DTU

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Ministeriet for Fødevarer, Landbrug og Fiskeri
Fødevarestyrelsen

Food & Bio Cluster Denmark

Danmarks Erhvervsfremmebestyrelse

24 March 2022

Theme day on novel food

The Novel food application – and assessment

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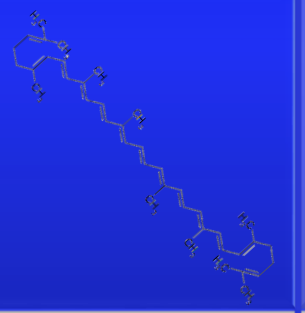
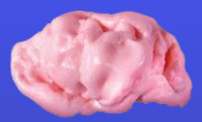
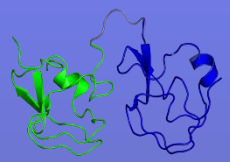
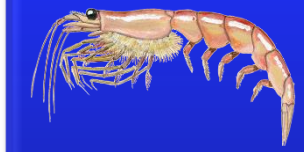
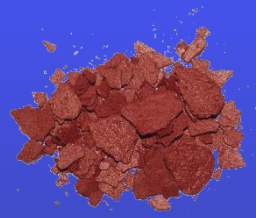
Why are we talking about Novel food?

Biotechnology meets food production

Great potential - wants to market them

In some cases you need to go through a novel food approval procedure

Examples Novel Foods

	newly synthesized / isolated compounds			new processes		
						
	Synthetic Lycopene	Non-sticky chewing gum base	Ice-structuring protein	UV-treated milk	Milk products fermented with *B.xylanisolvens*	UV-treated yeast
traditional foods from non-EU countries						
	Chia seeds	Baobab fruit	Noni Juice	Krill oil	Lycopene from *B.trispora*	Astaxanthin from *H.pluvialis*
new sources						

Other examples of novel food

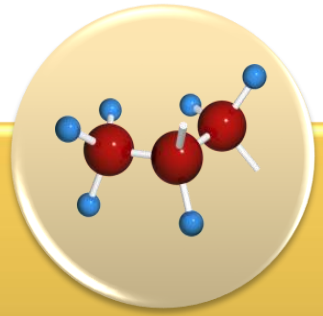
- Extracts from Shiitake mushroom and green algae
- Potato protein, lentil powder protein, duck weed protein
- Algal oil, fungal oil, Insects
- Coffee husk, coriander oil, bovine milk osteopontin
- Hoodia parviflora, 2-fucosyllactose, taxifolin

What is a novel food?

The Novel Foods Regulation defines novel food as food and food ingredients that does not have a significant history of consumption within the EU before May 1997

Novel Food categories

New production process



New or modified molecular structure

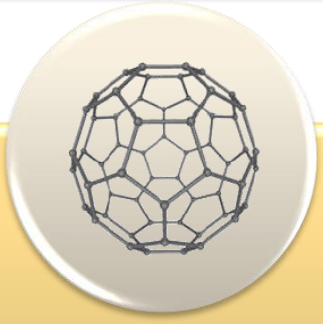
Micro-organisms, fungi, algae

From plants or their parts

Of mineral origin

From animals or their parts

cell or tissue cultures derived from animals/ plants/ fungi/ algae



Engineered nanomaterials

Novel food is by definition different from other foods

Therefore, they cannot be marketed as conventional food

Their safety need to be documented

Benefits are not considered

How safe should it be?

Traditionally, food is considered as safe based on ’a history of safe use’

’Zero-risk’ is unattainable, but food should be ’safe and wholesome’

Novel food should be assessed as traditional food; to be ’as safe and nutritious as…’

Novel food regulation Regulation (EC) 258/97 on novel foods and novel food ingredients

- The safety assessment of novel food is regulated through the EU novel food regulation from 1997
- The novel food regulation have been updated since
- Novel foods are subject to a pre-market safety assessment

SCIENTIFIC OPINION

EFSA Journal

ADOPTED: 21 September 2016

doi: 10.2903/j.efsa.2016.4594

Guidance on the preparation and presentation of an application for authorisation of a novel food in the context of Regulation (EU) 2015/2283

EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA),
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Susan Fairweather-Tait, Marina Heinonen, Karen Ildico Hirsch-Ernst, Inge Mangelsdorf,
Harry McArdle, Androniki Naska, Monika Neuhäuser-Berthold, Grażyna Nowicka,
Kristina Pentieva, Yolanda Sanz, Alfonso Siani, Anders Sjödin, Martin Stern, Daniel Tomé,
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Abstract

Following the adoption of Regulation (EU) 2015/2283 of the European Parliament and of the Council on novel foods, the European Commission requested EFSA to update and develop scientific and technical guidance for the preparation and presentation of applications for authorisation of novel foods. This guidance presents a common format for the organisation of the information to be presented in order to assist the applicant in preparing a well-structured application to demonstrate the safety of the novel food. The application should be comprehensive and complete. This guidance outlined the data needed for the safety assessments of novel foods. Requirements which should be covered in all applications relate to the description of the novel food, production process, compositional data, specification, proposed uses and use levels, and anticipated intake of the novel food. Further sections on the history of use of the novel food and/or its source, absorption, distribution, metabolism, excretion, nutritional information, toxicological information and allergenicity should be considered by the applicant by default. If not covered in the application, this should be justified. The applicant should integrate the data presented in the different sections to provide their overall considerations on how the information supports the safety of the novel food under the proposed conditions of use. Where potential health hazards have been identified, they should be discussed in relation to the anticipated intakes of the novel food and the proposed target populations. On the basis of the information provided, EFSA will assess the safety of the novel food under the proposed conditions of use.

The task of EFSA

In assessing the safety of novel foods, EFSA shall consider:

1) Whether the novel food concerned is as safe as food from a comparable food category already existing on the market within EU

2) Whether the composition of the novel food and the conditions of its use do not pose a safety risk to human health in EU

3) If replacing another food, it should not differ from that food in such a way that its normal consumption would be nutritionally disadvantageous for the consumer

Novel food approvement procedure in practice

- A company has developed a new food and ask the **national food authority** whether it is novel or not
- If novel, the company send an application to the **European Commission**
- This application is forwarded to the **European Food Safety Authority** (EFSA), who makes a safety assessment
- The outcome of the assessment is send to the **European Commission**
- The EU-commission put forward a suggestion for approval, and finally the **member states** vote whether the product should be marketed in the EU (EU-wide authorisation)

What is applied for?

