FNS - Cloud

Food Nutrition Security

Food Traceability & Metrology search engine

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Maria Z.Tsimidou & Nikolaos Nenadis (AUTH)

Katherine Flynn, Luis Mayor & Sofia Reis (IFA)

FNS-Cloud Final Event & Launch of FNSCloud Solution

Brussels - 12 Sept. 2023

AGENDA

❑ Key role of data for food quality, safety, and authenticity	*Claudia Zoani – ENEA*
❑ Search challenges and issues with search engines	*Karl Presser – PMT*
❑ Provision of analytical data for the traceability search engine: an example on olive oil	*Maria Tsimidou – AUTH*
❑ Intro to the Food traceability & metrology search engine	*Katherine Flynn, Luis Mayor & Sofia Reis - IFA, with ENEA & PMT*
❑ Hands-on session: what can I do with search engine?	
❑ Further developments and engaging user communities	*Claudia Zoani - ENEA; Karl Presser - PMT*

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Who worked to realize the Food Traceability & Metrology search engine

ENEA
Italian national agency for new technologies, energy and sustainable economic development

PREMOTEC

Institut "Jožef Stefan" Ljubljana, Slovenija

EuroFIR
European Food Information Resource

Quadram Institute
Science Health Food Innovation

ARISTOTLE UNIVERSITY OF THESSALONIKI

FONDAZIONE EDMUND MACH

National Research Council of Italy

National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

APRE
Agenzia per la Promozione della Ricerca Europea

UCD DUBLIN University College Dublin

mpr Milchprüfring Bayern e. V.

Qlip
Qualitätssicherung im Milchbereich

ICAR

...and all the consortium members who provided the datasets and tested the tool suggesting improvements

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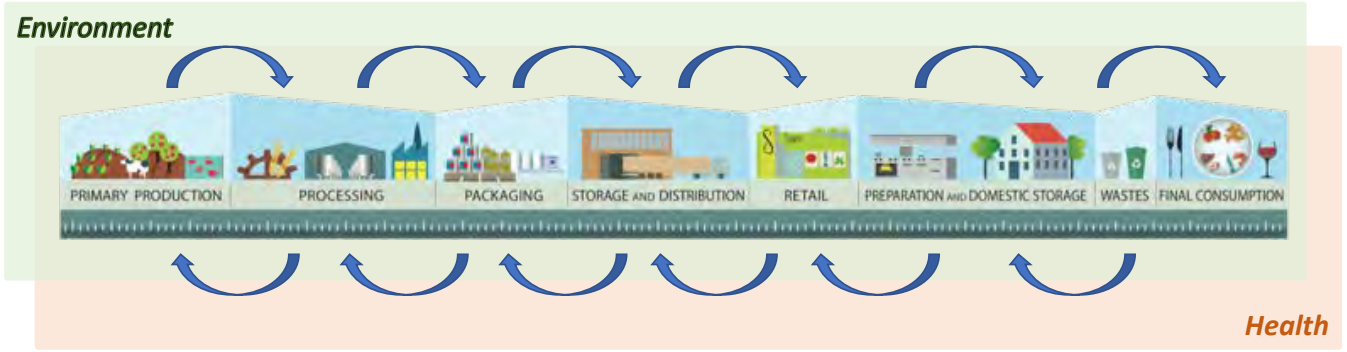
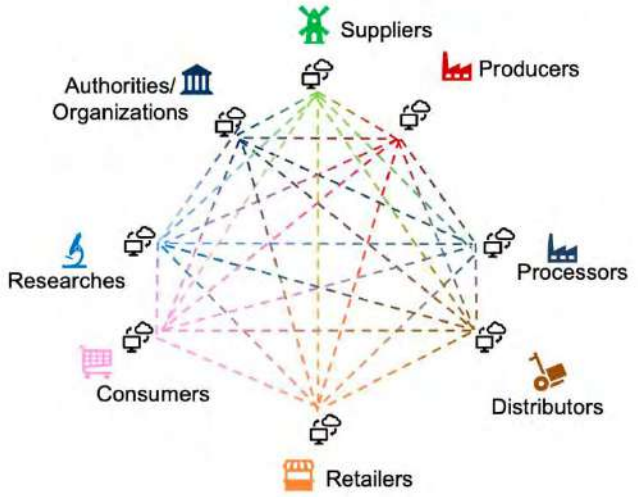
Why the engine?





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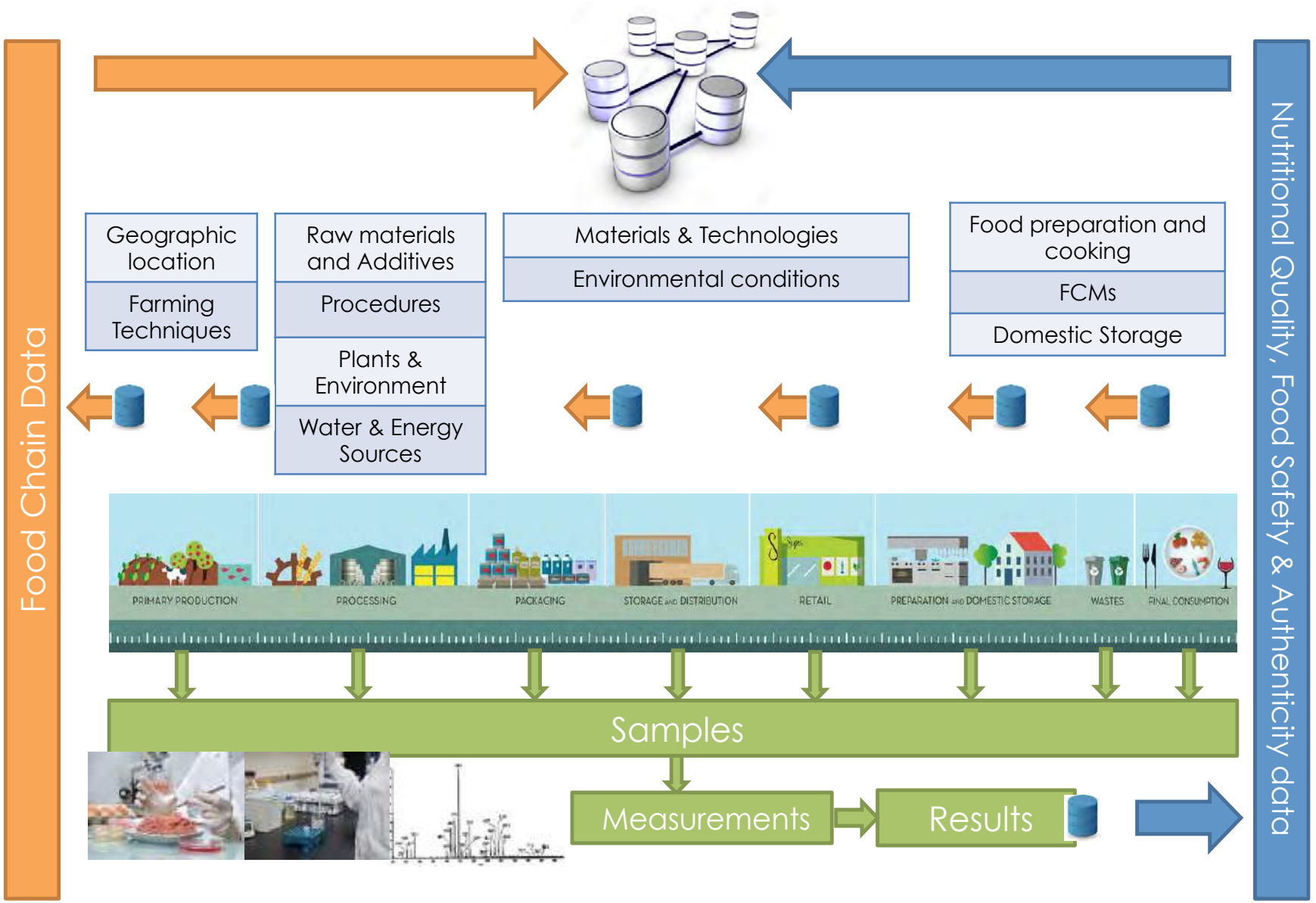

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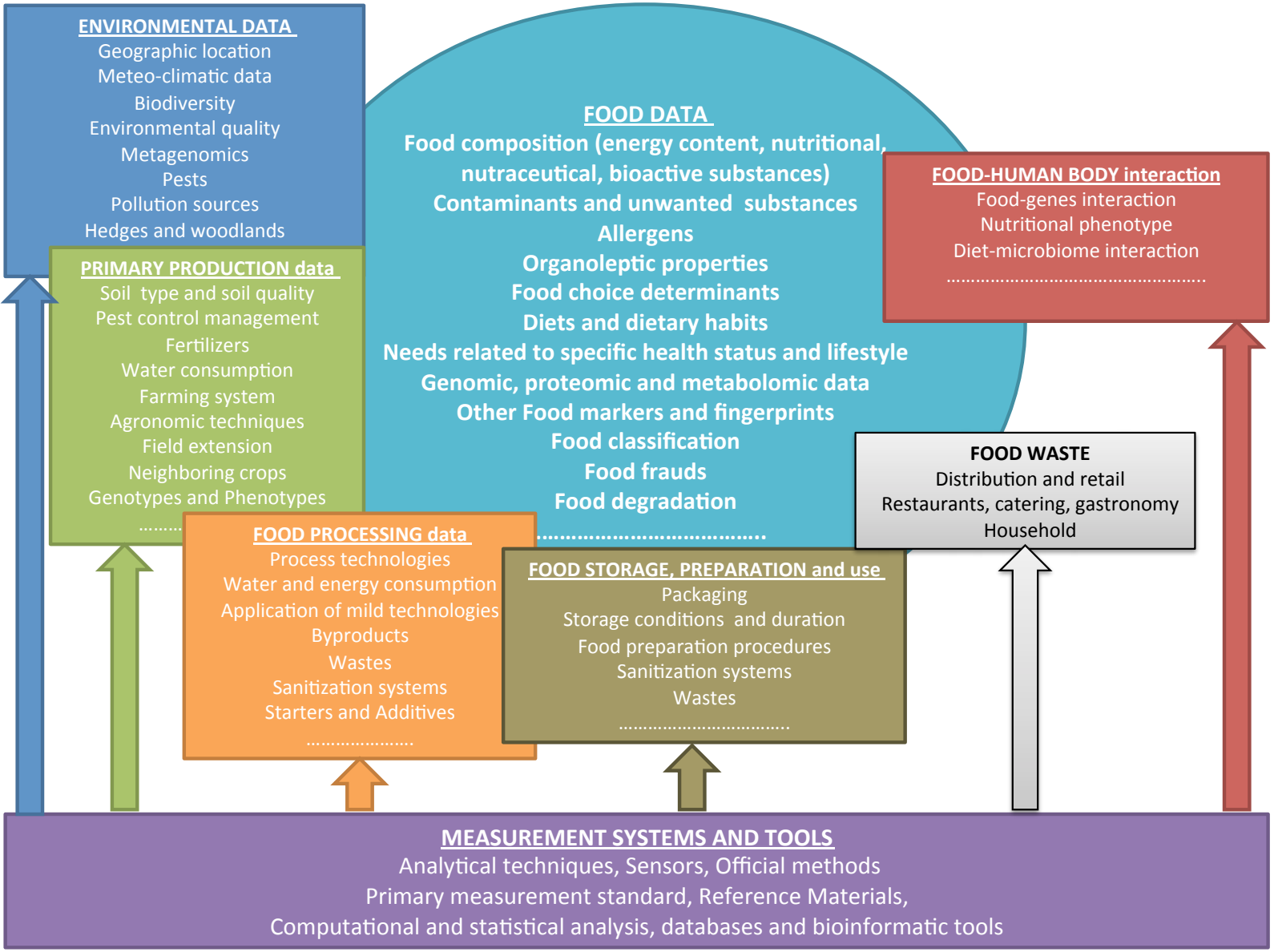

THE VISION is:

to realise a system enabling to collect and made interoperable information, data and metadata related to the **Food in all its lifecycle**, so as to reach a system able to describe the food on its whole and at the same time **relate those characteristics to the influencing factors** (collected as well as metadata).

