

Towards Healthy, Excellent Tasting Ice Cream: The Effect New Oil Formulations on Flavour, Structure and Sensory Perception

Gerhard A. de Ruiter¹, Martijn M.P. Zieverink¹, Ahmadilfitri Md Noor^{1,2}, Marjet Laats³,
Catrienus de Jong³

¹Unimills B.V., Zwijndrecht, The Netherlands. g.ruiter@unimills.nl, ²Golden Hope Research Berhad, Banting, Malaysia, ³NIZO food research, Ede, Netherlands

Current ice creams are either based on dairy fat (with 62% Saturated Fatty Acids or SAFA level) or coconut oil (92% SAFA). Based on the latest recommendations for healthy diets the saturated fatty acid content of ice creams needs to be reduced to levels as low as 40-50%. Consumers on the other hand do not want to compromise on the expected creamy taste. As oil formulations with high levels of unsaturated fatty acids are more sensitive to oxidation, leading to possible off flavours and less creaminess, new solutions are needed.

The main advantage of replacing coconut by straight palm oil is the fact that the latter has a lower SAFA level. However, a different ice cream texture and slight off-flavours may occur due to the fat replacement and changes of the fat melting properties.

To find solutions that can be implemented in ice cream manufacturing plants without changing the current processing lines we have characterised the microstructure of frozen ice cream using Confocal Scanning Laser Microscopy (CLSM). Using this technique, palm oil containing fat blends were optimized to give a good structure at lower SAFA levels. Macroscopic melting tests confirmed the applicability of low SAFA palm oil blends.

Ice cream off-flavours can be caused by the presence of small amounts of oxidized fatty acids. These can be further reduced by optimising the oil processing and fractionation. We identified six different compounds that are associated with the typical “cardboard” off-flavour. We now implement strategies to lower the release of these off-flavour compounds during oral processing as well as matching their release kinetics with the release of masking compounds.

Optimising fat network properties has resulted in an ice cream blend with 39% SAFA content, from which ice creams with excellent sensory properties can be produced at factory scale.