Reformulating Food Products for Improved Nutrition

Or: How to improve processed foods quietly

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Key messages

- Reformulation of food products has enormous potential to improve nutrition without changing consumer behavior.
- Voluntary reformulation by the food industry is not enough. Smart regulations are needed to drive innovation and implementation of solutions for better foods.
- Reformulation needs innovative solutions at the interface of sustainability, food science, and nutrition.

Introduction

The triple burden of malnutrition is a growing challenge worldwide that hampers the health of populations. Virtually all countries in transition have to deal not only with undernutrition but simultaneously with alarming rates of overweight, obesity, and related non-communicable diseases. In Western societies, the prevalence of obesity is soaring, with every third adult person in the United States being obese, generating healthcare expenditures of US$210 billion per year.[1] A healthy diet and physical activity are paramount to achieving a healthy weight. Most people, however, do not eat a healthy diet and are not physically active at the levels needed to maintain a healthy weight. One of the reasons is the changing food environment, which provides increasingly large supplies of rather inexpensive, highly palatable, energy-dense foods that are easily accessible, convenient to consume, and heavily marketed. This type of environment promotes excess caloric intake and eventually obesity.[2] Processed and prepackaged foods provide extensive amounts of sodium and added sugar to the diet in the US, Australia and Europe,[3] but are at the same time an important contributor to the adequate intake of micronutrients.[4]

Attempts to change consumer behavior

In countries of economic transition, the higher incomes of a growing middle class increase affordability of staple foods and lead to diets rich in "empty" calories. Attempts to shift consumer preferences toward nutrient-dense foods rather than energy-dense foods using labeling, fiscal measures, and social media campaigns have had limited success and impact on obesity. Obesity and malnutrition persist, as only a minority of the population is truly interested in healthy eating. Most others have different priorities concerning food, such as taste, price, convenience, family preferences, or simply other problems to deal with rather than healthy food choices – including unemployment, stress, work-life balance, health issues, disabilities, and many more. On top of all this comes the sustainability discussion, with the Sustainable Development Goals putting the focus on agriculture and nutrition – and, indeed, diets that are high in energy-dense but nutrient-poor foods have been highlighted as less environmentally sustainable.[5] Therefore, a more realistic way forward to address malnutrition, obesity, and sustainability challenges is needed rather than trying to change population behaviors.