Need to start from data FINDABILITY

SEARCH ENGINE

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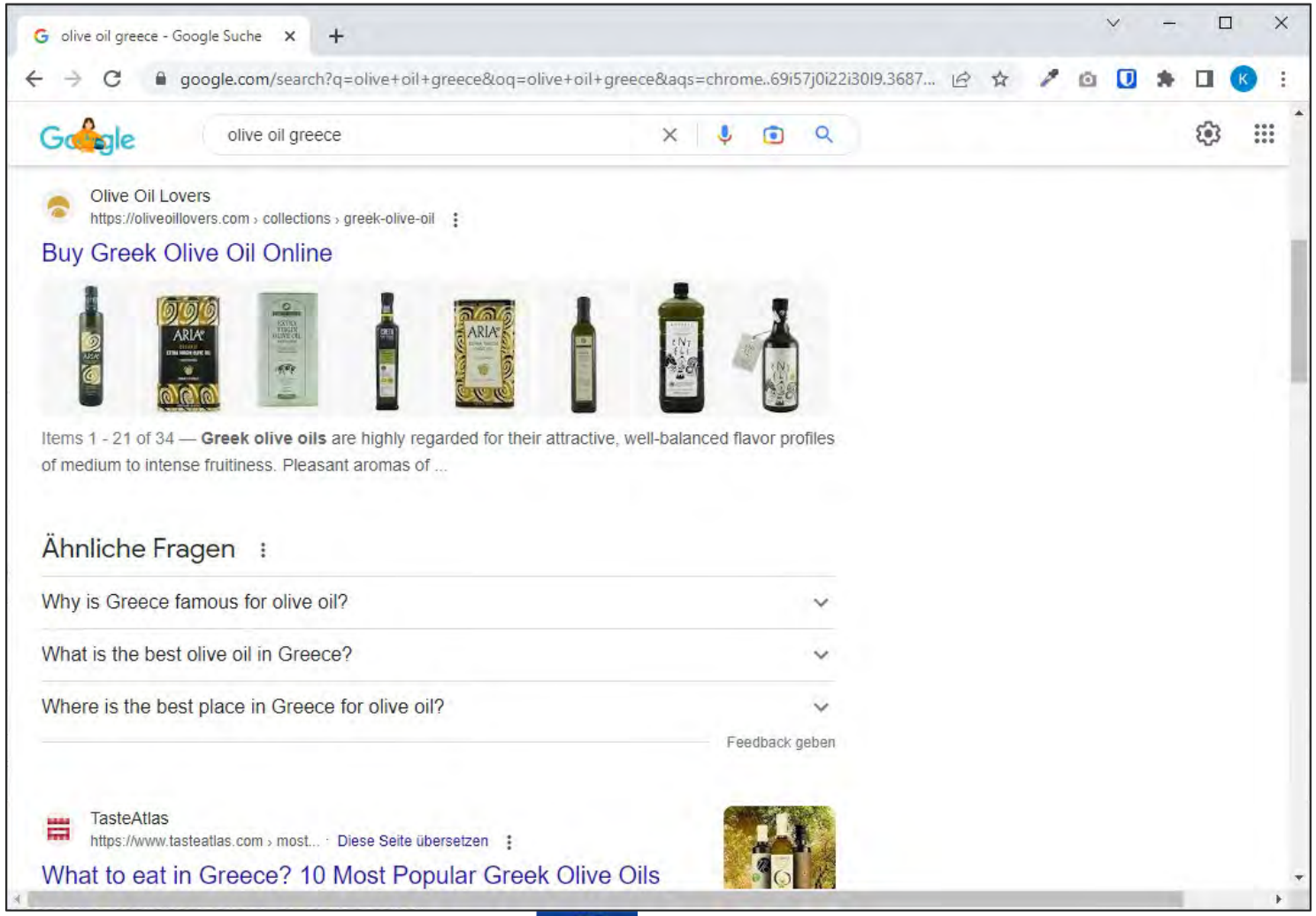
Motivation: Issues with Search Engines



- With Google you can find websites with relevant content
- Google presents results as a list

Issues:

- Are all relevant website shown?
- results are not appropriate to search scientific data
- No metainformation is used
- no structured data
- Not data but webpages are shown

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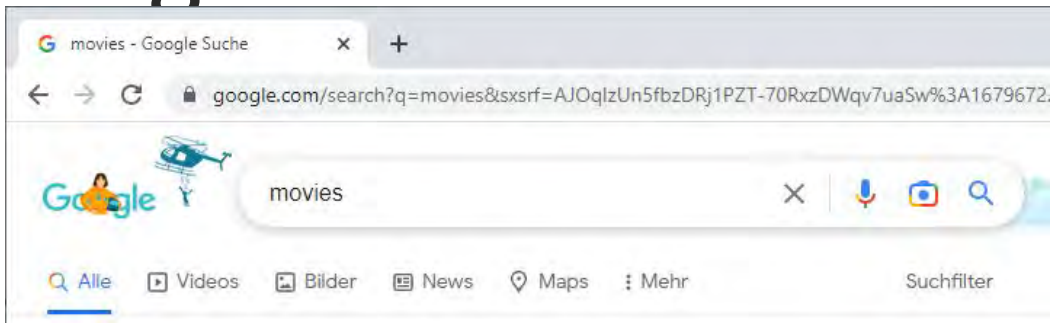
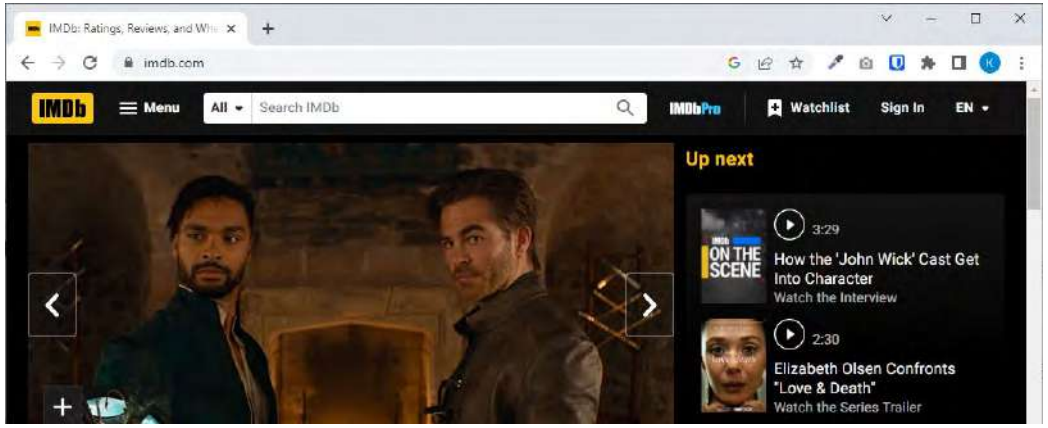
What is a researcher looking for?

Find a movie



Find a movie



Find a paper

Find data

?

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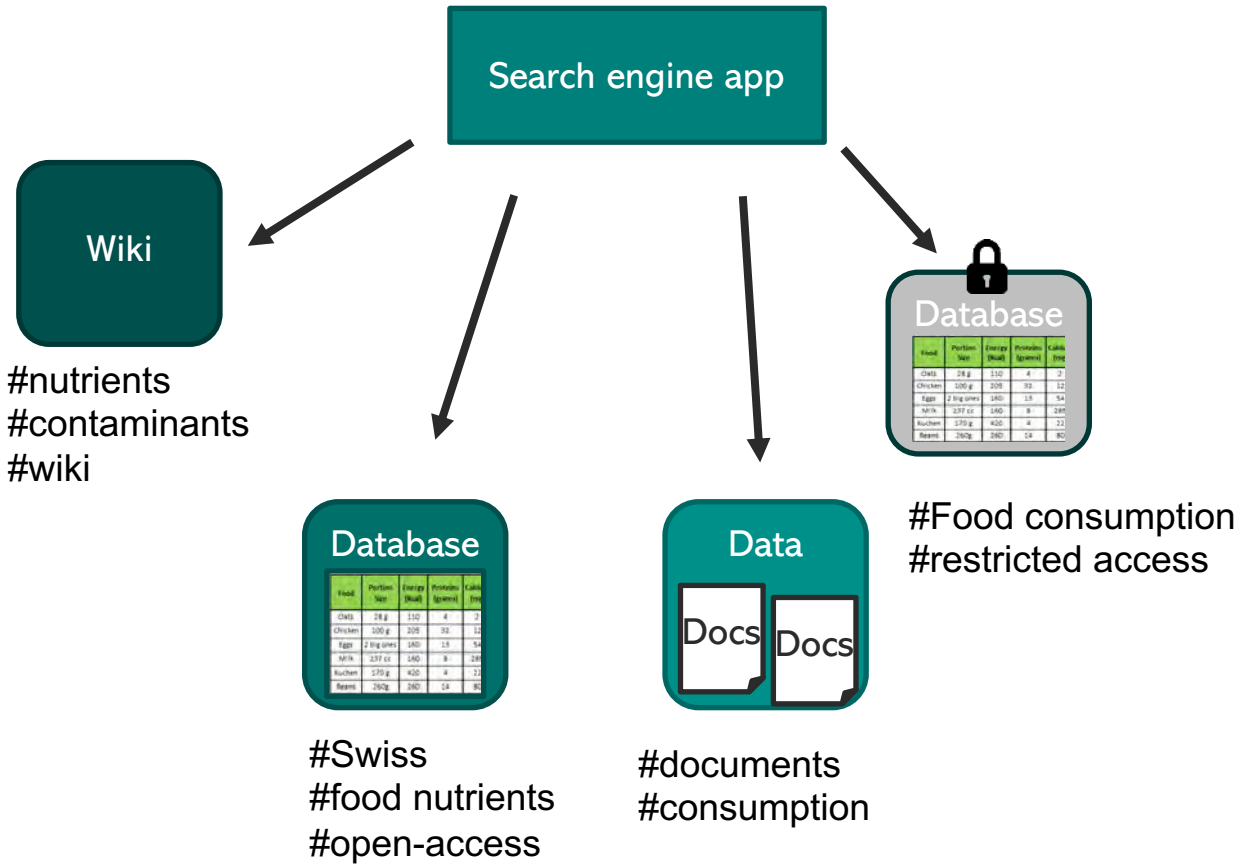
Concept 1: Broad Search and Tagging



