Food reformulation: more healthy nutrients and food consciousness

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Introduction

We live in a world surrounded by an unsustainable paradox: for every undernourished person, there are two who are overweight or obese. As highlighted by the World Health Organization in 2014, there are more than 1.9 billion adults overweight; 600 million people of these are obese and since 1980 the number of cases has more than doubled. Obesity is one of the major public health concerns, because it is a risk factor for several chronic diseases, like diabetes, cardiovascular disease, breast and colorectal cancer. Considering that chronic diseases are the main cause of disability and death in the world, the effort to tackle obesity should generate positive effects on health and longevity (with a ten-year increase in lifespan) and reduce economic costs (an obese person requires higher health care expenditure) also in the future. To achieve these goals, prevention can be one of the most effective ways to improve health, even if it requires time to contrast social constraints like lifestyle and human behaviour.

Governments can play a key role in promoting healthy diet through taxes on food and beverage, advanced nutrition labelling, regulation of food advertising, school-based interventions, physician counselling (Sassi, 2010). The private sector has the possibility to contribute to improving individual lifestyle and encouraging more healthy diets. Industries can take action by working on Food Reformulation (referred to also as "change in composition of food"), one of the most potentially effective policies that should be implemented.

The definition provided by the National Heart Foundation of Australia (Heart Foundation, 2012) explains that it consists in "changing the nutrient content of a processed food product to either reduce the content of negative nutrients such as sodium, sugar, saturated fat, trans fat or energy (kilojoules) or to increase the content of beneficial nutrients such as dietary fibre, wholegrains, fruit, vegetables and unsaturated fats".

The focus is on processed food because most primary food commodities result processed in some way (changed with chemical or biological items or through cooking) to obtain nutritious substances. This article aims to improve nutrient content of food through actions taken by food and beverage companies. By purchasing processed products, people consume the majority of unhealthy ingredients and consequently the role of the private sector in defining healthy food offer is crucial (Capacci *et al*., 2012).

Companies are involved in two different aspects: on one hand they have to follow (voluntary or mandatory) government guidelines on limiting the use of unhealthy ingredients such salt and sugar (useful for taste), or trans fats (used for economic convenience). On the other hand they want to guarantee consumer demands for their products. The work in changing the composition of food concerns several agents, involves social and economics aspects and can be obtained in different ways.

Type of Food Reformulation

Table 1 shows a summary of possible interventions, considering selected food categories and items. This initial stage proposition, presents actions taken by industries to reduce trans fat, saturated fat, salt, sugar or increasing fibre.

Table 1
Interventions on food reformulation by key nutrients and food category/items

Food category	Food items	1. Trans fatty acids (TFA)	2. Saturated fatty acids (SFA)	3. Salt	4. Sugar	5. Fibre
Cereals and cereal products	Bread			Reduced by 25%		
	Breakfast cereals			Reduced by 15-38%		Whole grain ranging from 15-100%
Meat	Processed meat			Reported reductions		
Milk and milk products	Milk		Reported reductions			
	Cheese		Reported reductions	Reported reductions		
	Yoghurt				Reported reductions	
Fats and oils	Margarines	Elimination				
	Fats	Elimination	Reduced by 20 to 80%			
Beverages	Sugary drinks				Reduced by 10-40% in light products	
Other foods	Snacks		Reduced by 30-70% in chips	Reduced by 25% in chips		
	Sweets					
	Soups			Reduced by 10-30%		
	Sauces			Reduced by 30%		
	Cakes and biscuits	Reduced below 1g/100g	Reduced by 15-18% in biscuits	Reduced by 20-40%		

Source: Van Raaij *et al*.

Reductions of fat in products or its replacement for lower fat alternatives are the most common solutions. In general fat can be replaced for potato, egg or soy, trying to maintain the same taste, as well as quantity of calories and volume.

The first initiative focuses on the removal or reduction of trans fatty acids (TFA), a type of fat that is naturally present in cow's milk and beef. It can also be obtained as result of an industrial process called "hydrogenation". Overconsumption of TFA can be a determinant to high risk of cardiovascular disease (CVDs), diabetes and cancers (Menaa *et al*., 2013). The elimination of TFA is more easily achieved in margarines and fats, while there are cases of reduction in cakes and biscuits. To reduce the presence of TFA, which is present largely due to the use of partially hydrogenated oils, food manufactures can also decide to replace it with alternative fats and oils (Mozaffarian and Clarke, 2009).

