

Whey biorefinery: sustainable strategies for added-value food manufacture – a bioeconomic approach

Antonia Terpou and Maria Kanellaki
University of Patras, Greece

Nowadays, enormous quantities of food waste are becoming a global concern. Specifically, dairy industry which is a major economical resource is generating a large volume of waste liquid effluent, namely whey. To address this persistent problem, sustainable interventions with green technologies are essential. Valuable products can be economically recovered from cheese whey using new biochemical processes. Thus, in the present study, whey was utilized initially as a substrate for the production of immobilised functional biocatalysts for the production of novel added-value food products. In parallel, after the biocatalysts removal the detergent liquid-whey was used as a raw material for manufacturing of functional beverages. Whey can be a valuable nutrient medium for cultivation of microorganisms and thus it was used as a substrate for the production of functional immobilised biocatalysts. Dried organic berries (*Hippophae rhamnoides* L.) were selected as supports for the immobilisation bioprocess of the probiotic bacterial strain *Lactobacillus casei* ATCC 393 due to their antioxidant

and antiproliferative activities along with their exceptional technological properties as natural immobilisation carriers. Whey protein and immobilised biocatalyst were removed from whey and used for the production of added value frozen desserts. Subsequently, valorization of the detergent whey was achieved by the incorporation of *Pistacia lentiscus* mastic gum added as a natural preservative. Mastic gum has been used in traditional Greek medicine for various gastrointestinal disorders from the ancient years and is well known for its antimicrobial properties. The incorporated freeze-dried mastic gum significantly reduced the initial high counts of yeasts and fungi of the produced beverages compared to initial whey used as a control sample during 30 days of storage at 4°C. The good texture and the exceptional mastic gum flavor & aroma, along with possible antimicrobial indicates the products high commercialization potential. Adapting biorefinery strategy with integrated approach can lead to the development of circular bioeconomy. Likewise, from the knowledge of environmental stress, proper treatment of whey is extremely necessary and thus the suggested bioprocess of whey valorization for the production of novel added value food products will explore many unfold issues in the field of food fortification, human nutrition and upgradation of dairy effluent whey.

ant.terpou@gmail.com