- Implement a search engine tailored for scientific food data
- Allow to tag datasets and use tagging for search
- Search databases, but also Wiki and Docs

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Concept 2: Show Result Map/Spaces

Food item/food group: Olive oil

Filter: Greece

Add

Show result as: Table

X-axis: Supply chain

Y-axis: High-level topics

Add

x

Olive oil (Greece)	Primary production	Processing	Packaging	Storage and distribution	Retail	Preparation and domestic storage	Wastes	Final consumption
Safety						Oxidation at different temperatures (link)		TDS data (link) Medication concentration data (link)
Quality/ nutrition		Contamination during olive oil extraction (link)		Loss of vitamins during storage (link)	Label information (link)			Greece food composition database (link)
Authenticity/ Origin	Isotope data AUTH (link)							
Metrology	Reference material XY (link)							Reference material YZ (link)
Security	Security report on olive oil in Greece (link)							

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Concept 3: Food Supply Chains

- Food supply chains are different foods and food groups
- Search engine should reflect that
- Search engine should graphically support with food supply chains

an Union's Horizon 2020 Research and Innovation programme (H2020-EU.3.2.2.3. – A sustainable and competitive agri-food industry) under Grant Agreement No. 863059 – www.fns-cloud.eu

Concept 4: Parameters of interest

SAFETY		
MATRIX	**RAW MILK**	
STEP	FEEDING AND FARMING PRACTICES	HAND/MACHINE MILKING
PARAMETERS OF INTEREST	brominated flame retardants, PAHs, organochlorines, perfluorinated substances, dioxins, antibiotic residues, antiparasitic drugs, painkillers, other drugs (Chloramphenicol), toxic and potentially toxic elements; pathogenic and spoilage organisms (E. Coli), spores of butyric acid bacteria, mycotoxins, viruses; foreign matters	disinfectants (iodine, quaternary ammonium compound (QAC) residues, TCM residues and chlorinated byproducts), phthalate esters; total bacteria, somatic cells, pathogenic and spoilage organisms (Staphylococcus aureus, E. coli, mastitis bacteria); foreign matters (metal, plastic, glass, rubber, wood parts, sand/soil, stones, hair)
PARAMETERS OF INFLUENCE	climatic and pedoclimatic conditions, feed composition, contaminants on feed and water, fertilisers content and type, pest and disease management, cow health status, veterinary medicines	cleaning procedures efficiency (environment, animals, operators); integrity of food contact materials (FCM)

- 3 areas: nutritional quality, safety, authenticity/transparency
- Parameter of interest = chemical substance/bacteria
- Define for each supply chain the parameters of interest
- Parameters of influence

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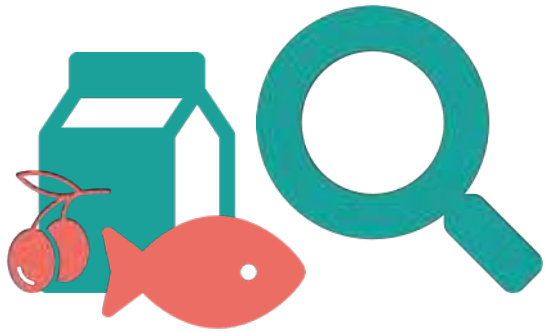
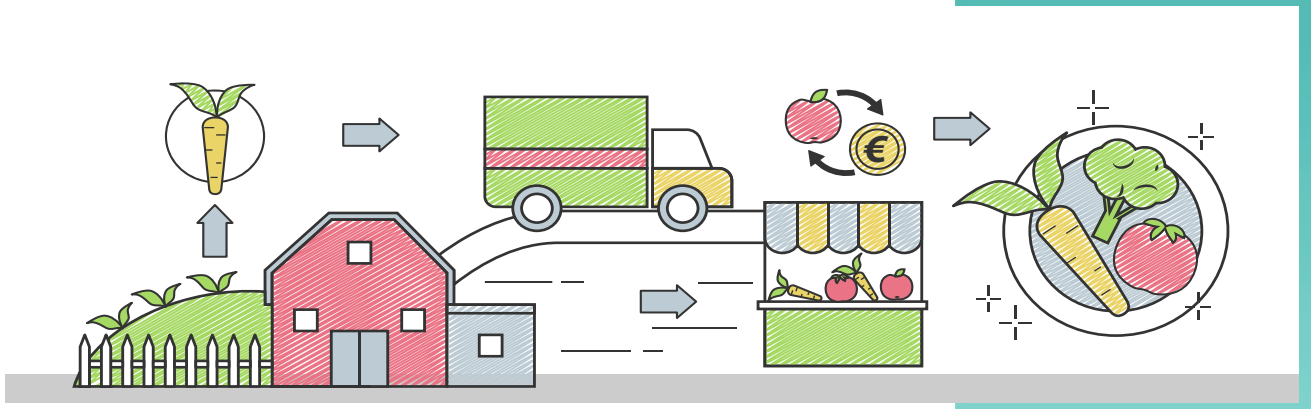
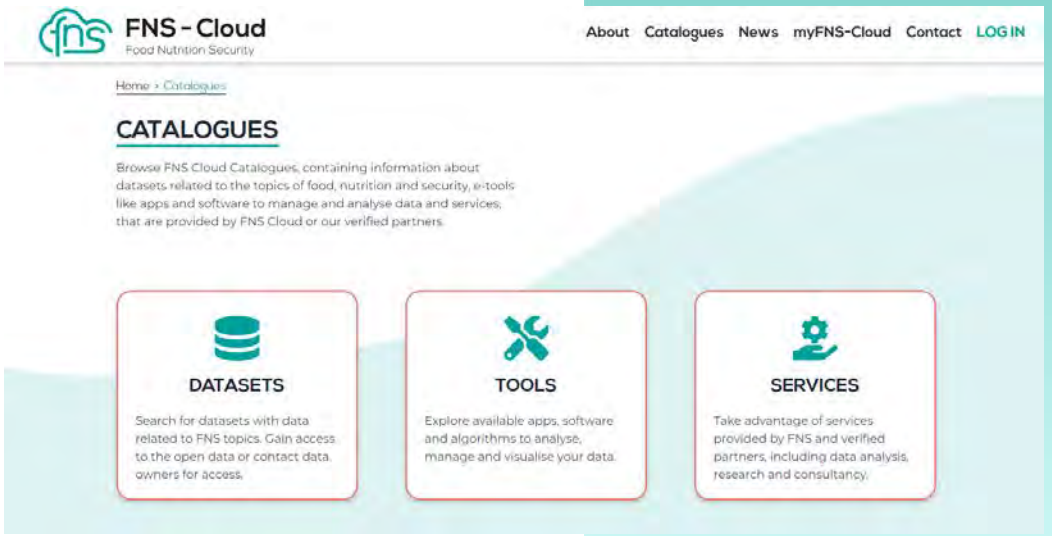
Develop a **search tool utilising existing and emerging FNS data** from multiple sources to enable **better visualization and understanding** of the composition, organoleptic properties, chemical characteristics, origins, etc. of three model foods (**milk, fish and olive oil**)







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Reseach questions and topics

Nutritional quality

Food safety

Traceability/ Authenticity

- Food composition
- Nutritional quality (e.g., nutrients, bioactive compounds; comparison among raw and pasteurised milk)
- Food safety – contaminants ad unwanted substances (e.g., contaminant concentration in the raw material, final product and/or process intermediates)
- Authenticity; geographical or botanical/zoological origin (markers and profiles); suspect food samples compared against authentic profiles to confirm or refute claims about origin or ingredients
- Primary production and processing (e.g., fishing and aquaculture)
- ...

