

CATEGORISATION OF FOOD MANUFACTURING PROCESSES

Prof. Holger ZORN, Justus Liebig University

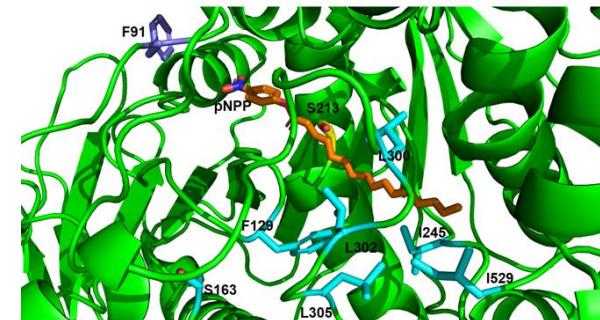


TRACING ENZYMES FROM FERMENTER TO FOODS – A CHALLENGE

Enzymes can be applied at different steps of a food manufacturing process



- food enzymes are generally added to a **raw material** for treatment or processing
- only few cases where the food enzyme is added directly to the **final food** to exert a technological function



VAST DIVERSITY OF DESCRIPTION IN DOSSIERS

A total of 99 different descriptors were found in dossiers (counted in 2016)

“Indicative food uses” and/or “Process” description in dossiers	
<ul style="list-style-type: none">• Baking• Baking and other cereal based processes• Production of bakery products• Production of bakery products and other cereal based products (e.g. pasta, noodles, snacks)	
<ul style="list-style-type: none">• Cereal based processes• Cereal processing	
<ul style="list-style-type: none">• Production of beer• Production of beer and other cereal based processes• Beverage processes• Beverage processing• Beverage alcohol processes• Production of cereal based distilled alcoholic beverages• Production of cereal based distilled alcoholic beverages (cider production)	
	<ul style="list-style-type: none">• Baking processes and other cereal based processes
	<ul style="list-style-type: none">• Brewing processes and other cereal based beverage processes
	<ul style="list-style-type: none">• Processing for grain alcohol• Potable alcohol production• Beverage alcohol (distilling) processes



HARMONIZATION OF THE “INTENDED USES”

EC working document describing the food processes in which food enzymes are intended to be used

- 1) Baking processes
- 2) Brewing processes
- 3) Cereal-based processes
- 4) Coffee processing
- 5) Confectionery processing
- 6) Dairy processing
- 7) Distilled alcohol production
- 8) Egg processing
- 9) Fats and oils processing
- 10) Flavouring production
- 11) Fruit and vegetable processing
- 12) Grain treatment and starch processing
- 13) Protein processing
- 14) Savoury snacks processing
- 15) Sugar processing
- 16) Tea processing as well as Herbal and fruit infusions processing
- 17) Wine production
- 18) Yeast processing



EFSA SELF-TASK IN 2017

Three deliverables

- to collate technical data for food manufacturing processes
- to develop simple Excel-based exposure calculators for each process (FEIM calculators)
- to develop a web-based multi-process exposure tool (FEIM-web)



CALLS-FOR-DATA

Purposes: 1) is the food enzyme TOS removed?

2) to collate technical data for individual processes where the residual TOS remains

2016

started with a plan for 18 calls

2022

ended with 41 calls launched

FoodEx hierarchical code	FoodEx matrix description	FoodEx hierarchical level	f1 (converting molasses to sugar beet or to sugar cane)	f2 (average fraction of molasses in respective FoodEx category)	f3 (Percentage of FoodEx category containing molasses)
A.01.06.001	Cereal flakes	3	40	0.04	0.03
A.01.06.002	Muesli	3	40	0.001	0.03
A.01.06.003	Cereal bars	3	40	0.001	0.01
A.01.07.001.020	Fruit cake	4	40	0.01	0.25
A.01.07.001.024	Gingerbread	4	40	0.1	1.00
A.01.07.001.044	Lebkuchen	4	40	0.1	1.00
A.01.07.002.008	Speculaas	4	40	0.1	1.00
A.10.04.001	Candies, with sugar	3	40	0.001	0.01
A.10.04.011	Liquorice candies	3	40	0.001	0.13

DELIVERABLE 1 – PROCESS-SPECIFIC TECHNICAL DATA

Exposure assessment of food enzymes



ANNEX B ADOPTED: 05 June 2018

Question number: EFSA-Q-2018-00087

Annex B – Process-specific technical data used in exposure assessment of food enzymes

EFSA Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids (CEF),

STATEMENT



ADOPTED: 25 November 2021

doi: 10.2903/j.efsa.2021.7010

Process-specific technical data used in exposure assessment of food enzymes

EFSA Panel on Food Contact Materials, Enzymes and Processing Aids (CEP),

- published in 2018, updated in 2019, 2020
- since 2021, it has become a stand-alone document
- each edition comprising more food manufacturing processes.
- the hitherto published list of processes reflected the order in which they were developed, rather than following any logical hierarchy
- in 2023, the last edition, reports 41 processes in a structured way



STRUCTURE OF THE FOOD MANUFACTURING PROCESSES

The 2023 edition reports 41 food manufacturing processes

- ❑ the name of each food manufacturing process reflects two types of information:
 - **Level 1:** the name refers to the processing of raw materials (not substrates),
 - **Level 2:** the name refers to the production of final foods (an ingredient or ready-to cook/consume).
- ❑ the order follows loosely the one used for food additives by starting with dairy products.



