

Abstract title: The role of cereals in the industry of plant-based foods

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Abstract body (500 words)

Current trends in human feeding promote a more plant-based diet, for several reasons [1]. Ethical and environmental concerns are among the most common reasons why people chose to avoid animal-based products [2], [3]. Also, there is an increasing perception that the excessive consumption of animal-based products is associated with higher risk of developing chronic diseases [4]. Thus, the demand for innovative and sustainable plant-based solutions is increasing exponentially. Such products must meet not only the nutritional requirements for a healthy diet but also be widely acceptable by the consumers in terms of flavour and texture, while being produced in an environmental-friendly manner and with the least possible industrial manipulations [5]. Several plant bases can be used based on their specific characteristics, nutritional and sensorial advantages, and possible applications. They are currently employed as substituents of animal-based products and can be grouped mainly into four distinct groups: cereals, legumes, nuts, and tubers. In particular, cereal grains are a major constituent of human diets around the world. Amongst the most consumed cereals, wheat, rice and maize are the most widely used. Other cereals and pseudo-cereals of interest include oat, millets, sorghum and spelt [6]. Cereal grains are a major source of plant-based protein in the human diet, being only surpassed by the legumes in terms of protein content, when considering their proximate composition [7], [8]. The main protein reservoir in cereals are the storage proteins, mainly present in the seeds. Cereals are also key contributors to increase the dietary energy, mainly through the digestion of starch as well as a good source of fibers, vitamins and minerals [9]. In addition, cereals also contain other bioactive compounds in their composition, such as polyphenols, antioxidants, vitamins, and minerals, including calcium, magnesium, zinc and iron [10]. Indeed, the consumption of cereal-based food – mainly whole grain cereals – has been associated with ameliorated conditions in certain diseases, including type 2 diabetes, cardiovascular diseases and certain types of cancer [11], [12].

Herein, we intend to provide a perspective on the characterization of relevant cereal-based alternatives (oat, rice, spelt, sorghum, millet cereal bases prepared in collaboration with Frulact S.A, Portugal in comparison with other plant bases in the market, highlighting the main

nutritional (protein, fat, carbohydrate, fibre and ash contents determined via AOAC methods) and sensorial advantages of each and possible applications. The technological challenges and innovative strategies that are currently employed to produce cereal-based food products were identified and will be discussed, with emphasis in the quality and safety of the final products. Finally, examples of industrial applications, collected within a market study with collection of data from the Mintel® Database, will be provided in the several categories of cereal-based food analogues.

Keywords: Cereals; Food Innovation; Food Market Trends; Nutrition; Plant-based analogues

Relevance for the cereal sector (2000 characters)

This work intends to contextualize the cereal-based alternatives within the current frame of plant-based food market. Current trends regarding human diets must consider not only the nutritional value of the food itself but also the impact of its production and the consumers expectations. Consumers are increasingly aware of all the aspects regarding food provenience, production and processing; additionally, their role in food choice shapes the evolution of this market. As the consumption of animal-based products is being considered detrimental for human and environmental health, in association with other ethical and moral concerns, shifting towards more plant-based diets is increasing the demand for improved products, which must be able to answer to these new specifications while meeting the nutritional value and keeping appealing flavor and texture. Several plant bases can – and must – be used and combined to achieve the best nutritional profiles and textures that often mimic animal-based products, thus increasing their acceptability by consumers that are more prone to enjoy such products. In this context, the application of cereal bases appears as both a solution and a challenge for the food industry. The understanding of the cereals benefits must start from the grain characterization, go through the production line, including the technological challenges and the innovative strategies underlying their utilization, and the final product evaluation regarding its safety, quality and acceptability by the consumers.

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