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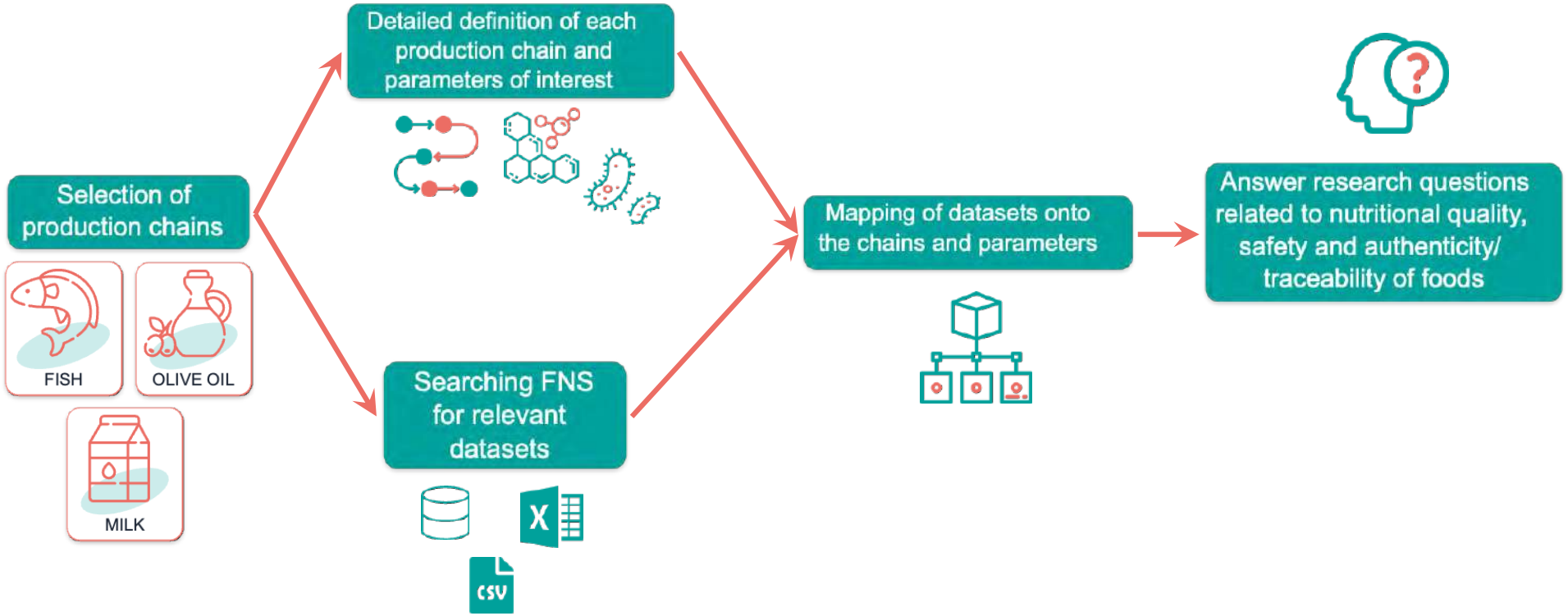
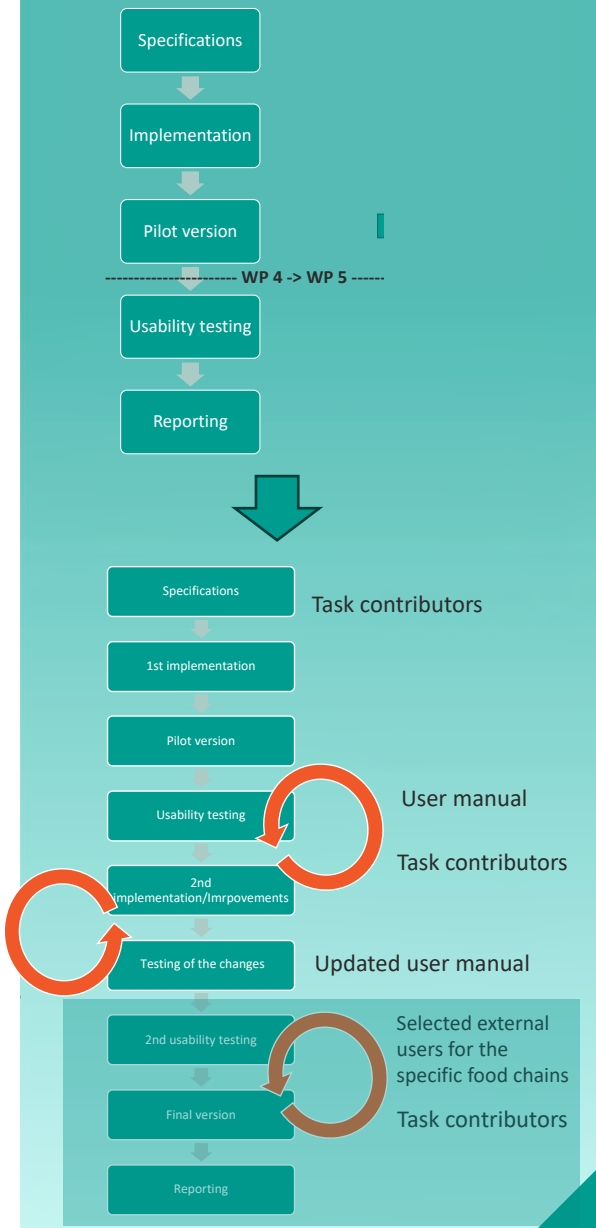
Workflow





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Supply chain selection	Virgin Olive oil; Milk, Fishery products (Atlantic salmon, common sole, European anchovy)
Supply chain analysis & representation	Flowchart: from primary production to human intake; Steps list: definition, input and output; Official definitions where applicable
Data and metadata mapping	Every supply chain step was examined to understand how it affects nutritional quality, safety and authenticity so to define the relevant parameters of interest and parameters of influence
Tagging of the FNS catalogues	Definition of the tags for each search criterion, preliminary tagging for the usability tests, refinement of the criteria, completion of the tagging for all the FNS datasets

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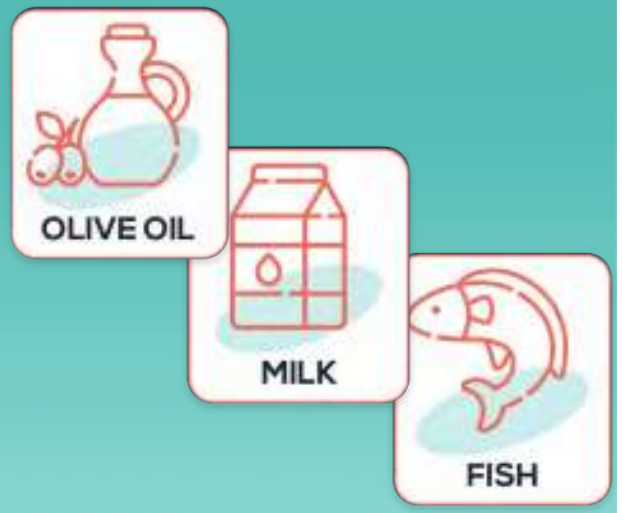
Three model foods



- **Olive oil** - authenticity, quality, sustainability
- **Milk** - quality, by-products, sustainability
- **Fish** - quality, safety, authenticity

Selection criteria:

- products of both vegetable and animal origin
- products of interest for different Countries/geographic areas in Europe, taking into account also trade
- possibility to extend the case studies to further products obtained by their processing
- current availability of datasets in the frame of other networks/projects/initiatives and possibility to involve in the Consortium and the Stakeholder Platform these networks and partners

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Value chains and datasets

VALUE CHAIN STEPS

INPUT

OUTPUT

Raw materials/Intermediates/Products

DEFINITIONS / Official Reg.

DEFINITIONS / Labelling

PARAMETERS OF INTEREST

PARAMETERS OF INFLUENCE

Parameter monitoring (off site, in-site, in-line, real time)

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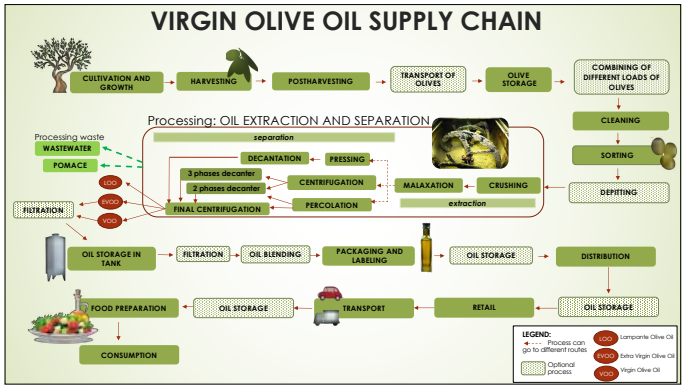
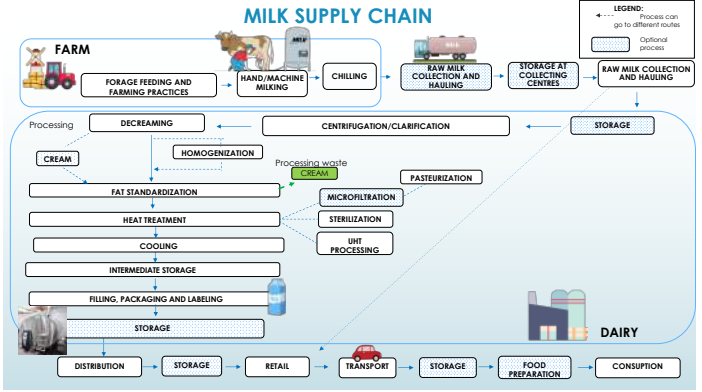
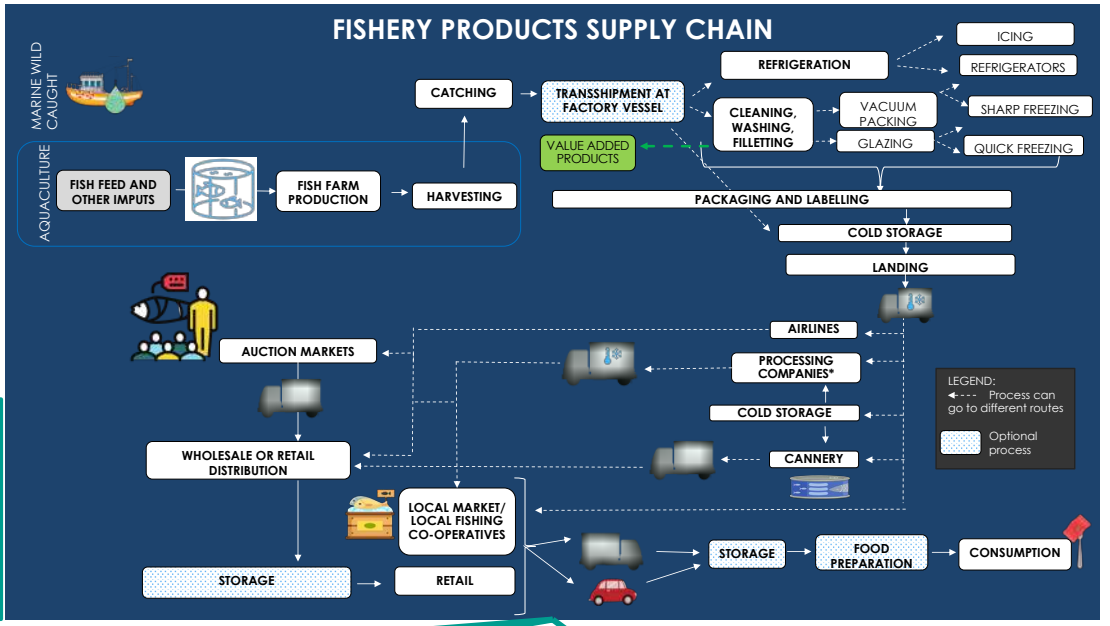
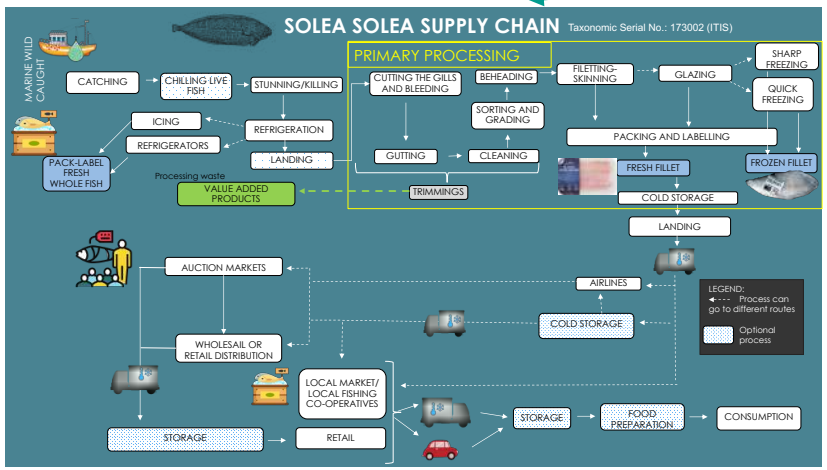


