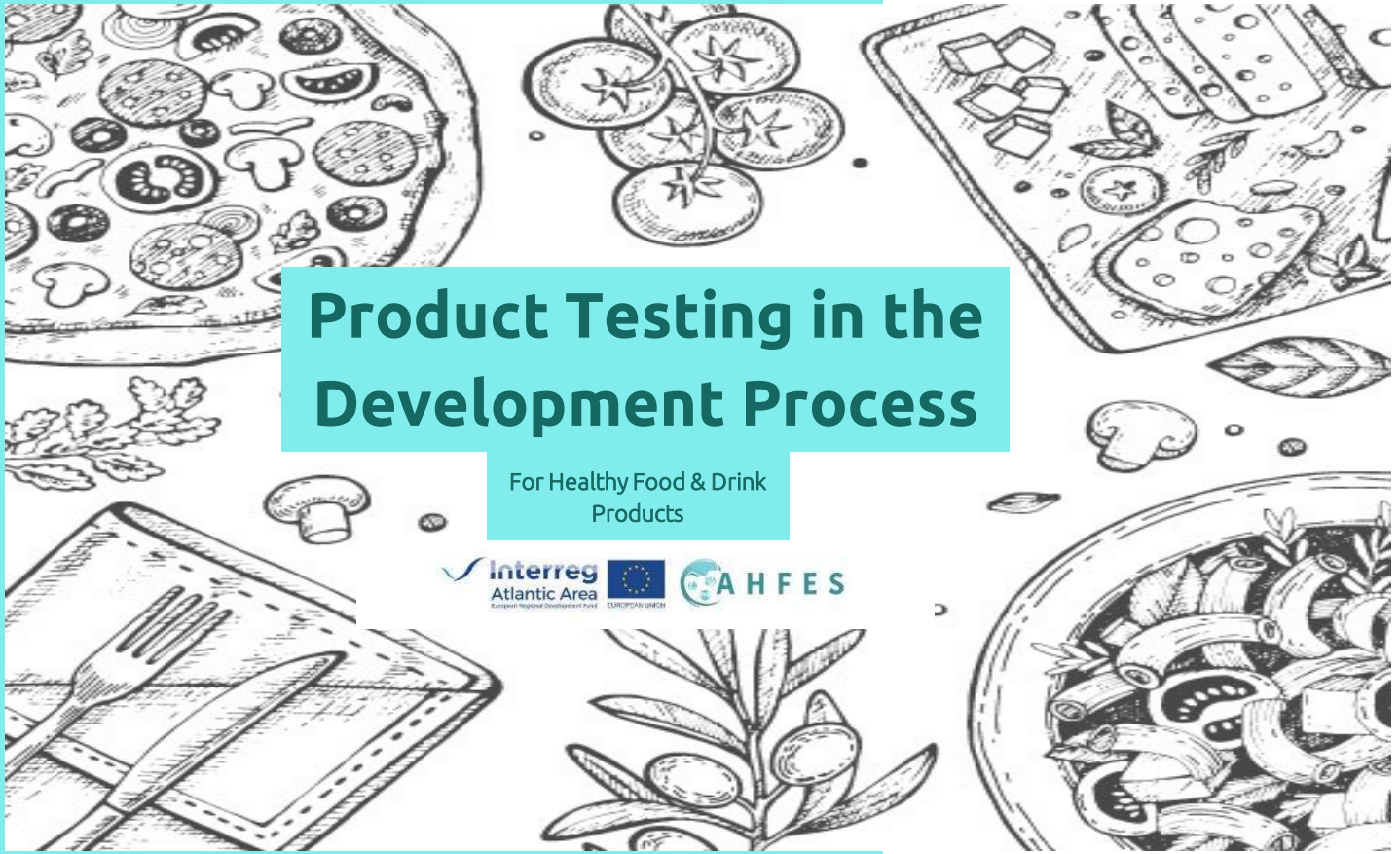


Product Testing in the Development Process

For Healthy Food & Drink Products

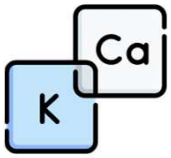
Interreg Atlantic Area

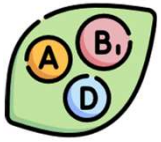
AHFES

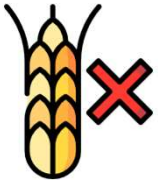
Module Contents

Module Contents

Scope of this Training Module







Ensuring that the products which you bring to market are **safe for consumption** during the whole of their shelf life is a **fundamental legal duty** of every food producer.

In addition you need to **prove that any information or claims** which you include on your product packaging or refer to in your marketing **is true**.

Also you will wish to advise consumers as to the best way to prepare and consume your product, so that they will have the **best possible experience** and wish to buy it frequently.

There are a number of tests which your products should undergo during the development process in order to provide you with the proof and verification which you need to launch safe and delicious products.

As products vary widely in their characteristics, this module is not able to cover every type of test that your individual products may require.

Instead it seeks to provide you with **an overview of the type of tests needed**, and we recommend that you **seek the advice of an appropriately qualified professional** for any product specific queries you may have.

Getting the Best from this Training Module

To gain the best outcomes from this training module you may wish to use the information it provides in conjunction with previous AHFES training modules.

Some modules that you may find useful include :

P1-M7 Legal Aspects of Development

P3-M5 Pack Design

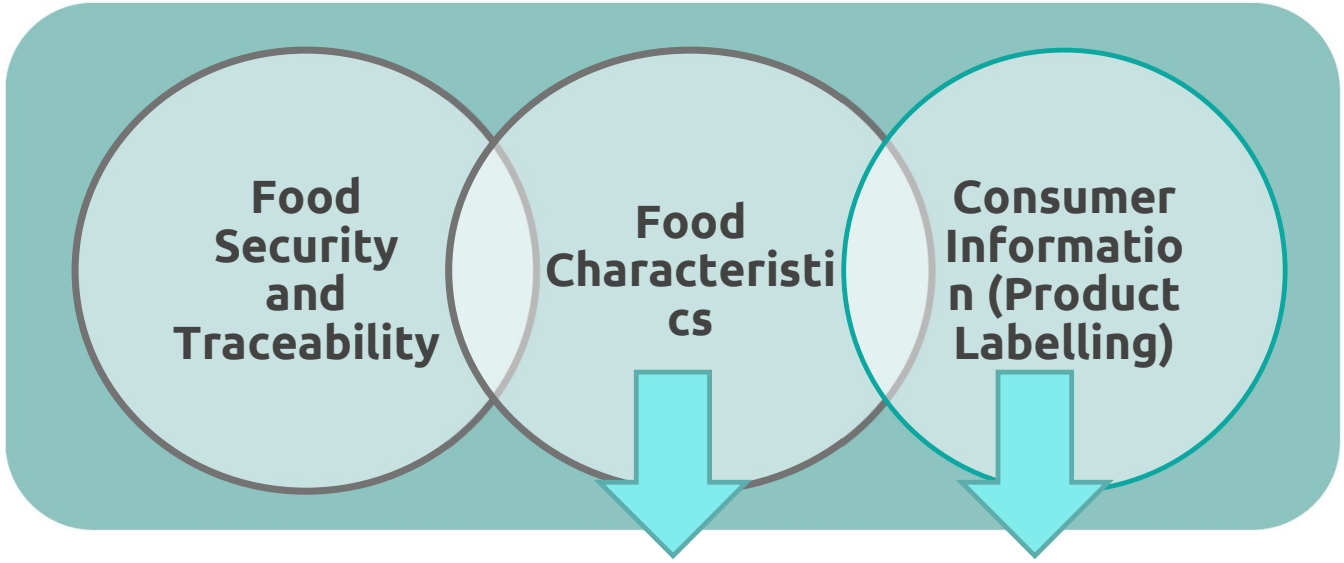
P5-M2 Defining Product Attributes

P5-M6 Conducting Effective Production Trials

P5-M8 Legal Labelling

Food Legislation

Food Legislation seeks to **protect consumers** from food which is not safe to eat or drink, and to ensure that any statements and claims made about the food are **not misleading or fraudulent**.
Testing your products prior to launching and **systematically recording the outcomes** is a key way in which you can generate proof that **your new food or drink complies with relevant legislation**.



See our P5-M2 Defining Product Attributes module for more information

See our P5-M8 Legal Labelling module for more information

Types of Product Testing

In this training module we will look at 8 of the main types of testing that products will need to undergo during the product development process -

01 Nutritional Testing for On Pack Declarations and Claims

02 Testing for Legal & Claimed Compostional Standards & Reserved Descriptions

03 Shelf-Life – Microbiological and Organolepic Testing

04 Sensory and Consumer Preference Testing

05 Contaminants and Residues in the Farm to Fork Supply Chain

06 Food Fraud and Food Authencity Testing

07 Packaging Functionality and Robustness Testing

08 Tests to Generate Cooking Guidelines

Legally Required Nutritional Information

The inclusion of nutritional information on your finished product label is a **legal requirement** in the many countries around the world, including the European Union and the United Kingdom.

When providing nutrition information, you are **legally required to declare 7 pieces of information** on the product's packaging.

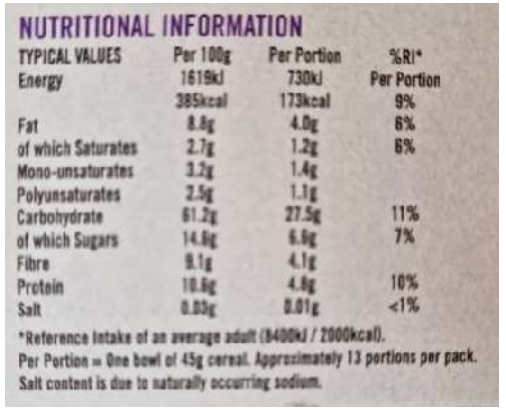
These are :

- **Energy value** – which is expressed as a calorie content in **kcals** (an abbreviation for kilocalories, and also in **kJ (**which is short for **kilojoules)**.
- A kilocalorie is another word for what's commonly called a calorie, so 1,000 calories will be written as 1,000 kcals.
  Kilojoules are the metric measurement of calories.

- Amounts of
  - **Fat**
  - **Saturated fat**
  - **Carbohydrate**
  - **Sugars**
  - **Protein**

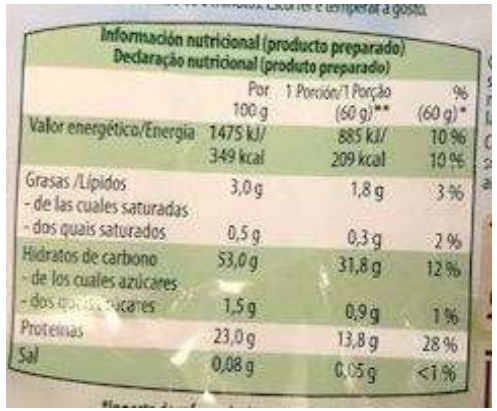
This information, which is commonly displayed on the back or side of packaging must be declared as **per 100g or 100ml of the product.**

However many brands also choose to display information calculated **per portion** to be more helpful to consumers.