The second intervention allow for reduced saturated fatty acids (SFA), a kind of fat that is found in animal food and in palm or coconut oils. Food industries can replace SFA with unsaturated fatty acids. This produces effects also on milk, thanks to a change in the diet of cows through the use of linseed oil that increases unsaturated fatty acids in milk (van Raaij *et al*., 2008). In this case, the risk of unsaturated fat is a change in consistency of the fat (softer) and the risk of increase in rancidity.

The third option, the most developed, is linked to processed food that is a major contributor to dietary salt intake of the population. Salt is a key determinant to diseases like Coronary Heart Disease (CHD). The salt content in Europe exceeds 1.8g/100 g, which represents 30 % of the targeted daily intake level. Reduction in dietary salt of up to 3g per day should be considered a target for the improvement of public health (Bibbins-Domingo *et al*., 2010). This initiative can involve wide food categories (i.e. by flavouring in chips). There is a risk of diminishing taste, but for a few nutrients results can also reach 40% in salt reduction. This policy is implemented in Europe by governments (UK, France, Finland) and food companies (Netherlands), with bread as the most targeted product.

Another intervention is based on decreased sugar utilization in drinks and yogurt. Sugar contributes to food texture and volume. Sometimes added sugar can often just be taken out. In other cases, if there are limits to reducing the amount of sugar, some food and beverage companies have introduced new light products where artificial sweeteners (isomalt) replace sugar. Nowadays many sugar-free and sugar reduced foods are available, but most of the time the replacement leads to a sort of compensation with other carbohydrates to maintain the same volume of food.

The last option presents a policy that target, in particular, breakfast cereals, which have been reformulated introducing wholegrain items. Fibre can be added, as well as water and air, to reduce energy density (Kj/g food).

Consumers, Food companies and Government

Food reformulation involves many agents who are complementary to the implementing of a successful intervention.

Consumers are the beneficiaries of this policy and they have the possibility to accept reformulated food or change their demand depending on personal interest, taste or appreciation. They can consider the "new" product too different in terms of taste from the previous one, which will bring them to the conclusion that they do not like it and will buy something else. On the other hand consumers can decide that it is better to have natural ingredients (fat, sugar) instead of artificial components as replacement. Consumers can also be influenced by price increase, because healthier foods may require more expensive input and procedure, and they may be unwilling to pay more for a healthier choice. Another option is related to psychological circumstances. In fact, if purchasers decide that a reformulated product is healthier but that it loses out in terms of taste, due to the perception that "low fat has poor taste", they will move on to other food items.

This consumer perception leads to the dilemma of the manufacturer, called "health or stealth": food companies can introduce reformulated foods as an opportunity to market new healthier nutrients or decide not to inform consumers of their change. In countries where governments invest in mass media campaigns to increase awareness about reduction in salt, fat and sugar intake, industries should promote their healthier options in the market. Otherwise, many private companies prefer the "stealth" choice as a successful strategy to achieve reformulation, to be sure not to have a "new" product which is considered inferior (Webster and Hawkes, 2009).

Recently, Unilever has confirmed "they are re-introducing some products into the market avoiding special labelling". And Nestlé has highlighted how they work on food reformulation for the entire portfolio through "stealth" strategy and not only for specific segment of products (A European Platform for Action, 2014). The change in the composition of food requires time and investment by industries, and sometimes they prefer to introduce a brand- new product into the market instead of working on reformulation of "old" food item. Costs to ensure taste, texture and safety for consumers in food reformulation are high, and they vary depending on types of products, companies and techniques implemented. Nestlé created is own Research Center in 1987, which represents the world's largest private food nutrition research institute. This power and capacity to define own standards on food safety could jeopardize the efficacy and influence of public norms.

Governments have a key role in boosting and supporting the food reformulation. There are laws already in place that define compositional standards for certain foods or for selected parts of the population. For instance, in 2005 the UK government introduced a salt reduction program that influenced food industries to set certain levels of nutrients in some products. Another option is to establish criteria for a targeted population, for example to reduce fat consumption in food in schools. In cooperation with governments, industries can be encouraged to change the composition of food with more healthy ingredients. And government regulations can generate new market opportunities for food companies, who can "reformulate products in way that may justify health claims" (Sassi, 2010).

