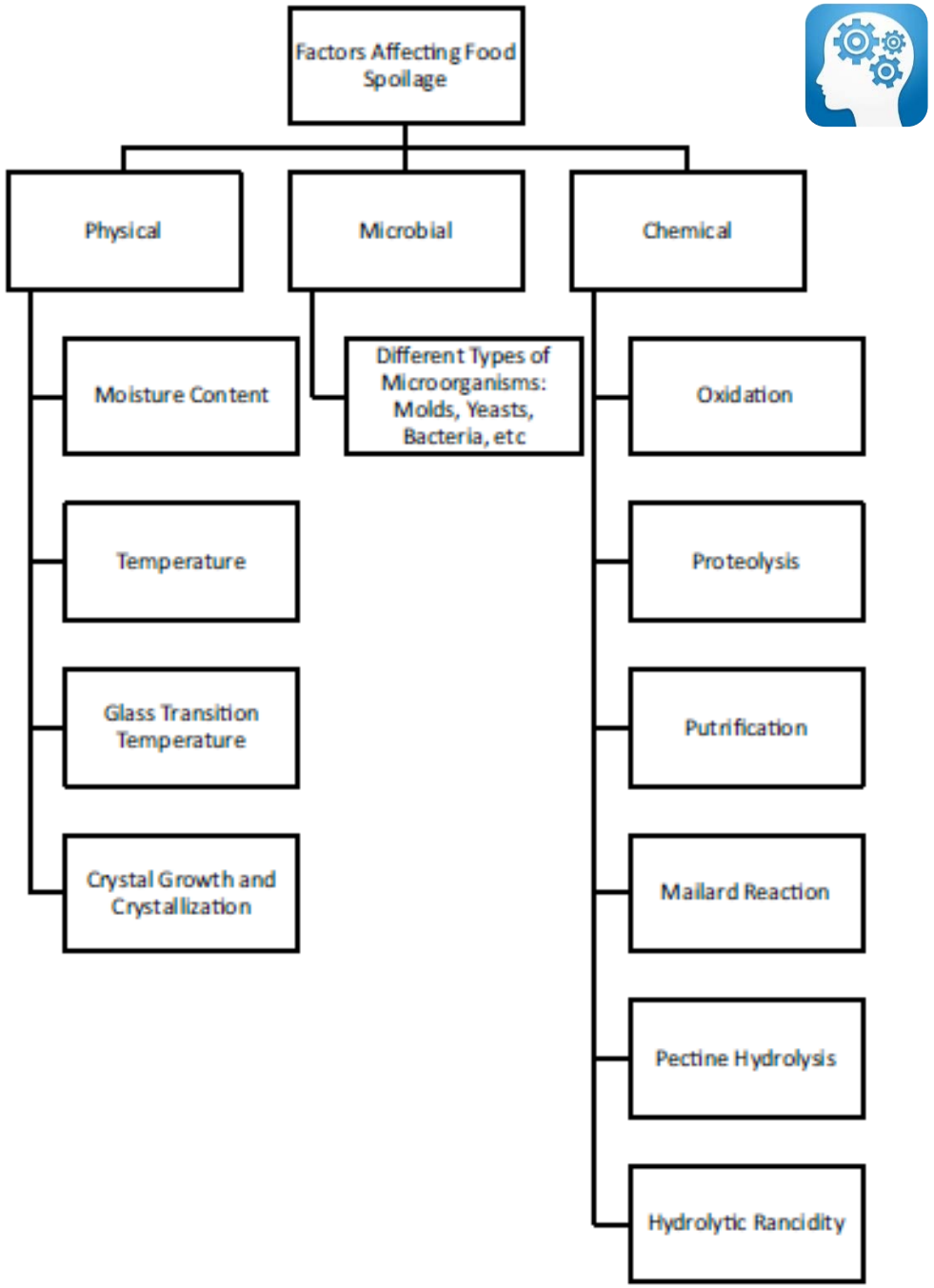
Food Quality and safety

FOOD DETERIORATION AND ITS CONTROL

- Food deterioration includes declines in
- Organoleptic desirability / aesthetic appeal,
- Nutritional value,
- Safety (i.e., product quality);occurs under the best of conditions.

Causes

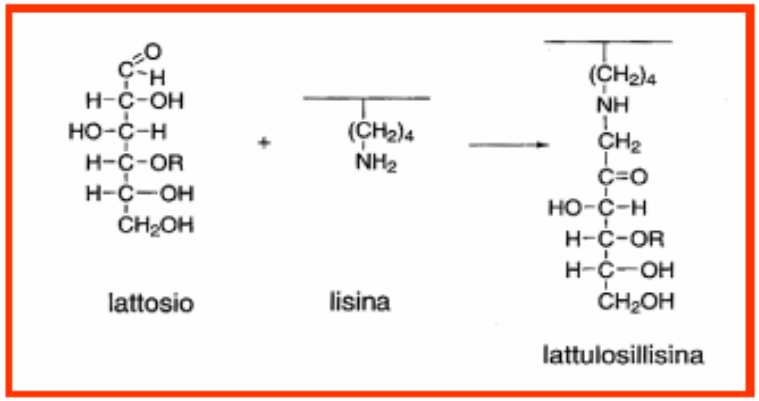
- Changes in temperature (heat and cold),
- Light,
- Oxygen,
- Changes in moisture content (water loss or uptake),
- Detrimental enzymes of the food,
- Microorganisms and macro organisms,
- Industrial contaminants (e.g., packaging materials)



A review on mechanisms and commercial aspects of food preservation and processing Amit *et al. Agric & Food Secur (2017) 6:51*

FOOD DETERIORATION AND ITS CONTROL –Maillard reaction

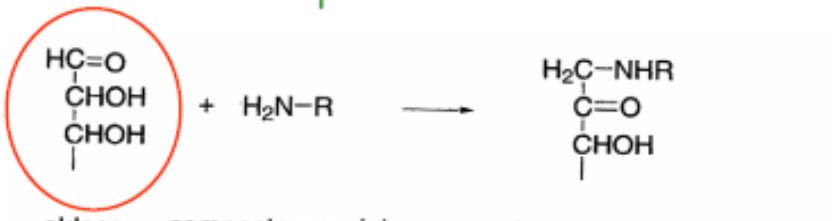
esempio di reazione tra un aldoso ed il gruppo aminico libero della lisina

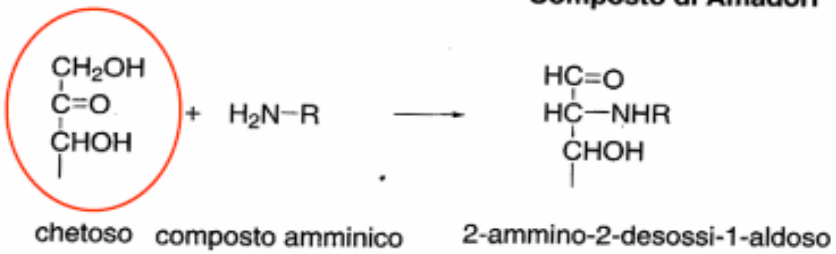


LISINA è l'AA più suscettibile e risulta così facilmente non più biodisponibile

Alimenti più suscettibili: latte (27% proteine e 36% lattosio) durante pastorizzazione, sterilizzazione, essiccamento; uova durante lo stoccaggio e l'essiccamento; pane, durante la cottura

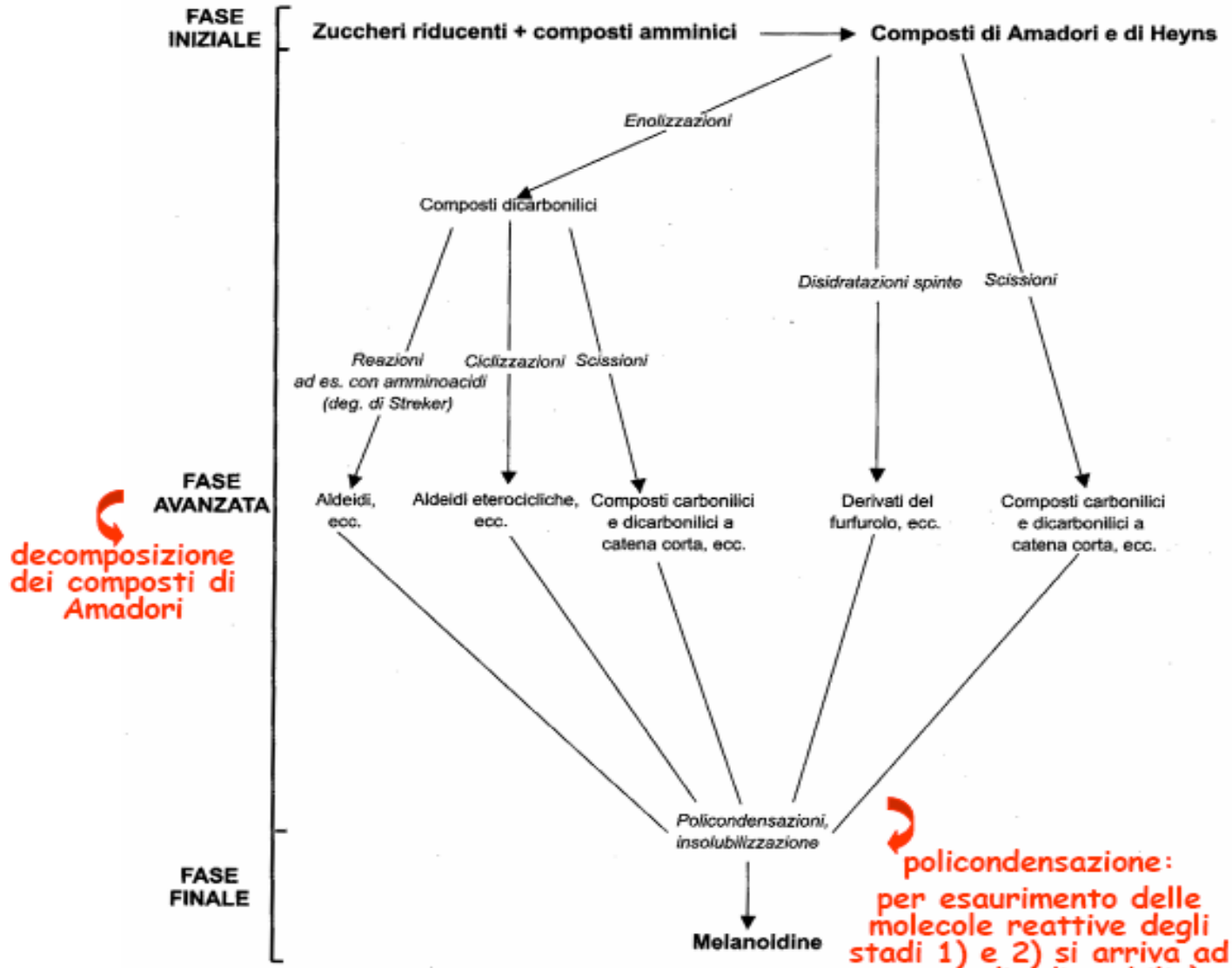
1) stadio iniziale: formazione di composti di Amadori





modificato da Restani, Prodotti Dietetici, Piccin 2004

FOOD DETERIORATION AND ITS CONTROL –Maillard reaction



modificato da Restani, Prodotti Dietetici, Piccin 2004

FOOD DETERIORATION AND ITS CONTROL – Oxidation reaction

Induzione e propagazione (formazione dei prodotti primari)

Formazione del radicale alchilico	$R-H \xrightarrow{\text{Luce, calore, metalli}} R\cdot + H\cdot$
Formazione del radicale idroperossi	$R\cdot + O_2 \longrightarrow R-OO\cdot$
Formazione dell'idroperossido	$R-OO\cdot + R-H \longrightarrow R-OOH + R\cdot$

Propagazione (formazione dei prodotti secondari)

Decomposizione degli idroperossidi	$2R-OOH \longrightarrow R-OO\cdot + R-O\cdot + H_2O$
Reazione del radicale alcossi con gli acidi grassi	$R-O\cdot + R-H \longrightarrow R-OH + R\cdot$
Reazione del radicale idroperossi con gli acidi grassi	$R-OO\cdot + R-H \longrightarrow R-OOH + R\cdot$
Decomposizione del radicale alcossi	$R-O\cdot \longrightarrow$ Composti di decomposizione* + radicali
Decomposizione del radicale idroperossi	$R-OO\cdot \longrightarrow$ Composti di decomposizione* + radicali
Formazione di epossidi	$R-OO\cdot \longrightarrow >C=C< \longrightarrow >C-C< + R-C$ (O)

Terminazione (collisione tra radicali liberi)

Formazione di dimeri	$R\cdot + R\cdot \longrightarrow R-R$
Formazione di eteri	$R-O\cdot + R\cdot \longrightarrow R-O-R$
Formazione di perossidi interni	$R-OO\cdot + R\cdot \longrightarrow R-OO-R$
	$2R-OO\cdot \longrightarrow R-OO-R + O_2$
	$R-O\cdot + R-O\cdot \longrightarrow R-OO-R$

* Alcoli, aldeidi, chetoni, idrocarburi

Figura 7.1
Perossidazione o «autossidazione» degli acidi grassi.

