days later. Coliforms were not discovered in any of the fresh or preserved yoghurt samples. When compared to other treatments, sensory evaluation results revealed that probiotic yoghurt with 10% WSP had the greatest acceptance scores.

Functional Labneh:

Concentrated yoghurt, also known as "labneh" in the Middle East or "strained yoghurt" in Greece and the rest of Europe, is one of the world's most popular dairy products [17]. Labneh is a semi-solid fermented dairy dish made by removing water and water-soluble components from yoghurt. It has a creamy/white colour, a soft and smooth body, strong spreadability with little syneresis, and a clean, slightly acidic flavour. The total solid (TS) content of the product is usually between 23 and 25 g/100 g, of which 8–11 g/100 g is fat, and it has a creamy/white colour, a soft and smooth body, strong spreadability with little syneresis, and a clean, slightly acidic flavour [18].

Elkot and Khalil [19] studied the effects of varying quantities (0, 2, 4, 6, and 8% w/v) of sweet lupine powder and *Bifidobacterium longum* ATCC 15707 on the physiochemical, textural, microbiological, and sensory aspects of low-fat bio-Labneh samples during storage at 5 1°C for 21 days. The results showed that low-fat bio-Labneh with a greater level of sweet lupine powder (8%) had tougher textural qualities than those manufactured without it. When compared to alternative treatments, the overall acceptance of a sample processed with 2% SLP showed that it is more acceptable. The total cell count of *B. longum* ATCC 15707 gradually increased until the 14th day of the storage period, after which it decreased till the end of the storage period. Furthermore, the number of viable cells of *B. longum* ATCC15707 remained > 7 log cfu/g at the end of the storage period in the treated samples.

Functional ice cream

Consumers are now looking for low-cost, nutritious dairy products (functional dairy products). Several researchers have looked into the process of making useful ice cream, including: Darwish et al. [19] investigated the effect of adding Jerusalem artichoke to ice cream on its functional qualities. Using prickly pear fruits, El-Samahy et al. [20] created a low-fat ice cream with better functional and rheological qualities. Ibrahim et al. [21] created the ideal synbiotic ice cream by combining okara (1–3%) and *Lactobacillus plantarum*, a probiotic (ATCC 8014). When more than 2% okara was added to ice cream, the results revealed a viscous viscosity. This formulation also caused ice cream to melt slowly for around 90 minutes, with a melting rate of 19–76%. Furthermore, when compared to the control (no okara), ice cream including okara had a higher protein content (> 5%) and a lower fat level (> 13%), demonstrating that it is a low-fat item. On day 60, the addition of more than 2% okara enhanced the vitality of *L. plantarum*. Overall, adding 1% okara to prospective symbiotic ice cream compositions indicated substantial acceptability. In the manufacturing of ice milk, Elkot et al. [22] used sebesten fruits as functional components rich in natural antioxidants and high quantities of unsaturated fatty acids.

Elkot et al. [23] produced a unique synbiotic ice cream made from camel milk and black rice powder, and studied the survival of probiotic bacteria (*Lactobacillus acidophilus* LA-5) during storage (60 days).

BRP was used to substitute skim milk powder at amounts of 0, 25, 50, and 75 percent. Some physicochemical, rheological, microbiological, and sensory aspects of the ice cream were investigated. The results showed that including black rice powder into ice cream mixes increased the overrun, viscosity, and melting resistance of the ice cream samples significantly. However, as the quantity of black rice powder in the mix was increased, the freezing point dropped. The most acceptable treatments were those created with 25% and may be increased to 50%, according to sensory evaluation results. Over the course of 60 days, black rice powder enhanced the survivability of *Lactobacillus acidophilus* LA-5 in ice cream samples. Overall, a synbiotic camel milk ice cream manufactured with black rice powder was created, which improved the physicochemical and rheological features of ice cream samples while also having a strong protective effect on probiotic bacteria survival.

Compliance with Ethics Requirements: Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human or animal subjects (if exist) respect the specific regulation and standards.

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