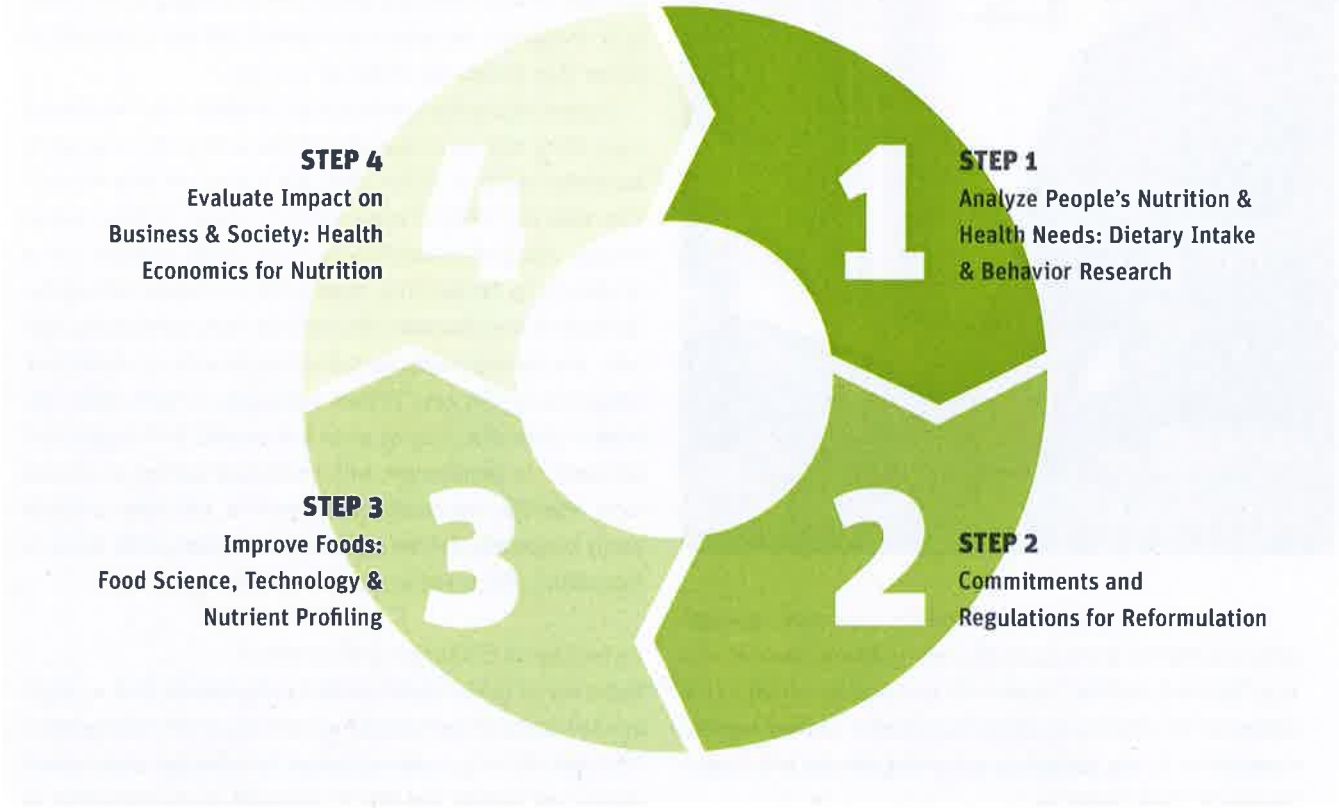
> "A more realistic way to address malnutrition, obesity, and sustainability challenges is needed"

Reformulation – a solution?

To reformulate existing and commonly consumed processed foods can be a highly realistic approach and opportunity to improve the health of people and the health of the planet, with a substantial estimated positive impact on obesity.[6]

The reformulation of processed foods is defined as changing their content by either reducing the content of negative ingredi-

FIGURE 1: A systematic approach to manufacturing foods for better public health.



ents, such as sodium, saturated fats, trans-fats, and energy, and/or by increasing the content of beneficial nutrients, such as dietary fiber, whole grains, fruits, vegetables, and micronutrients. Reformulation is appealing because it requires the least change in dietary behavior of the consumer. Reformulating foods over time with gradual changes may minimize consumer perception and negative attitudes, if both taste and palatability are preserved, thereby keeping food purchasing and consumption patterns unchanged. The gradual reduction of ingredients that are considered "baddies" (sugar, sodium, saturated and trans-fats) would go unnoticed by the vast majority of consumers and could ultimately reduce individual intakes.[7] But the nutritional quality of processed foods can be improved not just by decreasing the "baddies"; reformulation can also bring positive nutrients – the "goodies" such as vitamins and minerals – into diets and enable food fortification at low cost to increase nutrient density, which is the ultimate goal of the reformulation process.

Diets – meaningful targets – nutrient profiling

But where to start and how to do it? Figure 1 describes a systematic approach to manufacturing foods for better public health.[8]

Processed and prepackaged foods make up an important part of diets across the world, accounting, for instance, for more than 50% of the calorie intake in the US and Germany, thus playing a pivotal role in the diets of these populations. Research on dietary intake and eating behavior provides a clearer picture of the types of foods that need to be reformulated, first through the identification of the foods that are consumed by the majority of the population and in the largest amounts. This research therefore identifies the foods for which reformulation will have the greatest impact on public health. In the US, among consumers of pizza, 36% of the daily sodium intake in the age range of 6 to 19 stems from this food item alone. With approximately 20% of US children and adolescents consuming pizza on any given day, this food item has a very high contribution to sodium as well as energy and saturated fat intakes.[9] This clearly highlights the need for sodium reduction in this food category, as the overall sodium intake is well above the recommendations. A similar case can be made for sugar in breakfast cereals, which are often considered a healthy breakfast item by consumers.