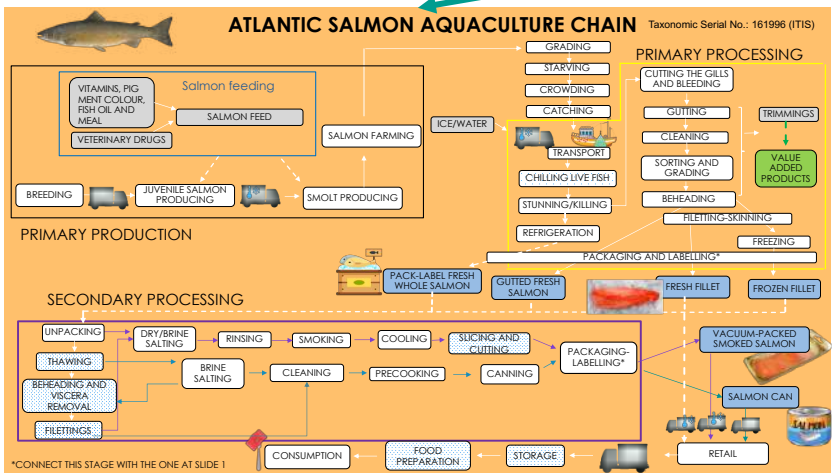




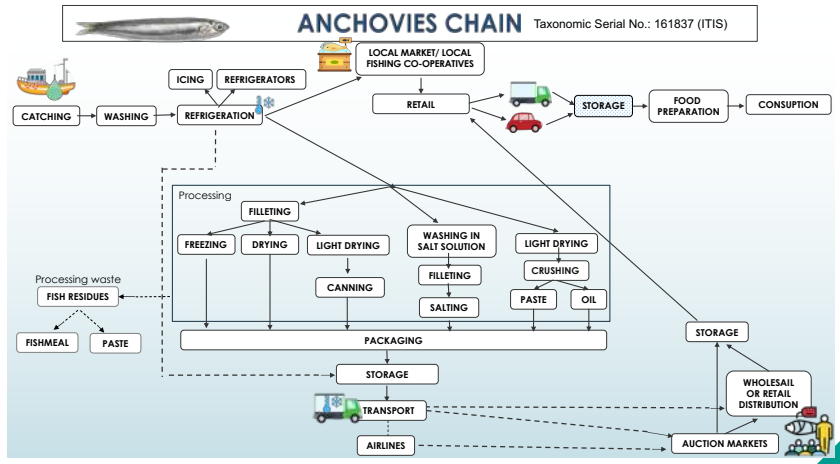
Fishery products chain (fish, crustaceans, cuttlefish, etc.)
Reg. (EC) 853/2004 (EU, 2004) - all seawater or freshwater animals (except for live bivalve molluscs, live echinoderms, live tunicates and live marine gastropods, and all mammals, reptiles and frogs) whether wild or farmed and including all edible forms, parts and products of such animals.



Sole supply chain - as representative of a marine wild-caught, medium size, and lean fish



Salmon supply chain - as representative of the aquaculture line, large size, and fatty fish



Anchovies supply chain - as representative of a marine wild-caught, small size, medium fat fish

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VIRGIN OLIVE OIL SUPPLY CHAIN

CULTIVATION AND GROWTH → HARVESTING → POSTHARVESTING → TRANSPORT OF OLIVES → OLIVE STORAGE → COMBINING OF DIFFERENT LOADS OF OLIVES → CLEANING → SORTING → DEPITTING

Processing: OIL EXTRACTION AND SEPARATION

separation

DECANTATION ← PRESSING

3 phases decanter

2 phases decanter

CENTRIFUGATION

FINAL CENTRIFUGATION ← PERCOLATION

MALAXATION ← CRUSHING

extraction

Processing waste

WASTEWATER

POMACE

LOO

EVOO

VOO

FILTRATION

OIL STORAGE IN TANK → FILTRATION → OIL BLENDING → PACKAGING AND LABELING

OIL STORAGE → DISTRIBUTION → OIL STORAGE → RETAIL → TRANSPORT → OIL STORAGE → FOOD PREPARATION → CONSUMPTION

LEGEND:

Process can go to different routes

Optional process

LOO — Lampante Olive Oil

EVOO — Extra Virgin Olive Oil

VOO — Virgin Olive Oil

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STEP	DEFINITION	INPUT	OUTPUT AND MATRIX OF ANALYSIS
CULTIVATION AND GROWTH	All stages that concern agronomic practices to make olives growth and keep them healthy until harvest	X	OLIVES
HARVESTING	The process of gathering a ripe crop from olives fields. Can be done after natural fall; by hand, by beating the branches, with shakers, by combing (previously is commonly used to punt canvases on the soil for the reception of the harvested fruits)	OLIVES	OLIVES
POSTHARVESTING	Olives are taken from the nets on the ground and put into bins	OLIVES	OLIVES
TRANSPORT OF OLIVES	Olives are transported to oil mill by olive grower	OLIVES	OLIVES
OLIVE STORAGE	Olives are stored in rigid and ventilated containers in a cool and dry environment	OLIVES	OLIVES
COMBINING DIFFERENT LOADS OF OLIVES	Olives can arrive from different olive's growers and are mixed together	OLIVES	OLIVES
CLEANING	Involves defoliation and washing	OLIVES	OLIVES
SORTING	Discarding any bruised or defective fruit	OLIVES	OLIVES
DEPITTING	Separation of the pits from the olives	OLIVES	OLIVES
extraction	Preparation of the paste. The ideal objective of any extraction method is to extract the largest possible amount of oil without altering its original quality	OLIVES	OLIVE PASTE
CRUSHING	Crushing of olives. The purpose is to disrupt the tissues of the fruit and facilitate release of oil from oil bodies. This step can be done with stone mills, metal tooth grinders, or various kinds of hammermills	OLIVES	OLIVE PASTE (oil-in-water emulsion)
MALAXATION	Mixing of olive paste that allows small oil droplets to combine into larger ones	OLIVE PASTE (oil-in-water emulsion)	OLIVE PASTE (Water-in-oil emulsion)
separation	Separation of olive paste in its components: oil, pomace (solid remains of olive) and vegetation water. It can be obtained with three system: - by pressing, - by centrifugation, - by percolation through selective filtration	OLIVE PASTE (Water-in-oil emulsion)	OLIVE OIL, OLIVE POMACE, VEGETATION WATER
PRESSING	Pressing is carried out with hydraulic electric pumps, cage and column press ore open monobloc super presses that allow reaching pressures of 350-500 atmospheres	OLIVE PASTE (Water-in-oil emulsion)	**OLIVE MUST** (OIL + VEG. WATER), OLIVE POMACE
DECANTATION	Separation of olive oil from water by natural decantation (is the most old method to preserve product); it followed by pouring	OLIVE POMACE, VEG. WATER, OLIVE PASTE	**VIRGIN OLIVE OIL**, VEG. WATER
PERCOLATION	Percolation is based on the difference in the surface tension between oil and vegetation water. Olive oil percolate goes to centrifuge and in some milling paste goes to 2 phase decanter to recover oil still present	OLIVE PASTE (Water-in-oil emulsion)	**OLIVE OIL**, OLIVE POMACE OIL
CENTRIFUGATION	It is based on the differences in density of the olive paste constituents (olive oil, water and insoluble solids). The olive paste is subjected to centrifugation in a conical rotating drum with a horizontal axis called DECANTER where Liquid-Solid Separation takes place	OLIVE PASTE (water-in-oil emulsion) + ADDED WATER IN THE 3 PHASE DEC.	**OLIVE OIL**, VEG. WATER, OLIVE POMACE OR **OLIVE OIL** AND HUMID OLIVE POMACE
2 AND 3 PHASES DECANTERS	In the three-phase centrifugal decanter, paste is divided into oil, vegetation water and solids (olive pomace), i.e. kernel and pulp fragments During the path to the three-phase centrifugal decanter, water is added to dilute the incoming paste. In the two- phase process, paste instead is separated in oil as a liquid phase and a solid phase composed of fragments and kernels, pulp and vegetation water (humid olive pomace)		
FINAL CENTRIFUGATION	Split olive oil from the other materials. Regardless of the process used for oil extraction, a final centrifugation with lukewarm water is performed to further remove water and small solids from the oil. Output is cleaned oil with less than 0.2% of moisture and volatile matter (% w/w), and less than 0.1% of insoluble impurities in light petroleum (% w/w) This process is carried out in vertical centrifuges that rotate at high speed (6000-7000 rpm)	OLIVE OIL + WATER	**VIRGIN OLIVE OIL** AND OILY DEPOSIT
PROCESSING WASTE	The by-products are olive mill wastewater (OMW) and/or olive-pomace and, and less importantly, twigs and leaves. The vegetation water can be used in agronomic, energy and industry fields. Olive-pomace can be transformed into olive-pomace oil, biofuel, compost, animal feed, biodiesel, polysaccharides, antioxidants, ceramic materials, etc.	WASTEWATER, OLIVE POMACE	OLIVE-POMACE OIL, AND OTHER
FILTRATION	It is aimed at making the oil clearer and protecting it from premature ageing. Is carried out in two steps: first, the suspended solids are re-moved, and second elimination of humidity gives the oil brilliant aspect. It can be carried out with press filters or spontaneous leaving the product at rest by the action of the force of gravity	OLIVE OIL	FILTERED VOO
OIL STORAGE	At industry keeping oil in sealed stainless steel tanks, with nitrogen blanketing at 15-18 °C. Other processes store oil in bottles or tin cans (or any other appropriated containers) at 15-18 °C	VOO	VOO
OIL BLENDING	Mixing virgin olive oils obtained from different olive varieties to create own unique blend	VOOs	BLEND -MULTI VARIETAL VOO
PACKAGING AND LABELING	Edible Virgin Olive Oil is put into bottles or tin cans and labelled	EDIBLE VOO	VOO PACKED & LABELED
DISTRIBUTION	Distribution of bottles or tin cans tanks using trucks or cargo through various channels to reach the final consumer. These channels are either retailing companies or other processing companies (for ex. canteen or restaurants)	VOO PACKED & LAB.	VOO PACKED & LABELED
RETAIL	Process that showcases the product for the consumer. This can be in the form of local corner shops or large hypermarkets or supermarkets	VOO PACKED & LAB.	VOO PACKED & LAB.
TRANSPORT	Bringing the item purchased at home/at restaurant	VOO PACKED & LAB.	VOO PACKED & LAB.
STORAGE	Storage at home or in restaurants, canteens, in clear and dark containers	VOO PACKED & LAB.	VOO PACKED & LAB.
FOOD PREPARATION	Using the oil in food recipes	VOO PACKED & LAB.	VOO READY TO EAT