NUTRITIONAL INFORMATION			
TYPICAL VALUES	Per 100g	Per Portion	%RI*
Energy	1619kJ	730kJ	Per Portion
	385kcal	173kcal	9%
Fat	8.8g	4.0g	6%
of which Saturates	2.7g	1.2g	6%
Mono-unsaturates	3.2g	1.4g	
Polyunsaturates	2.5g	1.1g	
Carbohydrate	61.2g	27.5g	11%
of which Sugars	14.6g	6.6g	7%
Fibre	9.1g	4.1g	
Protein	10.6g	4.8g	10%
Salt	0.03g	0.01g	<1%

*Reference intake of an average adult (8400kJ / 2000kcal).
Per Portion = One bowl of 45g cereal. Approximately 13 portions per pack.
Salt content is due to naturally occurring sodium.



Información nutricional (producto preparado) Declaração nutricional (produto preparado)	Por 100 g	1 Porción/1 Porção (60 g)**	% (60 g)*
Valor energético/Energia	1475 kJ/ 349 kcal	885 kJ/ 209 kcal	10 % 10 %
Grasas /Lípidos	3,0 g	1,8 g	3 %
- de las cuales saturadas - dos quais saturados	0,5 g	0,3 g	2 %
Hidratos de carbono	53,0 g	31,8 g	12 %
- de los cuales azúcares	1,5 g	0,9 g	1 %
Proteínas	23,0 g	13,8 g	28 %
Sal	0,08 g	0,05 g	<1 %

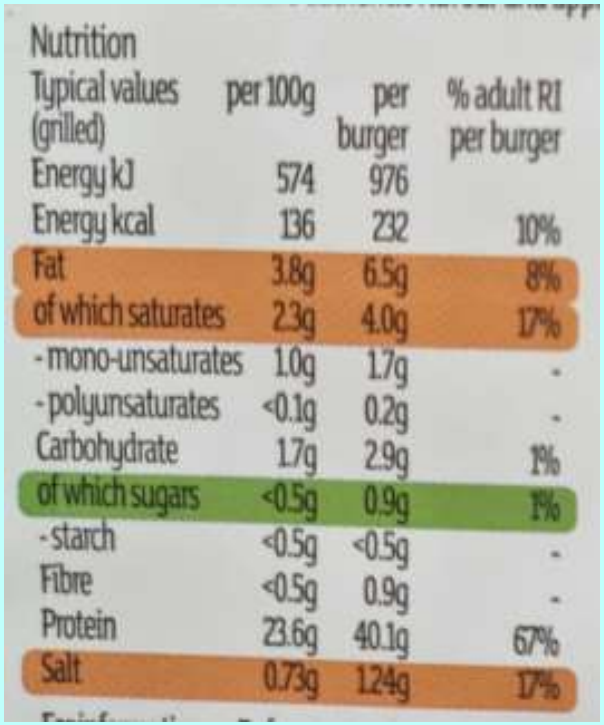
Examples of Nutritional Information in **tabular format**
per 100g and per portion

Discretionary Nutritional Information & Exemptions

Discretionary Nutritional Declarations

If you wish to do so, the content of the mandatory nutrition declaration **can be supplemented** with an indication of the amounts of one or more of the following:

- **Monounsaturated Fat**
- **Polyunsaturated Fat**
- **Polyols**
- **Starch**
- **Fibre**
- **Certain vitamins or minerals** present in significant amounts as outlined in Regulation 1169/2011 - Part A of Annex XIII



Nutrition Typical values (grilled)	per 100g	per burger	% adult RI per burger
Energy kJ	574	976	
Energy kcal	136	232	10%
Fat	3.8g	6.5g	8%
of which saturates	2.3g	4.0g	17%
- mono-unsaturates	1.0g	1.7g	-
- polyunsaturates	<0.1g	0.2g	-
Carbohydrate	1.7g	2.9g	1%
of which sugars	<0.5g	0.9g	1%
- starch	<0.5g	<0.5g	-
Fibre	<0.5g	0.9g	-
Protein	23.6g	40.1g	67%
Salt	0.73g	1.24g	17%

Example of Nutritional Information showing **mandatory and optional nutrients** declared

Foods which are Exempt from Nutritional Declarations

There are certain foods which are **exempt** from this nutritional declaration requirement. Details of these can be found in Annex V to the Food Information to Consumers (EU) Regulation N. 1169/2011. Exemptions relate mainly to **minimally processed foods** and those with **little nutritional value** for example a herb, water or salt.
Food directly supplied by manufacturer of small quantities of products to the final consumer or to local retail establishments directly supplying the final consumer is also exempt under Annex V point 19.

Generating Nutritional Information

There are 2 main ways to determine the nutrition of your food products

Laboratory Analysis

The laboratory analysis involves you sending your finished product to a laboratory where they will physically test the product using approved methods.

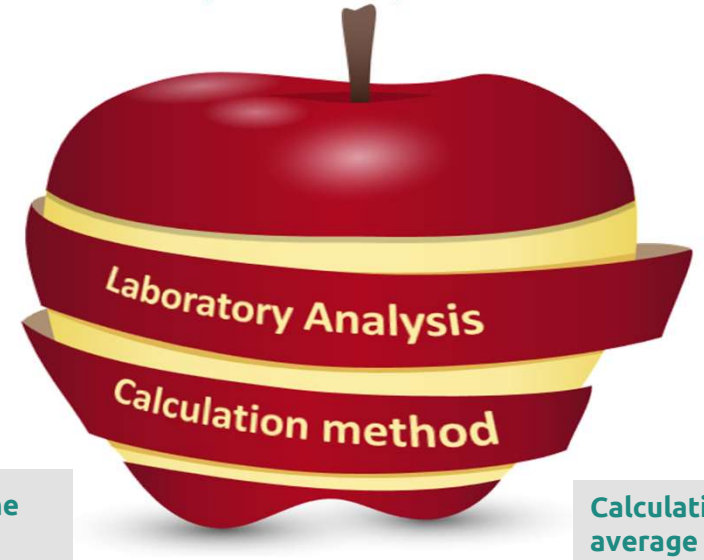
UKAS Acredited Laboratories – provide testing in the UK

Association of Official Analytical Chemistry (AOAC)

American Association of Cereal Chemists (AACC)

American Oil Chemists Society (AOCS)

Institute of Food Technologists (IFT)



Calculation Method

The calculation method involves using your recipe/formulation, raw ingredient nutrition data, and processing losses or gains to calculate the finished products overall nutrient value.

Calculations should be based on known or actual average values of the ingredients used in the product and be from genreally established and accepted data.

In order to be as robust as possible, it is good practice to use Nutritional Data from an authorative source for example
McCance and Widdowson's : The Composition of Foods

When sending products for laboratory analysis, it is important to ensure that the samples you submit to the laboratory are **fully representative** of your final end product so that your declaration is illustrative of the product.

Good practice suggests that 3 or more samples selected from your production trials should be tested so that an average figure for each nutrient can be declared on your packaging.

If you choose to calculate your nutritional information, be sure to base your calculations on **trustworthy and**

Presenting Nutritional Information on Your Packaging

The information must be **presented and expressed in specifically defined ways** – these include

- in a **tabular format** with the **numbers aligned**

- **where space does not permit**, the declaration may appear in **linear format**

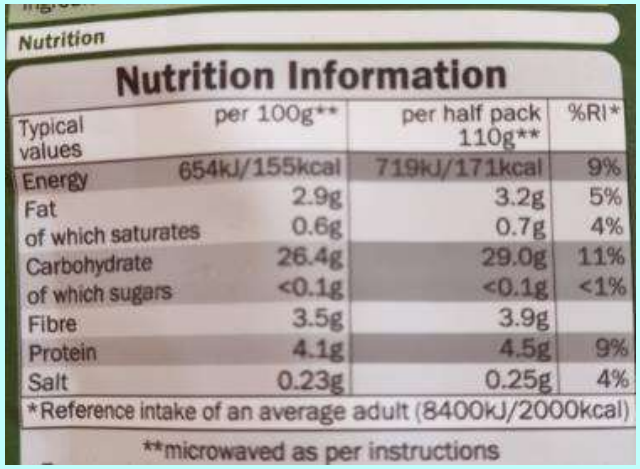
- energy value must be expressed in **kilojoules (kJ) and kilocalories (kcal)**

- the amount of the nutrients must be expressed in **grams (g)**

- all elements must be included **next to each other**. The elements must be presented together **in a clear format** and, where appropriate, in the order of presentation provided for in Annex XV to EU FIC.

- nutrition information must be expressed **per 100 g/ml**, using the measurement units specified in Regulation 1169/2011

- vitamins and minerals must be expressed per 100g/ml and as a percentage of the reference intake (RI)



Nutrition

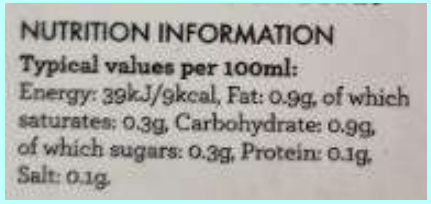
Nutrition Information

Typical values	per 100g**	per half pack 110g**	%RI*
Energy	654kJ/155kcal	719kJ/171kcal	9%
Fat	2.9g	3.2g	5%
of which saturates	0.6g	0.7g	4%
Carbohydrate	26.4g	29.0g	11%
of which sugars	<0.1g	<0.1g	<1%
Fibre	3.5g	3.9g	
Protein	4.1g	4.5g	9%
Salt	0.23g	0.25g	4%

*Reference intake of an average adult (8400kJ/2000kcal)

**microwaved as per instructions

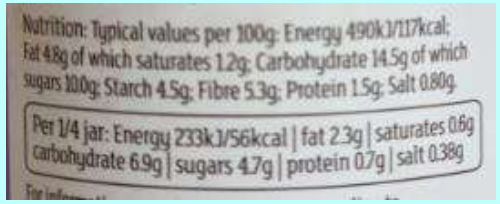
Example of Nutritional Information in **tabular format per 100g and per half pack portion**



NUTRITION INFORMATION

Typical values per 100ml:

Energy: 39kJ/9kcal, Fat: 0.9g, of which saturates: 0.3g, Carbohydrate: 0.9g, of which sugars: 0.3g, Protein: 0.1g, Salt: 0.1g.



Nutrition: Typical values per 100g: Energy 490kJ/117kcal; Fat 4.8g of which saturates 1.2g; Carbohydrate 14.5g of which sugars 10.0g; Starch 4.5g; Fibre 5.3g; Protein 1.5g; Salt 0.80g.