"Nutrient profiling is a tool to guide successful reformulation of foods"

Jörg Spieldenner: "One pizza: is that really 2 to 4 portions?"

In view of these examples, the need for a systematic approach and tools that can guide successful reformulation becomes obvious. "Nutrient profiling" is one such tool. It is described as the science of ranking or classifying foods based on their nutrient composition for the purpose of preventing disease and promoting health[10] (see Figure 2).

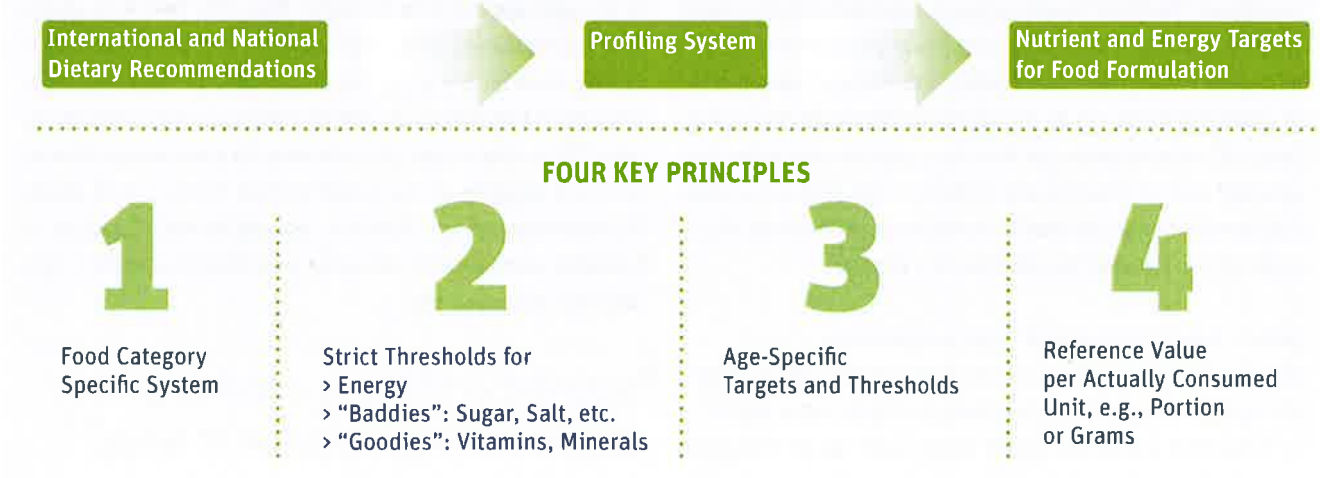
Some systems[11] follow this approach, but nearly all of them struggle with the definition of meaningful reference values for the amount of a specific food consumed. Two examples illustrate this challenge. The serving size of breakfast cereals – between 25 g and 40 g – is defined by food producers in many countries. The actual consumption of a breakfast cereal is, however, higher, leading to a higher intake of sugar than that mentioned on the label. A more striking example is prepackaged pizza, with most labels reporting 2–4 portions per one whole pizza in a carton package. *De facto*, the pizza (300–500 g) is mostly eaten entirely by one person, resulting in an intake of salt that is severalfold higher than the labeled intake per serving.

Several regulating bodies across the globe have introduced a per 100 g reference value as a concise anchor. This may seem somewhat objective at first sight, but it does not take into consideration the reality of consumption as shown in these two examples: 100 g of cereals/serving is too much, whereas 100 g of pizza is by far too little, making this a complex calculation exercise for the consumer. This calls for clear, transparent, realistic, and binding targets for critical ingredients in critical food categories, in this case sodium and sugar, in foods with high impact on the diet, such as pizza and cereals. Such targets and standards, in combination with mandatory portion or serving sizes reflecting true consumption patterns, will make products easily comparable for the consumer and subsequently drive reformulation efforts and improved food offerings.

