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Exploring probiotic activity and vitamin B2 synthesis in kefir-like cereal-based beverages

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Dairy foods constitute a significant portion of the foods included in the Mediterranean diet. Functional beverages stand out as a rapidly expanding segment within emerging food categories. Milk kefir, an ancient fermented beverage, holds a relevant place within the domain of potential functional fermented products, acknowledged for its established health-enhancing properties and the intake of live microbes. Different formulations and biotechnological innovations, such as the in situ synthesis of riboflavin by lactic microorganisms, were recently proposed to develop kefir with improved nutritional features. This study, within the OnFoods project, evaluates the probiotic activity and vitamin B2 synthesis in kefir-like beverages during fermentation of cereal matrices using green techniques. Cereal-based kefir-like fermentable products were obtained from oat, corn and barley flours. The standard milk-based formulation was included in the study as a control kefir production. Fermentations were carried out using two commercial kefir starters (water and milk kefir grains preparation). All the trials were considered with or without a selected *Lactoplantibacillus plantarum* strain capable of vitamin B2 overproduction. Volatile organic compounds with probiotic activity produced during fermentation were sampled automatically every 2 h for 48 h at 25°C by a dynamic headspace module of multipurpose GC automatic sampler into a PTR-ToF-MS 8000 device. Variations in matrix formulation, starter culture, and additional inoculation in the kefir beverages significantly impacted their probiotic activity across all samples. A consistent evolution of probiotic metabolites, such as SFCAs, over time was observed in both milk and kefir-like cereal-based associated volatiles, particularly in the case of barley. The inoculation with *L. plantarum* riboflavin overproducing strain with milk kefir starter in oat, lead to cover, for one serving of 100 g, 11.4% of RDA. The observed differences among kefir beverage types in terms of volatile profiles are anticipated to result in distinct nutritional and sensory properties. The results obtained may contribute to a better understanding of the probiotic activity of kefir, ultimately aiding in the design of innovative fermented foods.