Per 1/4 jar: Energy 233kJ/56kcal | fat 2.3g | saturates 0.6g carbohydrate 6.9g | sugars 4.7g | protein 0.7g | salt 0.38g

Examples of Nutritional Information in **linear format per 100ml, per 100g and per portion**

What to Base Your Nutritional Declaration Upon

When you provide nutritional Information, it should be based on **“average values”.**

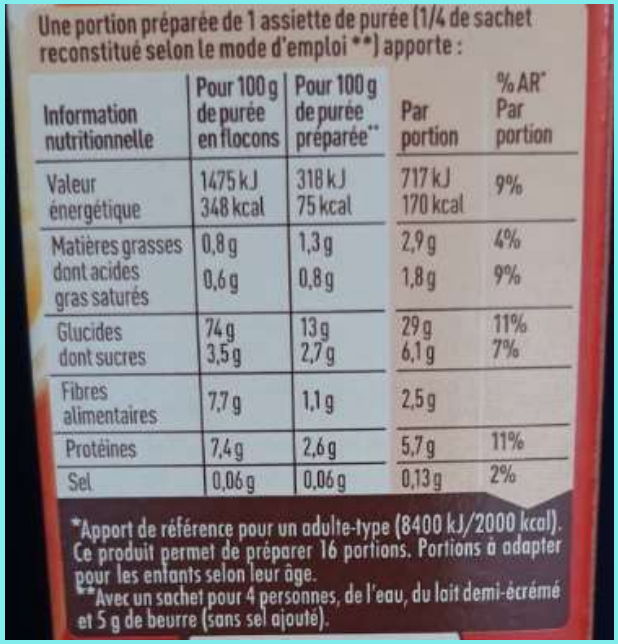
The term 'average value' means a value that **best represents the amount of the nutrient and allows for natural variability, seasonal variability**, **patterns of consumption** and other factors that may cause the actual value to vary.

So you will need to ensure that if you send samples for laboratory analysis, they reflect any variances you anticipate may occur.

The nutrient values must be for the food **“as sold”** – which means as it exists within the pack that the consumer purchases.

However, you are permitted to declare information which relates to the food after preparation – this is said to be **“as consumed”** – but this is only allowed when **sufficiently detailed preparation instructions** have been given on the packaging.

In this scenario, the nutritional information you declare should relate to the food as prepared for consumption in the manner that you have outlined on


Une portion préparée de 1 assiette de purée (1/4 de sachet reconstitué selon le mode d'emploi **) apporte :

Information nutritionnelle	Pour 100 g de purée en flocons	Pour 100 g de purée préparée**	Par portion	% AR* Par portion
Valeur énergétique	1475 kJ 348 kcal	318 kJ 75 kcal	717 kJ 170 kcal	9%
Matières grasses dont acides gras saturés	0,8 g 0,6 g	1,3 g 0,8 g	2,9 g 1,8 g	4% 9%
Glucides dont sucres	74 g 3,5 g	13 g 2,7 g	29 g 6,1 g	11% 7%
Fibres alimentaires	7,7 g	1,1 g	2,5 g	
Protéines	7,4 g	2,6 g	5,7 g	11%
Sel	0,06 g	0,06 g	0,13 g	2%

*Apport de référence pour un adulte-type (8400 kJ/2000 kcal). Ce produit permet de préparer 16 portions. Portions à adapter pour les enfants selon leur âge.
**Avec un sachet pour 4 personnes, de l'eau, du lait demi-écrémé et 5 g de beurre (sans sel ajouté).

Examples of Nutritional Information as sold and as prepared for consumption

Food Product Testing for Food Labelling

When you engage with an **accredited laboratory** to conduct your testing they will perform the tests you require through a variety of **certified methods** depending on the type of nutrients that are being analysed, so you will need to **specify what information you require and commission the appropriate testing suites** - for example :

- ❑ Anti-Nutrient Testing (plant compounds such as phytates, tannins, lectins, oxalates, which interfere with the absorption of beneficial nutrients).
- ❑ Amino Acid Testing
- ❑ Carbohydrate Testing
- ❑ Fatty Acid Testing
- ❑ Fats and Oils Testing
- ❑ Enzyme Testing
- ❑ Trace Elemental Analysis
- ❑ Nutrition Labelling Testing (NLEA for USA)
- ❑ Preservatives and Antioxidant Testing
- ❑ Proximate Analysis (refers to **the quantitative analysis of macromolecules in food).**
- ❑ Vitamin & Mineral Testing
- ❑ Food Allergen Testing

esting to Allow You To Make Product Claims

If you want to **make a claim** about your product, you will need to generate evidence to **prove** that what you are telling consumers about your product **is true**.

These claims can range from :

- **Provenance** – such as where the product is manufactured or where key ingredients are sourced from
- **Compliance** with certain **pre-defined standards** ensuring animal welfare or Fair Trade
- **Adherence to responsible & sustainable sourcing standards** for ingredients and packaging
- Meeting **organic** farming and product composition standards
- **Charitable activities**

- One key area of claims for healthy food and drink is that of **nutritional claims** and we will look at this now in some detail.

- Remember that you have to be capable of proving any claims **in a court of law**, so it is important to ensure that you **commission the correct tests** to generate the evidence and proof you will need to do this.

Nutritional Claims

'Nutrition claim' means any claim which **states, suggests or implies** that a **food has certain beneficial nutritional properties** due to:

1. The **energy** (calorific value) it:
    1. provides
    2. provides at a reduced or increased rate or
    3. does not provide

2. The **nutrients or other substances** it:
    1. contains
    2. contains in reduced or increased proportions or
    3. does not contain

Nutrition claims are only permitted in the EU and Northern Ireland if they are listed in the Annex of Regulation (EC) No 1924/2006, lastly amended by **Regulation (EU) No 1047/2012.**

The UK largely retained this EU legislation after Brexit, with appropriate amendments to the competent authorities, and full details are available on the UK Government website.

Permitted Nutrition Claims – Energy (kcal/kJ)

LOW ENERGY
A claim that a food is **low in energy**, and any claim likely to have the same meaning for the consumer, may only be made where the **product does not contain more than 40 kcal (170 kJ)/100 g for solids or more than 20 kcal (80 kJ)/100 ml for liquids.**

ENERGY- REDUCED
A claim that a food is **energy-reduced**, and any claim likely to have the same meaning for the consumer, may only be made where the **energy value is reduced by at least 30%, with an indication of the characteristic(s) which make(s) the food reduced in its total energy value.**

ENERGY- FREE
A claim that a food is **energy-free**, and any claim likely to have the same meaning for the consumer, may only be made where the **product does not contain more than 4 kcal (17 kJ)/100 ml.**

Permitted Nutrition Claims – Fat

LOW FAT
A claim that a food is low in fat, and any claim likely to have the same meaning for the consumer, may only be made where **the product contains no more than 3 g of fat per 100 g for solids or 1.5 g of fat per 100 ml for liquids (1,8 g of fat per 100 ml for semi-skimmed milk).**

FAT-FREE
A claim that a food is fat-free, and any claim likely to have the same meaning for the consumer, may only be made where **the product contains no more than 0.5 g of fat per 100 g or 100 ml. However, claims expressed as 'X % fat-free' shall be prohibited.**

LOW SATURATED FAT
A claim that a food is low in saturated fat, and any claim likely to have the same meaning for the consumer, **may only be made if the sum of saturated fatty acids and trans-fatty acids in the product does not exceed 1.5 g per 100 g for solids or 0,75 g/100 ml for liquids and in either case the sum of saturated fatty acids and trans-fatty acids must not provide more than 10% of energy.**

SATURATED FAT-FREE
A claim that a food does not contain saturated fat, and any claim likely to have the same meaning for the consumer, may **only be made where the sum of saturated fat and trans-fatty acids does not exceed 0.1 g of saturated fat per 100 g or 100 ml.**

Permitted Nutrition Claims – Mono-, Poly- and Unsaturated Fat

HIGH MONOUNSATURATED FAT
A claim that a food is high in monounsaturated fat, and any claim likely to have the same meaning for the consumer, may only be made **where at least 45% of the fatty acids present in the product derive from monounsaturated fat under the condition that monounsaturated fat provides more than 20% of energy of the product**.

HIGH POLYUNSATURATED FAT
A claim that a food is high in polyunsaturated fat, and any claim likely to have the same meaning for the consumer, may only be made **where at least 45% of the fatty acids present in the product derive from polyunsaturated fat under the condition that polyunsaturated fat provides more than 20% of energy of the product.**

HIGH UNSATURATED FAT
A claim that a food is high in unsaturated fat, and any claim likely to have the same meaning for the consumer may only be made **where at least 70% of the fatty acids present in the product derive from unsaturated fat under the condition that unsaturated fat provides more than 20% of energy of the product.**

Permitted Nutrition Claims – Sugars

LOW SUGARS
A claim that a food is low in sugars, and any claim likely to have the same meaning for the consumer, may only be made where the **product contains no more than 5 g of sugars per 100 g for solids or 2.5 g of sugars per 100 ml for liquids.**

SUGARS-FREE
A claim that a food is sugars-free, and any claim likely to have the same meaning for the consumer, may only be made where the **product contains no more than 0.5 g of sugars per 100 g or 100 ml.**

WITH NO ADDED SUGARS
A claim stating that sugars have not been added to a food, and any claim likely to have the same meaning for the consumer, may only be made where the **product does not contain any added mono- or disaccharides or any other food used for its sweetening properties. If sugars are naturally present in the food, the following indication should also appear on the label: 'CONTAINS NATURALLY OCCURRING SUGARS'.**

Permitted Nutrition Claims – Salt & Sodium

LOW SODIUM/SALT
A claim that a food is low in sodium/salt, and any claim likely to have the same meaning for the consumer, may only be made where the **product contains no more than 0.12 g of sodium, or the equivalent value for salt, per 100 g or per 100 ml**.
For **waters, other than natural mineral waters falling within the scope of Directive 80/777/EEC (**not exceed 2 mg of sodium per 100 ml).

VERY LOW SODIUM/SALT
A claim that a food is very low in sodium/salt, and any claim likely to have the same meaning for the consumer, may only be made where the **product contains no more than 0.04 g of sodium, or the equivalent value for salt, per 100 g or per 100 ml**. This claim shall not be used for natural mineral waters and other waters.

SODIUM-FREE or SALT-FREE
A claim that a food is sodium-free or salt-free, and any claim likely to have the same meaning for the consumer, may only be made where the **product contains no more than 0.005 g of sodium, or the equivalent value for salt, per 100 g**.

NO ADDED SODIUM/SALT
A claim stating that sodium/salt has not been added to a food and any claim likely to have the same meaning for the consumer may only be made where the **product does not contain any added sodium/salt or any other ingredient containing added sodium/salt and the product contains no more than 0.12 g sodium, or the equivalent value for salt, per 100 g or 100 ml.**

Permitted Nutrition Claims – Fibre and Protein

SOURCE OF FIBRE
A claim that a food is a source of fibre, and any claim likely to have the same meaning for the consumer, may only be made where the **product contains at least 3 g of fibre per 100 g or at least 1,5 g of fibre per 100 kcal.**

HIGH FIBRE
A claim that a food is high in fibre, and any claim likely to have the same meaning for the consumer, may only be made where the **product contains at least 6 g of fibre per 100 g or at least 3 g of fibre per 100 kcal.**

SOURCE OF PROTEIN
A claim that a food is a source of protein, and any claim likely to have the same meaning for the consumer, may only be made where **at least 12% of the energy value of the food is provided by protein.**

HIGH PROTEIN
A claim that a food is high in protein, and any claim likely to have the same meaning for the consumer, may only be made where at **least 20% of the energy value of the food is provided by protein.**

Permitted Nutrition Claims – Vitamins, Minerals and other Nutrients or substances

SOURCE OF [NAME OF VITAMIN/S] AND/OR [NAME OF MINERAL/S]
A claim that a food is a source of vitamins and/or minerals, and any claim likely to have the same meaning for the consumer, may only be made where the **product contains at least a significant amount as defined in the Annex to Directive 90/496/EEC or an amount provided for by derogations granted according to Article 6 of Regulation (EC) No 1925/2006 of the European Parliament and of the Council of 20 December 2006 on the addition of vitamins and minerals and of certain other substances to foods**.