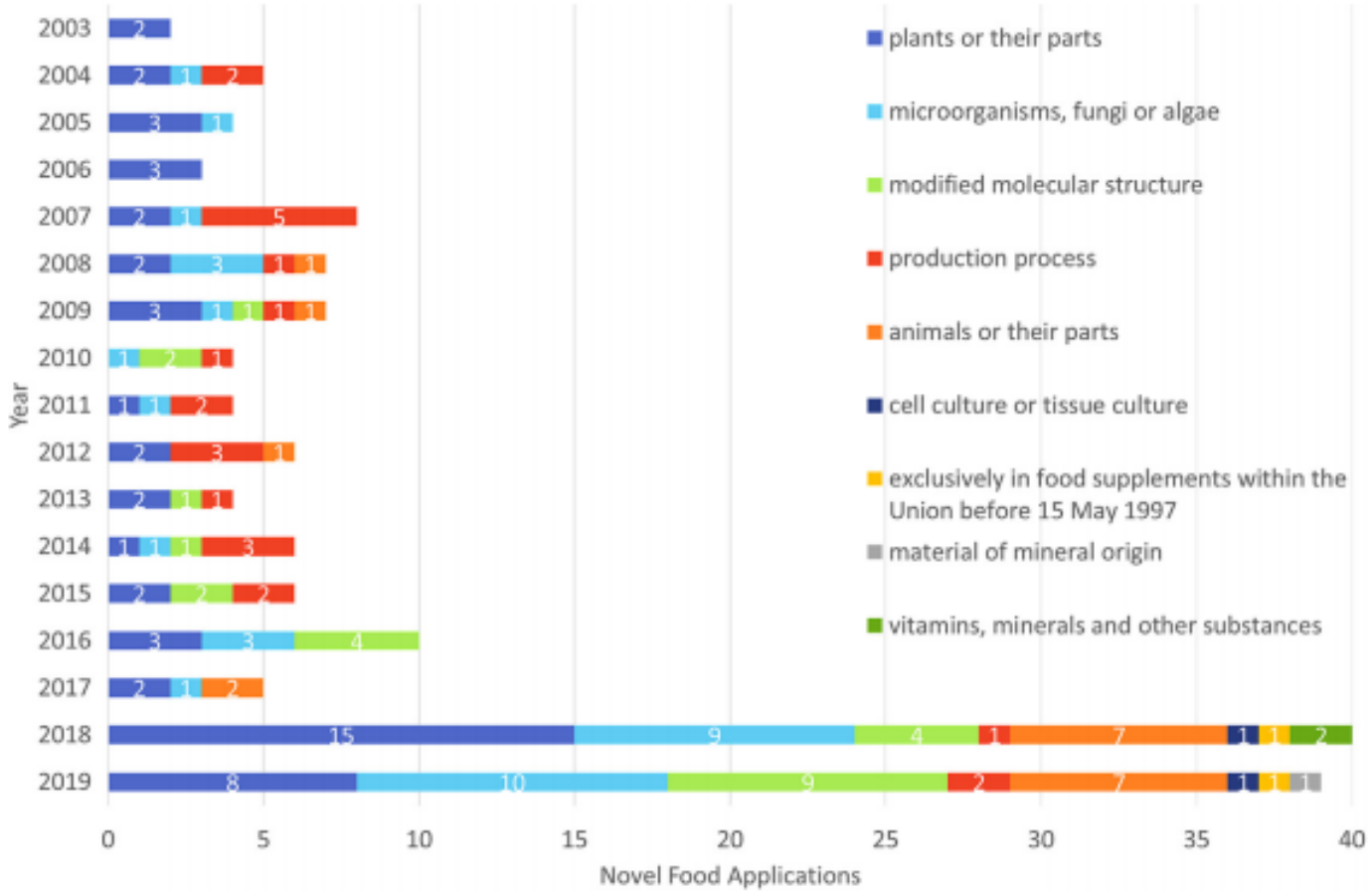


Fig. 5. The nature of novel foods that entered EFSA's risk assessment.

What does the safety assessment includes (Health criteria)

- **Identity**
- **Composition - Specification**
- **Production**
- Stability
- **Anticipated intake**
- Nutritional information
- Microbiological information
- **Toxicological information** (often a challenge – no specific requirements)
- Human studies
- Allergenicity

The application – first steps

The safety of the novel food should be documented – forget the benefits

Be clear from the beginning regarding – identity, target groups, use to be applied for

Literature search on the novel food and related foods to identify potential hazards

Go through novel food opinions with related products

Consult the guidance dokument

Basic data on the novel food like composition, specification, contaminants, stability etc. are obligatory – prepare samples to be analysed

What is your strategy? Comparison with related approved products, the amount used, intake from naturel sources

How can EFSA help?

EFSA Application Helpdesk:

- Help to understand what an application should include
- Procedure steps
- Status on application
- Answer scientific and administrative requests

Access to guidance documents, webinar, workshops, info-meetings (check web-site)

EFSA has launched new support initiatives dedicated to applicants from small and medium-sized enterprises (SMEs). SMEs will now be able to access support from EFSA when preparing, submitting and monitoring their applications (EFSA's web-site)

What are EFSA asking about?