FOOD MANUFACTURING PROCESSES

level	food manufacturing process	raw material
1	processing of dairy products	dairy products
2	production of lactose-reduced milk	milk
2	production of cheese	milk
2	production of fermented dairy products	milk
2	production of flavouring preparation from dairy products	cheese, cream, butter etc.
2	production of whey concentrates and whey protein isolates	whey
2	production of whey protein hydrolysates	whey protein concentrate
1	processing of eggs and egg products	eggs



FOOD MANUFACTURING PROCESSES

level	food manufacturing process	raw material
1	processing of meat and fish products	meat and fish
2	production of modified meat and fish products	meat and fish
2	production of protein hydrolysates from meat and fish protein isolates	meat and fish proteins



STRUCTURE OF FOOD MANUFACTURING PROCESSES

level	food manufacturing process	raw material
1	processing of cereals and other grains	cereals
2	production of flour	cereals
2	production of starch and gluten fractions	cereals
2	production of baked products	flour
2	production of cereal-based products other than baked	flour
2	production of brewed products	cereals
2	production of glucose syrups and other starch hydrolysates	starch
2	Production of distilled alcohol	fermentable carbohydrates



STRUCTURE OF FOOD MANUFACTURING PROCESSES

level	food manufacturing process	raw material
1	processing of fruits and vegetables	fruit and vegetables
2	production of juices	fruit and vegetables
2	production of fruit and vegetable products other than juices	fruit and vegetables
2	production of wine and wine vinegar	grapes
2	production of alcoholic beverages other than grape wine	fruits
2	production of non-wine vinegar	fruits



STRUCTURE OF FOOD MANUFACTURING PROCESSES

level	food manufacturing process	raw material
1	processing of plant-derived products	plant components
2	production of refined and unrefined sugar	sugar beets and sugar canes
2	production of edible oils from plant and algae	plants and algae
2	production of green coffee beans by demucilation	coffee cherries
2	production of coffee extracts	demucilated coffee beans
2	production of coffee substitutes	cereals, chicory, etc.
2	production of tea and other herbal and fruit infusions	tea leaves or other plants
2	production of plant extracts	plants
2	production of plant-based analogues of milk and milk products	plant-based raw materials
2	production of soy sauce	soya
2	production of protein hydrolysates from plants	plant proteins



STRUCTURE OF FOOD MANUFACTURING PROCESSES

level	food manufacturing process	raw material
1	processing of yeast and yeast products	yeast
1	processing of fats and oils	fats and oils
2	production of refined edible oils by degumming	crude oils
2	production of modified fats and oils by interesterification	fats and oils
2	production of free fatty acids by hydrolysis	fats and oils
2	production of flavour compounds by esterification	fats and oils
2	production of modified lecithins	lecithin



STRUCTURE OF FOOD MANUFACTURING PROCESSES

level	food manufacturing process	raw material
1	processing of sugars	mono-, di- and oligo-saccharides
2	production of confectionery products	sucrose, fructose
2	production of oligosaccharides	di- and oligo-saccharides
2	production of specialty carbohydrates (excluding oligosaccharides)	mono-, di- and oligo-saccharides
1	prevention of acrylamide formation in foods	carbohydrate and asparagine containing foods



INFORMATION FOR EACH FOOD MANUFACTURING PROCESSES

3.21 Production of non-wine vinegar

This process is defined according to the "EC working document on food processes in which food enzymes are used" as follows⁹:

this food manufacturing process relies on agricultural origin other than grapes (e.g. fruits, cereal grains) as the raw materials. By alcoholic and acetous fermentation, it leads to the production of non-wine vinegars.

Food enzymes that can be typically used in this process are amylases and phytases.

It excludes wine vinegar production covered by category "Production of wine and wine vinegar".

Following the open call-for-data³³, feedback was received from CULINARIA EUROPE e.V.