HIGH [NAME OF VITAMIN/S] AND/OR [NAME OF MINERAL/S]
A claim that a food is high in vitamins and/or minerals, and any claim likely to have the same meaning for the consumer, may only be made where **the product contains at least twice the value of 'source of [NAME OF VITAMIN/S] and/or [NAME OF MINERAL/S]'.**

CONTAINS [NAME OF THE NUTRIENT OR OTHER SUBSTANCE]
A claim that a food contains a nutrient or another substance, for which specific conditions are not laid down in this Regulation, or any claim likely to have the same meaning for the consumer, may only be made where the **product complies with all the applicable provisions of this Regulation, and in particular Article 5.**
For vitamins and minerals, the conditions of the claim 'source of' shall apply.

Permitted Nutrition Claims – Light/Lite, Natural and Omega-3

LIGHT/LITE

A claim stating that a product is 'light' or 'lite', and any claim likely to have the same meaning for the consumer, shall follow the **same conditions as those set for the term 'reduced'; the claim shall also be accompanied by an indication of the characteristic(s) which make(s) the food 'light' or 'lite'.**

NATURALLY/NATURAL

Where a food naturally meets the condition(s) laid down in this Annex for the use of a nutritional claim**, the term 'naturally/natural' may be used as a prefix to the claim.**

SOURCE OF OMEGA-3 FATTY ACIDS

A claim that a food is a source of omega-3 fatty acids, and any claim likely to have the same meaning for the consumer, may only be made where the **product contains at least 0.3 g alpha-linolenic acid per 100g and per 100kcal, or at least 40mg of the sum of eicosapentaenoic acid and docosahexaenoic acid per 100g and per 100kcal.**

HIGH OMEGA-3 FATTY ACIDS

A claim that a food is high in omega-3 fatty acids, and any claim likely to have the same meaning for the consumer, may only be made where the **product contains at least 0.6 g alpha-linolenic acid per 100 g and per 100 kcal, or at least 80 mg of the sum of eicosapentaenoic acid and docosahexaenoic acid per 100 g and per 100 kcal.**

“Free From” Claims

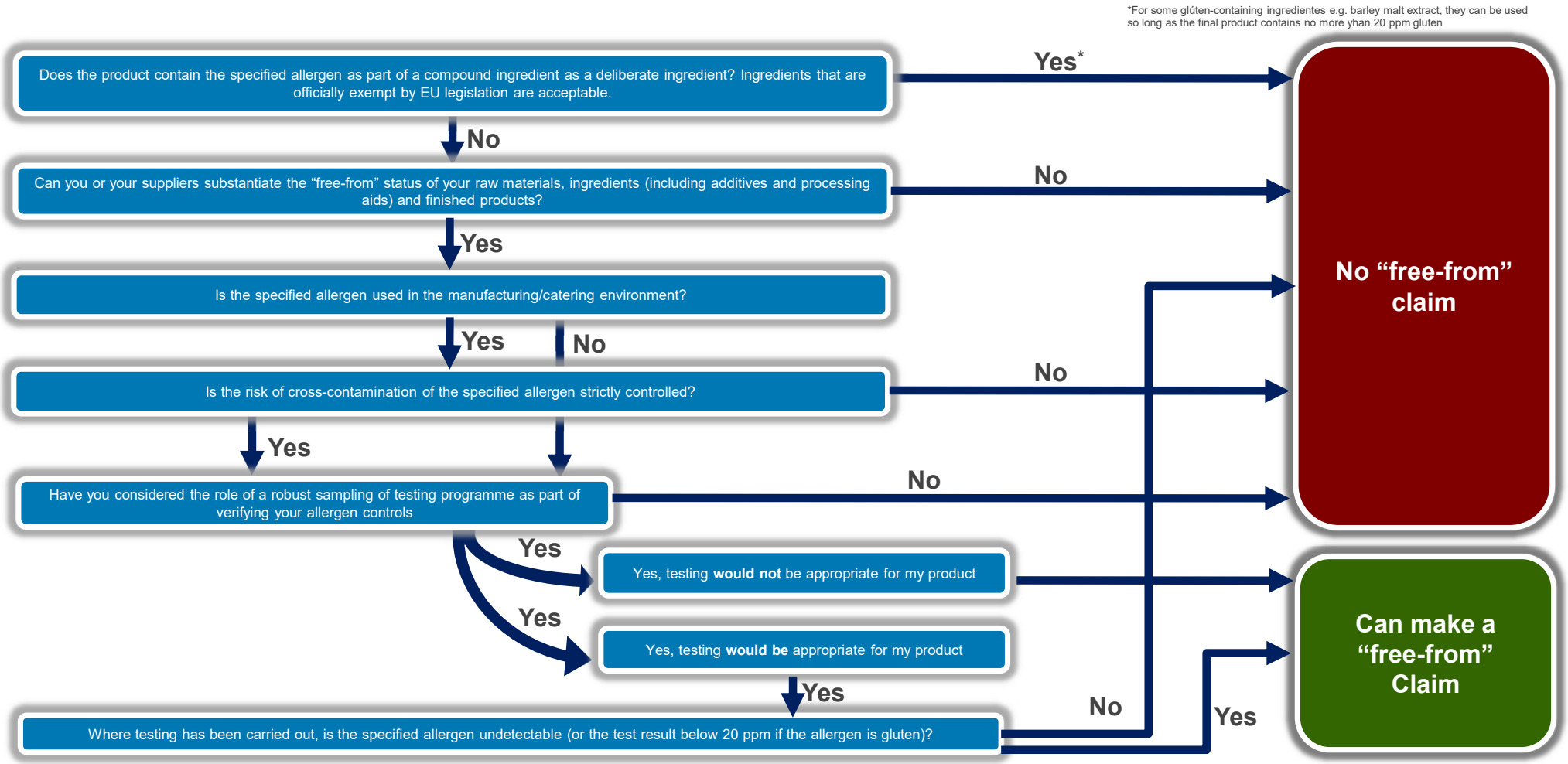
Having considered what you may wish to prove is in a product so that you can **provide evidence for any claims you wish to make**, if you wish to claim that a **component is NOT present** in a food or drink, you must also be able to prove this.

So, for example, if you are in the development process for a new product or reformulation an existing product and you wish to claim the product is Gluten Free, Nut Free or Lactose Free, you must ensure that the products are tested by an accredited body.

You will also need to put provisions in place for ongoing testing to prove that the **product remains free from that component throughout manufacturing**, from raw materials through processing and packing.
There must be **no cross contamination** of the product during storage, handling and transportation at any stage of the supply chain.

Not only is this a legal obligation, but customers who may suffer from severe allergies are **relying upon you to protect their lives** with these testing regimes.

Decision Tree for Validation of “Free From” claims e.g. Gluten Free, Lactose Free



Use this helpful decision tree to determine if a free from claim is appropriate for your product.

Meeting Legal or Claimed Compositional Standards & Reserved Descriptions

If you are new to producing foods and drinks in a particular product sector, **take time to fully investigate** any specific regulations that apply to certain products.

If you wish to **claim that your product has a certain composition**, or state that it **contains a defined amount of an ingredient**, then you will need to maintain robust documentary evidence of the recipe, specification and manufacturing processes, and may need to test for certain elements.

Certain products have **specific regulations which define their composition or define "reserved descriptions".**

In order to demonstrate that your products comply, you will need to determine if your product falls within one of these categories and then **look in detail at what specific requirements apply** – examples are the meat content in a burger, fat content in milk or fruit per kg in jams.

Examples of Products with Specific Standards - UK Link

- bread and flour
- cocoa and chocolate products
- soluble coffee
- milk products
- honey
- fruit juices and nectars
- infant formula
- jams and marmalade
- meat products - sausages, burgers and pies
- fish
- natural mineral waters
- spreadable fats
- sugars
- irradiated food
- foods containing genetic modification (GM)

INSA to add link to EU Regs

Proving Product Composition Claims

If you believe that the composition of your new product will allow you to make a nutritional claims, you can submit the product for nutritional analysis which can validate your claim.

Nutrition testing can be performed through a variety of certified methods depending on the type of nutrients:

- ❑ Nutrition Labelling Testing - which will cover the main macronutrients which appear on product labelling
- ❑ Fatty Acid Testing
- ❑ Fats and Oils Testing
- ❑ Trace Elemental Analysis
- ❑ Preservatives and Antioxidant Testing
- ❑ Vitamin Testing

Determining Your Product's Shelf-Life

One critical aspect of launching your new or reformulated food or drink product is to determine how long it **remains safe to eat** and of a **quality** that means consumers will enjoy the product and be encouraged to re-purchase.

This time frame is often called **"shelf-life"** of the product, even though it encompasses the entire period from manufacturing and packing, through storage, transportation to the actual time on shelf – be this in a store, industrial kitchen or in the consumer's home.

Two different forms of shelf-life are declared on products in

USE BY DATES are about FOOD SAFETY

They state **the date up to and including the day** that consumers can eat a **short-life, perishable food**.
Most use-by dates must also state the **specific storage and handling instructions** under which the food will remain safe until that date.
Such products should state instructions on the packaging telling the consumer how to keep the product safe to eat for example to refrigerate after opening or to keep the food in a fridge at 5°C or below.
It is **illegal to sell** a food or drink item after it's Use By date, and consumers are **advised not to consume it even if it appears to be fine**, as it may contain bacterial growth which is not evident when looking at or smelling the food.
However, in order to avoid food wastage many manufacturers recommend that consumers can freeze a product before the use-by date is reached.

BEST BEFORE Dates are about FOOD QUALITY

They indicate to the consumer the time period during which the product will be at it's **optimum quality** if it is **stored according to the instructions** on the packaging.
Best Before (and Best Before End) dates are widely used on frozen, tinned, dried and other foods which are stable in ambient temperature conditions.
After this date the product may **no longer be of the quality it was when first made**, but it **remains safe to eat**.
Consumers are advised to **use their own judgement** as to whether they consume the product, and it is **still legal to sell the product** after a Best Before date has been reached.