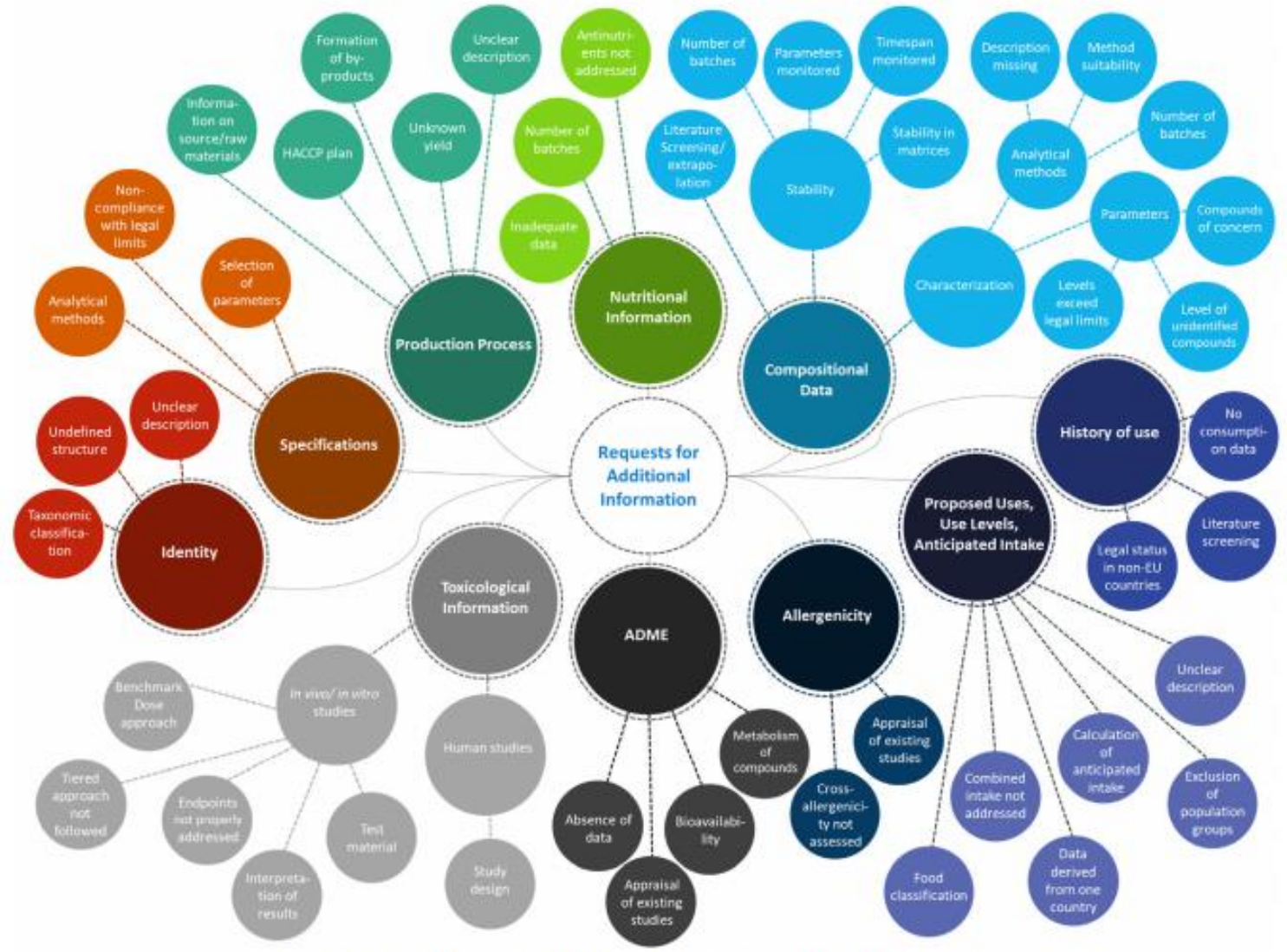


Fig. 6. Mapping of requests for additional or supplementary information sent by EFSA.

The application – further steps

No such thing as the perfect application but make it transparent and clear

A fair dialogue is possible – there are persons to help you

No ‘bad excuses’ – use scientific arguments

Follow the guidelines, but not necessarily in every detail (the guideline are supposed to cover alle imaginable novel foods)

Novel Carbohydrates as Novel Foods

Human identical Milk Oligosaccharides (HiMOs)

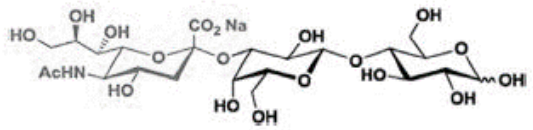
The following PPT's are prepared by EFSA and presented at an open event arranged by EFSA

