Innovation in processing and reformulation of vegetable oils and fats

Within the global context of health, diet and physical activity, the vegetable oils and fats sector is actively working on healthy solutions for the EU food market.

Despite different national diets in the EU, which present a variety of challenges for reformulating options, the industry has worked over the last 10 years towards achieving the following goals:

- Lowering Trans Fatty Acids (TFA),
- Lowering Saturated Fatty Acids (SAFA) and
- Increasing Mono- and Polyunsaturated Fatty Acids (MUFA, PUFA)

Within the global context of health, diet and physical activity, the vegetable oils and fats sector is actively working on healthy solutions for the EU food market.

The vegetable oils and fats industry is committed to deliver formulations with an improved nutritional profile to the food industry:

- Significant improvements have been achieved in the last 10 years in reducing TFA and SAFA, and increasing MUFA and PUFA
- The vegetable oils and fats industry and food producers have to overcome technical challenges to deliver food products with the same functionalities and sensory properties
- Raw materials and innovative processes are in constant development with a clear cost impact

The vegetable oils and fats industry will continue working closely with its customers and with regulators to provide ‘healthier’ solutions in a flexible regulatory framework.

Results

- The average TFA content in vegetable oils and fats has decreased over the last 10 years from 5.3 to 1% on fat basis, which corresponds to a relative decrease of 81%.
- A slight increase of SAFA can be observed from 1998 to 2003, followed by a decrease from 2003 to 2008 reaching 27.3% of total fat. Further important reformulation efforts have taken place since 2008.
- An increase of the MUFA content can be observed in 2008 compared to 2003, which corresponds to a relative increase of 17%.
- The level of PUFA has remained relatively steady over the last 10 years. Since 2008, initiatives aiming at increasing PUFA are being implemented.
Confectionary coating fats were traditionally partially hydrogenated fats high in TFA, to obtain best melting behaviour. In the past years, TFA levels have been drastically reduced, sometimes with increasing SAFA levels to come to an acceptable functionality. These types of fats are used in the biscuits and confectionary industry. Slower crystallization and slower melting, less optimal mouthfeel are existing challenges.

Conclusions:

- At present, large amounts of TFA can be successfully removed from most foods. However, it is critical to keep the flexibility in production processes, where hydrogenation and even (slightly) partially hydrogenated products have clear technological and sensory benefits and at the same time remain a satisfactory option from a nutritional perspective.

- A complete ban on TFA may have counter-productive effects because achieving the same functionalities may require using higher SAFA solutions.

(*) EFSA opinion on TFA (2004) and EFSA opinion on dietary reference values for fats (2010)
Reducing SAFA while simultaneously retaining low levels of TFA is in certain cases very challenging.

Also, because of the different diets across the EU-27, SAFA intakes are widely variable, with intakes in some Member States already below the WHO recommended intake of 10% E.

However, against this background, the industry itself has engaged in substantial R&D activity to reduce SAFA levels in recent years. In a number of product launches and reformulations, SAFA levels have been reduced, sometimes by as much as 30% and even in some cases, by more than 50%, depending on the application. Examples exist in the areas of deep frying oils, biscuits, confectionery creams & caramel. Some products however, cannot be reformulated without losing their protected regulatory status: eg. chocolate, ice cream, ...

The technical challenges are similar to the replacement of TFA and vary depending on the food category (for both functional and organoleptic properties). SAFA-rich products have a hard structure, better oxidative stability, increased crystallisation speed, specific melting profiles and better aeration properties.

The current approaches to SAFA reduction include full or partial replacement of raw materials with high SAFA content by low SAFA ingredients (eg. palm kernel by palm, palm by liquid oils).

Potential solutions may also include the use of structuring agents (can be hard fats), use of antioxidants, use of higher stability oils (e.g. high oleic sunflower oil), new focus on processes and adaptation in production for oil producers, as well as adaptation at the application level by the oil users.

Further substantial investments are needed in oils and fats processing (new and adapted processes) and reformulation (R&D, raw material, etc.). The change to low SAFA vegetable oils and fats also requires investments by the oil users.

Examples:

In the past, the oils used for deep frying contained many hard fats, mostly partially hydrogenated vegetable or animal fats. To reduce TFA levels, many of these fats were replaced by non-hydrogenated palm based products. With TFA virtually removed, lowering SAFA is next in line, through increasing use of liquid oils. However, challenges concerning reduced oxidative stability and in some cases reduced crystallization speed challenges remain to be managed.

Conclusions:

Some major challenges still remain for which solutions are needed, but a number of successful examples show the potential for SAFA reduction.

Notwithstanding, potentially significant challenges faced in attempting further SAFA reductions include: functionality, product flavour and texture, product stability, cost. Some of these factors may limit the scale of SAFA reduction.

There is a considerable need to maintain the flexibility of production processes both for the vegetable oils and fats industry as well as the end users.

The reduction of SAFA presents a bigger cost impact on product reformulation than in the case of TFA-reduction (higher raw material cost and/or adaptations needed in production).

We cannot solve the TFA or SAFA issue alone. Other relevant dietary contributors need to be considered as well.
INCREASE OF MUFA AND PUFA – IMPROVING THE FATTY ACID COMPOSITION

Current trends to increase MUFA and PUFA include:

- Blending different types of vegetable oils to improve their nutritional profile, especially in terms of omega-3 fatty acids, considered as the most deficient fatty acid in Western diets.
- Replacing, partially or totally, fats by liquid oils, resulting in an increase of unsaturated fatty acids in foods.
- Using new types of oils such as high oleic sunflower oil or high oleic rapeseed oil both rich in MUFA and bringing, in addition, new functionalities such as oxidative stability.

Example:

In bottled oils many different oil blends are used today as opposed to single oils (sunflower, rapeseed) in the past.