Food Shelf-Life Considerations

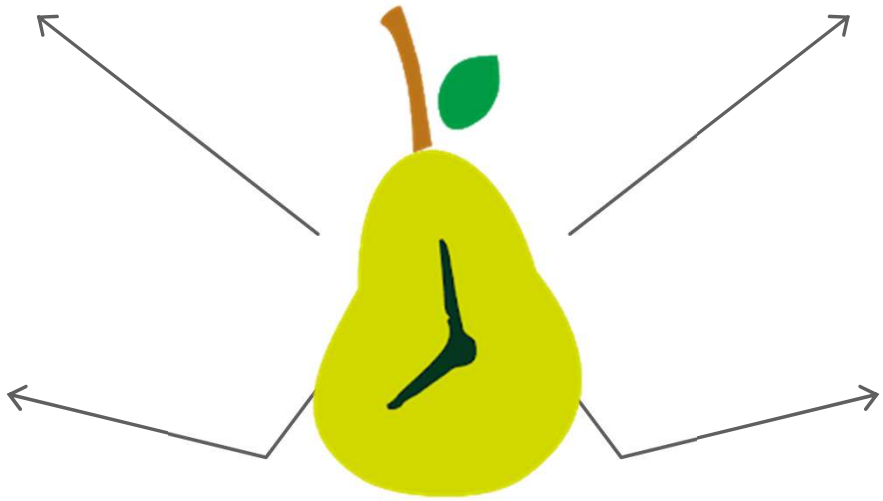
You will need to utilise a range of testing methods to define the specific period of time during which your food product will:

Be Safe to Eat

- Quality / Safety
- Chemistry
- Microbiology
- Toxicology
- Packaging

Maintain an Acceptable Quality

- Quality / Safety
- Regulatory
- Chemistry
- Microbiology
- Sensory / Consumer Insight
- Packaging



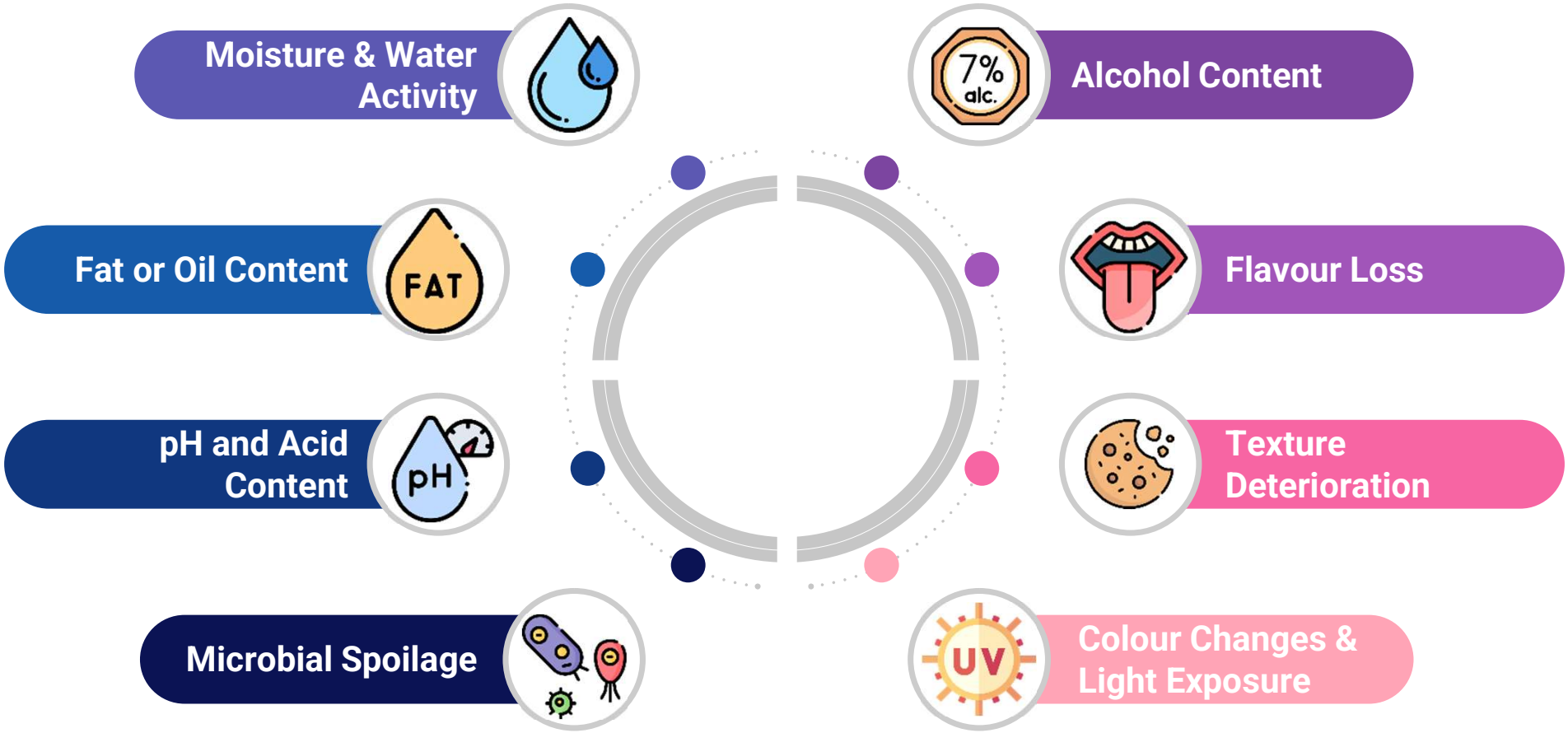
Maintain its Nutritional value

- Scientific Affairs
- Regulatory
- Nutrition
- Chemistry
- Packaging

Be Commercially Stable

- Quality / Safety
- Regulatory
- Packaging

Factors To Access During Food Shelf-Life Testing



Factors Which Impact Food Shelf Life

Chemical and Physical Change Drivers

When exposed to external factors such as **moisture**, **heat**, **oxygen** and **light**, a product undergoes chemical or physical changes.

While these changes do not generally create food safety issues, they **may change the product's sensory experience,** which impacts consumer satisfaction.

Microbiological Changes and Spoilage Drivers

Yeast, mold and bacteria growth can all contribute to a change in **product sensory attributes**, functionally reducing the product's shelf-life.

Growth of yeast, mold or lactic acid bacteria will often result in a visual growth on the product a sour taste
or aroma and/or a soft or mealy texture.

They may also cause **package bloating** – also known as the pack "blowing", providing a noticeable indicator to consumers that something is wrong with the product.
While the appearance of mold or other growth on a product is highly unappealing, they are not generally a food safety concern.

Food Shelf-Life Testing

A combination of tests will be needed to check for pathogens as well as the physical and organoleptic properties of a product over the shelf-life period that is being targeted.
Pathogen testing will vary by type of product based on its formulation and risk factors, so it is wise to seek the advice of an experienced microbiologist as to which tests are needed for your type of product.

Microbiological Shelf-life Tests

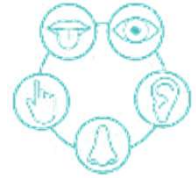
- Listeria monocytogenes
- Staphylococcus aureus
- Escherichia coli O157:H7
- Escherichia coli
- Salmonella
- Bacillus cereus
- Campylobacter

Chemistry Quality Tests

Shelf-life testing involves food quality chemistry.

These tests help determine the ‘freshness” of the product.

Test could include moisture content (at what point does the product dry out), acidity levels, pH and more.



Sensory and Physical Tests

During the shelf-life of a product, the food should remain safe to eat, and maintain its appearance, odour, texture and flavour.

Organoleptic “taste” testing should be conducted either in house or by the nominated laboratory to determine whether the product maintains expectations throughout the targeted shelf-life.

Tests should also review the robustness of the packaging used to ensure that seals remain intact, materials do not deteriorate and there are no adverse reactions of the packaging with the food it contains.

Types of Shelf-life Evaluation

There are two types of shelf-life evaluations:

Real Time

- This is applicable in ambient, refrigerated, and frozen foods where the storage temperature is real time;
- Microbiological evaluations are applicable in ambient and refrigerated foods

Accelerated

- This is applicable in shelf stable foods where the storage temperature is increased to accelerated the time needed to make a valid assessment

Microbiological testing is paired with organoleptic analysis to assess the consumer response to any changes over shelf-life.

When formulating or reformulating products, it is possible to use Predictive Modelling to forecast whether certain changes will impact a product's shelf-life. This tool can assess the survival and/or growth of a microorganism under a range of temperatures, pH and water activities (aw), so that you can consider different compositional, processing and packing options. The prediction can then be tested once the product has been created.

Food Shelf Life

There is no table, chart or piece of equipment to define a product's shelf life.
Rather, shelf life is determined in real time using the actual product and packaging, while following a defined evaluation protocol, for example -

Shelf-Life Tests

Shelf-Life Test (6 samples over 12 weeks)

APC | E.Coli/Coliform | Listeria Spp. | Salmonella | Staph | Yeast/Mold | Water Phase Salt | pH | Lactic Acid

Accelerated Shelf-Life Test (6 samples over 6 weeks; incubated samples)

Shelf-Life Remaining	Actions
180 days (100%)	Production date; shelf-life begins to deplete
90 days (50%)	Product must be shipped to retailer
30-10 days (16% - 5%)	Retailer may pull from shelf at manufacturer expense
0 days (0%)	Shelf-life ends; product discarded at manufacturer expense if not sold

Working with A Laboratory to Arrange Shelf-Life Testing

Handy Tip : Test on arrival, then at intervals which decrease as the test progresses. You want to know as accurately as possible the point at which the product reaches the end of its life, not lose possible days due to a gap in information.

1. **appoint a suitably accredited laboratory.**

   Discuss with their expert staff what tests are needed, at what intervals and how many samples per test occasion.

2. **Agree interim and final reporting dates and the format in which your test results will be provided to you.**

   Make sure you are advised of the costs involved in the testing.

3. **Ensure that you send the correct number of samples to the laboratory to cover all the tests agreed.**

4. **Choose a transport method that will maintain the temperature of the product – this is especially critical for chilled and frozen products.**

5. **Organoleptic tests should be conducted at the same time as microbiological testing – either by the laboratory or by yourselves.**

6. **Document all the testing conducted and how the data has been used to set the shelf-life for the product. This may be needed as evidence to prove your due diligence to any authorities in the future.**

Handy Tip : Arrange to be told immediately if your product fails a test. A retest to ensure it is not an isolated incident is a good idea, but if further failures occur it is better to cancel the remaining tests, review the issues causing the problem, address these and arrange another testing session.
You do not want to lose valuable time or pay for a sequence of failed tests.

Handy Tip : Use your Product Quality Standards as a benchmark.
Use the information in our P5-M2 Defining Product Quality Attributes module to create the Organoleptic benchmarks against which you will assess your products over their shelf-life.

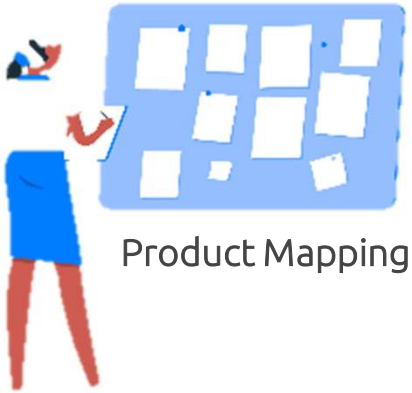
Sensory Panels

Sensory evaluation is a science that measures, analyses and interprets the reaction of the senses.
See our P1-M3 Benchmarking for Product Development training module for more information & helpful templates.