Human identical Milk Oligosaccharides as Novel Foods in the EU

- 2'-O-fucosyllactose (2’-FL) (EFSA, 2015)
- lacto-N-neotetraose (LNnT) (EFSA, 2015)
- LNnT and 2’-FL in food supplements for children (EFSA, 2015)
- N-acetyl-D-neuraminic acid (NANA) (EFSA, 2017)
- 2’-FL/difucosyllactose mixture (EFSA, 2019)
- lacto-N-tetraose (LNT) (EFSA, 2019)
- 6’-Sialyllactose (6’-SL) sodium salt (EFSA, 2020)
- 3’-Sialyllactose (3’-SL) sodium salt (EFSA, 2020)
- Lacto-N-neotetraose (EFSA, 2020)
- 3-fucosyllactose (3-FL)(2) (EFSA, 2021)
- 2’-FL (EFSA, 2021)
- 3’-Sialyllactose (3’-SL) (EFSA, 2022)?
- 6’-Sialyllactose (6’-SL) (EFSA, 2022)?
- Lacto-N-tetraose (LNT) (EFSA, 2022)?

Main Considerations for Safety Assessment

Identity

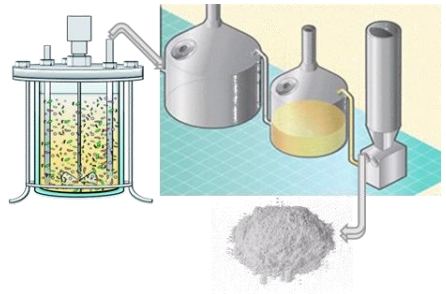


- Food with a new or intentionally modified molecular structure*
- Food consisting of, isolated from or produced from microorganisms, fungi or algae *
- Information on the NF source
- Chemical & structural characterization of the NF vs natural HMOs

*Regulation (EU) 2015/2283

Production Process

- Chemical synthesis or fermentation by genetically modified microorganisms (GMM, e.g. *E.coli*)
  - check for absence of DNA, byproducts and antimicrobial resistance genes
  - impurities and solvents



Main Considerations for Safety Assessment

Characterisation & Specifications

- Qualitative and quantitative characterisation of the main constituents & proximate analysis
- Substances of possible concern to human health (residual endotoxins)

Main Considerations for Safety Assessment

Proposed uses, use levels and anticipated intake

- Uses for infant and follow-on formulae, variety of food and food supplements as proposed
- Appropriate exposure assessment from different foods in various population categories

Main Considerations for Safety Assessment

Anticipated intake:

- Define an appropriate natural level (representative concentration of a given HMO) in breast milk, based on literature data
- Estimate a possible maximal natural intake of the HMO per kg bodyweight of infants
- Estimate a possible maximal intake of the HiMO per kg bodyweight of infants further to NF intake
- Compare the intake of HiMO per kg bodyweight to the natural intake of HMOs from breast milk

- A possible consumption that does not exceed a natural intake is considered **safe**

Main Considerations for Safety Assessment

Toxicological information

- Limited toxicological studies (Tier I) as per guidance
- Genotoxicity studies to rule-out specific concerns (e.g. for impurities)
- Sub-chronic studies (e.g. 90-day) provide insight on the behaviour of the NF
- Sometimes limited margin of exposure in comparison with the anticipated intake

Nutritional information

- Non-digestible oligosaccharides, negligible nutritional impact
- Demonstration that they are not nutritionally disadvantageous

Plants & Products thereof as Novel Foods

Processing & Formulations

Whole plants

Grains or seeds, and their derivates (e.g. flours)

Part of plants

(e.g. leaves, roots)

Processing

Protein-based powders/extracts

Protein isolates/ concentrates

Others

(e.g. fermented protein mixtures)

Production process

- Fertilizer composition
- Pesticide residues
- Growth medium
- Primary/secondary metabolites
- Water/ground contamination
- Environmental and transportation conditions

PROCESSING

- Heat-treatment
- Reduction of antinutrients
- Off-flavours
- Extraction solvents
- Process enzymes
- Fermentation
- Toxic compounds from Maillard reaction

Characterisation & Specifications

- Contaminants & undesirable substances

(e.g. primary & secondary metabolites, process enzymes and heavy metals, residues of cultivation conditions)

- Microbiological aspects

(e.g. pH, water activity, microbial counts & toxins)

- Processing contaminants

(e.g. thermal processing: lysinoalanine, Maillard reaction products, acrylamide)

- Stability markers

(e.g. lipid oxidation markers, organoleptic attributes)

- Macro- and micro- nutrients
- Antinutritional factors
- Toxicants/allergens

Thank you