Technological challenges and solutions

Reduction of public health–sensitive ingredients such as sugar and salt is one of the "classic" ways to approach reformulation. The reach of this is, however, limited, as reduction alone lowers volume and weight and this is perceived by the consumer as "less for more." Some regulations may define volumes, weight, or even composition (product identity standards) in certain food categories. Possible solutions include replacement, for example of sugar with other "fillers" to keep volume and weight stable. However, fillers such as maltodextrin have similar physiological effects as sugar and are not recommended, even if permitted by

FIGURE 2: Nutrient profiling principles



most regulations. Another possibility is to change the food component itself by changing its physical structure. An interesting example is "hollow sugar," obtained by hollowing out sugar particles so they dissolve more quickly on the tongue. This creates the perception of an almost identical sweetness as before, but with much less of the ingredient.[12]

Reduction through decreasing the particle size and effecting a different distribution in the food product or the food matrix is another approach. Enhancing taste perception through surface optimization and a more taste-sensitive positioning of the nutrient is another reduction technique. For instance, salt crystals can be placed on the bottom of the crust of the pizza so that the particles touch the tongue immediately for the perception of the salty taste. Improvement of the nutrient as such is another option – for example, sodium through a mix of sodium and potassium chloride instead of sodium chloride only, given the widespread inadequate potassium intake. Another possibility is to replace food components with similar components, as is done with the reduction of palm oil by partly replacing it with other oils or oil mixtures.

Another important reformulation front concerns nutrient absorption. Mixes of minerals and vitamins that are more bioavailable and have higher bioefficacy are being developed and tested. Regulations are still focused on the amount of the nutrient in food content claims but without taking into account its bioavailability, which can be a true game changer in fortification, particularly with iron.

Nutrition and sustainability

Reformulation according to nutritional and sustainable criteria in the spirit of sustainable nutrition is still in its infancy. Systematic evaluations of nutrition and sustainability in conjunction are still in the research and concept stage and are yet to be implemented at large scale.

In short, innovative approaches to reformulation do exist but come with a cost increase most of the time. This cost increase will generally be passed on to the consumer, who needs to be convinced to buy a better product. This means a change in the marketing approach to an intelligent way of selling a product with added nutritional and sustainability value – an endeavor that needs to be carefully balanced with silent reformulation and steering clear of the breaking point of consumer acceptance.

"Reformulation has the potential to improve diets and thus address obesity and nutrition-related diseases"

Klazine van der Horst: "Although perceived as healthy, cereals contain large amounts of sugar"

Conclusion: The context for a successful implementation

Reformulation has the potential to improve diets and thus address obesity and nutrition-related diseases. The impact on nutrient intake in the diet is immediate without consumers needing to change their eating habits in a profound way. However, reformulation will not replace a healthy diet, and some food products can never be considered healthy options. Only a combination of voluntary measures and regulations alongside individual behavioral changes can achieve effective dietary shifts. Voluntary reformulation based solely upon the good will of the food industry is not sufficient. Why should a food company invest in and lower its margins for better nutrient density in the absence of consumer demand or clear-cut regulation if the competition is not doing it? It is for national authorities to set regulations, creating a level playing field based on their population's diet and nutrient-density needs. These regulations (nutrient and composition targets) need to be smart, encouraging food producers and retailers to increase nutrient density while nudging consumers to increase their purchasing of reformulated foods. Smart regulations as well as consumer demand will drive innovation and investment into the food sector that otherwise would not be generated. Research investment in food technology, behavior science, effectiveness evaluation (e.g., health economics in nutrition), and at the crossroads of agriculture, nutrition, and sustainability will foster interdisciplinary knowledge generation and innovative solutions. Certainly, a mandatory "quiet" improvement of processed foods through reformulation will create quite some noise from farmers to food manufacturers to retailers – yet it is a *sine qua non* for improved nutrition.