This analysis is very useful for a wide range of purposes :

Shelf-Life Studies

Product Matching



Product Mapping

Specifications and Quality Control

Product Reformulation

Consumer Acceptability of the Product

Types of Sensory Tests

Sensory testing is another **important** part of product testing during the development process and various testing methods are used for different purposes.

Analysis Method	Objective of Testing
Discriminative Tests (Difference Testing)	- Sensory differences between two or more products are evaluated. - The aim is to determine if the difference between two products is significant. - These tests are often used when matching an existing product to confirm a match has been achieved.
Descriptive Tests	- Provide a detailed description of the sensory characteristics of the products. - They allow the intensity of the sensory attributes of a product to be evaluated. - They can determine whether there are significant differences between two products, and, if the answer is yes, then define what these differences comprise.
Affective Tests (Preference Tests)	- These tests deliberately explore consumers' subjective views - They evaluate the acceptance and preference of consumers in relation to one or more products.

Selecting Panellists

The type of panellist you need **depends on the purpose of your tes**
For analytical tests, **panellists' senses must be well honed**.
Anyone participating in these types of tests are generally expected
be more sensitive to differences in tested products than normal consumers.
Therefore, they **undergo screening exercises** before being selected to become a sensory panellist and will be **trained in how to undertake a panel**.

In practice, the criteria to evaluate subjects' sensory sensitivity varies depending on the difficulty of the screening test or the requirements of the project.
Furthermore, those subjects who have prior technical knowledge of products or projects should not be invited to participate in analytical sensory testing in order to **avoid possible bias in the results**.

However, to gain insight on whether "ordinary" consumers like a product, **consumer preference testing** should be used. These panels use untrained panellists who represent your target audience.
To avoid negative influences those who have been trained in analytical tests or have some knowledge about the products or projects, should be excluded from this type of tests.

Consumer Panels vs Trained Panels

You could use an **'acceptance' test to seek** feedback on the **general consumer acceptability** of the product.
You would use a panel of **untrained tasters** who are representative of your target consumers for a product.
You can ask the tasters to score the food product as a whole, or to express their thoughts about specific attributes within it - such as flavour, appearance or texture. They would use a rating scale according to how much they **like or dislike it**.

You could use an **"overall difference" test -** also called a **" noticeable difference" test -** to compare your new product with products that are already on the market. It will allow you to understand the relative attributes of a newly developed product.
In this test, the **specially selected and trained panellists** will assess the product's specific characteristics.
Panellists are given two or more food samples – one is a control, the other in the product being tested, but the panellists should not know which sample is which.

You can use the results of these test to decide to what extent, and in what ways, the new product still needs to be reformulated.

How Large Should Consumer Panels Be ?

Good practice for sensory acceptance tests would be around 30 panellists, which is viewed as a minimum group size for testing.

Having a larger number of panellists means that each individual point of view and score have less impact on the panel results forming a more **broad outcome** to your panel, and you get a better picture of the variability among consumers,.

When you and your team have worked hard to develop a new product, it can be **disappointing to hear from consumers that they do not like it**, or would not purchase it.

However, it is important to **seek this feedback and take action** from what you learn !
Ultimately, if a product is not acceptable to consumers, **they will not repeat purchase and sales will dwindle.**

So these tests are **a valuable investment** because they allow your company to get feedback on your food product's quality and acceptability and avoid you spending a lot of time, energy and money on a product which will not achieve your sales targets.

Consumer Panels vs Trained Panels – A Case Study

A business wished to test an innovative Omega-3 enriched ice cream, which contains microencapsulated fish oil

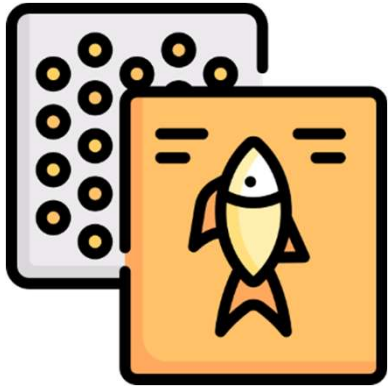
They use an ‘acceptance’ test with a panel of untrained tasters.

The tasters score the food product on a rating scale according to how much they like or dislike it this gives them information about the general acceptability of this product.

Next, they use an “overall difference” test using specially selected and trained panellists to test for any fishy taste and odour.

In this test, the panellists were given two or more food samples – one is a control with no fish oil, the other has fish oil added.

Through this test, the food technologists could work out how much fish oil could be added to a food and understand if reformulation of the product was necessary.



Source:Consumer testing of functional foods — Science Learning Hub

Sensory Testing for Assigning Shelf-Life - Case Study

Sensory tests can also be used **to validate shelf-life** by assessing the length of time that a product will remain the same "acceptable quality" level or have "no change in desired sensory characteristics" over that entire life of a product.

This example shows a study which hoped to extend the shelf-life of salmon sliced into portions.

Samples of the sliced salmon portions were taken from representative production runs, and underwent 5 treatments with one being a control, and stored at 1°C.

At 0, 3, 6, 9, 12, and 15 days of storage, samples were cooked and examined by 15 semi-trained panelists for overall acceptability on appearance, odour intensity, salmon flavour, aftertaste, tenderness, juiciness, off-odour, and off-flavour using hedonic scales which assessed consumers' eating enjoyment.

The results could be cross referenced to microbiological tests, and an appropriate shelf assigned to the salmon in the intended packaging.

Consumer Preference Testing - Product Evaluation Example

It is good practice to allocate each sample a random 3 digit code, as this removes a possible bias from labelling products A,B, C or 1,2,3. Each sensory attribute can then be scored in turn.

Visual Appearance (appearance and color)	Sample Codes		
Appraisal value	XXX	XXX	XXX
1 - I disliked it extremely			
2 - I disliked it a lot			
3 - Dislike moderately			
4 - I disliked it slightly			
5 - Neither liked nor disliked			
6 - I liked it slightly			
7 - I liked it moderately			
8 - I liked it a lot			
9 - I liked it extremely			

Flavour	Sample Codes		
Appraisal value	XXX	XXX	XXX
1 - I disliked it extremely			
2 - I disliked it a lot			
3 - Dislike moderately			
4 - I disliked it slightly			
5 - Neither liked nor disliked			
6 - I liked it slightly			
7 - I liked it moderately			
8 - I liked it a lot			
9 - I liked it extremely			

Sensory Test Sheet (example tables)

Evaluating the Results

The results from each panellist can then be **combined** and an **overall indication** of which samples are preferred can be created. By **looking at each organoleptic attribute**, you can see if any one aspect is causing panellists to strongly like or dislike the product – for example they may dislike the appearance but strongly like the taste of the product.

An adverse result can **raise an alarm bell and direct you to further product development** – or if the results are positive, this evidence can be **used in your sales pitch** to reassure customers that the product will be well received by consumers.

Pairs	Code	degree of difference				
		1-None	2-Slight	3-Moderate	4-A lot	5-Extreme
1	XXX vs XXX					
2	XXX vs XXX					
3	XXX vs XXX					

To evaluate the preference, sort the samples, in ascending order of preference, with 1= I don't like it; 2 = I don't like it; 3 = I like it and 4 = I like it very much.

Sample	xxx	xxx	xxx	xxx
Preference				

Commissioning Consumer Sensory Panels From Specialist Providers

Selected Panel

Testing Products

Testing Facility

Product Evaluation

If you are not able to conduct sensory panels with your target consumers within your own business, you can **engage with a specialist sensory research provider** who offers this service.

They will often recruit panellists to your specific requirements, and will conduct the tests with the samples that you provide, prepared to your instructions and will create an informative report to allow you to determine if consumers like and would purchase your intended product.

So you will need to be well prepared and able to provide all of the relevant information to the researcher team :

1. who are the target consumers they should recruit ?
2. how should the samples be prepared and served ?
3. what questions do you want answered ?
4. how do you wish these to be asked ?

Food Chain
“Farm to Fork“

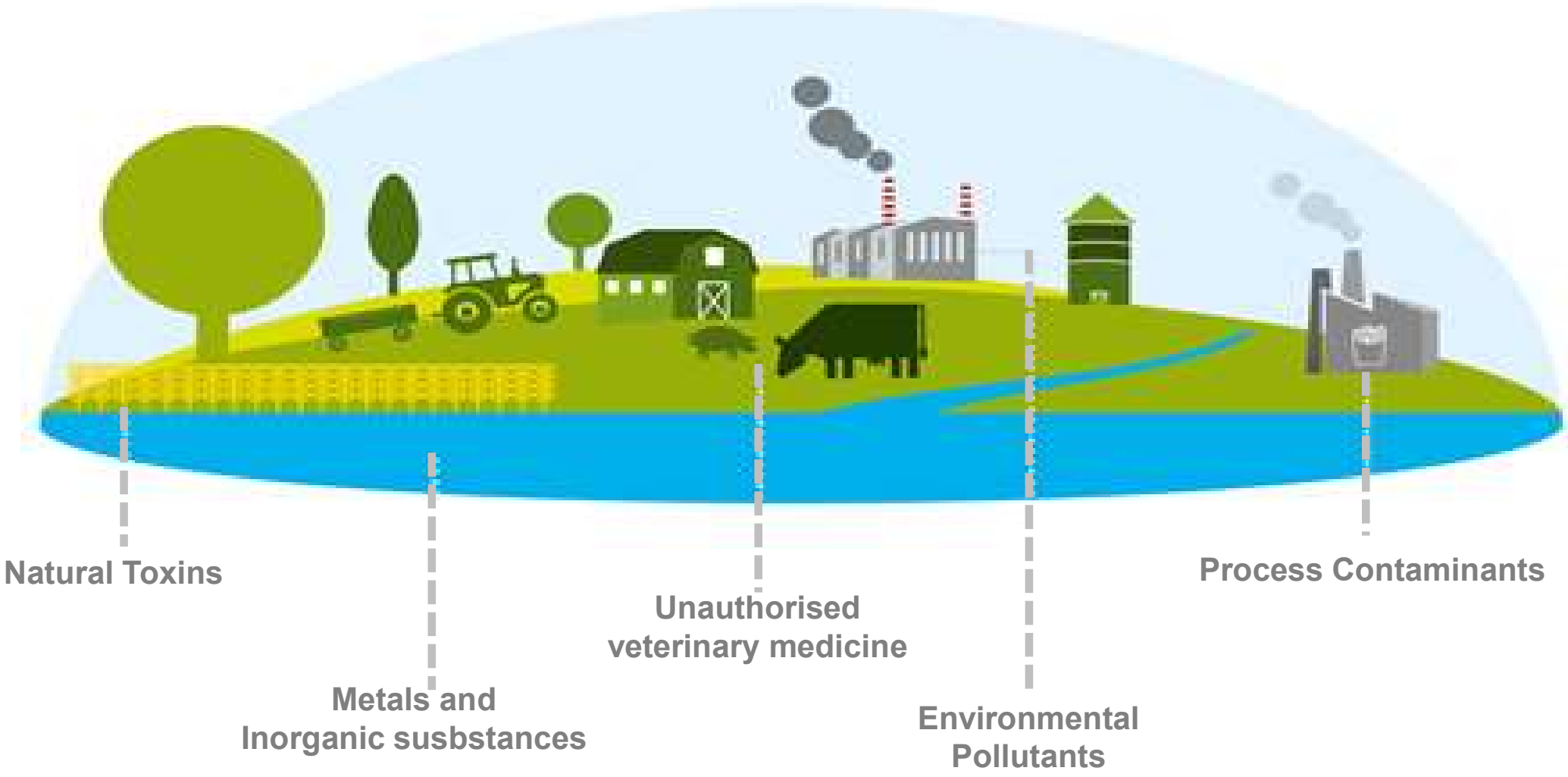
Most foods are created from ingredients which are grown or extracted from the earth.