Successful examples, food labelling and education

To promote and facilitate the development of healthier composition of food, there are a few actions suggested by the literature that can improve this process. It could be important to focus on and spread the news of successful examples where the reduction of unhealthy elements is possible and effective. This is the case in the reformulation of bread and biscuits, the most mentioned areas of intervention in many countries. A second improvement is shown by studies on food labelling, where some governments have introduced policies to increase information about products and quantity of ingredients. A labelling intervention produces effects and leads to change in composition of food, in particular referring to salt reduction and increase in fibre (Vyth *et al*., 2010). This interaction among different health policies can also be seen in in education campaigns (van Raaij *et al*., 2008). If a consumer chooses to buy reformulated food, his decision will be based on the selling price and whether or not the original product is still in the market. But more relevant for the effectiveness of the policy will be whether communication and education on health benefits in fat, salt and sugar reduction have reached the population.

Limits and Risks

Reformulation differs in each category of products and is not always possible. The limit of change in composition of nutrients concerns food safety. Due to the reduction of sodium in one product, industries have had to find an effective replacement for salt capacity to prevent food spoilage. Another issue is to achieve healthier nutrient through proper technological support, which guarantees the structure of food with alternative ingredients that replace saturated fat for instance. In fact, the question "what replaces the substituted product is necessarily better for health?" is relevant (Traill *et al*., 2012). An evidence based example proves that a risk for consumers occurs when private companies decide to replace trans fat with saturated fat: this intervention could mitigate positive effects on health because the combined content of these fats in the food could remain about the same or even increase (Mozaffarian *et al*., 2010). If we consider soft drinks, where the presence of sugar has been reduced thanks to sweetening agents, there are still some questions about the long-term health impact on diet.

Outcomes

The literature documents some results achieved after the introduction of food reformulation policy. In 2005 the Food Standards Agency (FSA) and UK government set a salt reduction target and they established commitments towards food companies that collaborated in reducing levels of fat, salt and sugar. In 2009 they reported achievement on reduction of salt intake in breakfast cereals (-44%), sliced bread (-33%), and cakes and biscuits (up to -55%). The UK population changed its level of daily personal consumption from 9.5 g to 8.6 g (Traill *et al*., 2012).

Starting from 1975, Finland introduced the same policy with positive effects, reaching 9g per day per person and a reduction of 3g in average population salt intake. These are two countries that have already demonstrated the impact of salt reduction intervention on public health: they reported effectiveness of a policy combination of food reformulation, food labelling and initiatives to raise consumer awareness (Kanzler *et al*., 2014). Also in Sweden, thanks to a previous introduction of food labelling intervention, food companies were encouraged to reformulate their products to reduce fat ingredients.

In addition to results in terms of quantity decrease, the UK government presented estimation on health benefits due to saturated fat reduction of 0.5%, which could produce over 200,000 Quality Adjusted Life Years (QALYs). OECD estimates that "a regulatory intervention designed to achieve a reduction in salt intake of 3g per day would save 194,000 to 392,000 QALYs and $10 billion to $24 billion in health care costs annually".

At European level, the EU Platform for Action on Diet, Physical Activity and Health is working on a tax for food reformulation and selecting target of products. Thanks to recommendation and assessment of the Irish Special Action Group on Obesity, the introduction of a tax (10%) on sugar-sweetened drinks (SSDs) could achieve a reduction of 10.000 cases of obese adults. Concerning reduction of saturated fat content, Romania reported a decrease up to 5% between 2007 and 2011. And Slovenia approved a national plan to decrease the content of SFA by 10% by 2020 without any increase to the total sum of TFA + SFA (High Level Group on Nutrition and Physical Activity, 2013).

Some countries, like Australia, reported less positive data in terms of effectiveness. The lack of coordination in salt reduction strategy among public institutions and private sector, combined with the absence of reduction targets for ready meals, have reduced the positive impact of this policy (Kanzler *et al*., 2014).

Conclusion

There is evidence that food reformulation alone will not be effective, and it should be implemented in combination with food labelling and public campaigns (food education) to increase people awareness and widen their set of choices. To reduce the information asymmetry between consumers and companies, the latter should proceed to change the composition of products while reducing "stealth" strategy. It is only thanks to information campaigns that the change in composition of food can be an effective policy, which will allow companies to gain a competitive advantage. This means that all agents need to work together to create a healthier diet, which is one of the key policies in which governments expect a contribution from the food and beverage industry. If the private sector acts in collaboration with and in response to government pressure, the food reformulation policy is bound to work.

Thanks to Expo Milano 2015 (where the core theme is "Feeding the Planet, Energy for Life"), the focus on food safety and security will be a great opportunity to gain the *momentum* about introduction of innovative food policies. In particular, food issue in the Mediterranean region will be presented at the Cluster "Bio-Mediterraneum", where over ten countries will propose possible solutions to increase participation and integration through healthy food.

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