To assist food manufacturers in optimising the nutritional profiles of their products, we have a science-based approach for the reformulation of these products. With our expertise, we define practical guidelines for reducing sugar, salt and SAFAs content and increasing fibre content while retaining a product’s particular commercial qualities.

Over the years, we have acquired a thorough understanding of single and multiple ingredient functionalities which we can use to assist manufacturers to overcome challenges in product reformulation.

Today’s consumers place an increasingly strong emphasis on healthy and natural food products with lower levels of fat, salt and sugar. Food manufacturers meet this need by seeking ways to reduce these levels and boost nutritional value, for instance by adding extra fibre, without losing product quality, shelf life or increasing costs. At TNO, we have an excellent track record in assisting the industry to reformulate products in several product categories, especially concerning the combined reduction of multiple ingredients such as sugar and fat.

Our success relies on our ability to translate scientific knowledge into real-life applications. This is achieved by our thorough understanding of the multiple functionalities of ingredients during processing and our innovative approach using food structure design concepts. For example, we have investigated numerous options for cakes and biscuits and determined how the use of eggs and sugar could be reduced. We have also found ways to lower salt and fat levels in one of our traditional and extremely popular savoury snacks, the Dutch kroket. Another example is lowering salt in soups and sauces without compromising product safety and shelf stability.

For our partners in the food industry and for us at TNO, challenges concern the effective replacement or reformulation of single and multiple ingredients in combination with the need to retain the product properties that our end users, product consumers, value so highly – and for which they will continue to buy improved products. Thanks to our long-term experience and our wide knowledge of multiple functionalities, we are able to assist manufacturers in improving their product processes and their ultimate end products. Some of our joint successes are listed on the back side.
CARAMEL
Replacing sugar in caramel proved to be no simple task: replacements had notable effects on product texture, taste and processing conditions. At TNO, we used different analytical tools to unravel the functionalities of sugar that is present in caramel and subsequently selected potential replacer combinations to produce caramel with reduced sugar content. We set up a small-scale production model to determine key characteristics, for instance by applying stress and by using light microscopy in combination with light scattering. This enabled us to formulate effective rules to adapt the caramel production process and to ensure optimum conditions for the use of replacements without affecting product appearance and consumer perception.

HEALTH BREAD
TNO has led an EU consortium with several knowledge institutes, bakery ingredient producers and bakeries. Together, we developed innovative and commercially viable ingredients with which the quality of bread could be enhanced. We investigated how to ‘unlock’ the health-promoting substances that are situated in the outer layers of whole grain and that are usually excluded from bread made from refined grains. We also determined ways to ‘free’ important compounds such as anti-oxidants that remain locked inside a cell’s tissue when this tissue consists of indigestible dietary fibres. The fruits of these efforts are the solutions we formulated for the bakery sector to optimise its products. Breads produced from these improved ingredients are now produced all over Europe.

CAKE
In a unique partnership with a number of commercial food companies, we have developed strategies and processes for the multiple reformulation of cake products. We concentrated on the simultaneous reduction of fat and sugar as well as increases in fibre content and protein substitutions without compromising the product’s sensory properties or its shelf life. We investigated how these ingredients control the formation of the typical cake structure during baking, and how this is related to cake texture. This approach enabled us to identify optimum replacing solutions. Moreover, because partners hailed from different sectors throughout the food chain, we were able to combine their experience with ours and reduce the time to market for newly reformulated products.

TNO AS A PARTNER
At TNO, we offer manufacturers an integrated and flexible approach to reformulation challenges. In bilateral projects, we can conduct literature reviews, review current product composition and processes or suggest alternatives, and we can also assist in product development up to pilot scale. For in-depth studies and the development of new technologies, we can assemble and lead consortia. We value the involvement of our partners’ technical staff for the long-term implementation of our joint solutions, for which we can organise active dissemination events and master classes.