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Prodotti primari dell'ossidazione dei lipidi

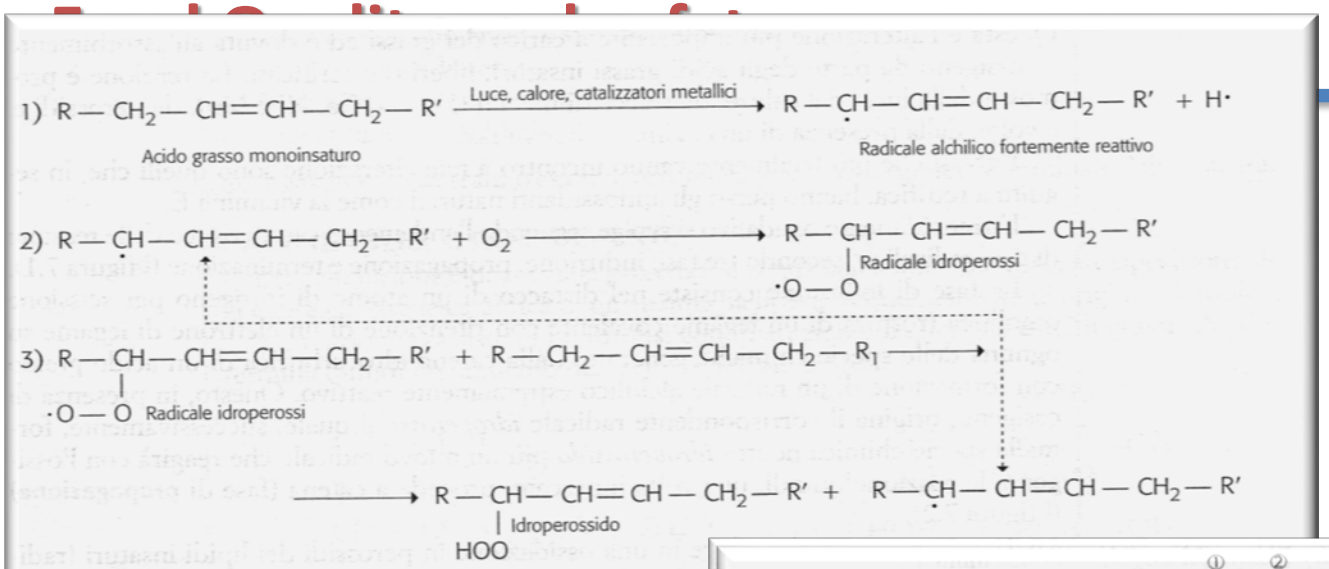


Figura 7.2
Formazione degli idroperossidi, prodotti primari dell'ossidazione dei grassi.

Prodotti secondari dell'ossidazione dei lipidi

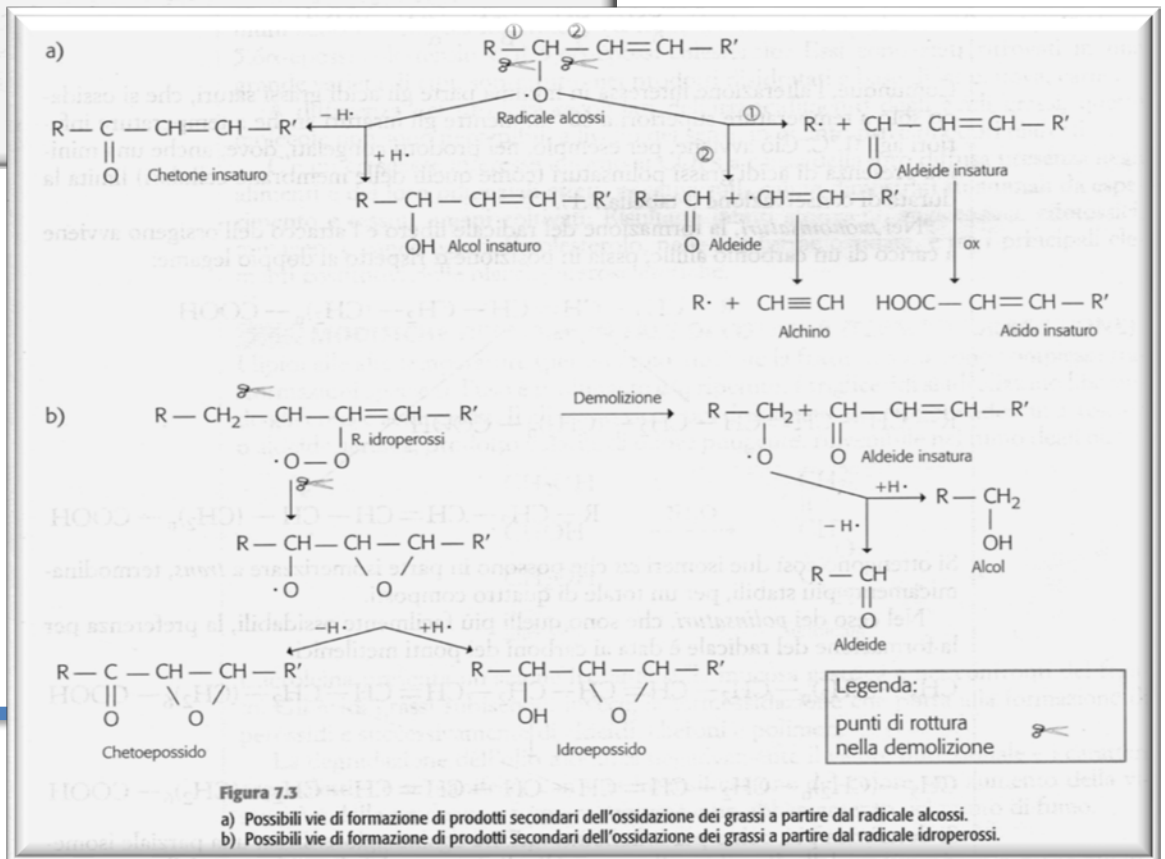
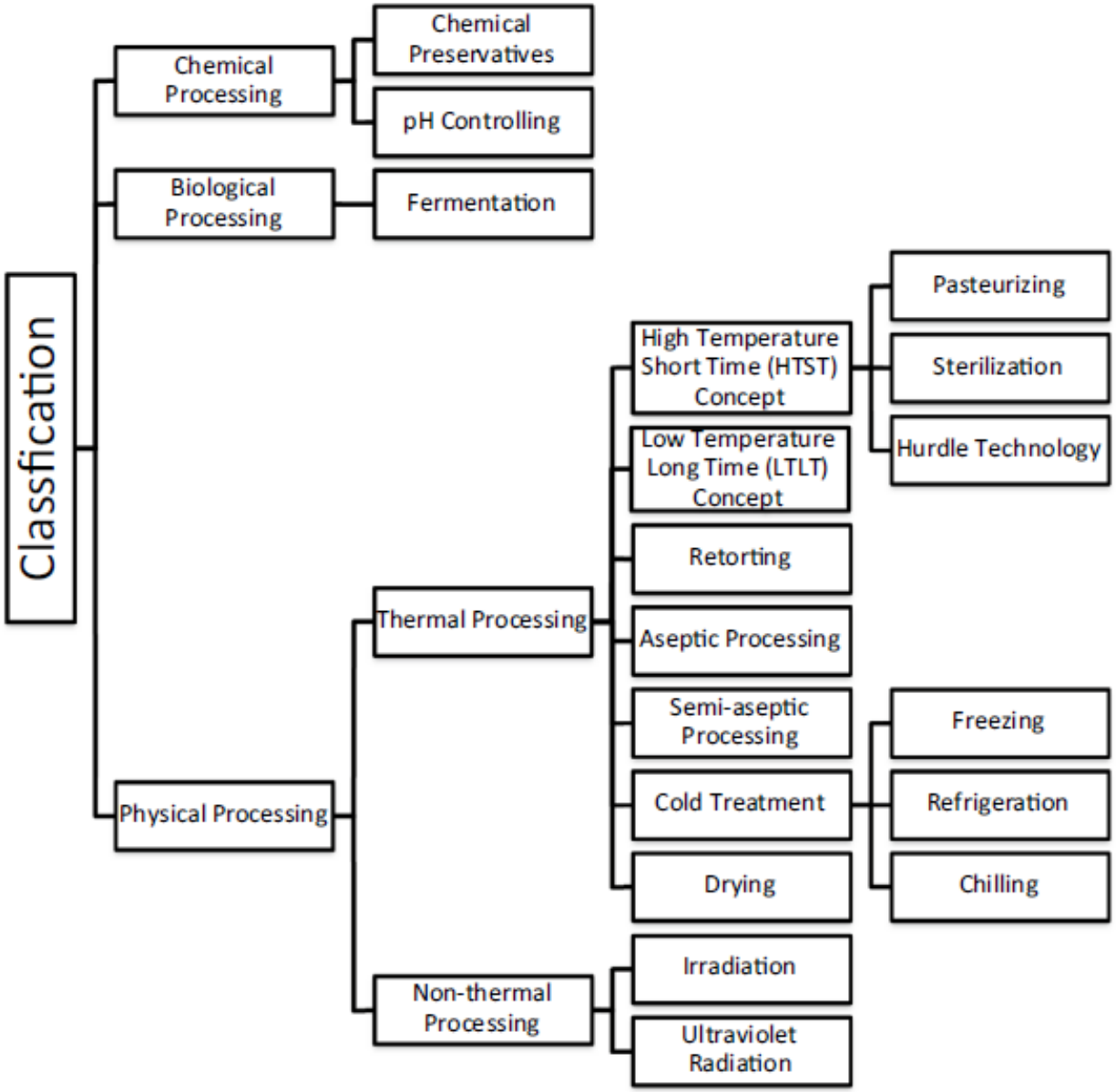


Figura 7.3
a) Possibili vie di formazione di prodotti secondari dell'ossidazione dei grassi a partire dal radicale alcossi.
b) Possibili vie di formazione di prodotti secondari dell'ossidazione dei grassi a partire dal radicale idroperossi.

SPOILAGE CONTROLS



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SPOILAGE CONTROLS

Physical processing

Drying *dehydration is the process of removing water from a solid or liquid food by means of evaporation*

Pasteurization *food is heated up to a specific temperature to destroy spoilage-causing microorganisms and enzymes*

Sterilization *process that completely destroys all the viable microorganisms (yeasts, molds, vegetative bacteria, and spore formers) resulting in a longer period of shelf life*

Criteria	VAT	HTST	UHT
Process type	Batch	Continuous	Continuous
Typical temperature–time combination	65 °C for 30 min	72 °C for 15–30 s	135–150 °C for a few seconds
Foods preserved	Butter milk and sour cream	Milk, eggnog, frozen dessert mixes, fruit juices, etc.	Milk
Shelf life increase (milk)	Several days when refrigerated	2–3 weeks when refrigerated	6–9 months when aseptically packaged
Type of microbes destroyed	Vegetative pathogens	Vegetative pathogens	All bacteria and spores

Table 8 Comparison between pasteurization and sterilization [74, 75]

Criteria	Pasteurization	Sterilization
Temperature level	Mild heat treatment process. Temperature level 65–75 °C (exception: UHT)	Severe heat treatment process. 135–140 °C and up to 150 °C are applied
Status of heat-resisting microorganisms	Many heat-resisting microorganisms, viruses, and spores may remain alive	Bacteria species, spores, and thermophiles
Change in nutritional capacity and profile	Negligible	Fats, protein, and sugar may decompose; calcium, minerals, and vitamins may escape
Storage	Refrigerated conditions	Ambient temperature
Product parameter (pH)	$3.5 < pH < 4.6$	$pH > 4.6$
Shelf life extension	For few days to weeks	For months

Food Quality and safety

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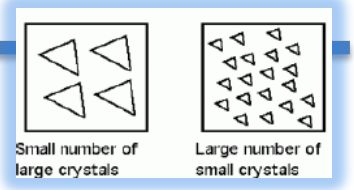

SPOILAGE CONTROLS

Physical processing

Freezing *slows down the physiochemical and biochemical reactions by forming ice from water below freezing temperature and thus inhibits the growth of deteriorative and pathogenic microorganisms in foods . It reduces the amount of liquid water in the food items and diminishes water activity. Heat transfer during freezing of a food item involves a complex situation of simultaneous phase transition and alteration of thermal properties. Nucleation and growth are two basic sequential processes of freezing. Nucleation means the formation of ice crystal, which is followed by 'growth' process that indicates the subsequent increase in crystal size*

Chilling *the temperature of foods is maintained between 0 and 4 °C. Chilling process reduces the initial temperature of the products and maintains the final temperature of products for a prolonged period of time)fresh products)*

Irradiation

Irradiation is a physical process in which substance undergoes a definite dose of ionizing radiation (IR) . IR can be natural and artificial. Natural IR generally includes X-rays, gamma rays, and high-energy Ultraviolet (UV) radiation; artificially generated IR is accelerated electrons and induced secondary radiation . IR is used in 40 different countries on more than 60 different foods. The effects of IR include: (a) disinfestation of grains, fruits, and vegetables, (b) improvement in the shelf life of fruits and vegetables by inhibiting sprouting or by altering their rate of maturation and senescence, and (c) improvement in shelf life of foods by the inactivation of spoilage organisms and improvement in the safety of foods by inactivating foodborne pathogens

Food Quality and safety

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SPOILAGE CONTROLS

Enzimatic processing

Fermentation method uses microorganisms to preserve food. This method involves decomposition of carbohydrates with the action of microorganisms and/or the enzymes . Bacteria, yeasts, and molds are the most common groups of microorganisms involved in fermentation of a wide range of food items, such as dairy products, cereal-based foods, and meat products.

