

Chapter 9

The Health Benefits of the Cheese

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ABSTRACT

This chapter focuses on the nutritional components of cheese and their impact on human health. Cheese is a widely enjoyed fermented dairy product that offers essential nutrients and beneficial bioactive compounds and contains bioactive peptides, proteins, amino acids, lipids, fatty acids, vitamins, and minerals, which provide various health benefits such as antioxidant, antihypertensive, antiproliferative, anti-inflammatory, antidiabetic, anticancer, immune-modulating, and antimicrobial effects. Cheese is rich in calcium, phosphorus, zinc, and magnesium, which help prevent tooth decay and osteoporosis. During cheese production, lactic acid bacteria and yeast starter strains inhibit the growth of harmful microorganisms and their byproducts. These microorganisms produce functional metabolites like bioactive peptides, exopolysaccharides, and conjugated linoleic acid, which enhance cheese's functional properties. Adding probiotic lactic acid bacteria strains to starter cultures improves the absorption of bioactive substances and promotes health.

BACKGROUND

Cheese is a fermented dairy product that comes in a variety of flavors, textures, and shapes and is extensively eaten all over the globe (Sharma Khanal et al., 2019; Chourasia et al., 2020). The kind of milk, starter cultures, fermentation parameters, manufacturing procedures, and ripening conditions all affect the variety of cheese that may be made (Chourasia et al., 2020). Cheese is produced by coagulating milk (wholly or with a certain amount of fat separated) or milk by-products with rennet or acid. Cheese, a stable milk concentrate, consists mainly of casein and milk fat (Picciotti et al., 2022). Fermentation is the most critical phase of the cheese-making process, and it is initiated by the addition of rennet to coagulate the milk protein casein. The fresh cheese is subsequently processed through stages such as pressing, salting, and, if desired, ripening to complete the production process (da Cruz et al., 2009).

Consumers demand functional foods that are beneficial for health while meeting their basic nutritional needs (Machado et al., 2023). Functional foods aim to improve quality of life as well as reduce the potential risks of some nutrition-related chronic diseases (Curutchet et al., 2023). Everyday, more

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research is being conducted into the design and manufacture of novel functional foods. It is possible to increase the functional properties of the product by adding health-beneficial supplements to cheese varieties. Cheese is a suitable food for the transport of bioactive compounds (Picciotti et al., 2022). New foods created by combining functional ingredients with carrier foods improve consumer health while also providing large profits to manufacturers (Curutchet et al., 2023).

Cheese includes the majority of the nutrients required for the human body, including proteins, bioactive peptides, amino acids, lipids, fatty acids, vitamins, and minerals (van Mierlo et al., 2006). Cheeses may include a variety of nutraceutical substances, including bioactive peptides, γ -aminobutyric acid, lipids, vitamins, bacteriocins, exopolysaccharides (EPS), and organic acids (Chourasia et al., 2020). Thanks to these compounds they contain, they have various health benefits, including antioxidant, antiproliferative, anti-inflammatory, immunomodulatory and antimicrobial activities (Chourasia et al., 2020). Certain peptides included in cheese are recognized as heart-protective nutrients, including minerals that have the ability to reduce blood pressure, such as calcium (van Mierlo et al., 2006). Lactic acid bacteria (LAB) added to milk during manufacturing help to improve cheese texture and taste, as well as produce bioactive substances by metabolizing milk proteins and enhancing functionality (Chourasia et al., 2020). Biotechnological techniques for enhancing cheese quality and functioning need controlled cheese fermentation with suitable LAB and yeast strains. Controlled cheese manufacturing inhibits the development of antibiotic-resistant and infectious microorganisms, as well as their unwanted metabolic products. Furthermore, the metabolites generated by LAB and yeasts improve the functioning of cheese products (Settanni & Moschetti, 2010; Ruiz-Moyano et al., 2019). Cheese is one of the foods that may be supplemented with probiotics owing to its sensory appeal as well as possible health advantages (such as antihypertensive, anti-inflammatory and antiproliferative properties). Cheese varieties can create a suitable environment that can maintain the viability of probiotic strains throughout their shelf life (Shah, 2007; Machado et al., 2023). Supplementing cheese with prebiotic compounds will increase the number of live probiotics that help maintain a healthy intestinal microbiota upon cheese consumption (Chourasia et al., 2020). In this way, its beneficial effects on health can be increased. The manufacturing of cheeses with useful characteristics is becoming more important as worldwide demand grows. This review article provides an overview of the nutritional elements contained in cheeses and their beneficial effects on human health.

Cheese Production Technology

Since raw milk has a very short shelf life, turning it into products such as cheese is one of the preservation methods of raw milk (da Cruz et al., 2009). Cheese is one of the dairy products obtained by coagulating milk or dairy by-products such as whey, using suitable proteolytic enzymes known as cheese rennet and/or organic acids, followed by the separation of whey, shaping, and salting of the curd, then consumed either fresh or after ripening (Üçüncü, 2013; Sharma Khanal et al., 2019). Although it is very difficult to classify cheeses systematically, a grouping can be made based on factors such as the basic characteristics of cheeses (fat rate, water rate, texture, etc.), coagulation and ripening method (da Cruz et al., 2009; Rashidinejad et al., 2017). To make cheese, milk has to coagulate. This is generally done by chymosin working on the kappa-casein steric anchoring layer of the casein micelle. One of the main steps in making cheese is drying out milk. As a result of microbial and biochemical reactions, the desired taste, smell, and texture qualities can be reached by putting freshly made cheeses in a controlled environment for a certain amount of time. Thus, ripened cheese can be produced (da Cruz et al., 2009).

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