

Advancing cheese through basidiomycota fermentation: Innovations in cheese alternatives and byproduct valorization

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Shifting towards a sustainable and ethical food system necessitates addressing nutrition, safety, sensory attributes, and affordability. In the dairy-free cheese sector, a key challenge is achieving consumer acceptance by replicating the texture and sensory profile of traditional dairy cheese, often compromised by plant-based proteins. Concurrently, valorizing byproducts from both dairy-free cheese production and underutilized resources like acid whey is crucial for circular economy implementation. This underscores the urgent need for research and innovation focused on enhancing the texture, flavor, and overall appeal of dairy-free cheese alternatives, alongside byproduct upcycling into value-added food chain components.

The fungal division Basidiomycota, encompassing over 30,000 species with substantial genomic capacity, exhibits significant metabolic versatility. The unique enzyme toolbox of edible basidiomycota functions as a natural biocatalytic platform ('aroma factory'), capable of generating novel flavors through inherent biochemical pathways, thereby imparting distinctive organoleptic characteristics to food. Furthermore, basidiomycota biomass (mycoprotein) presents a promising alternative protein source due to its favorable nutritional composition and techno-functional properties. Addressing these challenges, the presentation will highlight the competence of basidiomycota-mediated bioprocessing for generating of natural cheese flavors and cheese alternatives, as well as for byproduct valorization, and showcase recent findings from our IGF projects (01IF23315N & 01IF22540N): 1) Edible basidiomycete *Cyclocybe aegerita* for dual production of natural cheese-like aromas from soy-based substrates and high-quality mycoprotein (balanced amino acid composition, umami flavor, no bitterness, desirable firmness and hardness after emulsification) as a novel ingredient for cheese alternatives; and 2) Leveraging basidiomycete *Ischnoderma benzoinum* fermentation of (acid) whey for novel almond-like flavored beverage creation and flavorings benzene derivative (anisaldehyde and benzaldehyde) generation.