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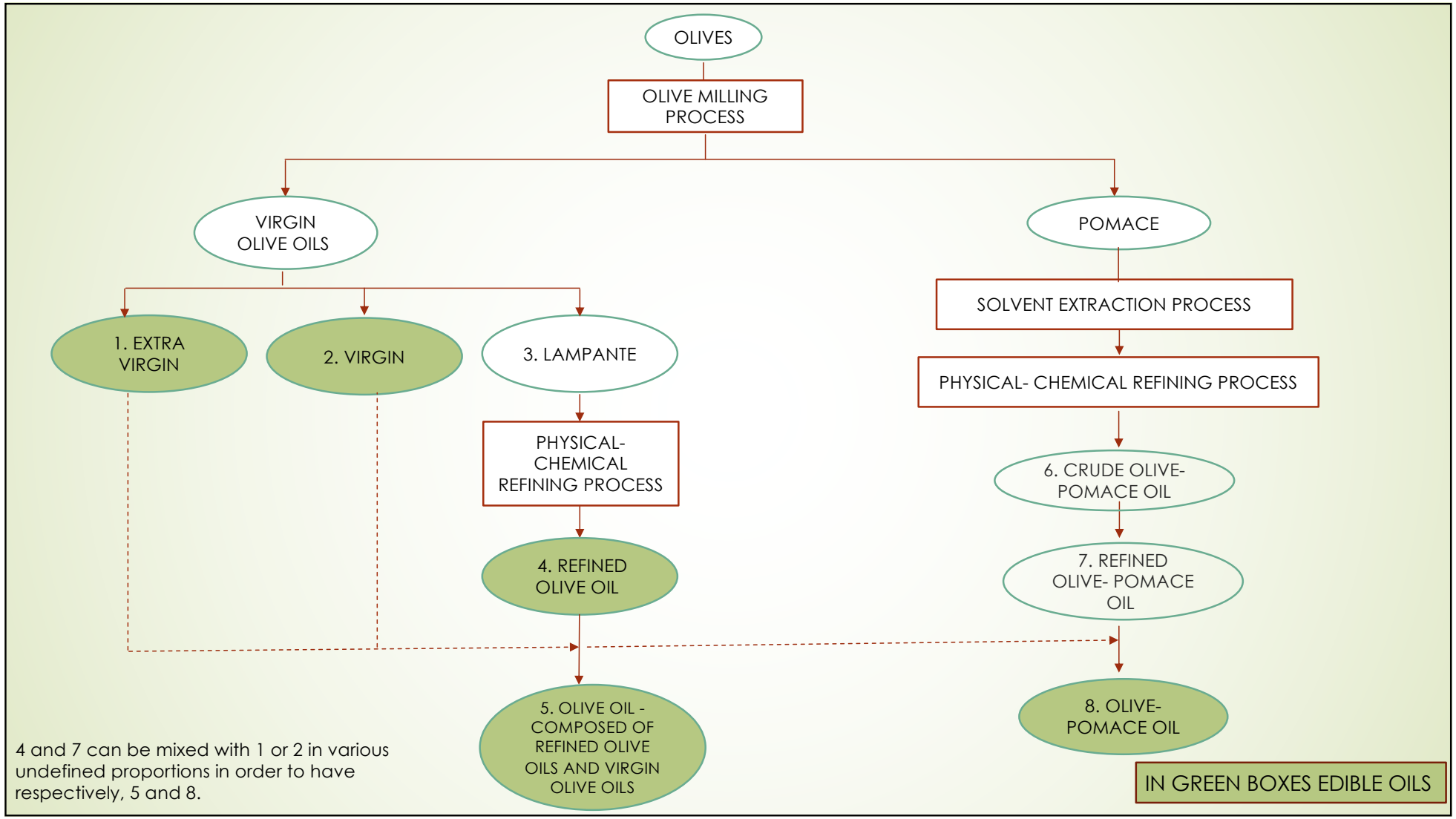

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DEFINITIONS

VIRGIN OLIVE OILS

Oils obtained from the fruit of the olive tree solely by mechanical or other physical means under conditions that do not lead to alterations in the oil, which have not undergone any treatment other than washing, decantation, centrifugation or filtration, to the exclusion of oils obtained using solvents or using adjuvants having a chemical or biochemical action, or by re-esterification process and any mixture with oils of other kinds.
Classified as follows:

1. EXTRA VIRGIN OLIVE OIL
Virgin olive oil having a maximum free acidity, in terms of oleic acid, of 0,8 g per 100 g, the other characteristics of which comply with those laid down by the Commission […]for this category.

2. VIRGIN OLIVE OIL
Virgin olive oil having a maximum free acidity, in terms of oleic acid, of 2 g per 100 g, the other characteristics of which comply with those laid down by the Commission […] for this category.

3. LAMPANTE OLIVE OIL
Virgin olive oil having a free acidity in terms of oleic acid, of more than 2 g per 100 g, and/or the other characteristics of which comply with those laid down by the Commission […] for this category.

4. REFINED OLIVE OIL
Olive oil obtained by refining virgin olive oil, having a free acidity content expressed as oleic acid, of not more than 0,3 g per 100 g, and the other characteristics of which comply with those laid down by the Commission […] for this category.

5. OLIVE OIL - COMPOSED OF REFINED OLIVE OILS AND VIRGIN OLIVE OILS
Olive oil obtained by blending refined olive oil and virgin olive oil other than lampante olive oil, having a free acidity content expressed as oleic acid, of not more than 1 g per 100 g, and the other characteristics of which comply with those laid down by the Commission […]for this category.

6. CRUDE OLIVE-POMACE OIL
Oil obtained from olive pomace by treatment with solvents or by physical means or oil corresponding to lampante olive oil, except for certain specified characteristics, excluding oil obtained by means of re-esterification and mixtures with other types of oils, and the other characteristics of which comply with those laid down by the Commission […] for this category.

7. REFINED OLIVE-POMACE OIL
Oil obtained by refining crude olive-pomace oil, having free acidity content expressed as oleic acid, of not more than 0,3 g per 100 g, and the other characteristics of which comply with those laid down by the Commission […] for this category.

8. OLIVE-POMACE OIL
Oil obtained by blending refined olive-pomace oil and virgin olive oil other than lampante olive oil, having a free acidity content expressed as oleic acid, of not more than 1 g per 100 g, and the other characteristics of which comply with those laid down by the Commission […] for this category.

IN GREEN BOXES EDIBLE OILS

Annex XVI REGULATION (EC) 1308/2013 (cons. 2020)

FNS – Cloud
Food Nutrition Security

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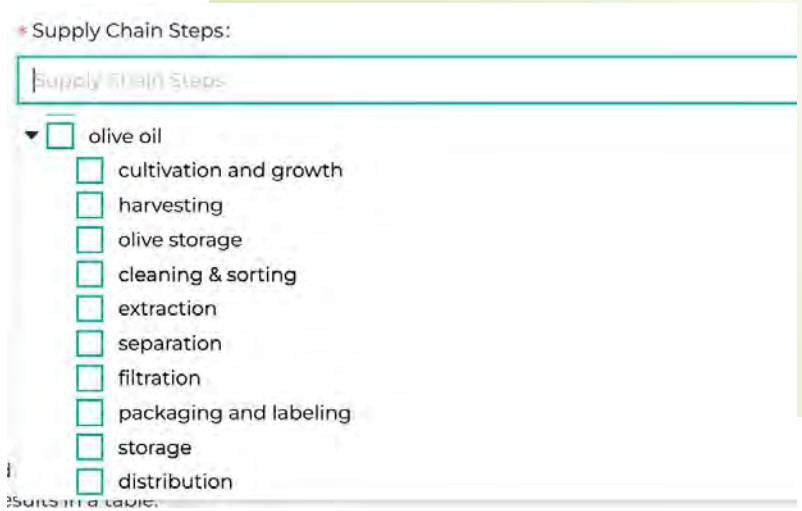
VIRGIN OLIVE OIL SUPPLY CHAIN



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MATRIX	OLIVES	OLIVE PASTE	MUST	OIL-MUST	OIL	FILTERED OIL					OIL			
STEP	CRUSHING	MALAXATION	EXTRACTION AND SEPARATION	CENTRIFUGATION	FILTRATION	OIL STORAGE	OIL BLENDING	PACKAGING AND LABELING	STORAGE	DISTRIBUTION	STORAGE	RETAILTRANSPORT	*STORAGE*	FOOD PREPARATION
PARAMETERS OF INTEREST	*Analytes or characteristics that may be subjected to change depending on the condition in the step analized*													
INFLUENCE PARAMETERS	*Conditions that can influence levels of the parameters of interest*													
PARAMETERS OF INTEREST MONITORING	*e.g., analytical methodologies, non destructive tests*													
INFLUENCE PARAMETERS MONITORING	*e.g., sensors, drones, agrometeorological stations*													

