

# SUSTAINABLE PRODUCTION & HEALTHY EATING

## FACT SHEET



# LOW FAT

SHEET NO. 6

This fact sheet is one of a series compiled by the Food Innovation Centre at the University of Nottingham, providing clear, concise and scientifically reliable information on key topics for SMEs

## Fat Reduction in foods & drinks

### Fats and Oils

Fats and oils (liquid fats) are important to food texture and flavour. They are also an essential part of a healthy diet, as they provide consumers:

- **Energy.** Fats are an energy dense nutrient compared with other nutrients (i.e. carbohydrate and protein). Fats provide 9 kcal/g, protein and carbohydrate provide around 4kcal/g.
- **Essential fatty acids.** Essential fatty acids cannot be made by the human body and have to be obtained through the diet (e.g. some polyunsaturated fatty acids such as omegas 3 & 6), are considered as essential fatty acids for body function.
- **Fat soluble vitamins (e. g vitamins A, D, E and K) and aroma.** Fats not only carry the fat soluble vitamins for human body use, but also carry fat soluble aromas that could be appeal in terms of improving product sensory properties including flavour and mouthfeel.

### Why reduce fat intake and fat level in foods ?

*fat – excessive intake causes public health issues:*

- Fat is essential in our diet. However, like sugar, high fat (high calorie) intake, is also associated with increased risk of obesity and type 2 diabetes. Long term high fat consumption, especially the saturated fats and trans fats, may cause high blood cholesterol, coronary heart disease and some types of cancers and cardiovascular disorders.
- WHO (2003) recommends the daily total fat intake should be less than 30% of the total calories; saturated fat intake should not exceed 10% of the total calories. The UK Food Standard Agency (2008) recommends that saturated fat consumption should be reduced from 13.3% of dietary energy to 11%. Many European countries have included 'reducing fat content through food reformulation' into their nutrition action plans.
- **UK government policy.** The Department of Health & Social Care, UK (updated July 2021) is introducing a policy restricting promotions of products high in fat, sugar and salt by location and by price. The aim of this policy is to help improve people's (especially children) diet and reduce the risk of obesity and obesity related diseases. ([Reference: click here](#))
- **Increased market demand:** With the increase preference of healthy eating, consumers demand more healthier foods.

### Which products ?

Meat and fish (especially processed meats) and bakery products are the major sources of fat, and are the main contributors to high fat intake (Fig 1). These food groups should be the main targets for food producers to reduce fat.

### Which type of fats need to be reduced or replaced?

- **There are two main group of fats:** saturated fats (including trans fats) and unsaturated fats (monounsaturated fatty acids, e.g. in olive, rapeseed oils, or polyunsaturated fatty acids, e.g. omegas 3 & 6 in seafoods, sunflower and corn oils).
- **Saturated fats:** usually solid form in room temperature, mainly found in foods of animal origin (e.g. lards, fat on meats, butter, full fat dairy products, and pastries). Vegetable based saturated fats include coconut oil, cocoa butter and palm oil.
- **Trans-fats:** usually produced from hydrogenation or generated from frying of vegetable oils. They are found in processed foods and considered less healthy.
- Saturated fats need to be cut down in products and diet. They can be reduced/replaced by using fat replacers/substitutes.

### Fat replacers market and trends

- Globally, North America is the largest market for fat replacers in the world due to the increasing demand for low calories foods and drinks. Within Europe, the UK is dominating the fat replacer market, followed by Germany and others.
- According to a report from the Orion Market Research Private Ltd, in the UK, the fat replacer market is projected to grow 6.6.% per year from 2020 - 2026. The key driving factor of this growth is consumer shift towards healthy dietary habits. Additionally, governments have taken initiatives to minimize the fat content in processed foods, which leads to food companies substituting fat in their products with the fat replacers, driving the fat replacer market growth.
- **Major players:** In the UK fat replacer market, the Key players include Tate & Lyle Plc, Kerry Group Plc, associated British food Plc, Ashland Inc., Cargill, Inc. ADM, Pfizer Inc, Unilever, DSM Food specialists, Andeavor, Sensus etc. For example, Ulrick and Short (a British clean label ingredient company) has recently launched a new fat replacer product i.e. Delyte 9, which is suitable for the application in dairy based confectionery products (e.g. custards, cream).

