PoC Project: Assessment of Ice Cream Waste as a Feedstock for Higher Value Applications

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Industrial Collaborator: Unilever

The Challenge
Industrial fermentation feedstocks typically incorporate food-grade materials, such as sugars and vegetable oils, in varying amounts to produce the desired products. This project has evaluated a range of strains across commercially relevant biological production platforms to see if ice cream waste - a rich source of simple sugars and oils - could be used in place of the usual food grade feedstocks.

Project Goals
During the study, multiple analyses of ice cream waste were conducted, the composition varying depending on the products being manufactured at the time. For example, total sugar levels showed a higher level of variation (8 percentage points) than fats. In the fermentation experiments conducted, a comparison was made of the full waste, sugar mixes (e.g. various blends of ice cream waste with optimal pure sugars) and a pure optimal sugar feedstock, to determine the viability of using ice cream waste as a source of sugars and various other growth mediating components.

This project allowed Unilever to examine whether they were able to recover value from an existing manufacturing waste stream and help address their corporate waste policy (where waste is unavoidable, identify outlets for constructive reuse of the waste material).

Conclusions
The growth of the different micro-organisms, and production of materials of value from the ice cream waste were found to vary. One gene expression strain exhibited best growth using the ice cream waste, some strains showed an equivalent growth and production of organic acids or alcohols compared with growth on other sugar sources, while other strains showed reduced growth and yields when ice cream waste alone was used indicating the presence of inhibiting compounds.

Project Outcome
Following the completion of this project the collaborators completed a second project to assess the use of a lipid rich food by-product as a feedstock for the production of microbial lipases.

Academic viewpoint
The project enabled CNAP and the BDC to further expand their capabilities in the Biorenewables sector whilst addressing a current industrial challenge.