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NUTRITIONAL QUALITY

MATRIX	OLIVES											OLIVE PASTE	MUST	OIL-MUST	OIL	FILTERED OIL	OIL								
STEP	CULTIVATION AND GROWTH	HARVESTING	POSTHARVESTING	*TRANSPORT OF OLIVES*	OLIVES STORAGE	ARRIVAL AT THE MILL	*COMBINING DIFFERENT LOADS OF OLIVES*	CLEANING	SORTING	*DEPITTING*	CRUSHING	MALAXATION	EXTRACTION AND SEPARATION	CENTRIFUGATION	FILTRATION	OIL STORAGE	OIL BLENDING	PACKAGING AND LABELING	STORAGE	DISTRIBUTION	STORAGE	RETAIL	TRANSPORT	STORAGE	FOOD PREPARATION
PARAMETERS OF INTEREST	fatty acids (FFAs, SFAs, MUFAs and PUFAs), total polyphenols, tocopherol, secoiridoids (oleuropein, hydroxytyrosol), phytosterols, pigments (carotenoids, chlorophylls), lignans, secoiridoid derivatives, 3,4-DHPEA-AC, monoglycerides and peroxides, DAGs, peroxide value, pH, total CHO, soluble solids, % in oil				micronutrients content, free acidity level, peroxide, K232 value, K270 value, mould	air humidity, free acidity	micronutrients, total polyphenols, secoiridoids, phytosterols, pigments	total polyphenols	olives texture	pits, pit dust	micronutrients, total polyphenols, volatile compounds and pigments, secoiridoids, total DAGs, acidity, homogeneity, non-volatile oxidation products (phenols, hydroxylated fatty acids), organoleptic characteristics					1,2-DAGs, tocopherol, peroxide value, lipid oxidation products (i.e. hydroperoxides, conjugated dienes and trienes), K232 value, K270 value, organoleptic characteristics	tot polyphenols, volatile compounds and pigments, secoiridoids, organoleptic characteristics		tot polyphenols, volatile compounds and pigments, secoiridoids, organoleptic characteristics					
PARAMETERS OF INFLUENCE	climatic and pedoclimatic conditions: e.g., air composition, sun exposure, physical-chemical characteristics (pH, cation exchange capacity (CEC); C total, pE) of soil and trees, irrigation); type and fertilisers content; pruning, pest and disease management	time (t), techniques applied, maturity index, detachment index	Temperature (T), t, mechanical breakages, equipment type and characteristics		storage conditions (T,t)	storage conditions (T,t)	mixing ratio, content in each single load of olives	t, washing water quality and T	machinery efficiency	machinery efficiency	T, t, equipment type and characteristics, machinery efficiency, oxidation, handling practices and cleaning efficiency, chemical and solid residues, degree of emulsification produced in the crushing stage, extention of cell damage					T, t, humidity, light, enzymes, metalloproteins, impurities and solid residues	x	package's materials and integrity, machinery efficiency, light	T, t, light, hu					
PARAMETERS OF INTEREST MONITORING	chemical analysis: GC and GC–MS, GC/FID, LC-MS/MS, HPLC, HPLC-DAD, HPLC-UV, UHPLC–MS, Fourier transformed infrared (FTIR), colorimetric methods; non-destructive tests				chemical analysis: atomic spectroscopy (AAS, ICP-AES), titration of free fatty acids, acidimeter, titration with sodium thiosulfate for POV, UV spectrophotometer, UHPLC—DAD—QTOFMS for Fungal Metabolites Analysis), DNA based techniques	chemical analysis: titration of free fatty acids, acidimeter	chemical analysis: atomic spectroscopy (AAS, ICP-AES), GC and GC–MS, GC/FID, LC-MS/MS	chemical analysis: GC, HPLC, CE, CGC, RP-HPLC	non-destructive tests	non-destructive tests	chemical analysis: atomic spectroscopy (AAS, ICP-AES), GC, GC–MS, GC/FID, LC-MS/MS, Headspace-Gas Chromatography					chemical analysis: GC, GC–MS, GC/FID, LC-MS/MS, HPLC, UV spectrophotometer	chemical analysis: GC, GC–MS, GC/FID, LC-MS/MS, HPLC, UV spectrophotometer)		chemical analysis: GC, HPLC, UV, spectrophotometry/ HPLC, Headspace-Gas Chromatography, panels for sensory analysis					

Nutritional quality

SAFETY

MATRIX	OLIVES											OLIVE PASTE	MUST	OIL-MUST	OIL	FILTERED OIL	OIL								
STEP	CULTIVATION AND GROWTH	HARVESTING	POSTHARVESTING	*TRANSPORT OF OLIVES*	OLIVES STORAGE	ARRIVAL AT THE MILL	*COMBINING DIFFERENT LOADS OF OLIVES*	CLEANING	SORTING	*DEPITTING*	CRUSHING	MALAXATION	EXTRACTION AND SEPARATION	CENTRIFUGATION	FILTRATION	OIL STORAGE	OIL BLENDING	PACKAGING AND LABELING	STORAGE	DISTRIBUTION	STORAGE	RETAIL	TRANSPORT	STORAGE	FOOD PREPARATION
INFLUENCE PARAMETERS MONITORING																									
PARAMETERS OF INTEREST	chemical: PHAs, pesticides, toxic and potentially toxic elements; biological: mycotoxins, moulds, physical contaminants: radionuclides	microbial growth and fermentation by bacteria, yeasts, moulds	mixing the good olives with broken or contamined ones, chemical: phtalate esters; biological: yeast, flies' larvae, moulds; physical contaminants: foreign materials				chemical and biological contaminants: mixing the good olives withwith broken or contamined ones	chemical: pesticides; biological contaminants: mixing the good olives withwith broken or contamined ones; physical: dust, leaves, sand	x	x	chemical: trihalomethanes, mineral hydrocarbons; physical contaminants: metals					chemical: phtalate esters, mineral hydrocarbons, physical contaminants: impurities and solid residues		chemical: phtalate esters, BPA, mineral hydrocarbon; physical: foreign matters		biological: moulds, bacteria, yeasts					chemical: acrolein, biological: pathogenic and spoilage organisms
INFLUENCE PARAMETERS	pedoclimatic conditions e.g., physical-chemical characteristics of soil (pH, cation exchange capacity (CEC); C total, PE), environmental pollution, physiopatological factors, biocides and plant protection products, irrigation water	t, harvesting system (breaking and bruising, mud)	equipment, storage and trasport conditions (T, t, airflow, rain, sun), mechanical breakages, handling efficiency, cleaning and sanitizing procedures, integrity of food contact material (FCM)				handling efficiency	washing water quality, cleaning efficiency	x	x	T, t, cleaning and disinfection programs efficiency, integrity of food contact material (FCM), food contact with the lubricating oils of processing plants and machinery (bulldozer motor oil, lubricating oils used in augers, belt conveyors)					cleaning and sanitizing procedures, integrity of FCM		cleaning and sanitizing procedures, integrity of FCM , printing ink ingredients							
PARAMETERS OF INTEREST MONITORING	chemical analysis: GC-MS, HPLC-MS, HPLC-MS/MS, UFLC-MS/MS, thin-layer chromatography (TLC), HPLC-FLD, GC-MS, AAS, ICP-AES, ICP-MS, DNA-based techniques	chemical analysis: LC-MS, HPLC-DAD-QTOFMS for Fungal Metabolites	chemical analysis (LC—MS, HPLC—DAD—QTOFMS for Fungal Metabolites Analysis), DNA-based techniques, visual inspection				chemical analysis: LC-MS, HPLC-DAD-QTOFMS for Fungal Metabolites Analysis, DNA-based techniques, visual	chemical analysis (LC-MS, HPLC-DAD-QTOFMS for Fungal Metabolites Analysis, Liquid-liquid extraction techniques coupled with solid-phase extraction clean up (SE, loo	x	x	chemical analysis: HPLC, HPLC-GC-FID, AAS, ICP-AES, ICP-MS					chemical analysis: HPLC, HPLC-GC-FID	visual inspection, nondestructive tests	chemical analysis: HPLC, HPLC-GC-FID; nondestructive tests		visual inspection, nondestructive tests					chemical analysis (LC-MS, GC-MS, liquid-liquid microextraction (DLLME), GC-MS, visual

Safety

AUTHENTICITY/TRANSPARENCY

MATRIX	OLIVES											OLIVE PASTE	MUST	OIL-MUST	OIL	FILTERED OIL	OIL								
STEP	CULTIVATION AND GROWTH	HARVESTING	POSTHARVESTING	*TRANSPORT OF OLIVES*	OLIVES STORAGE	ARRIVAL AT THE MILL	*COMBINING DIFFERENT LOADS OF OLIVES*	CLEANING	SORTING	*DEPITTING*	CRUSHING	MALAXATION	EXTRACTION AND SEPARATION	CENTRIFUGATION	FILTRATION	OIL STORAGE	OIL BLENDING	PACKAGING AND LABELING	STORAGE	DISTRIBUTION	STORAGE	RETAIL	TRANSPORT	STORAGE	FOOD PREPARATION
INFLUENCE PARAMETERS MONITORING	agro-mete agricult																								
PARAMETERS OF INTEREST	isotopic ratios, rare earth elements, organic compounds (fatty acids, triglycerides, volatile compounds, pigments profiles), minerals, genomic profiles				x		isotopic ratios, rare earth elements, organic compounds (fatty acids, triglycerides, volatile compounds, pigments profiles), minerals, genomic profiles		x						x	glycosides of leaves; sterols, fatty acid alkyl esters (FAAEs), diacylglycerols (DAGs), degradation products of chlorophylls and phenolic compounds -e.g., pyropheophytins (PPPs); volatile compounds	x	origin of olives used: isotopic ratios, rare earth elements, micronutrients, pigments profiles, genomic profiles		x			origin of olives used: isotopic ratios, rare earth elements, micronutrients, pigments profiles, genomic profiles		x
INFLUENCE PARAMETERS	cultivar, latitude, longitude, rainfall, distance from sea, sun exposition, physical-chemical characteristics of soil (pH, cation exchange capacity (CEC); C total, pE) fertilisers use				x		olives loads provenance, cultivar, latitude, longitude, rainfall, distance from sea, sun exposition, physical-chemical characteristics of soil, fertilisers use		x						X	presence of leaves, refined oils	x	cultivar, latitude, longitude, rainfall, distance from sea, sun exposition, physical-chemical characteristics of soil, fertilisers use		x					
PARAMETERS OF INTEREST MONITORING	chemical analysis: GC, GC–MS, GC/FID, LC-MS/MS, HPLC, GC/C/IRMS, DNA-based techniques, spectroscopy (e.g., nuclear magnetic resonance, mass spectrometry, NRM); eletronic noses				x		chemical analysis: GC, GC–MS, GC/FID, LC-MS/MS, HPLC, GC/C/IRMS; DNA-based techniques, spectroscopy (e.g., nuclear magnetic resonance, mass spectrometry, NMR); eletronic noses		x						x	chemical analysis: GC, GC–MS, GC/FID, LC-MS/MS, HPLC	x	chemical analysis: GC, GC–MS, GC/FID, LC-MS/MS, HPLC		x			microsatellite DNA,randomn amplified polymorphic DNA); chromatography; spectroscopy (e.g.,NMR, MS); visual inspection		x
INFLUENCE PARAMETERS MONITORING	logbook, drone, satellite images, agro-meteorological station, chemical analysis				x		logbook, disciplinary of production (for certificated products)		x						X	logbook, disciplinary of production (for certificated products), inspection (infrared, x-ray, etc.)	X	logbook, disciplinary of production (for certificated products)		x			x		x

