

... Food production 1: The evolution of meeting nutritional needs through processing and labelling ...

European consumers expect nutritious, safe, environmentally sustainable, and affordable food products. This article gives an overview of food processing, its evolution, consumer trends, and how the food industry works to meet EU consumer needs and desires, focusing on nutrition.



From raw ingredients to foods

While some foods can be eaten raw (like most fruits and some vegetables), most foods need to be processed in some way to ensure safety and digestibility, and to improve colour, flavour or texture, to meet consumer expectations. The most basic definition of **food processing** is "a variety of operations by which raw foodstuffs are made suitable for consumption, cooking, or storage". Hence, you could consider washing, peeling, slicing, juicing, and removing inedible parts, to be forms of processing. Legislation defines "food processing" as actions that substantially change the initial product, including heating, smoking,

curing, maturing, drying, marinating, extraction, extrusion.¹

How does food processing affect nutritional value?

Simple procedures like washing, cutting and packaging of fresh vegetables have little effect on their nutritional quality. **Heating and boiling** can reduce vitamin content (particularly water-soluble vitamins such as vitamin C, for example up to 40% of vitamin C can be lost from boiling peeled potatoes²), which varies with heating time and temperature. The process of blanching or boiling vegetables for a few minutes, followed by freezing, drying or canning, retains vitamins and minerals. Refined grains like white pasta, rice and bread, contain a lower amount of fibre and of vitamins and minerals than their **whole grain** counterparts; unless these are added back after milling (by the process of enrichment). In other cases, processing can release nutrients and make them more readily available for our bodies to use. For example, the **Niacin (Vitamin B₃) in maize** is not nutritionally available unless the maize has been soaked and cooked in limewater (an alkaline solution of calcium hydroxide in water).

The history of food processing

Food processing has occurred since pre-historic times. Humans have been using fire for at least 250,000 years.³ **Cooking**, a form of food processing which improves palatability, digestibility, and safety, followed thereafter. More complex forms of food processing emerged in ancient and medieval times: baking bread, producing cheese, wine, sun-dried or vinegar-pickled vegetables, and salted or smoked meat. Processed foods made up a significant part of the human diet whenever it was not possible to eat fresh or to be sustained by agriculture and farming due to seasonal changes, crop failures or wars. Marching armies and sailors on long sea voyages relied heavily on processed foods as well. Mass scale food processing (producing foods in large amounts) was introduced during the industrial revolution in the 18th and 19th century, starting with the advent of canned and pasteurised foods. In the first half of the 20th century, Europe was ravaged by malnutrition (undernutrition), caused by poverty, an economic depression and two catastrophic world wars.^{4,5} As a result, mass food production focused on sustaining the European population; reducing foodborne diseases, malnutrition and nutrient deficiencies by providing protein-rich, energy-dense and fortified foods (with vitamins) that were accessible to all.

Modern times

Mass food production and processing still serves an important role. Without it, consumers would be restricted to what is produced locally, limiting food availability and accessibility for the great majority that live in urban environments.⁶ An increased food offer allows people to choose a more varied diet, which is more likely to provide all the nutrients required for good health.⁷

The factors that influence consumers' food choice include quality, price, appearance, taste, health, family preferences, habits, safety, production methods, country of origin, brand name, availability, and avoiding food allergies.⁸ Our eating habits have shifted, driven by convenience and time pressures, with more food eaten out-of-home (10-30% of total daily energy intake).⁹⁻¹¹ In addition, food choices can be driven by emerging trends, such as perceived environmental sustainability, organic or fair-trade foods. In the last decades, consumers have become more health conscious and interested in maintaining or improving their health through their diets.

Obesity is considered by the World Health Organization as one of the greatest public health challenges for the 21st century.¹² Recent figures show that, globally, 36.9% of men and 38.0% of women are overweight or obese.¹³ For the European continent, adult overweight and obesity prevalence has reached an average of 59.5% for men and 51.9% for women.¹³ The EU population is also ageing, and the older population is expected to become an even more important consumer group in the future.¹⁴

Product development and labelling

The European Commission established the **EU Platform for Action on Diet, Physical Activity and Health** in 2005. The Platform brings together policy makers, industry and non-profit organisations to improve European diets and health. The members of the Platform pledge commitments - voluntary actions that promote healthier lifestyles. Various commitments have been taken by the platform members including pledges on portion sizes, labelling information, health promotion and education. Significant progress has been made by **reformulating** (changing the nutrient composition of existing products), e.g. to reduce



their energy, **fat, sugar** and **salt** content where technically possible. For example, four commitments that provided quantified and comparable data on salt resulted in a reduction of 733.⁴ tons of salt in 2011.¹⁵ However, reformulation **is not a simple task, as removing or reducing an ingredient** like sugar or salt may drastically change the taste, texture, appearance and even safety of a food. Thus food processing procedures have to be adapted, to achieve a final product that still meets consumer expectations.

On the other hand, products may have ingredients added to improve their nutritional value, **fortified or enriched** with minerals or vitamins for example. Furthermore, so called **"functional" foods** are foods that, when consumed as part of a balanced diet, offer potential health benefits beyond their traditional nutritional value (for example margarines with added **sterols and stanol esters**). The food industry is constantly performing innovative research, in-house or in-collaboration with research institutes and universities, to improve food processing techniques and to better understanding consumer preferences.

Nutrition labelling is another way to support consumers in making better informed choices regarding their diets. The European Commission's new regulation on the provision of food information to consumers makes nutrition labelling mandatory for pre-packed food (all products by end of 2016).¹⁶ The legislation requires the declaration of the nutrient content (per 100 grams or millilitres) for energy and macronutrients such as carbohydrates, fats (and saturates), proteins and salt, as well as highlighting allergens.¹⁶ Additional information on monounsaturates, polyunsaturates, polyols, starch, fibre, vitamins and minerals, can be given if present in significant amounts. The information may also be given per portion of food. The food industry also voluntarily provides nutritional information as a percentage of the reference intake of an average adult (commonly known as **Guideline Daily Amounts, GDAs**). In some member states other voluntary front-of-pack schemes may be given in the same field of vision, such as the traffic lights-GDA in the UK, Keyhole symbol in the Nordic countries, and the Choices logo in The Netherlands. The extent that consumers understand and use nutritional information on food labels was explored by the **FLABEL project**. The project found that consumers lack motivation and attention to use nutrition labelling, which could be improved by showing it in a consistent way on the front-of-pack, perhaps combined with a logo.¹⁷

To be continued...

In this article we have explained how food processing has evolved throughout human history reflecting the changes in societal needs and consumer expectations. We have also highlighted some of the policies that aim to improve consumer diets. Two following Food Today articles will focus on the efforts to provide safe (Food production 2) and environmentally sustainable food products (Food production 3).

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