Fermentation enhances nutritional value, healthfulness, and digestibility of foods. This is a healthy alternative of many toxic chemical preservatives

Table 16 Microorganisms used in food processing and flavor compounds produced [113]

Food items	Microorganisms	Flavor compounds produced
Buttermilk	*Streptococcus lactis* *Streptococcus cremoris* *Lactobacillus bulgaricus*	Lactic acid, diacetyl, small amounts of acetaldehyde
Yoghurt	*Streptococcus thermophiles* *Lactobacillus bulgaricus*	Acetaldehyde and diacetyl acetoin
Alcoholic fermented milk	*Saccharomyces sp.* *Lactobacillus sp.*	Ethanol acetoin and diacetyl
Sauerkraut	*Mixed cultures of* *Lactobacillus brevis* *Leuconostoc mesenteroides* *Lactobacillus plantarum*	Acetate and small amounts of short-chain fatty acids
Soybean milk	*Lactobacillus sp.* *Streptococcus thermophiles*	Aldehydes including pentanal
Soya sauce	*Aspergillus oryzae* *Lactobacillus sp.* *Saccharomyces rouxii*	Organic acids, alkyl phenols, and pyrazines
Tempeh	*Rhizopus sp.*	Fatty acid
Bread	*Saccharomyces cerevisiae*	Ethanol
Swiss cheese	*Propionibacterium shermanii*	Propionic acid
Cocoa	*Saccharomyces sp.* *Lactobacillus sp.* *Acetobacter sp.*	Fatty acids and aromatic acids

Food Quality and safety

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SPOILAGE CONTROLS

Chemical processing

Preservatives are defined as the substances capable of inhibiting, retarding, or arresting the growth of microorganisms or any other deterioration resulting from their presence.

Food preservatives extend the shelf life of certain food products. Preservatives retard degradation caused by microorganisms and therefore maintain the color, texture, and flavor of the food item.

They are Food Additives

	Antimicrobial agents	Antioxidants agents	Antienzymatic agents
Definition	Inhibit the growth of undesirable microorganisms (fungi, bacteria, yeast)	Inhibit atmospheric oxidation. Mainly used for the products that contains unsaturated fatty acids, oils, and lipids	Prevent natural ripening process and oxidative deterioration of food by inhibiting the bacteria, parasite, fungi
Mechanism	Creates unfavorable environment for microorganisms by reducing moisture content and increasing acidity	Oxidation of unsaturated fats produces free radicals which can start chain reactions. In this reaction, aldehyde and ketones are produced which results in the rancid taste of foods. Antioxidants terminate these chain reactions by removing free radical intermediates and inhibit other oxidation reactions	Blocks enzymatic processes in the food that continue to metabolize after harvest. Metal chelating agents can remove the metal cofactors that many enzymes need
Applications	Sorbic acid (2,4-hexadienoic acid) and potassium sorbet for the preservation of cheese, bakery products, vegetable-based products, dried fruits, beverages, and other products as well as smoked fish, margarine, salad cream, and mayonnaises.	Butylated hydroxyl anisole, (BHA) for the preservation of butter, lard, meats, beer, baked goods, snacks, potato chips, nut products, dry mix for beverages	Citric acid for the preservation of foods, beverages, dairy products, and pharmaceuticals
	Benzoic acid and sodium benzoate for the preservation of mayonnaises, pickled vegetables, fruit preparation and fruit based drinks, dessert sauces and syrups	Butylated hydroxyl toluene (BHT) in fats and oils processing	EDTA (ethylenediamine tetra acetic acid) in food processing
	Lactic acid for the preservation of meats	Sulfites for the preservation of beer, wines, dried foods	Polyphosphates for the preservation of fresh peeled fruits and vegetables
	Parabens (esters of para-hydroxy benzoic acid) for the preservation of dried meat products, cereal and potato based snacks and confectionary	Vitamin E for the preservation off fruits and vegetables	Polyphosphates for the preservation of fresh peeled fruits and vegetables
	Nitrite (sodium nitrate) for the preservation of meat	Gallates in fats and oils processing	–
	Sulfur dioxide, sodium sulfite for the preservation of dried fruits, certain fruit juices, potatoes, and wines	Ascorbyl palmitate for the preservation of sausages and chicken broths	–

Food Quality and safety

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Food Additives

shall mean any substance not normally consumed as a food in itself and not normally used as a characteristic ingredient of food, whether or not it has nutritive value, the intentional addition of which to food for a technological purpose in the manufacture, processing, preparation, treatment, packaging, transport or storage of such food results, or may be reasonably expected to result, in it or its by-products becoming directly or indirectly a component of such foods.

1. When establishing the conditions of use […]:
(a) the level of use shall be set at the lowest level necessary to achieve the desired effect;
(b) the levels shall take into account:
(i) any acceptable daily intake, or equivalent assessment, established for the food additive and the probable daily intake of it from all sources;
(ii) where the food additive is to be used in foods eaten by special groups of consumers, the possible daily intake of the food additive by consumers in those groups.

2. Where appropriate, no maximum numerical level shall be fixed for a food additive (quantum satis). In that case, the food additive shall be used in accordance with the principle of quantum satis.

Food Quality and safety

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Food Additives

Safety assessment of food additives is based on the reviews of all available toxicological data, including observations in humans and in animal models. From the available data, a maximum level of an additive that has no demonstrable effect is determined.

This level is called **'no-observed-effect level' (NOEL)** and together to **'no-observed-adeverse-effect level' NOAEL** is used to determine the **'Acceptable Daily Intake' (ADI)** for each food additive. https://www.youtube.com/watch?feature=player_embedded&x-yt-ts=1422503916&v=BSoRFqxRAoE&x-yt-cl=85027636

The NOEL and the NOAEL are expressed in milligrams of the additive per kilogram of bodyweight per day (mg/kg bodyweight/day).

The NOEL/NOAEL is then divided by a safety factor, usually 100, which results in a large margin of safety, for two main reasons:

- The NOAEL is determined in animals, not humans. It is therefore prudent to adjust (by a factor of 10) this value by assuming that man is more sensitive than the most sensitive test animal.
- The reliability of toxicity tests is limited by the number of animals tested. Such tests cannot represent the diversity of the human population, subgroups of which may show different sensitivities (e.g. children, elderly and sick). Again, it is prudent to adjust (further by a factor of 10) this value.

Food Quality and safety

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Food Additives

The ADI provides a large margin of safety and refers to the amount of a food additive that can be assumed daily in the diet, in a lifetime, without any negative effect on the health.
ADI is expressed as “mg/kg body weight/day”.

It is calculated taking into account the "average" and the "extreme" consumption estimates in the whole/particular subgroups population.

After the definition of the ADI for a new additive it can be included in the POSITIVE LIST of “the food additives approved for use in foods” together with the food categories allowed for this new additive and its maximum dose admissible for each category (annex II).
This list is continually updated.

E codes

E100–E199 (colours)
E200–E299 (preservatives)
E300–E399 (antioxidants, acidity regulators)
E400–E499 (thickeners, stabilizers, emulsifiers)
E500–E599 (acidity regulators, anti-caking agents)
E600–E699 (flavour enhancers)
E700–E799 (antibiotics)
E900–E999 (miscellaneous)
E1000–E1599 (additional chemicals)

Food Quality and safety

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Food Additives - Colorants

All three drinks taste the same!

REASON FOR FOOD COLOURING

- To restore the color loss due to light, air, temperature, moisture and storage
- To correct natural variations in colours
- To enhance the natural colors associated with a given product.
- To provide a colorful identity to the colorless or dull looking foods.
- To provide a colorful appearance to "fun foods."
- To protect flavors and vitamins that may be affected by sunlight.

Food Quality and safety

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Food Additives - Colorants

Colouring agents

Organic

Inorganic

natural

synthetic

Calcium carbonate (E170)
Titanium dioxide (E171)
Silver (E174)
Gold (E175)

Plants
Animal sources
Microbial sources

Natural identical
Azo dyes (tartrazine E102)
Triarylmethane (E133)
Chinophtalon (quinolines E104)

Food Additives - Sweetners

Sweeteners are a very heterogeneous class of compounds from the chemical point of view.

Classification of sweeteners
1) Bulk sweeteners: polyalcohols or polyols
Calorific value: 2.8 kcal/g close to that of sucrose; sweetening power slightly lower
2) Hight-intensity sweeteners: saccharin, cyclamate, aspartame, neotame, acesulfame K, sucralose, thaumatin, stevia…
Sweetwning power: significantly higher than that of sucrose, calorific value zero
3) synergistic mixtures of sweeteners often used as table-top sweeteners.

Some Properties of Nonnutritive Sweeteners

Sweetener	Sweetness in relation to sucrose	Aftertaste	Stability		ADI[a] (mg/kg body weight)
			In solution	During heating	
Acesulfame K	150×	Very slight, bitter	Stable	Stable	0–9
Aspartame	180×	Prolonged sweetness	Not stable in acid conditions	Unstable, sweetness may disappear	40
Cyclamate	30–60×	Chemical flavor	Relatively stable	Relatively stable	0–7
Saccharin	300×	Bitter metallic	Stable in pH < 2.0	Relatively stable	2.5
Stevioside	100–300×	Bitter	Relatively stable	Relatively stable	Not acceptable
Talin	200–2500×	Licorice-like	Relatively stable	Stable at neutral to low pH	Not specified
Sucralose	600×	—	Stable	Stable	0–15

[a] WHO and European Union Scientific Committee on Food.

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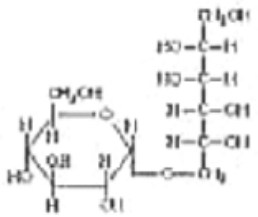
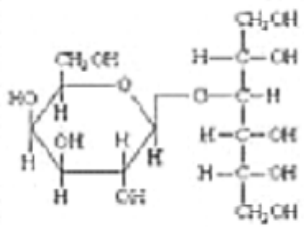
Food Additives - Sweetners

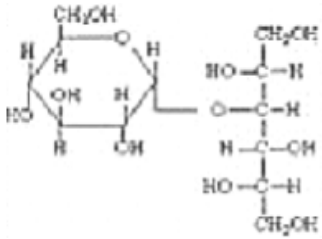
Some Properties of Nutritive Sweeteners



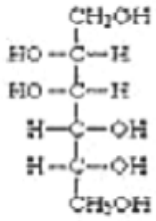
Isomalt E953



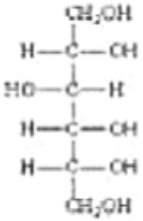
Lactitol E966



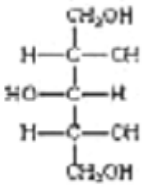
Maltitol E965



Mannitol E421



Sorbitol E420



Xylitol E967

Polyol	E code	Synonyms	Sweetness (sucrose = 100)	Melting point (°C)	Solubility at 25°C (g/100 g H_2O)	Impact on blood sugar	Laxative effect[a]
Xylitol	E 967	Xylit	90–100	93–94.5	64	Very low	++
Sorbitol	E 420	Glucitol	50–60	93–112	72	Low	++
Mannitol	E 421	Mannit, mannose sugar	50–60	165–168	18	Low	+++
Lactitol	E 966	Lactit	30–40	94–97	149°	None	+
Maltitol	E 965	Maltit	80–90	—	Easily soluble	Low	++
Isomaltitol	E 953	Isomalti	50	—		None	+++

- The main disadvantage of these seweeteners is the possible laxative effect caused by delayed intestinal absorption and consequent stagnation. The polyols are characterized by slow absorption which results in slower metabolism and less calories than sugar yield (2.8 kcal / g).
- The non-cariogenicity is the basis of their use in toothpaste and chewing gum. Bacterial plaque is not capable of fermenting them as it does with sugars.

