RETASTE Conference Abstracts
RETASTE-FLW-1272-In-person Poster
Rethymno, September 16-18, 2026
© Author(s) 2026 CC BY 4.0 License
DOI:10.5281/zenodo.23678471

Upcycling Durum Wheat Defatted Cake as Dry-fractionated Ingredient in a Snack Bar

Antonella Pasqualone, Vittoria Latrofa, Francesca Vurro, Davide De Angelis, Giacomo Squeo and Francesco Caponio

University of Bari, Italy

ACCEPTED

Abstract

The contemporary food industry is currently navigating a transformative shift driven by a growing consumer base identifying as vegetarian, vegan, or flexitarian. This movement has catalysed an urgent global requirement for sustainable, plant-derived protein alternatives and "clean label" formulations that minimize artificial additives. Parallel to these dietary trends is a pressing industrial imperative to integrate circular economy principles and zero-waste approaches into manufacturing. A notable opportunity for such innovation exists within the milling sector: the extraction of lipids from durum wheat (*Triticum turgidum* L. var. *durum)* by-products, however yielding a substantial quantity of defatted cake. Although historically underutilized or discarded as waste, defatted durum wheat cake is a concentrated reservoir of high-quality proteins and dietary fibre, presenting a significant opportunity for the development of value-added food ingredients, especially after the application of dry-fractionation. This research focused on the development and characterization of a vegan, cereal-based snack bar fortified with the dry-fractionated fine fraction of defatted durum wheat cake (DFC). To achieve a product that met both nutritional goals and consumer expectations for quality, a Design of Experiments (DoE) methodology for mixtures was rigorously applied. This approach allowed for the precise optimization of the ingredient ratios to balance structural integrity with sensory appeal. The resulting optimized formulation featured 10% DFC, 30% glucose syrup—serving as the primary binding agent—and a 60% blend of puffed and rolled grains. The experimental outcomes revealed that the incorporation of DFC profoundly influenced the physical and organoleptic properties of the final product. Instrumental texture analysis demonstrated that the DFC-enriched bars possessed a significantly denser and more robust matrix than the control bars. Specifically, the enriched bars exhibited a cutting stress of 1.2 N/mm^2 and a fracture stress of 12.9 N/mm^2, whereas the control group produced values of only 0.52 N/mm^2 and 9.8 N/mm^2, respectively. This increase in mechanical resistance is attributed to the densifying effect of the fine particles within the cereal interstices. Visually, the addition of the by-product shifted the aesthetic profile toward a deeper, more intense yellow-brownish hue. From a sensory perspective, the DFC-enriched bars were characterized by a more complex aromatic profile, specifically showcasing an intensified caramel flavour that was highly favourable. Ultimately, the DFC-fortified snack bar qualified for "low fat" and "source of fibre" nutritional claims under EC Reg. 1924/06, confirming that upcycling milling by-products is a scientifically viable strategy for producing nutritious, sustainable, and market-ready plant-based foods.

Keywords: Vegan food, Milling, Design of experiments, Nutritional composition