

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

Joana Cristina Barbosa^a, Isabel Franco^b, Joana Inácio^b, Ana Cristina Freitas^{a†}, Ana Maria Gomes^a

^a Universidade Católica Portuguesa, CBQF – Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Diogo Botelho 1327, 4169-005 Porto, Portugal
^b Frulact, S. A., Maia, Portugal



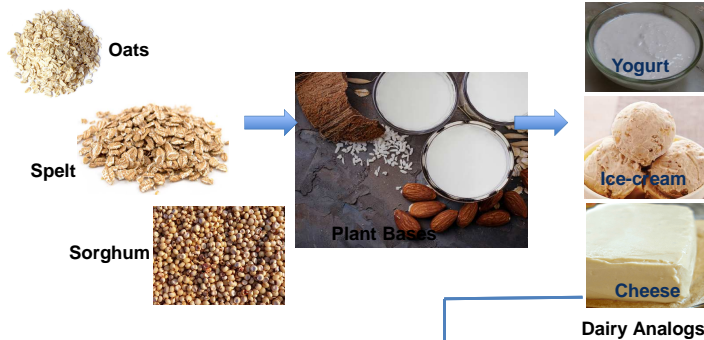
Introduction

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.

Methods

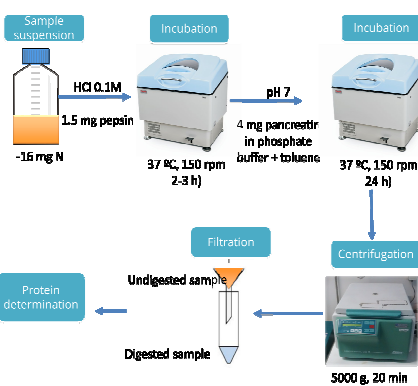
Plant Bases Preparation and Dairy Analog Production



Proximate Composition

Moisture	Gravimetric method
Protein	Kjeldahl Method
Fat	Soxhlet method
Total sugars	Munson and Walker method
Fibre	Enzymatic gravimetric method
Ash	Incineration 550 °C

Protein Digestibility



Results

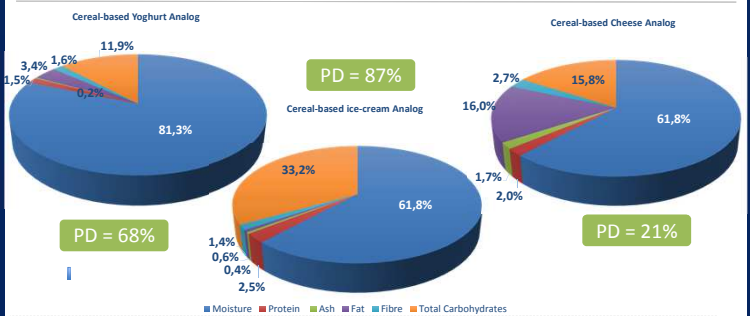


Figure 1. Proximate composition (g/100 g food product) and respective protein digestibility (PD) of cereal-based yoghurt, ice-cream and cheese analogs prepared from oat, spelt and sorghum respectively

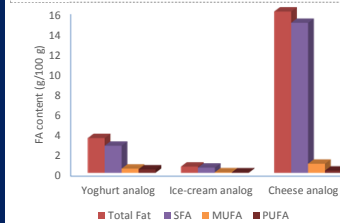


Table 1: Fatty acid composition (% área normalized fat)

Fatty acid	Yoghurt analog	Ice-cream analog	Cheese Analog
C6:0	0,3	nd	0,5
C8:0	6,0	nd	7,4
C10:0	4,1	nd	5,5
C12:0	37,7	nd	46,3
C14:0	15,2	nd	19,7
C16:0	11,7	51,8	10,2
C18:0	2,9	31,4	3,3
C18:1n9c	12,2	8,4	5,6
C18:2n6c	9,0	8,3	1,3
C20:0	0,1	nd	0,1
C18:3n3	0,4	nd	0,0
C22:6n3	0,4	nd	nd

Figure 2. Total fat content and associated distribution between saturated (SFA), monounsaturated (MUFA) and polyunsaturated (PUFA) fractions of dairy analogs.

- Protein content below average content of conventional dairy products.
- Fibre content was two-fold higher in the sorghum ice-cream analog compared to conventional counterpart. 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.
- Oleic and linoleic acids => most predominant unsaturated fatty acids.
- Protein digestibility differed as a consequence of the different cereal bases as well as food structures.

Conclusion

- Proximate composition, nutrient profiles and digestibility of final products are affected by selected cereal-base and matrix structure/formulation.
- Insights on nutritional information and behavior of plant-based dairy analogs are important to guide successful product development or improvement contributing to improving consumers' acceptance.

References

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