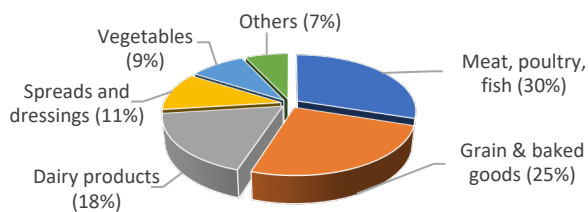


Figure 1: Major sources of fat in US diet (USAD)

## What are the challenges around reducing fat/fat replacement ?

- **Technical challenges (Nutrition vs Shelf life).** 1) Highly unsaturated oils are generally considered healthier than saturated fats. However, they are more easily oxidised and have lower melting points. As such, replacing saturated fats with unsaturated oils may affect the product shelf life and product processibility. 2) The food industry has aggressively reduced saturated fat content in processed foods, but it is not easy, as solid fat plays important roles in product physical properties and acceptance, e.g. texture properties of meat, dairy and chocolate products, are very dependent on their solid fat content.
- **Consumer acceptance:** There is no single fat replacer ingredient can replace all functional roles of fats in every product. Often, a combination of multiple fat replacers is a solution, but it is still depending upon the exact functionality requirement of specific product application. Thus, product quality in terms of sensory attributes such as appearance/colour, texture, volume and microbial shelf life, is affected by lowering or removing fat, which may change consumers acceptance.
- **Cost.** Reducing saturated fat by using healthier but more expensive fats/oils, or fat replacement ingredients, would increase product cost. Product reformulation and innovation, requires more resources, production time input and may also require new packaging/nutritional claims. It could further increase industries' cost and then pass on to consumers, thereby may affect consumers' purchase choice and expectations.
- **Regulatory:** Partially hydrogenated fats are not allowed in foods. Food SMEs must select approved and commercially available replacers.

## Functional role of fats in foods:

Functionality	Brief description In food products
Texture	Provide shortness, crumbly texture in baked products (fats coat flour, inhibits gluten formation); creaminess in emulsion-based products (e.g. Ice cream, mayonnaise)
Aeration and stability	Prevent gas loss and allows baked products to expand better (e.g. fat crystallises hold the air bubbles)
Lubrication and heat transfer	Natural lubricant – improving dough handing (less sticky); heat transfer medium for frying
Moisture barrier	Extend shelf-life In baked goods by preventing moisture migration
Emulsification	Air cell retention by surrounding air bubbles in baked goods, and/or ice cream
Melting & crystallisation	Contribute mouthfeel in chocolate, confectionary fillings, margarines, spreads
Colour & flavour	Chocolate coating; butter contributes to yellow colour to biscuits; carry fat soluble flavours, infused oils (i.e. garlic, chilli oils), off-flavour from oxidation

## Traffic light labelling and claims for reduced-fat products

Nutrient	Low	Medium	High
Fat	≤ 3g/100g	< 3g -20g /100g	> 20g/100g
Saturated fat	≤ 1.5g/100g	< 1.5g - 5g /100g	> 5g/100g

### Fat related nutritional claims:

'**Fat free**': 0.5g of fat or less per 100g or 100ml. (avoid 'X% fat free').

'**Low in fat**': ≤ 3g per 100g food, or < 1.5g per 100ml for liquids.

'**Saturated fat free**': 0.1g of saturates per 100g or 100ml.

'**Low in saturated fat**': ≤ 1.5g of saturates per 100g, or ≤ 0.75g per 100ml for liquids.

## How to reduce fat in foods for food businesses?

- The initial strategy in 1980s was to directly remove the fat from food products. While this worked well for milk, some dairy products and certain processed meats, it did not work for many other products.
- In 21<sup>st</sup> century, many food industries and scientists are reformulating products to reduce fat content. One of the most important approaches is to develop functional ingredients as fat replacers to simulate the functional roles (e.g. texture/creaminess, mouthfeel, lubrication, heat transfer/frying, sensory/flavour, palatability etc) of fats.
- Today there are many types of commercial fat replacers/substitutes available on the market:
  - **1. Carbohydrate-based ingredients:** Dominating in fat replacer market, including cellulose, gums, starches, fibres, maltodextrins, inulin etc. Most of them have been safely used for many years for many product formulations as food stabilizers and thickeners. Suitable for heat applications, but not suitable for frying foods.
  - **2. Protein based ingredients:** Protein microspheres (e.g. egg white, whey protein microparticulates) that are a similar size to fat droplets can act as fat replacers. There are relatively fewer commercially available options, but very suitable for uncooked, refrigerated and frozen product applications, sometimes for heat applications (e.g. cream soups, pasteurized products, baked goods), but not suitable for frying foods or allergy- sensitive consumers.
  - **3. Fat-based ingredients:** Usually made from fat, for example by replacing triglycerides in vegetable oils to provide fewer or no calories. They are heat stable, can be used in baked, cheese, confections, sour cream etc. Some are suitable for frying.
- Future technologies: Scientists are looking at structuring approaches to reduce fat content, e.g. Oleogel technology, particle design techniques for oil or oil droplet structuring to simulate fats.

## Resources

Wentao Liu(2021) 'Fat Reduction in foods'. In: Wentao Liu (2021) 'Healthy Eating'.

## Contacts & further information

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To download this document, the main reference guide and more:

🌐 <https://www.nottingham.ac.uk/fic/research-healthy-eating.aspx>