During cultivation and processing risks arise which can negatively impact the food safety of components and finished products.

Tests are therefore required to be conducted, based on these risks, to ensure that foods and drinks are safe for consumers.

Food Contaminants and Residues

The risks from contamination and the residual presence of undesirable substances can arise from many sources.



Testing for Food Contaminants and Residues

The EFSA – the European Food Safety Agency and the FSA (Food Standards Agency in the UK) have defined the type of risks that might arise, the acceptable tolerances for the presence of undesirable substances and the testing methods that must be used to confirm that foodstuffs are safe to eat.
We will now look at some of these in more detail :

- Natural toxins (Mycotoxins)
- Environmental pollutants (Brominated flame retardants; Dioxins and PCBs)
- Process contaminants (Acrylamide; Furan, PAH's)
- Metals - Metals are an important group of contaminants that occur naturally but are usually present in food and feed as a result of human activity.

Types of Food Contaminants and Residues for which testing may be required

Natural toxins

- Secondary metabolite produced by fungi with undesirable effects on human health.
- Cereals, dried fruit, nuts and spices.

Aflatoxins (B1, sum of B1, B2, M1)

- Mycotoxins produced by 2 species of Aspergillus
- Genotoxic and carcinogenic (IARC group 1)

Ochratoxin A

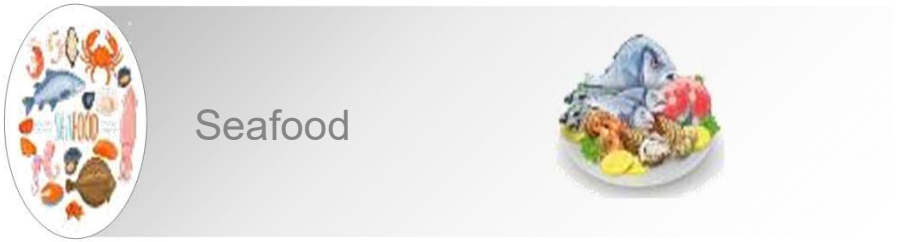
- potent nephrotoxin
- Possibly carcinogenic (IARC group 2B)

Occurrence: cereals, coffee, cocoa

IARC-International Agency for Research on Cancer

Types of Food Contaminants and Residues for which testing may be required

Environmental Contaminants



Brominated Flame Retardants (BFRs)

- Substances used to prevent combustion in case of fire
- Persistent in the environment and have a cumulative effect on the food chain
- Main danger of the aquatic environment PBDEs major class BFRs, and are possibly carcinogenic (IARC group 2B)

Dioxins

- Toxic chemicals that persist in the environment and accumulate in the food chain
- 90% of human exposure is via ingestion through food, mainly meat, dairy products, fish, molluscs and bivalves

Types of Food Contaminants and Residues for which testing may be required

Process Contaminants

Acrylamide

- Contaminant formed during the cooking process.
- Foods that contain asparagine and sugars when cooked at temperatures above 120ºC for moderate periods, in the presence of water, form acrylamide.
- In particular, foods which are fried and baked at high temperatures induce the formation of acrylamide.

Furans

- Contaminant formed during the cooking process
- Food and beverages, due to the breakdown of sugars in the presence of polyunsaturated fatty acids and ascorbic acid (vitamin C)

Types of Food Contaminants and Residues for which testing may be required

Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAHs)

- are a group of contaminants produced by burning of carbon-based materials
- smoked and flame grilled meat products are at risk
- certain types of dried foods, including spices and plant or algal-based supplements can be susceptible to PAH contamination if not dried correctly
- bivalve shellfish accumulate PAHs from seawater and sediment Limits are therefore applied to ensure that excessively-contaminated mussels or oysters do not enter the food chain.
- EU Legislation 1881/2006 as amended applies and these regulations are also retained in UK Law

Types of Food Contaminants and Residues for which testing may be required

Heavy Metals

Elements	Chemical Species	Efect
Mercury	Organic (MeHg)	Passes the blood-brain barrier
	Inorganic (iHg)	Does not pass the blood-brain barrier
Arsenic	Inorganic (As (III), As (V))	Carcinogenic
	Organic (AsB)	No known toxicity
Chromium	Hexavalent Cr (VI)	Toxic
	Trivalent Cr (III)	Nutrient

Food Fraud

The EU defines Food Fraud as

"any suspected intentional action by businesses or individuals for the purpose of deceiving purchasers and gaining undue advantage therefrom, in violation of the rules referred to in Article 1(2) of Regulation (EU) 2017/625 (the agri-food chain legislation)"

(Source : EFSA)

Most governments act to prevent and prosecute food fraud through public bodies.
For example the UK has a National Food Crime Unit who focus on seven types of food crime as below and offer a Food Fraud Resilience Self Assessment Tool for food businesses.

- **Theft** - dishonestly obtaining food, drink or feed products to profit from their use or sale
- **Illegal processing** - slaughtering or preparing meat and related products in unapproved premises or using unauthorised techniques
- **Waste diversion** - illegally diverting food, drink or feed meant for disposal, back into the supply chain
- **Adulteration** - including a foreign substance which is not on the product's label to lower costs or fake a higher quality
- **Substitution** - replacing a food or ingredient with another substance that is similar but inferior
- **Misrepresentation** - marketing or labelling a product to wrongly portray its quality, safety, origin or freshness
- **Document fraud** - making, using or possessing false documents with the intent to sell or market a fraudulent or substandard product

Food Authenticity

Standard requirements to prove food authenticity are being set up around the world.

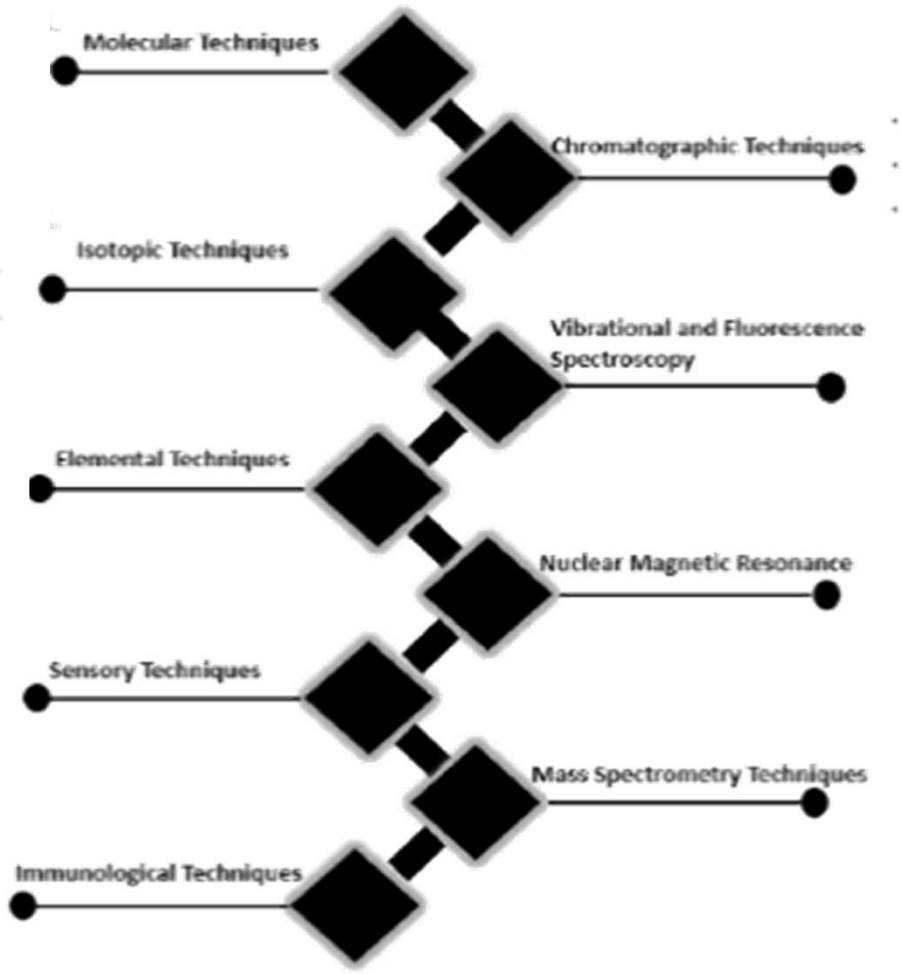
The British Retail Consortium (BRC) Global Standards, is a leading brand and consumer protection organisation which is used by over 26,000 certificated suppliers in over 130 countries.

BRC Version 8 includes standards to protect food authenticity and to prevent/reduce food fraud by:

1. Having access to information on **historical and developing threats** to the supply chain, which may present a risk of food fraud

2. Performing a **documented vulnerability as**sessment on all food raw materials

3. Performing appropriate **assurance and/or testing** to reduce uncovered risks for raw materials.



Authenticity of food can be traced by various food profiling techniques

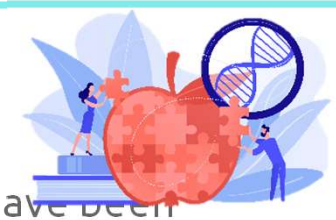
GMO Testing

A basic analytical approach known as GMO Screening, will check a sample for the general presence of **Genetically Modified Organisms,** which are **any animal, plant, or microbe whose DNA has been altered using genetic engineering techniques.**

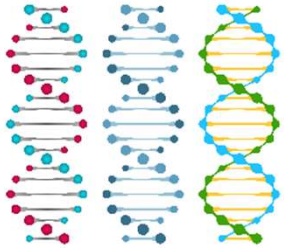
Subsequently, it might be important to know which particular GMO event is contained in a sample (identification), since this has legal consequences.

The relative amount of GMO in the sample must be determined (also called quantification) in some cases.

GMO Testing



Strip Test



PCR Tests

Food products **modified through biotechnological methods** have been on the market for decades, but many retailers and food service operators prohibit GMO's in their ranges.

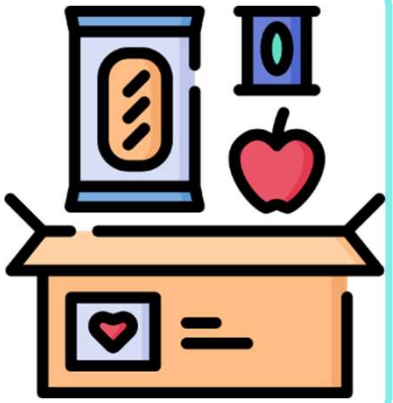
In the GMO screening process, screening methods are utilised to provide identification of authorised and unauthorised GMOs.