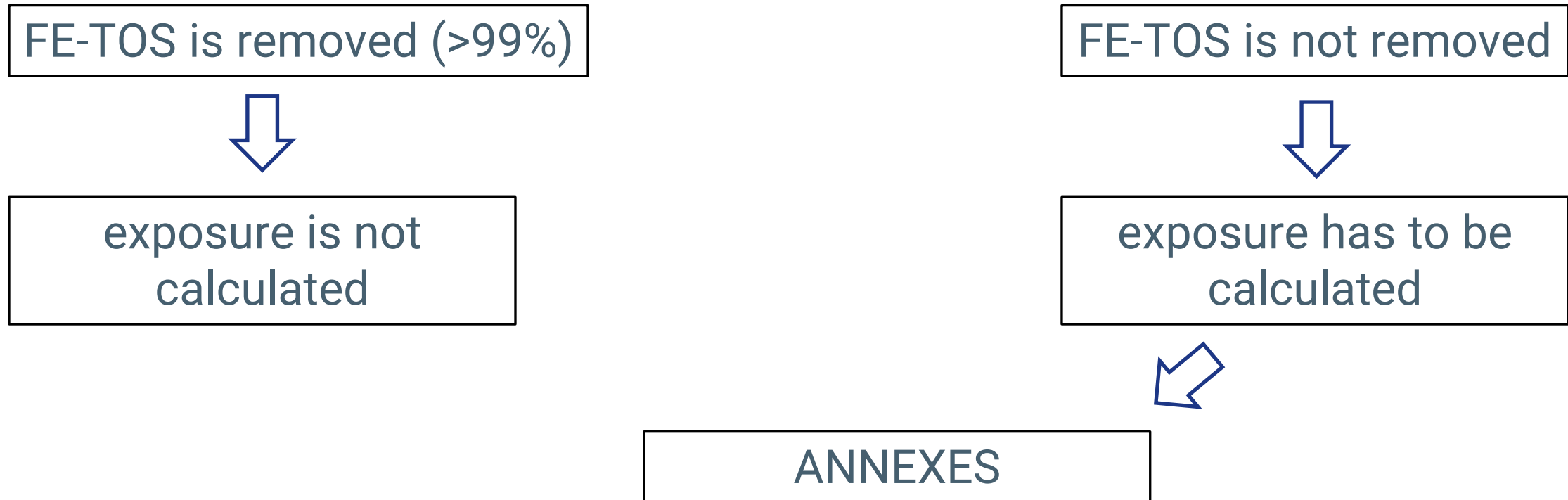
The input data used to estimate dietary exposure to food enzyme-TOS in foods relevant to this intended use are summarised in Annex 18.

brief description of the process
specific inclusion or exclusion
synopsis of the call-for-data



CARRY-OVER OF THE FOOD ENZYME TOS

A food manufacturing processes can fall into one or the two categories



ANNEXES – AN EXAMPLE

Production of baked products						
Title	Column	Explanation				
FoodEx hierarchical code	A	EFSA FoodEx Classification System				
FoodEx matrix description	B					
FoodEx hierarchical level	C	Level of detail in food description (FoodEx1: 1-4; FoodEX2: 1-7)				
f1	D	Average Technical conversion factor: converting flour to flour				
Explanation of the concerned ingredient	E	ingredient considered in the FoodEx category				
f2	F	Average Recipe/Ingredient factor: average fraction of flour in respective FoodEx category				
f3	G	Percentage of FoodEx category containing flour				
To estimate exposure to a food enzyme used in the "Production of baked products" both enzyme use level and food intake are expressed on the basis of flour						
FoodEx1 hierarchical code	FoodEx matrix description	FoodEx1 hierarchical level	f1 (converting raw material to flour)	Explanation of the concerned ingredient	f2 (average fraction of flour in respective FoodEx category)	f3 (percentage of FoodEx category containing flour)
A.01.04	Bread and rolls (unspecified)	4	1.0	flour	0.70	1
A.01.04.001	Wheat bread and rolls	3	1.0	flour	0.70	1
A.01.04.002	Rye bread and rolls	3	1.0	flour	0.70	1
A.01.04.003	Mixed wheat and rye bread and rolls	3	1.0	flour	0.70	1
A.01.04.004	Multigrain bread and rolls	3	1.0	flour	0.70	1
A.01.04.005	Unleavened bread, crisp bread and rusk (unspecified)	4	1.0	flour	0.90	1
A.01.04.005.001	Crisp bread, rye wholemeal	4	1.0	flour	0.90	1
A.01.04.005.002	Crisp bread, rye, light	4	1.0	flour	0.90	1
A.01.04.005.003	Crisp bread, wheat, wholemeal	4	1.0	flour	0.90	1
A.01.04.005.004	Crisp bread, wheat, light	4	1.0	flour	0.90	1
A.01.04.005.005	Rusk, light	4	1.0	flour	0.90	1
A.01.04.005.006	Rusk, wholemeal	4	1.0	flour	0.90	1
A.01.04.005.007	Pita bread	4	1.0	flour	0.70	1
A.01.04.005.008	Matzo	4	1.0	flour	0.90	1
A.01.04.005.009	Tortilla	4	1.0	flour	0.70	1



PROCESS-SPECIFIC TECHNICAL DATA – 2023 EDITION

currently under public consultation

start date: 14/03/2023, end date: 09/05/2023

accessible at <https://connect.efsa.europa.eu/RM/s/publicconsultation2/a0l09000006qpdkAAA/pc0399>

open for comments and suggestions

- a pdf file, explaining how the 41 food manufacturing processes are renamed and ordered
- 31 annexes, listing input data for each process where TOS remains
 - food groups (in FoodEx1 and FoodEx2 classification systems)
 - technical factors for each food group

