

# Production and Nutritional Characterization of Plant-Based Dairy Substitutes

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## Commentary

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## DESCRIPTION

The global shift towards plant-based diets has led to an increasing demand for plant-based dairy substitutes. These alternatives cater to individuals with lactose intolerance, vegan diets or those seeking healthier and more sustainable food options. Plant-based dairy substitutes, such as plant milks, cheeses, yogurts and creams, are derived from various plant sources such as soy, almonds, oats, coconut, rice and peas. These alternatives mimic the sensory qualities of dairy products while offering unique nutritional profiles. This article explores the production processes and nutritional characterization of plant-based dairy substitutes.

Raw plant materials are soaked in water to soften them, making it easier to extract their nutrients and flavours. The soaked ingredients are ground into a fine paste or slurry. This is done to release the soluble nutrients and flavour compounds. For products like plant milks, water is added to the slurry, and the mixture is filtered to separate the liquid from the solid remains (which are often used for animal feed or compost). The liquid is then homogenized to ensure smooth texture and uniform consistency, preventing the separation of solids and liquids. To improve the nutritional profile, plant-based dairy substitutes are often fortified with vitamins and minerals such as calcium, vitamin D and vitamin B12, which are found in higher amounts in cow's milk.

Plant-based dairy products often require the addition of thickeners, emulsifiers, sweeteners and flavour enhancers to match the taste and texture of traditional dairy products.

Nutritionally, plant-based dairy substitutes vary widely depending on the raw materials used and the fortification process. While they are generally lower in saturated fats and cholesterol compared to cow's milk, their protein content, calcium and other micronutrients can differ significantly.

One of the most significant differences between plant-based and dairy products is the protein content. Dairy products are rich in high-quality proteins, providing essential amino acids. However, many plant-based alternatives are lower in protein unless specifically fortified or made from protein-rich sources like soy or peas.

Among the plant-based options, soy milk comes closest to cow's milk in terms of protein content. A cup of soy milk can provide 7-9 grams of protein, comparable to the 8 grams found in a cup of cow's milk. Almond milk typically contains only 1 gram of protein per cup, which is much lower than cow's milk or soy milk. Oat milk has moderate protein content, providing around 2-3 grams of protein per cup.

The fat content in plant-based dairy substitutes varies significantly depending on the raw materials used. Coconut-based products are typically high in saturated fats, whereas almond and oat-based products tend to be lower in fat. Since plant-based dairy substitutes are naturally lower in calcium, many are fortified to match or exceed the calcium content of cow's milk. Fortification with vitamins A, D and B12 is also common to make plant-based products nutritionally comparable to dairy milk.

Fortified oat milk typically contains a similar amount of calcium and is often enhanced with vitamin D to support calcium absorption. Plant-based dairy substitutes generally contain a lower level of lactose and are free of cholesterol, making them ideal for lactose-intolerant individuals and those seeking to lower cholesterol intake. Additionally, some varieties of plant-based products provide beneficial fibre, especially oat and almond-based options.

### **CONCLUSION**

The production and nutritional characterization of plant-based dairy substitutes reflect a significant opportunity for innovation in the food industry. While these substitutes vary in terms of protein, fat and other nutrients, their ability to cater to diverse dietary needs including lactose intolerance, veganism and the desire for more sustainable food choices makes them an essential part of the modern diet. With advancements in processing technology, plant-based dairy substitutes will continue to evolve, offering improved nutritional profiles and sensory qualities that rival traditional dairy products.