The two main GMO test methods are **protein-based lateral flow strip tests and DNA-based polymerase chain reaction (PCR)**.

Strip tests detect specific proteins produced by genetically modified DNA in GM crops.
The test works similar to a home pregnancy test and produces results in two to five minutes.

A **Polymerase Chain Reaction (PCR)** test qualifies and quantifies genetically modified organisms (GMO) present in a food or feed samples and provides independent verification to prove a product can be traded in confident knowledge it is GMO free.

Packaging Functionality and Robustness



Testing the **robustness of your packaging** and ensuring that it is **“fit for purpose”,** is another key testing step as you develop your products.

Packaging has many useful functions, including its primary goals of holding products and food, protecting their internal qualities, preserving their initial characteristics, protecting them during distribution and home storage, maintaining food’s shelf life and preserving food safety or to cook and serve the product.

Any packaging problem can produce a functionality failure, which could compromise the product or the food inside and lead to consumer dissatisfaction.

Testing Packaging Functionality and Robustness

There are different types of tests to assess packaging functionality, they include :

1. Compatibility Tests

2. Gas Analyser

3. Leak Detection

4. Sensory Analysis

1. Compatibility tests

Your packaging needs to **compliment your product** and **ensure it stays in optimum condition.**

See our training module P3-M5 Pack Design for more useful information about this subject.

Interaction between the packaging and the product it contains may result in undesirable changes in the packaging or alterations in product quality.

Changes in shape, texture, oxidation, odor, taste or modifications of package tightness and loss of moisture are some of the possible consequences of packaging and product interaction during storage.

Compatibility tests are necessary to ensure product quality throughout its life cycle.

2. Gas Analyser

"Headspace" is the internal volume of a packaging where there is no product.

The atmosphere in this space is called **headspace gas**.
Analysing and measuring this headspace gas is a key quality control process in the food, beverage and pharmaceutical industries for **products packaged in a modified atmosphere**.

This test is performed by inserting a fine needle into the packaging and using a pump to extract a small amount of headspace gas volume.

The extracted gas comes into contact with a sensor that measures the concentration of residual oxygen and carbon dioxide in the gas sample.

This **non-destructive test** can be used to evaluate the composition of the headspace at different times over long periods in order to identify any changes in the headspace composition due to permeability and leaks.

3. Leak Detection

The tightness of certain packaging must be ensured, along with it being securely sealed
and not having been punctured, to protect and preserve the product inside during the
entire supply chain and subsequent home storage.

There are many tests to guarantee packaging system integrity based on the type of packaging, pore size to be detected, equipment used and other factors.

There are four types of testing, and the choice is based on the type of product and packaging being used :

- visual testing
- pressure decay leak test for pressurised packages with & without restraining plates
- seal strength test
- bubble emission test

4. Sensory Analysis for Packaging Impacts

Packaging materials can “contaminate” food by **transferring substances** either by direct contact with the packaging material or indirectly through the headspace of the packaging.
This can lead to strange and **undesirable aroma and taste sensations** in the packaged food.

There are to tests to verify this:

- Assessment of the **inherent odour** of the packaging material under test (odour test), in which the packaging is stored in a container in controlled conditions and the odour of the atmosphere in the container is then evaluated using sensory analysis methods.

- Assessment of the **change in flavour of food** after direct or indirect contact with the packaging material under test in actual conditions or in simulated conditions (contact test).
In this case, the food, or failing that, the simulant, is assessed using sensory analysis methods in terms of changes in odour and smell and taste sensations.

Whenever possible, it is **ideal to test using real food and storage conditions** such as temperature and contact time.

Transit Trials




It is **good practice to conduct a transit trial** in several circumstances – for example if you are

- developing a **new style of product** with which you are not already familiar
- adopting **new formats of packaging** – including both **primary and secondary** (outer cases) packaging
- launching a product which is **fragile and prone to breakage**
- launching a product whose **appearance is liable to deteriorate unattractively** if it moves around in the packaging

A **representative sample** of the product in its **intended outer case or wrapping** should be despatched in conditions that mimic the way it will be transported when the product goes live.
The product should be tracked and monitored throughout its journey, so that you can be confident that

- the **product does not get damaged**
- the **product maintains its desired visual appearance** and looks attractive to consumers
- the **packaging stands up to the transit conditions** without crushing, ripping, breaking or shattering

It is helpful to **take photographs** of the product, and its primary and outer packaging, as it progresses through the transit and delivery process to **record any issues identified** so you can resolve them, or **prove it remains robust**.

Cooking Guidelines Verification for Food Safe Regeneration

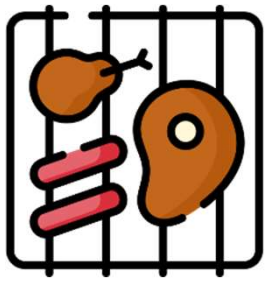
What is Food Regeneration?

Many foods and some drinks **must be cooked to be safe to eat**, or they may be **more enjoyable when served hot**.

Regeneration of food is a process aimed to **maintain the quality of food** by raising it to a temperature that renders it safe to eat, or more enjoyable to consume, whilst not damaging the food or negatively impacting its quality.

As a manufacturer, you must advise the consumer how to regenerated the food or drink product meals by giving them specific **guidelines for preparation, heating and serving.**

You will need to conduct tests **to generate and verify** that the information and recommendations you are offering consumers produces a safe and enjoyable outcome.



The Importance of Cooking Guidelines Verification

The generation of cooking guidelines needs to be approached in a **methodical and careful way**.

The safety of your product is at stake – **protecting consumers from harmful pathogens** such as E.coli, Salmonella app and Listeria monocyctogenes.

There are **many factors to consider** and you will need to feel confident that you can address all of these fully before you create your guidelines.

If you are not confident, you may wish to commission these tests from a reputable company who have specialist knowledge and equipment to conduct the tests and generate guidelines on your behalf, rather than risk recommending a guideline which does not create a food safe product.

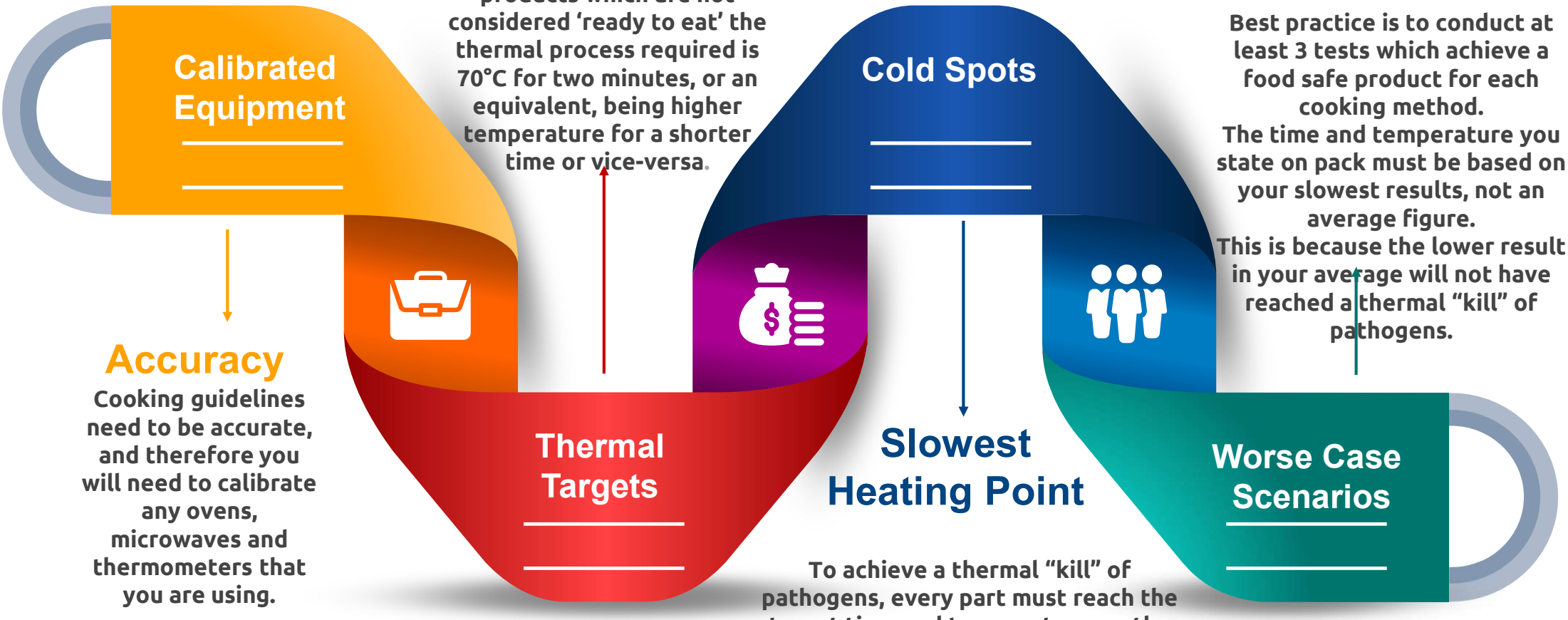
Temperature at the slowest heating point (°C)	Time required at the reference temperature to achieve an equivalent process
60 °C	43.48 minutes
65 °C	9.30 minutes
70 °C	2.00 minutes
74 °C	0.43 (26 seconds)
80 °C	0.09 (5 seconds)

Thermal Equivalence of 70oC for 2 minutes

Source : Campden BRI

Key Factors in Cooking Guidelines Verification

Here are some of the important factors to consider -



Building On This Training Module

Now you have gathered and assessed your test results, these will assist you in preparing legally compliant information to feature in your product labelling.

Some further AHFES modules that you may find useful include :

P3-M5 Pack Design

P5-M8 Legal Labelling

P5-M9 Generating Pack Copy for Product Packaging

P5-M10 Artwork Checking Procedures for Product Packaging

We hope that you have found this training module a useful and helpful support to your healthy food and drink innovation.

This training module is one of a number of training opportunities, organised into themed training programmes to support SME's (small & medium sized enterprises) in the participating regions of Wales, Northern Ireland, Ireland, Spain, Portugal and France to successfully bring new and reformulated healthy food and drink products to market.

The training was created by the partners within the AHFES project
which is a quadruple helix Atlantic area healthy food eco-system for the growth of SME's
funded by the European Union under the Interreg Atlantic Area Funding Programme.

This programme promotes transnational cooperation among 36 Atlantic regions of 5 European countries and co-finances cooperation projects in the fields of Innovation & Competitiveness, Resource Efficiency, Territorial Risks Management, Biodiversity and Natural & Cultural Assets.

For more information about other training available please click here.

This project is co-financed by the European Regional Development Fund through the Interreg Atlantic Area Programme

Acknowledgements

Presentation template by Slidesgo

Icons by Flaticon

Images by the AHFES Project team members Pixabay, Freepik

Infographic by Slidesgo and Slidemodel