Food Quality and safety

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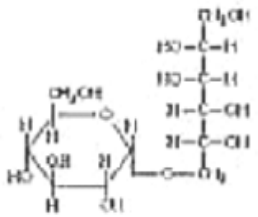
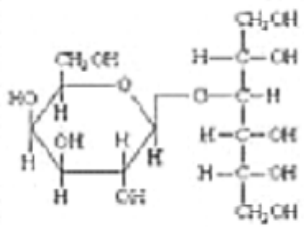
Food Additives - Sweetners

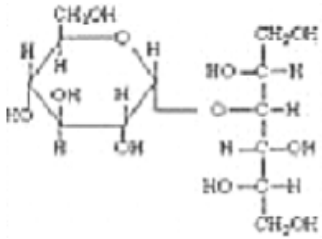
Some Properties of Nutritive Sweeteners



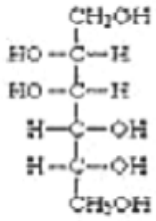
Isomalt E953



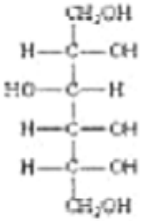
Lactitol E966



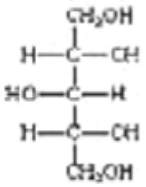
Maltitol E965



Mannitol E421



Sorbitol E420



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Isomaltitol	E 953	Isomalti	50	—		None	+++

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- The non-cariogenicity is the basis of their use in toothpaste and chewing gum. Bacterial plaque is not capable of fermenting them as it does with sugars.

Food Quality and safety

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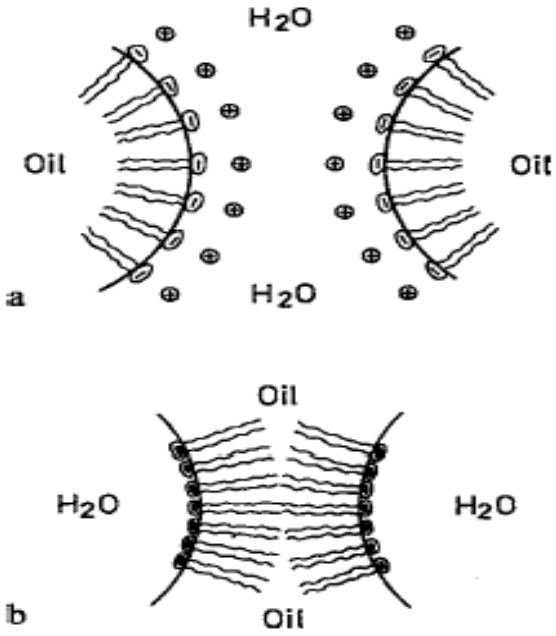
Food Additives - Emulsifyers

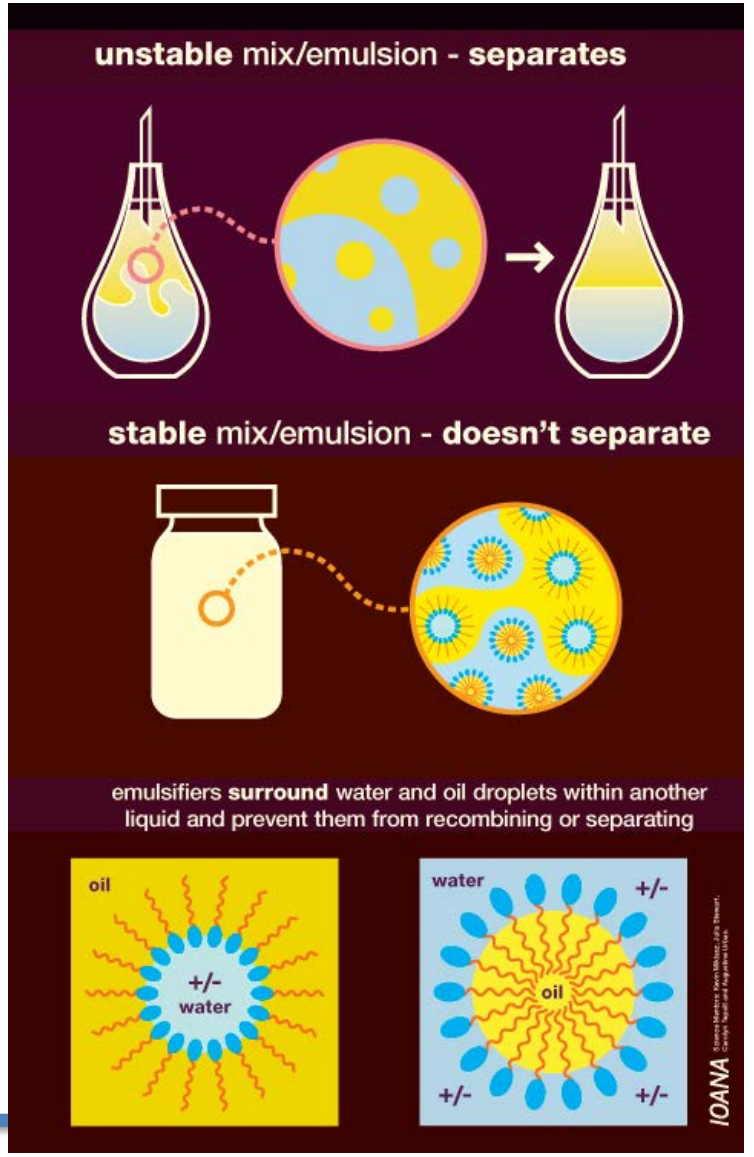
Emulsifiers: Substances which make it possible to form or maintain a homogenous mixture of two or more immiscible phases such as oil and water in a foodstuff.



Stabilization of an emulsion.

a Activity of an ionic emulsifier in an o/w emulsion.

b Activity of a nonpolar emulsifier in w/o emulsion. ◦



Food Quality and safety

U4

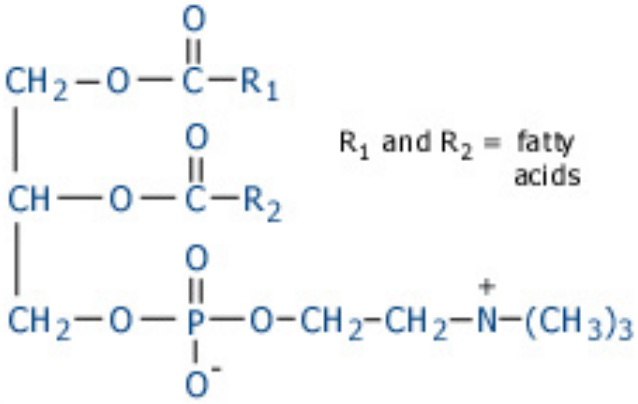
Food Additives - Emulsifyers

"An emulsion is a heterogeneous system, consisting of at least one immiscible liquid intimately dispersed in another in the form of droplets, whose diameter, in general, exceeds 0.1 µm. Such systems possess a minimal stability, which may be accentuated by such additives as surface-active agents, finely divided solids, etc.'' (Becher, 1957)

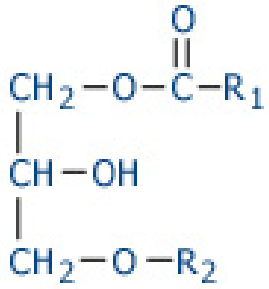
Emulsifiers are molecules that have two distinct ends. One end likes to be in water (hydrophilic) and the other end likes to be in oil (lipophilic).

The most commonly used emulsifiers are **lecithin** (E322) and the **mono- and di-glycerides of fatty acids** (E471), in particular palmitate, stearate and oleate.

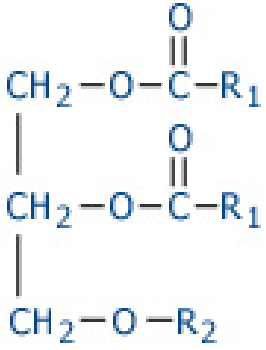
Lecithin:



Monoglyceride:



Diglyceride:



Food Quality and safety

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Food Additives - Emulsifyers

- FORM EMULSIONS
- STABILIZE EMULSIONS
- MODIFY STRUCTURES

Food Emulsifier Categories

Lecithin and lecithin derivatives
Glycerol fatty acid esters
Hydroxycarboxylic acid and fatty acid esters
Lactylate fatty acid esters
Polyglycerol fatty acid esters
Ethylene or propylene glycol fatty acid esters
Ethoxylated derivatives of monoglycerides
Sorbitan fatty acid esters
Miscellaneous derivatives

Functions	Product examples
Emulsification, water-in-oil emulsions	Margarine
Emulsification, oil-in-water emulsions	Mayonaise
Aeration	Whipped toppings
Whippability	Whipped toppings
Inhibition of fat crystallization	Candy
Softening	Candy
Antistaling	Bread
Dough conditioner	Bread dough
Improve loaf volume	Bread
Reduce shortening requirements	Bread
Pan-release agent	Yeast-leavened and other dough and batter products
Fat stabilizer	Food oils
Antispattering agent	Margarine and frying oils
Antisticking agent	Caramel candy
Protective coating	Fresh fruits and vegetables
Surfactant	Molasses
Control viscosity	Molten chocolate
Improved solubility	Instant drinks
Starch complexation	Instant potatoes
Humectant	Cake icings
Plasticizer	Cake icings
Defoaming agent	Sugar production
Stabilization of flavor oils	Flavor emulsions
Promotion of ''dryness''	Ice cream
Freeze–thaw stability	Whipped toppings
Improve wetting ability	Instant soups
Inhibition of sugar crystallization	Panned coatings

Food Quality and safety

U4

Food Additives - Emulsifyers

Bread making which has made with emulsifiers?

Cereal-based products

Wheat flour is used in the production of bread. It contains a protein, called **gluten** that is responsible for giving the dough made from the wheat **its elastic texture** This is important in the baking process as it traps carbon dioxide produced by the yeast during fermentation and makes the bread rise evenly.

Emulsifiers with larger molecular structures, particularly diacetyl tartaric esters of monoglycerides (DATEM) (E472e), interacts with the gluten to strengthen this gluten network and give the bread a good texture.

- **During mixing**
  - Improves weteability
  - Improves distribution of shortening
  - Interacts with starch, protein and fat
- **Results in:**
  - Decreased mixing time
  - Decreased shortening usage
  - Improved mixing tolerance
  - Improved physical characteristics of the dough

- **During fermentation**
  - Results in better gas retention
- **During baking**
  - Improved gas retention
  - Improved loaf volume
  - Decreased water loss
  - Finer, more uniform texture
- **During Storage**
  - Increased softness
  - Less staling

Food Quality and safety

U4

Food Additives – Gelling agents

Source		Compound	E Number
Seeds	The outside of the seeds are removed and the inner part (endosperm) is ground into a powder which can be used as a stabiliser, thickener or gelling agent	Guar gum	E412
		Locust beangum	E410
		Tara gum	E417
Plant exudates	Some plants ooze out sticky substances that can be harvested and used	Gum arabic (acacia gum)	E414
		Karaya gum	E416
		Tragacanth gum	E413
Citrus fruit and apples	Pectin is dissolved out from fruits, filtered and then precipitated from the solution	Pectin	E440
Plant materials	Plant cells are made up of cellulose. It is isolated and used as the raw material for a series of modified cellulose compounds	Cellulose	E460
Seaweed	Seaweeds are often farmed commercially and used to obtain a variety of thickeners, gelling agents and stabilisers	Agar	E406
		Alginates	E400-404
		Carrageenan	E407
Maize and potato	Starch is obtained from maize and potatoes before being modified	Starches	E1404-1451

Food Quality and safety

U4

Food Additives – Viscosity, gelling and stabilizers

Starch characteristics

	Percent amylose	Texture	Flavor
Common corn	28	Firm gel	Cereal
Waxy maize	<1	Paste	Slight cereal
Tapioca	22	Soft gel	Neutral
Potato	18	Sauve	Earthy
Wheat	30	Firm gel	Slight grain
High amylose corn	55–70	Rigid gel	Cereal
Rice	24	Soft gel	Slight grain
Waxy rice	<2	Paste	Neutral

Modified starch (enzymatic)

Starch can be hydrolyzed into simpler carbohydrates by acids, various enzymes, or a combination of the two. Food products made in this way include:

Maltodextrin, a lightly hydrolyzed starch product used as a bland-tasting filler and thickener.
Various corn syrups , viscous solutions used as sweeteners and thickeners in many kinds of processed foods.
Dextrose, commercial glucose, prepared by the complete hydrolysis of starch.
Resistant starch (RS) is starch that escapes digestion in the small intestine of healthy individuals such as that found in seeds or legumes and unprocessed whole grains uncooked potato, green banana flour , corn-flakes. Resistant starch can act as a replacement for wheat products in foods that are required to be gluten-free.

