



Using a predefined strategy and modelling can help manufacturers substitute sugar, salt and fats, claims Dutch research institute TNO. **Maurits Burgering** introduces the first of IFI's new insights into the world of independent ingredients research

A systematic approach to healthier reformulation

With the consumer increasingly looking for healthier options, many in the food industry are left with little choice but to introduce products which meet those new expectations. But how do you go about reducing ingredients such as salt, sugar and fats?

In the mishmash of substitutes, it is not always easy to come up with the right product solution without loss of taste, texture and shelflife.

Food can be made as healthy as you want, but if consumers do not find the taste and texture they expect from a product, they will not buy it.

At the same time, convenience, shelflife and safety are all key issues for the consumer. All of which presents the food industry with a significant challenge in designing healthy products. It sometimes seems a near impossibility to comply with all of these requirements without having to raise the cost price.

So what do Heinz (among other food companies), the Dutch Bakery and Confectionery Industry Association (VBZ) and the Product Board For Livestock and Meat have in common? The answer is that we have worked with all of them on a systematic approach to reformulation in order to address these challenges. TNO is also an active participant in the Top Institute Food and Nutrition (TIFN) partnership, developing technologies to reduce salt, sugar and fat.

Modelling options

Central to our comprehensive approach are our various food model systems, able to quickly and cost-efficiently screen and test the different solutions. The model systems are simplified products that are representative of the specific end product. The approach is illustrated opposite (Figure 1).

We also have theoretical and empirical computer models that are able to quickly evaluate all kinds of options. For instance,

TNO has adapted the 'Hansen model' developed by the paint industry to calculate solute-solvent interactions, and the 'Bruggeman Model' describing the macroscopic properties of food based on the properties and the relative fractions of its components.

Once a reformulation strategy is established, the various product alternatives can actually be made. Critical parameters can then be measured to check how successful the reformulation has been. Texture, microscopy, (accelerated) shelflife tests and taste profiles are the most prevalent parameters.

Salt plays a key role in the taste, texture and shelf life of products, so it is not always feasible to reduce the amount of salt by any significant amount. However, TNO is able to obviate this salt effect by incorporating knowledge of both the formation of texture, the shelflife impact (reduction of water activity) and taste, designing sustainable solutions for a whole range of food applications. One example is the minimisation of salt in bacon, where TNO has managed a viable reduction for industry of up to 40%.

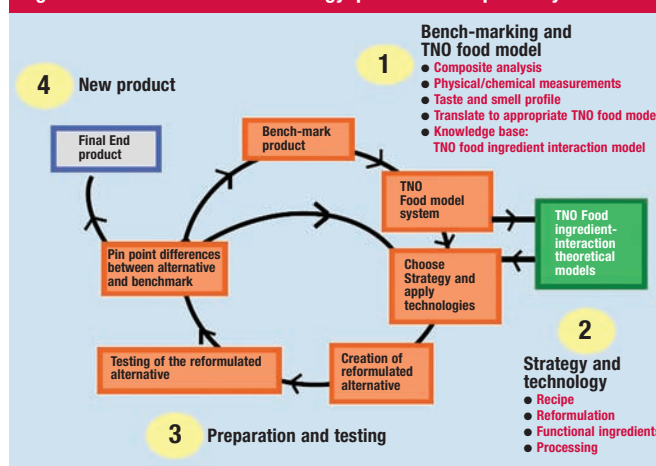
Sugar is frequently added to food to enhance not only sweetness but also other properties like texture (viscosity, stickiness, crystallisation, glazing) and volume. But of course, the calorie content of this ingredient is not so positive for our health. While sugar substitutes seem to be the obvious choice, it is essential that the product retains its taste and texture. This can be achieved by the use of new types of low-calorie sugar in combination with, for

instance, a protein or protein/carbohydrate blend.

Changes in taste caused by altered 'Maillard' reactions also have to be taken into account during production. TNO has generic formulation technology at its disposal that can be used across a wide spectrum for low-calorie, good-tasting products.

Fat reduction, too, has its fair share of problems. Fats are taste carriers, play a role in heat transfer and water activity in a prod-

Figure 1: TNO's reformulation strategy: product development cycle



uct and help to determine the consistency, texture and mouth sensation. In short, the challenge in substituting this functionality is considerable.

Apart from reducing total fat content, the specific reduction of trans- and saturated fatty acids (SAFAs) is high on the agenda. For bakery applications, we have a toolbox that can help reduce 33% of the saturated fatty acids in the end product without any loss of product quality.

Our reformulation work with the VBZ was in the area of SAFA – as well as salt – reduction, and illustrates the broad benefits this type of collaborative strategy can bring. **IFI** Dr. Maurits JM Burgering is senior scientist at TNO Quality of Life for the business unit Food and Biotechnology Innovations