

Proximate Composition, In Vitro Protein Digestibility and Fatty Acid Profiles of Commercial Cereal-Based Dairy Analogs

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Plant-based protein products as alternatives to animal-based protein counterparts are becoming increasingly available given their alignment with the increased environmental, health, and ethical focus of consumers. Among these are plant-based dairy alternatives, which respond to increased lactose intolerance as well as veganism. One of the most important challenges in such product development is the need to select appropriate ingredients, combined with appropriate technologies in order to guarantee the development of environmentally friendly, nutrient-rich foods that maintain their sensory attractiveness in terms of flavor and texture. In this perspective, cereal-based ingredients are positioned as promising ingredients given their technological versatility, richness in protein, fibre, vitamins, minerals, and important phytochemicals that synergistically contribute to important biological activities contributing to alleviating several non-communicable diseases. On the other hand, the important fibre contents may contribute to glycaemic and cholesterolemic control as well as satiety promotion. Different cereal bases will most certainly impact differently these properties in the final products. The aim of this study was to assess the proximate composition, in vitro protein digestibility, and

fatty acid profiles of three cereal-based preparations, namely oat-base, spelt-base and sorghum-base that were used in the development of yogurt, ice-cream, and cheese analogs, respectively.

Protein, fat, total carbohydrates, sugars, fibre, and ash contents were determined according to AOAC methods. The in vitro protein digestibility (IVPD) of the samples was determined by the combination of the methods of Arte et al. (2015) and Elmaki et al. (1999) with some modifications. The fatty acid composition was based on the conversion into fatty acid methyl esters (FAME) followed by analysis with GC-Flame ionization detection (FID).

Cereal-base type and associated formulation impacted the final proximate composition; protein content varied between average values of 1.5 g/100 g yogurt to 2.5 g/100 g cheese and is below average content of conventional dairy products, one of the main challenges within this product category. On the other hand, fibre content was two-fold higher in the sorghum ice-cream analog and present at values between 1.6 g/100 g yogurt to 2.7 g/100 g cheese. Adaptation of portion sizes and adjustments of formulations may enable fibre nutritional claims. Fat contents were always lower in cereal-based analogs in comparison to conventional animal-based counterparts. Among the three dairy analogs, the cheese alternative revealed the highest content as a consequence of the added coconut oil to improve texture mimetization. Such addition was also reflected in the higher saturated fatty acid fraction. Oleic acid (C18:1n9) and linoleic acid were the most predominant unsaturated fatty acids in the oat-base and spelt-base yogurt and ice cream alternatives, respectively. Protein digestibility differed among the three dairy alternatives as a consequence of the different cereal bases as well as food structures.

These results provide important insights on nutritional information and behavior to be used for future product development or improvement contributing to improving consumers' acceptance.

Keywords: cereal-based dairy analogsinnovative food productshealthnutritional valuedigestibility

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