Food Quality and safety

Food Additives – Fat Replacers
Fat substitutes and fat mimetic

Type of fat replacer				Nutrient source	Energy density	Specific application	Functional properties
Fat substitutes (derived from fat)	**Olestra/ Olean**			Sucrose polyester of 6-8 fatty acids	noncaloric (not absorbed)	Savory snacks	Texturize, provide flavor and crispiness, conduct heat
	Caprenin			Caprocaprylobehenic triacylglyceride	5 kcal/g	Soft candy, confectionary coatings	Simulating properties of cocoa butter (emulsify, texturize)
	Salatrim			Short and long acyl triglyceryde molecule	5 kcal/g	Chocolate-flavored coatings, deposited chips, caramels and toffees, fillings and inclusions for confectionary, peanut spread	range melting points, hardness, appearance
						baked goods, fillings and inclusions for baked goods;	Emulsify, provide cohesiveness, tenderize carry flavor, replace shortening, prevent staling, prevent starch retrogradation, condition dough
						savory dressings, dips, sauces	Emulsify, provide mouthfeel and lubricity, hold flavorants
						dairy desserts, cheese	provide flavor, body, mouthfeel, and texture, stabilize, increse overrun
Fat mimetics	Derived from protein	**Simplesse**		White egg protein, milk protein	4 kcal/g	Yogurt, cheese, sour cream	stabilize, emulsify
		Simplesse100		Whey protein		baked goods	texturize
						frozen dessert products	texturize stabilize
						frostings	provide mouthfeel, texturize
						salad dressing, dips, mayonnaise	Texturize, provide mouthfeel
						margarine	texturize
						Sauces, soups	texturize
		LITA		zein	1-4 kcal/g	baked goods	texturize
		Trailblazer		White egg protein, serum protein mixed with xanthan gum		dairy products	Stabilize, emulsify
						Soups, sauces	texturize
Fat mimetics	Derived from protein	**N-Flate**		Non fat milk, gums, emulsifiers and modified starch		salad dressing	Texturize, provide mouthfeel
						Icings, glazes, desserts, ice cream	Texturize, stabilize
						ground beef	Texturize, provide mouthfeel, water holding
	Derived from carbohydrate	**GUMS**	Guar	Galactomannan extracted from leguminous seed	noncaloric	baked goods	retain moisture, retard staling
			Xanthan	Microbial polisaccharide produced by aerobic fermentation of *Xantomonas campestris*			
			Locust bean	Extracted from seeds of the tree *Ceratonia silique*			
			Carrageenan	Sulphated polysaccharides extracted from red seaweed (marine algae of the class *Rhodophyta*)		salad dressings	increase viscosity, provide mouthfeel, texturize,
			Gum arabic	Dry exude from *Accacia* tree			
			Pectins	Cell wall polysaccharides extracted from apple pomace, citrus peel, sugar beet pulp, sunflowers heads		sauces	Thicken, provide mouthfeel, texturize

Food Quality and safety

Food Additives – Fat Replacers
Fat substitutes and fat mimetic

Starch: native, modified by acid or enzymatic hydro-lysis, oxidation, dextrinization, crosslinking, or mono-substitution; available in pregelatinized or instant forms		Common corn, high amylose corn, waxy maize, wheat, potato, tapioca, rice, waxy rice	4 kcal/g	Margarine, spreads, dressings, sauces, baked goods, frostings, fillings, meat emulsions	modifying texture, gelling, thickening, stabilizing, water holding
CELLULOSE	**microcrystalline cellulose**	Obtained by mechanical grinding from various plant sources	noncaloric	salad dressings frozen desserts sauces dairy products	contributes body, consistency and mouthfeel, stabilizes emulsions and foams, controls syneresis, adds viscosity, gloss and opacity to foods
	powdered cellulose	Obtained by chemical depolymerization from various plant sources		frying	reducing the fat in fried batter coatings and fried cake donuts
				baked goods	increasing the volume of baked goods because it can stabilize air bubbles and minimize after baking shrinkage
	methyl cellulose	Obtained by chemical derivitization from various plant sources	noncaloric	baked goods frozen desserts dry mix sauces	impart creaminess, lubricity, air entrapment and moisture retention
	hydroxypropyl methyl cellulose	Obtained by chemical derivitization from various plant sources		Sauces, dressings	impart pouring and spooning qualities
maltodextrins		Produced by partial hydrolysis of starch (corn, potato, oat, rice, wheat, tapioca,)	4 kcal/g	table spreads, margarine imitation sour cream, salad dressings, baked goods, frostings, fillings sauces, processed meat, frozen desserts	build solids and viscosity, bind/control water, contribute smooth mouthfeel
polydextrose		Randomly-bonded polymer of glucose, sorbitol, and citric or phosphoric acid	1 kcal/g	baking goods and baking mixes, chewing gum, confections, frostings salad dressing, frozen dairy desserts and mixes gelatins, puddings and fillings, hard and soft candy, peanut spreads, fruit spreads, sweet sauces, toppings and syrups	bulking agent, formulation aid, humectant, texturizer smoothness in high-moisture formulation, fat-sparing effect
β-glucan		Soluble fiber extracted from oats (sometime barley)	1-4 kcal/g	baked goods and a variety of other food products	adding body and texture

Food Quality and safety

U4

Food Additives – Flavourings

(a) '**flavourings'** shall mean products:

(i) not intended to be consumed as such, which are added to food in order to impart or modify odour and/or taste;

(b) '**flavouring substance**' shall mean a defined chemical substance with flavouring properties;

(c) '**natural flavouring substance**' shall mean a flavouring substance obtained by appropriate physical, enzymatic or microbiological processes from material of vegetable, animal or microbiological origin either in the raw state or after processing for human consumption by one or more of the traditional food preparation processes listed in Annex II;

(d) '**flavouring preparation**' shall mean a product, other than a flavouring substance, obtained from:

(i) food by appropriate physical, enzymatic or microbiological processes […];

(ii) material of vegetable, animal or microbiological origin, other than food, by appropriate physical, enzymatic or microbiological processes, […];

(e) '**thermal process flavouring**' shall mean a product obtained after heat treatment from a mixture of ingredients not necessarily having flavouring properties themselves;

(f) '**smoke flavouring**' shall mean a product obtained by fractionation and purification of a condensed smoke yielding primary smoke condensates, primary tar fractions and/or derived smoke flavourings as defined in Article 3 of Reg. (EC) 2065/2003.

Food framework law – Food safety

U4

ISO, 2006. *International Organisation of Standardization* (ISO): Definition of Quality on official website. www.iso.org
CAC. (2003). Basic texts on food hygiene (3rd ed.). *Codex Alimentarious Comission.*

Food Safety *vs* Food Quality

U4

Defects and improper food quality may result in consumer rejection and lower sales, while food safety hazards may be hidden and go undetected until the product has been consumed.

If detected, serious food safety hazards may result in market access exclusion and major economic loss and costs.

Since food safety hazards directly affect public health and economies, achieving proper food safety must always take precedence over achieving high levels of other quality attributes.

Food safety and quality assurance programmes should always focus on preventing problems, not simply curing them. Once product quality has been undermined, it is virtually impossible to restore

UN. (2007). Safety and quality of fresh fruit and vegetables: A training manual for trainers. United Nations. Retrieved from http://www.unctad.org/en/docs/ditccom200616_en.pdf (Accessed 15/02/2015).

Food safety management?

U4

WORLD LEVEL MANEGEMENT

WHO

(world health organization)

FAO

(food and agricultural organization)

CODEX ALIMENTARIUS

OIE

(the world organization for animal health)

OECD

(Organization economic cooperation an developement

COMMUNITY LEVEL

FDA

(Food and drug administration)

EFSA

(European food safety authority)

NATIONAL LEVEL

Health departement

Food framework law - EFSA

efsa
European Food Safety Authority
Committed since 2002 to ensuring that Europe's food is safe

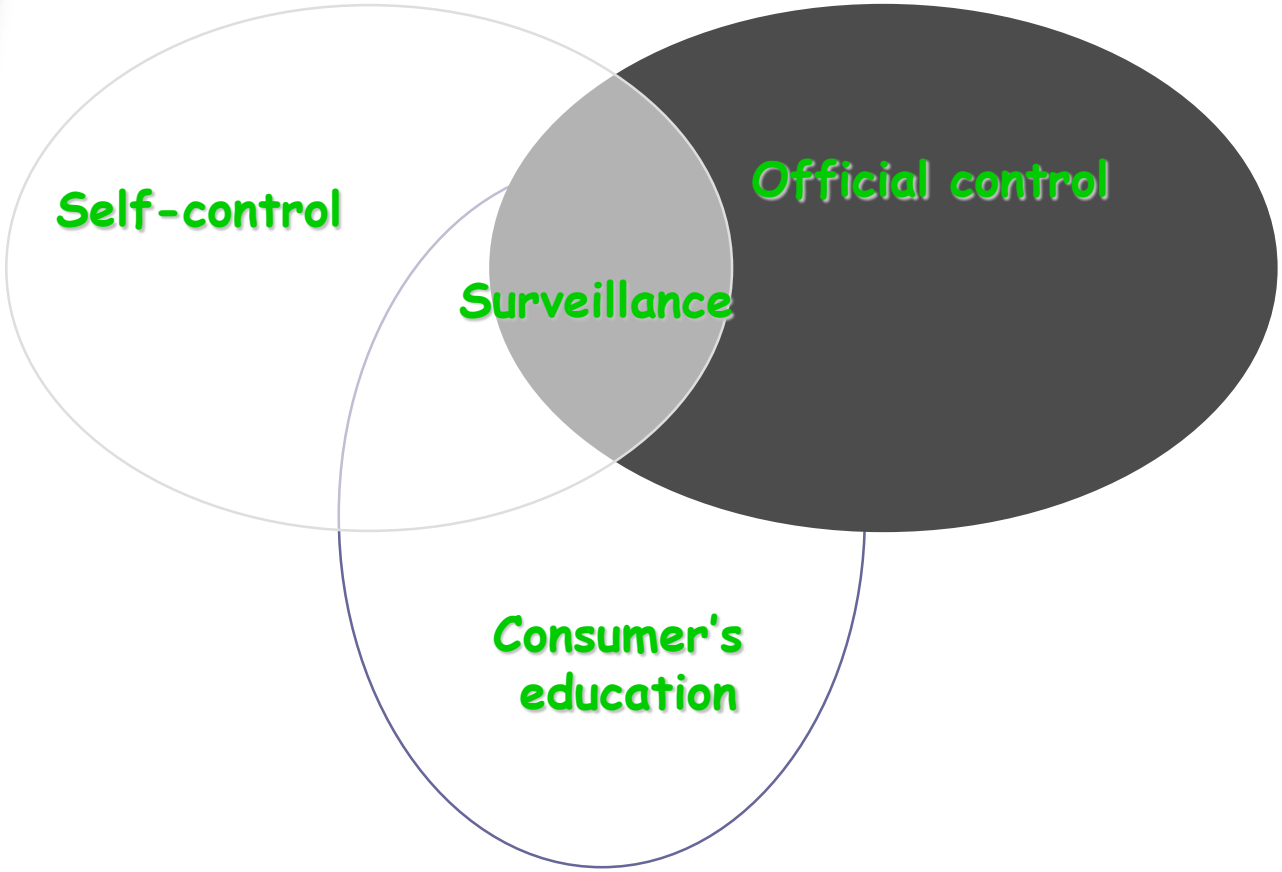
Risk
probability of an adverse health effect and the severity of that effect, consequential to a hazard

Hazard
biological, chemical or physical agent in, or condition of, food or feed with the potential to cause an adverse health effect

Commission And Member States

- Risk analysis
- Assessment
- Manegement
- Communication
- Emerging Risk

Integrated System



Food safety management

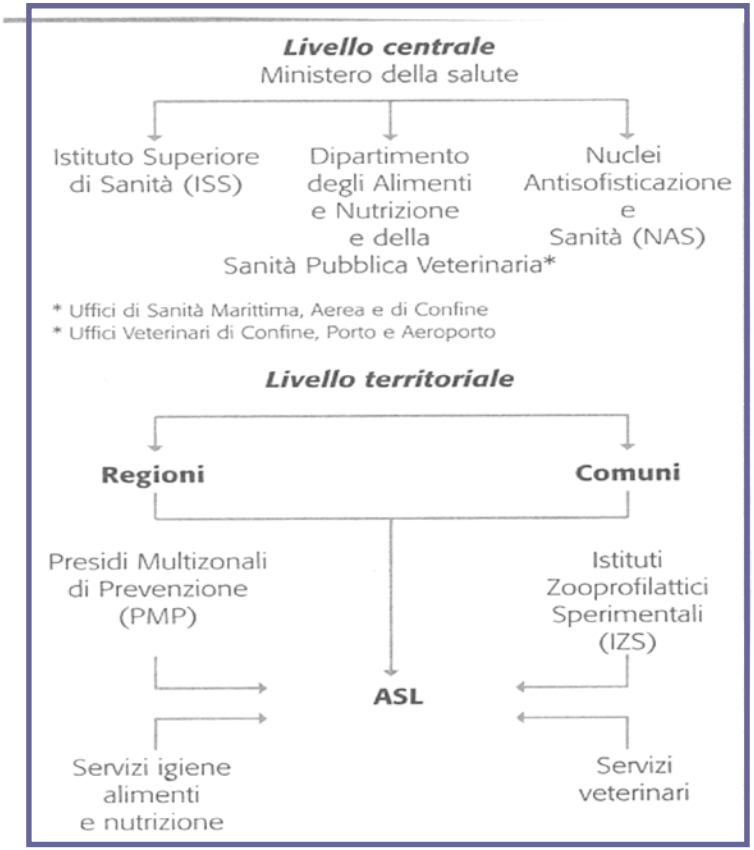
U4

Official Control

Inspections

Sampling and analysis

Controls: Hygiene&staff
documentation
Verification Quality System

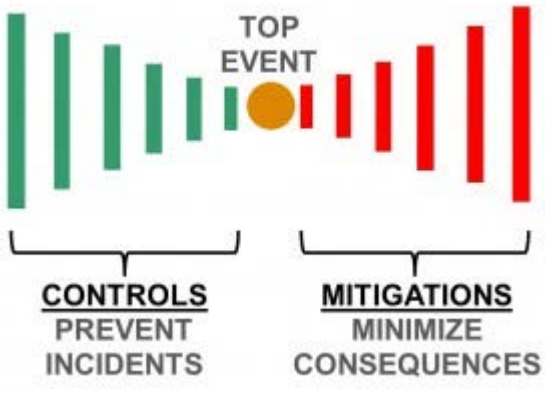


Aims

- ✓ Ensure compliance with the laws
- ✓ To prevent risks by reducing / eliminating the contaminants
- ✓ protecting consumer interests while avoiding adulteration and fraud
- ✓ To promote correct behavior through information
- ✓ To ensure regularity of commercial transactions

Self-Control

The principles that underpin the development of a HACCP plan are:
a) analysis of the potential risks for food;
b) identification of the points in which you may experience the risks posed to food;
c) decisions to be taken with regard to the identified deficiencies,
d) identifying and implementing effective control and monitoring of critical points procedures;
e) periodic review, and on the occasion of changes in each process and the type of activity, risk analysis, critical points and control and monitoring procedures
f) Document system



Self-Control & Alert System

The **RASFF** was put in place to provide food and feed control authorities with an **effective tool to exchange information about measures taken responding to serious risks detected in relation to food or feed**. This exchange of information helps Member States to act more rapidly and in a coordinated manner in response to a health threat caused by food or feed. Its effectiveness is ensured by keeping its structure simple: **it consists essentially of clearly identified contact points in the Commission, EFSA, ESA (EFSA Surveillance Authority) and at national level in member countries, exchanging information in a clear and structured way by means of templates.**

RASFF notifications

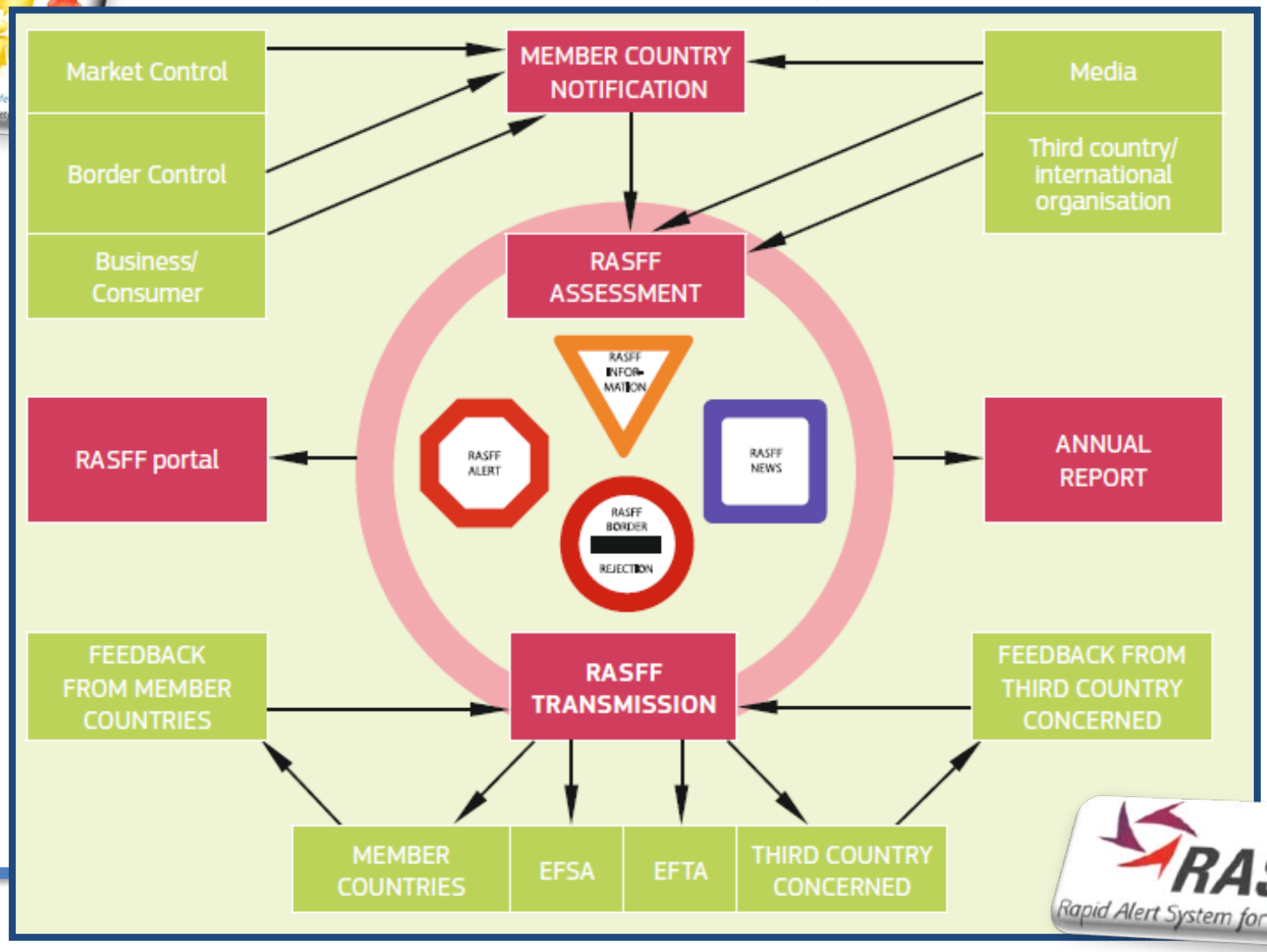
RASFF notifications usually report on risks identified in food, feed or food contact materials that are placed on the market in the notifying country or detained at an EU point of entry at the border with an EU neighbouring country. The notifying country reports on the risks it has identified, the *product* and its traceability and the measures it has taken.

According to the seriousness of the risks identified and the distribution of the product on the market, the RASFF notification **is classified** after verification by the Commission contact point as **alert, information or border rejection** notification before the Commission contact point transmits it to all network members.

Food safety management

U4

Self-Control & Alert System



Comsumers' education

REGULATION (EU) No 1169/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 25 October 2011

on the provision of food information to consumers, amending Regulations (EC) No 1924/2006 and (EC) No 1925/2006 of the European Parliament and of the Council, and repealing Commission Directive 87/250/EEC, Council Directive 90/496/EEC, Commission Directive 1999/10/EC, Directive 2000/13/EC of the European Parliament and of the Council, Commission Directives 2002/67/EC and 2008/5/EC and Commission Regulation (EC) No 608/2004

'food information law' means the Union provisions governing the food information, and in particular labelling, including rules of a general nature applicable to all foods in particular circumstances or to certain categories of foods and rules which apply only to specific foods;

labelling' means any words, particulars, trade marks, brand name, pictorial matter or symbol relating to a food and placed on any packaging, document, notice, label, ring or collar accompanying or referring to such food;

- It provides information from the food manufacturer to the consumer.
- It helps tell consumers what they are buying

Food safety management

U4

Comsumers' education

(a) the name of the food;

(b) the list of ingredients;

(c) any ingredient or processing aid listed in Annex II or derived from a substance or product listed in Annex II causing allergies or intolerances used in the manufacture or preparation of a food and still present in the finished product, even if in an altered form;

(d) the quantity of certain ingredients or categories of ingredients;

(e) the net quantity of the food;

(f) the date of minimum durability or the 'use by' date;

(g) any special storage conditions and/or conditions of use;

(h) the name or business name and address of the food business operator;

(i) the country of origin or place of provenance;

(j) instructions for use where it would be difficult to make appropriate use of the food in the absence of such instructions;

(k) with respect to beverages containing more than 1,2 % by volume of alcohol, the actual alcoholic strength by volume;

(l) a nutrition declaration.

the date of minimum durability or the ‘use by’ date

U4

Use By

- Used for foods that are microbiologically highly perishable and might harm humans if consumed beyond a certain date.
- Often used for chilled foods: e.g. sandwiches, fresh juices and fresh meat products

Use By date

Best Before

- Written in the form of Day, Month, Year
- Used for products that have a shelf-life of three months or less.

e.g. bread, biscuits, crisps and sweets.

Best Before End

- Alternative to ‘Best Before’ date
- Used for products that have longer shelf-life
- May be expressed in a months or year only format.

Food safety management

U4

Comsumers' education

VOLUNTEER

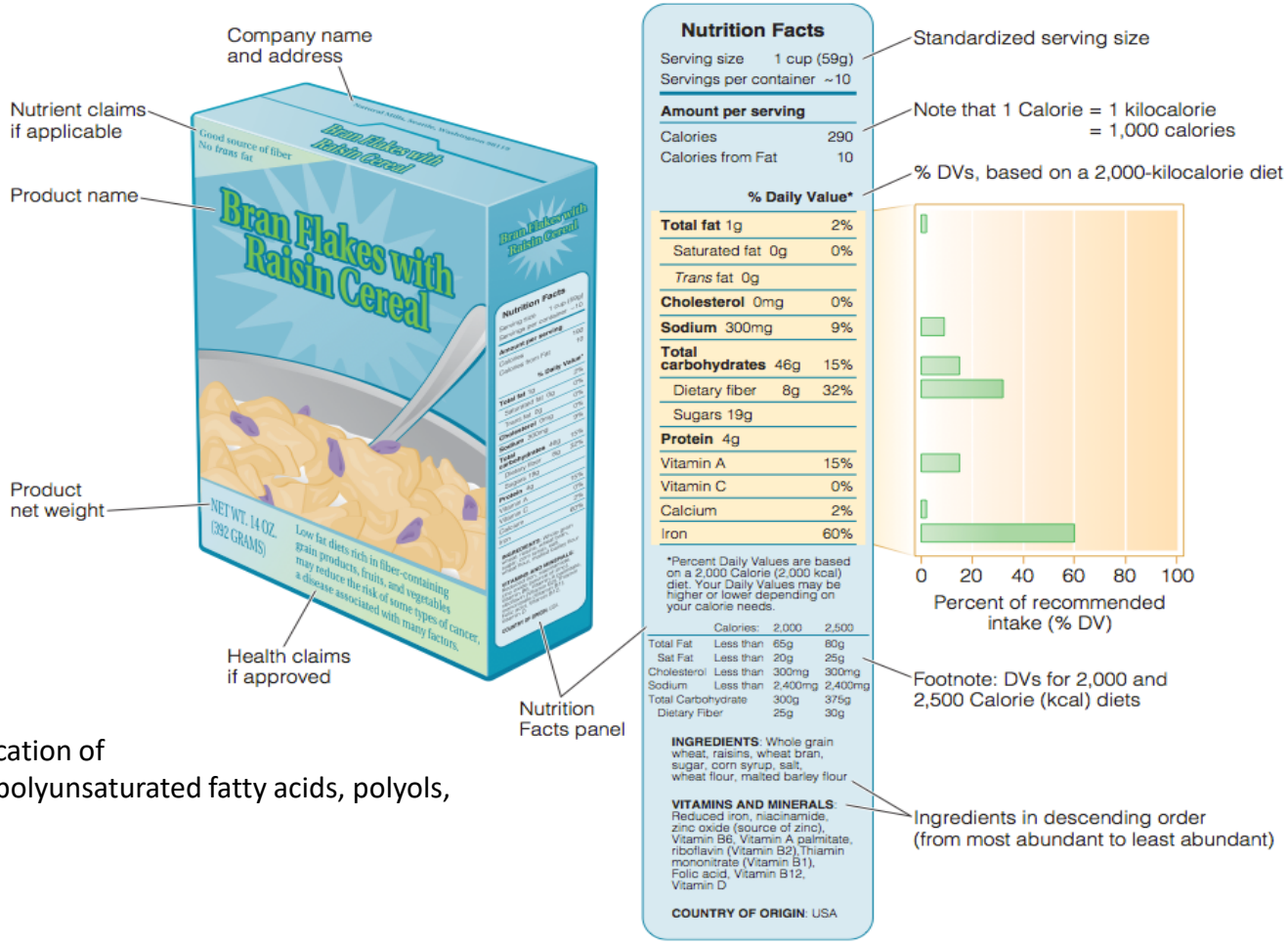
e

Food safety management

U4

Comsumers' education

Figure 2.10 Understanding Food Labels and Nutrition Facts Panels The FDA requires food labels to have specific information such as manufacturer's name, net contents, and nutrition information. Nutrition Facts panels provide a variety of information useful in dietary planning.



Are mandatory particulars on:

- energy value
- fat
- saturated fatty acids
- carbohydrates
- sugars
- proteins
- salt

The nutrition declaration may
Be supplemented with an indication of monounsaturated fatty acids, polyunsaturated fatty acids, polyols, starch, fibers.

Claim of food properties

U4

REGULATION (EC) No 1924/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 20 December 2006

on nutrition and health claims made on foods

'claim' means any message or representation, which is not mandatory under Community or national legislation, including pictorial, graphic or symbolic representation, in any form, which states, suggests or implies that a food has particular characteristics;

Regulates the signs relating to food products labeled and advertised in the European Union (EU). It aims to ensure that nutrition and signs health claims made on food labels, presentations and advertisements are clear and based on scientific evidence generally accepted by the scientific community.

A wide range of substances such as vitamins, minerals, amino acids, essential fatty acids and herbal extracts with a nutritional or physiological effect, may be present in a food and be the subject of a claim.

The regulation is thus intended to:

- ensuring a high level of consumer protection;
- provide them with the necessary information to make choices in full knowledge of the facts and
- creating equal conditions of competition for the food industry

U4

CLAIMS

PHYSIOLOGICAL	THERAPEUTIC
It promotes transit Intestinal	treatment of constipation
It promotes the tropism articular	treatment osteoarthritis
It promotes the tropism microcirculation	treatment venous insufficiency

Claim of food properties

U4

REGULATION (EC) No 1924/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 20 December 2006

on nutrition and health claims made on foods

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

(a) the energy (calorific value) it

(i) provides,

(ii) provides at a reduced or increased rate, or

(iii) does not provide; and/or

(**b) the nutrients or other substances it**

(i) contains,

(ii) contains in reduced or increased proportions, or

(iii) does not contain;

'**health claim**' means any claim that states, suggests or implies that a relationship exists between a food category, a food or one of its constituents and health;

'**reduction of disease risk claim**' means any health claim that states, suggests or implies that the consumption of a food category, a food or one of its constituents significantly reduces a risk factor in the development of a human disease;

Claim of food properties

U4

REGULATION (EC) No 1924/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 20 December 2006

on nutrition and health claims made on foods

Nutritional & Health claims shall only be permitted if the following information is included in the labelling, or if no such labelling exists, in the presentation and advertising:

(a) a statement indicating the importance of a varied and balanced diet and a healthy lifestyle;

(b) the quantity of the food and pattern of consumption required to obtain the claimed beneficial effect;

(c) where appropriate, a statement addressed to persons who should avoid using the food; and

(d) an appropriate warning for products that are likely to present a health risk if consumed to excess

https://ec.europa.eu/food/safety/labelling_nutrition/claims/health_claims_en

Claim of food properties

U4

REGULATION (EC) No 1924/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 20 December 2006

on nutrition and health claims made on foods

HEALTH CLAIMS

Nutritional claim

- -Nutrient composition & other substances
- -Comparison

Funtional claim

- Art 13.1 based on generally accepted scientific data
- Art 13.5 based on newly developed scientific data and/or which include a request for the protection of proprietary data shall be adopted

Health claim

- Claim on the reduction of disease risk
- Claim on the development and health of children

Claim of food properties

U4

REGULATION (EC) No 1924/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 20 December 2006

on nutrition and health claims made on foods

Nutritional claim

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. For table-top sweeteners the limit of 4 kcal (17 J)/portion, with equivalent sweetening properties to 6 g of sucrose (approximately one teaspoon of sucrose), applies.

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. For table-top sweeteners the limit of 0,4 kcal (1,7kJ)/portion, with equivalent sweetening properties to 6 g of sucrose (approximately one teaspoon of sucrose), applies.

Claim of food properties

U4

REGULATION (EC) No 1924/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 20 December 2006

on nutrition and health claims made on foods

Nutritional claim

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.

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

Claim of food properties

U4

FONTE DI FIBRE
il prodotto contiene almeno 3 g di fibre per 100 g
o almeno 1,5 g di fibre per 100 kcal

AD ALTO CONTENUTO DI FIBRE
il prodotto contiene almeno 6 g di fibre per 100 g
o almeno 3 g di fibre per 100 kcal

FONTE DI/AD ALTO CONTENUTO DI [NOME DELLA VITAMINA E/O MINERALE]
il prodotto contiene almeno il 15/30% della dose giornaliera raccomandata di vitamina e/o minerale

A TASSO RIDOTTO DI [NOME DELLA SOSTANZA NUTRITIVA]
la riduzione è pari ad almeno il 30%
rispetto a un prodotto simile

AD ALTO CONTENUTO DI PROTEINE
almeno il 20% del valore energetico dell'alimento è apportato da proteine

LEGGERO/LIGHT
il valore energetico è ridotto di almeno 30%

FONTE DI ACIDI GRASSI OMEGA-3
il prodotto contiene almeno 0,3 g di acido alfa-linolenico (ALA) per 100 gr o 100 kcal

RICCO DI ACIDI GRASSI OMEGA-3
il prodotto contiene almeno 0,6 g di ALA per 100 gr o 100 kcal

RICCO DI GRASSI MONOINSATURI (O POLINSATURI)
almeno il 45% degli acidi grassi presenti nel prodotto derivano dai grassi monoinsaturi/polinsaturi e a condizione che gli stess apportino oltre il 20% del valore energetico del prodotto

RICCO DI GRASSI INSATURI
almeno il 70% degli acidi grassi presenti nel prodotto derivano da grassi insaturi e a condizione che gli stessi apportino oltre
20% del valore energetico del prodotto

A BASSO CONTENUTO CALORICO
il prodotto contiene non più di 40 kcal/100 g per i solidi o più di 20 kcal/100 ml per i liquidi

A RIDOTTO CONTENUTO CALORICO
il valore energetico è ridotto di almeno il 30%

SENZA CALORIE
il prodotto contiene non più di 4 kcal/100 ml

USE OF NUTRITION CLAIMS LISTED IN ANNEX I Re 1924/2006 WILL PERMITTED ONLY IF THE FOLLOWING CONDITIONS ARE SATISFIED:

1. It is shown that the composition of the food is complies with the requirement set out in Schedule
2. It refers to the food ready for consumption in accordance the manufacturer's instructions
3. If the nutrient or other substance is bioavailable (When applicable)
4. The amount of food that you can reasonably consume is sufficient to determine the effect positive

Claim of food properties

U4

Funtional claim

Art 13.1 based on generally accepted scientific data

Art 13.5 based on newly developed scientific data and/or which include a request for the protection of proprietary data shall be adopted

Article 13

Health claims other than those referring to the reduction of disease risk

1. Health claims describing or referring to:

(a) the role of a nutrient or other substance in growth, development and the functions of the body, or

(b) psychological and behavioural functions; or

(c) without prejudice to Directive 96/8/EC, slimming or weight-control or a reduction in the sense of hunger or an increase in the sense of satiety or to the reduction of the available energy from the diet,

5. Any additions of claims to the list referred to in paragraph 3 based on newly developed scientific data and/or which include a request for the protection of proprietary data shall be adopted following the procedure laid down in Articles 15 to 18.

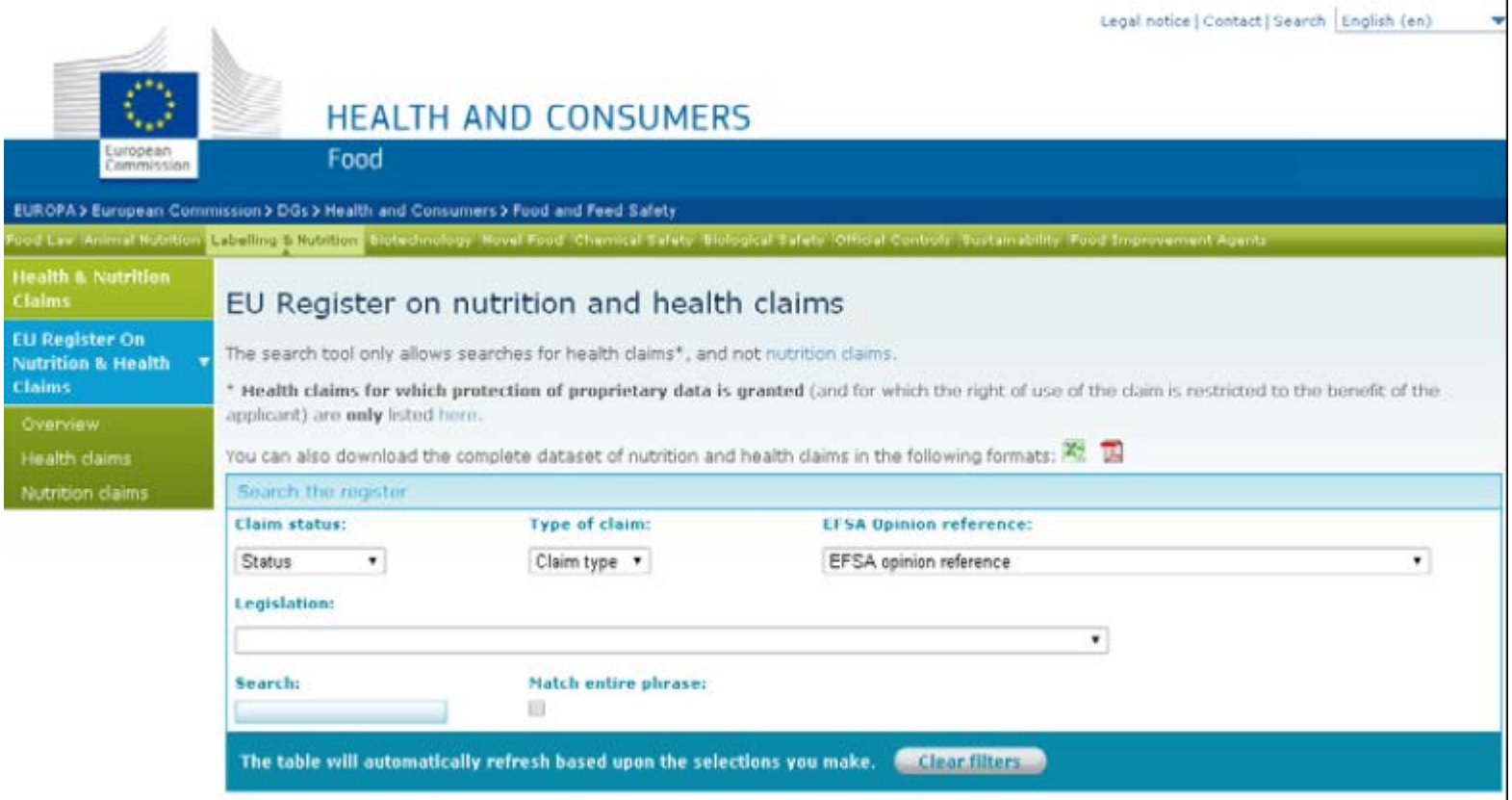
Article 6

Scientific substantiation for claims

Claim of food properties

U4

Health claims, il Registro Europeo



http://ec.europa.eu/nuhclaims/

Claim of food properties

Claim type	substance, food or food category	Claim	Conditions of use of the claim / Restrictions of use / Reasons for non-authorisation	Health relationship	reference / Journal reference	Commission Regulation	Status	Entry ID
Art.13(1)	Arabinoxylan produced from wheat endosperm	Consumption of arabinoxylan as part of a meal contributes to a reduction of the blood glucose rise after that meal	The claim may be used only for food which contains at least 8 g of arabinoxylan (AX)-rich fibre produced from wheat endosperm (at least 60 % AX by weight) per 100 g of available carbohydrates in a quantified portion as part of the meal. In order to bear the claim information shall be given to the consumer that the beneficial effect is obtained by consuming the arabinoxylan (AX)-rich fibre produced from wheat endosperm as part of the meal.	reduction of post-prandial glycaemic responses	2011;9(6):2205	Commission Regulation (EU) 432/2012 of 16/05/2012	Authorised	830

Art 13.1: fibra (16)

Search the register

Claim status: Authorised

Type of claim: Art.13(1)

EFSA Opinion reference: EFSA opinion reference

Legislation: Commission Regulation

Search: fibre

Match entire phrase:

		normal bowel function	HIGH FIBRE as listed in the Annex to Regulation (EC) No 1924/2006.	function		(EU) 432/2012 of 16/05/2012		
Art.13(1)	Wheat bran fibre	Wheat bran fibre contributes to an acceleration of intestinal transit	The claim may be used only for food which is high in that fibre as referred to in the claim HIGH FIBRE as listed in the Annex to Regulation (EC) No 1924/2006. In order to bear the claim information shall be given to the consumer that the claimed effect is obtained with a daily intake of at least 10 g of wheat bran fibre.	reduction in intestinal transit time	2010;8(10):1817	Commission Regulation (EU) 432/2012 of 16/05/2012	Authorised	828, 839, 3067, 4699
Art.13(1)	Wheat bran fibre	Wheat bran fibre contributes to an increase in faecal bulk	The claim may be used only for food which is high in that fibre as referred to in the claim HIGH FIBRE as listed in the Annex to Regulation (EC) No 1924/2006.	Increase in faecal bulk	2010;8(10):1817	Commission Regulation (EU) 432/2012 of 16/05/2012	Authorised	3066

Claim of food properties

PROBIOTIC, SYMBIOTIC or similar: 121 request

MYCRORGANISM: Bifidobacterium (lactis Bb12, bulgaricus LBY-27®…) Lactobacillus (casei, paracasei, plantarum, acidophilus LA-5®, helveticus …) Saccharomices cerevisiae var boulardii, Streptococcus thermophilus, Lactococcus lactis

anyone authorized

FOODS: Cheese, fermented milk

Denied authorization: "…decreasing potentially pathogenic intestinal microorganisms; reduction of symptoms of inflammatory bowel conditions; immune defence against pathogens; "healthy and balanced digestive system"….

Claim type	Nutrient, substance, food or food category	Claim	Conditions of use of the claim / Restrictions of use / Reasons for non-authorisation	Health relationship	EFSA opinion reference / Journal reference	Commission Regulation	Status	Entry ID
Art.13(1)	Live yoghurt cultures	Live cultures in yoghurt or fermented milk improve lactose digestion of the product in individuals who have difficulty digesting lactose	In order to bear the claim, yoghurt or fermented milk should contain at least 108 Colony Forming Units live starter microorganisms (Lactobacillus delbrueckii subsp. bulgaricus and Streptococcus thermophilus) per gram.	improved lactose digestion	2010;8(10):1763	Commission Regulation (EU) 432/2012 of 16/05/2012	Authorised	1143, 2976

Claim of food properties

Art 13.1 Antioxidant? 148 requests

No claim has been authorized by the term ANTIOXIDANT
or PROPERTIES 'antioxidants or similar

FOOD: acerola, fruit, honey, persimmon, berries, guava, coffee, pomegranate, plum....

POLYPHENOLS: cocoa, coffee, pomegranate juice, wine red, tea, fruits and vegetables.
Flavonoids: tea, apples, onions, cranberry, soy ...

CAROTENOIDS: lutein, β-carotene, lycopene, zeaxanthin, cryptoxanthin, from fruit and vegetable juices

OTHER MATERIALS: resveratrol, glutathione, taurine, coenzyme Q10.

The antioxidant properties of foods and changes in the overall antioxidant capacity of plasma do not predict a role of the food/constituent in the protection of body cells and molecules such as DNA, proteins and lipids from oxidative damage in vivo, and therefore are not suitable outcome measures for the scientific substantiation of the claimed effect.

EFSA Journal 2011;9(12):2474

Claim of food properties

Art 13.1

laim ype	Nutrient, substance, food or food category	Claim	Conditions of use of the claim / Restrictions of use / Reasons for non-authorisation	Health relationship	EFSA opinion reference Journal reference		Status
Art.13(1)	Walnuts	Walnuts contribute to the improvement of the elasticity of blood vessels	The claim may be used only for food which provides a daily intake of 30 g of walnuts. In order to bear the claim, information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 30 g of walnuts.	Improvement of endothelium-dependent vasodilation	2011;9(4):2074	Commission Regulation (EU) 432/2012 of 16/05/2012	Authorise

Claim type	Nutrient, substance, food or food category	Claim	Conditions of use of the claim / Restrictions of use / Reasons for non-authorisation	Health relationship	EFSA opinion reference / Journal reference	Commission Regulation	Status
Art.13(1)	Olive oil polyphenols	Olive oil polyphenols contribute to the protection of blood lipids from oxidative stress	The claim may be used only for olive oil which contains at least 5 mg of hydroxytyrosol and its derivatives (e.g. oleuropein complex and tyrosol) per 20 g of olive oil. In order to bear the claim information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 20 g of olive oil.	protection of LDL particles from oxidative damage	2011;9(4):2033	Commission Regulation (EU) 432/2012 of 16/05/2012	Authorised

Art.13(1)	Vitamin C	Vitamin C contributes to the protection of cells from oxidative stress	The claim may be used only for food which is at least a source of vitamin C as referred to in the claim SOURCE OF [NAME OF VITAMIN/S] AND/OR [NAME OF MINERAL/S] as listed in the Annex to Regulation (EC) No 1924/2006	protection of DNA, proteins and lipids from oxidative damage	2009;7(9):1226, 2010;8(10):1815	Commission Regulation (EU) 432/2012 of 16/05/2012	Authorised	129 138 143 148 333

Commission Regulation (EU) No. 432/2012 establishes a list of permitted Article 13 claims.

Claim of food properties

Art 13.5 newly and with proprietary data

Nutrient, substance, food or food category	Claim	Conditions of use of the claim / Restrictions of use / Reasons for non-authorisation	Restriction of use for the benefit of	Expiry date of the restriction of use
Slowly digestible starch	Consumption of products high in slowly digestible starch (SDS) raises blood glucose concentration less after a meal compared to products low in SDS	The claim may be used only on food where the digestible carbohydrates provide at least 60 % of the total energy and where at least 55 % of those carbohydrates is digestible starch, of which at least 40 % is SDS	Mondelez International group, Three Parkway North Deerfield, IL , 60015, UNITED STATES	23/09/2018
'Reformulated, non-alcoholic, acidic drink with: — less than 1 g fermentable carbohydrate per 100 ml (sugars and other carbohydrates except polyols), — calcium in a range from 0,3 to 0,8 mol per mol acidulant, — display of pH between 3,7-4,0.	Replacing sugar-containing, acidic drinks, such as soft drinks (typically 8-12 g sugars/100 ml), with reformulated drinks contributes to the maintenance of tooth mineralisation	In order to bear the claim, reformulated acidic drinks shall comply with the description of the food subject to the claim	Lucozade Ribena Suntory Limited and its affiliates (See footnote 1) 2 Longwalk Road Stockley Park Uxbridge UB11 1BA UNITED KINGDOM	23/09/2018
Water-Soluble Tomato Concentrate (WSTC) I and II	Water-Soluble Tomato Concentrate (WSTC) I and II helps maintain normal platelet aggregation, which contributes to healthy blood flow	Information to the consumer that the beneficial effect is obtained with a daily consumption of 3g WSTC I or 150 mg WSTC II in up to 250 ml of either fruit juices, flavoured drinks or yogurt drinks (unless heavily pasteurised) or with a daily consumption of 3 g WSTC I or 150 mg WSTC II in food supplements when taken with a glass of water or other liquid	Provexis Natural Products Limited Thames Court 1 Victoria, Street Windsor, Berkshire SL4 1YB UNITED KINGDOM	16/12/2014

Claim of food properties

U4

REGULATION (EC) No 1924/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 20 December 2006

on nutrition and health claims made on foods

Article 14

Health claim

- Claim on the reduction of disease risk
- Claim on the development and health of children

Reduction of disease risk claims

1. Notwithstanding Article 2(1)(b) of Directive 2000/13/EC, reduction of disease risk claims may be made where they have been authorised in accordance with the procedure laid down in Articles 15 to 18 of this Regulation for inclusion in a Community list of such permitted claims together with all the necessary conditions for the use of these claims.

claims referring to reduction of disease risk and to children's development and health.

reduction of disease risk claims and claims referring to children's development and health may be made where they have been authorised in accordance with the procedure laid down in Articles 15, 16, 17 and 19 of the Regulation.

Claim of food properties

Claim status: Authorised

Type of claim: Art.14(1)(a)

EFSA Opinion reference: EFSA opinion reference

Legislation: Commission Regulation

Search: glucan

Match entire phrase:

Claim type	Nutrient, substance, food or food category	Claim	Conditions of use of the claim / Restrictions of use / Reasons for non-authorisation	Health relationship	EFSA opinion reference / Journal reference	Commission Regulation	Status	Entr ID
Art.14(1)(a)	Barley beta-glucans	Barley beta-glucans has been shown to lower/reduce blood cholesterol. High cholesterol is a risk factor in the development of coronary heart disease.	Information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 3 g of barley beta-glucan. The claim can be used for foods which provide at least 1 g of barley beta-glucan per quantified portion.		Q-2011-00798	Commission Regulation (EU) 1048/2012 of 08/11/2012	Authorised	N/A
Art.14(1)(a)	Barley beta-glucans	Barley beta-glucans has been shown to lower/reduce blood cholesterol. High cholesterol is a risk factor in the development of coronary heart disease	Information shall be given to the consumer that the beneficial effect is obtained with daily intake of 3 g of barley beta-glucan. The claim can be used for foods which provide at least 1 g of barley beta-glucan per quantified portion.		Q-2011-00799	Commission Regulation (EU) 1048/2012 of 08/11/2012	Authorised	N/A

Claim of food properties

Art 14.1b Claim on development and health of children

Claim type	Nutrient, substance, food or food category	Claim	Conditions of use of the claim / Restrictions of use / Reasons for non-authorisation	Health relationship	EFSA opinion reference / Journal reference	Commission Regulation	Status	Entry ID
Art.14(1)(b)	Docosahexaenoic acid (DHA)	Docosahexaenoic acid (DHA) maternal intake contributes to the normal brain development of the foetus and breastfed infants.	Information shall be given to pregnant and lactating women that the beneficial effect is obtained with a daily intake of 200 mg of DHA in addition to the recommended daily intake for omega-3 fatty acids for adults, i.e.: 250 mg DHA and EPA. The claim can be used only for food which provides a daily intake of at least 200 mg DHA		Q-2008-773	Commission Regulation (EU) No 440/2011 of 06/05/2011	Authorised	N/A
Art.14(1)(b)	Docosahexaenoic acid (DHA)	Docosahexaenoic acid (DHA) intake contributes to the normal visual development of infants up to 12 months of age.	Information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 100 mg of DHA. When the claim is used on follow-on formula, the food shall contain at least 0,3 % of the total fatty acids as DHA.		Q-2008-211, Q-2008-688, Q-2008-689	Commission Regulation (EU) No 440/2011 of 06/05/2011	Authorised	N/A
Art.14(1)(b)	Docosahexaenoic acid (DHA)	Docosahexaenoic acid (DHA) maternal intake contributes to the normal development of the eye of the foetus and breastfed	Information shall be given to pregnant and lactating women that the beneficial effect is obtained with a daily intake of 200 mg of DHA in addition to the recommended daily intake for omega-3 fatty acids for adults, i.e.: 250 mg DHA and eicosapentaenoic acid (EPA). The claim can be used only for food		Q-2009-675	Commission Regulation (EU) No 440/2011 of 06/05/2011	Authorised	N/A

Claim of food properties

Art 15 Application for authorisation

1. When reference is made to this Article, an application for authorisation shall be submitted in accordance with the following paragraphs.

2. The application shall be sent to the national competent authority of a Member State

(a) The national competent authority shall:
(i) acknowledge receipt of an application in writing within 14 days of its receipt. The acknowledgement shall state the date of receipt of the application;
(ii) ii) inform without delay the Authority;
(iii) and (iii) make the application and any supplementary information supplied by the applicant available to the Authority;

(b) the Authority shall:
(i) inform without delay the other Member States and the Commission of the application and shall make the application and any supplementary information supplied by the applicant available to them;
(ii) make the summary of the application referred to in paragraph 3(g) available to the public.

Claim of food properties

Art 15 Application for authorisation

3. The application shall include the following:
(a) the name and address of the applicant;

(b) the nutrient or other substance, or the food or the category of food, in respect of which the health claim is to be made and its particular characteristics;

(c) a copy of the studies, including, where available, independent, peer-reviewed studies, which have been carried out with regard to the health claim and any other material which is available to demonstrate that the health claim complies with the criteria provided for in this Regulation;

(d) where appropriate, an indication of the information which should be regarded as proprietary accompanied by verifiable justification;

(e) a copy of other scientific studies which are relevant to that health claim;

(f) a proposal for the wording of the health claim for which authorisation is sought including, as the case may be, specific conditions for use;

(g) a summary of the application.

http://www.salute.gov.it/portale/ministro/p4_8_0.jsp?lingua=italiano&label=servizionline&idMat=NUTR&idAmb=CLAIM&idSrv=A1&flag=P