Traceability/ Autenticity

FNS - Cloud
Food Nutrition Security

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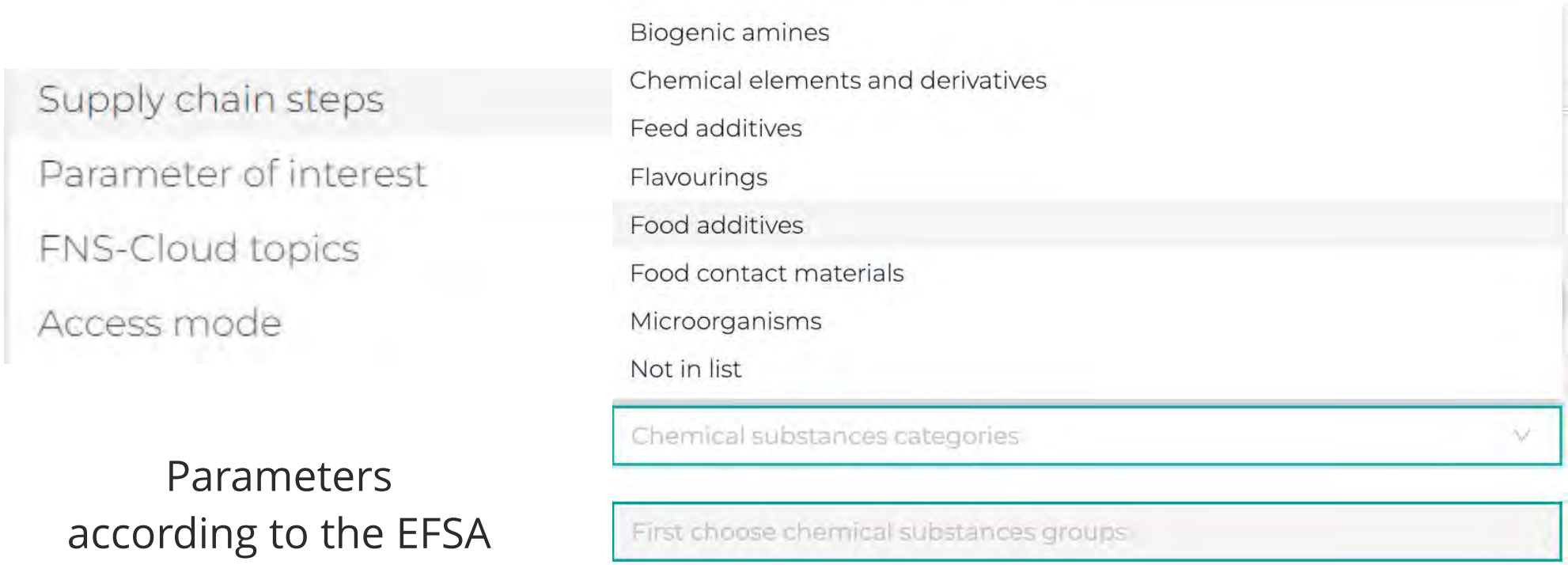
NUTRITIONAL QUALITY												
MATRIX	OLIVES				MUST	OIL						
STEP	CULTIVATION AND GROWTH	HARVESTING	OLIVES STORAGE	CLEANING & SORTING	EXTRACTION AND SEPARATION	FILTRATION	PACKAGING AND LABELING	STORAGE	DISTRIBUTION	RETAIL	TRANSPORT	FOOD PREPARATION & CONSUMPTION
PARAMETERS OF INTEREST	• https://catalogues.fns.foodcase-services.com/catalogues/datasets/2 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/11 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/25 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/24 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/1 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/26		x				• https://catalogues.fns.foodcase-services.com/catalogues/datasets/10 * • https://catalogues.fns.foodcase-services.com/catalogues/datasets/11 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/12 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/13 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/25 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/55** • https://catalogues.fns.foodcase-services.com/catalogues/datasets/56 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/54 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/24 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/1					• https://catalogues.fns.foodcase-services.com/catalogues/datasets/5 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/9 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/52 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/57 • https://catalogues.fns.foodcase-services.com/catalogues/datasets/61
analytical technique used	x		x				*Attenuated-total-reflectance Fourier Transformed Infrared Spectroscopy ((ATR-FTIR) **UV-Vis and liquid chromatographic					x



Parameters according to the EFSA classification

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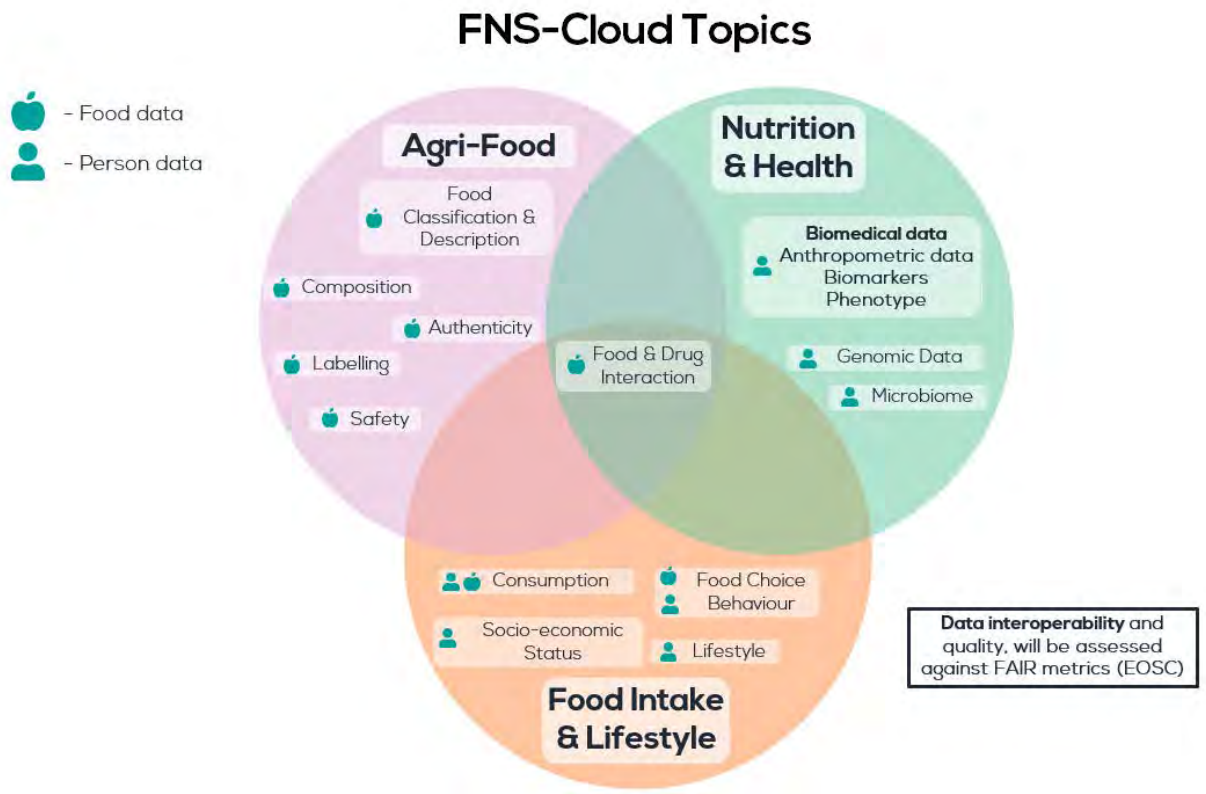

Tags in FNS-Cloud Topics according to the chart

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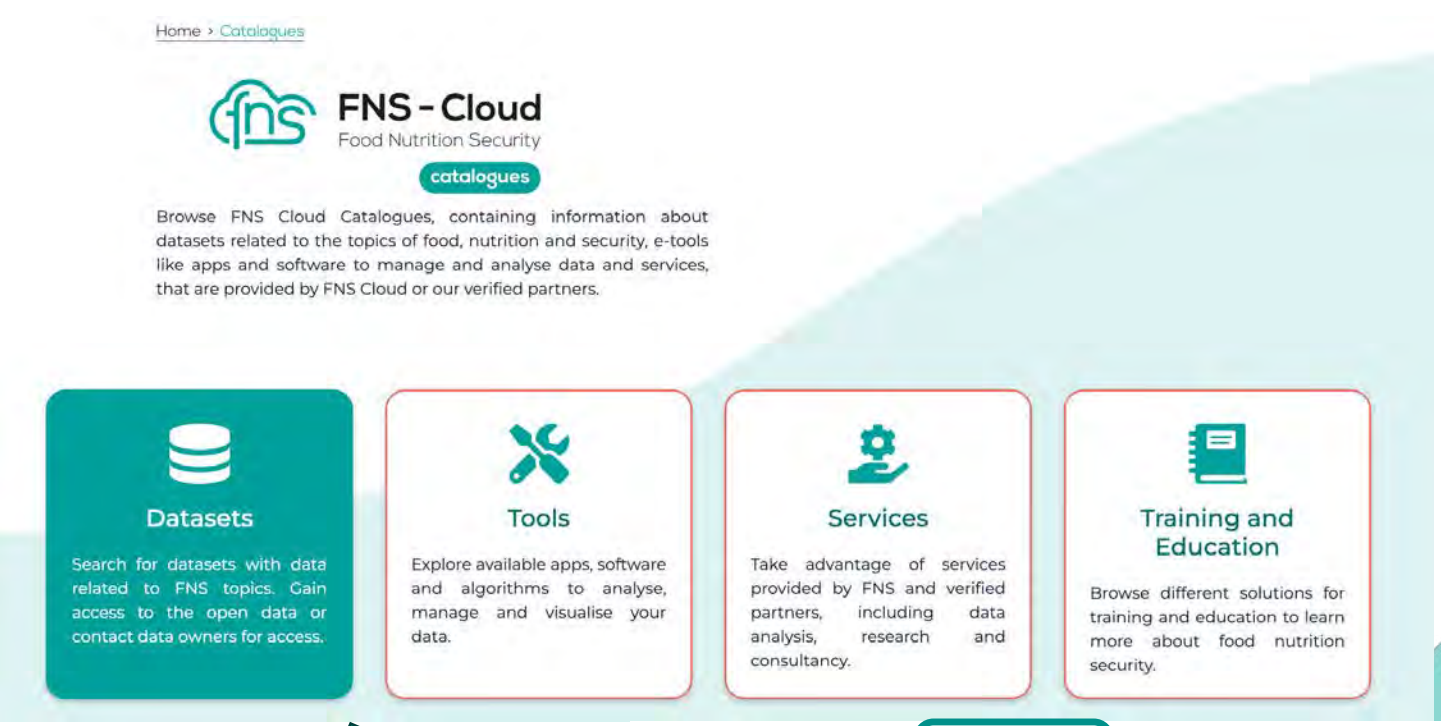
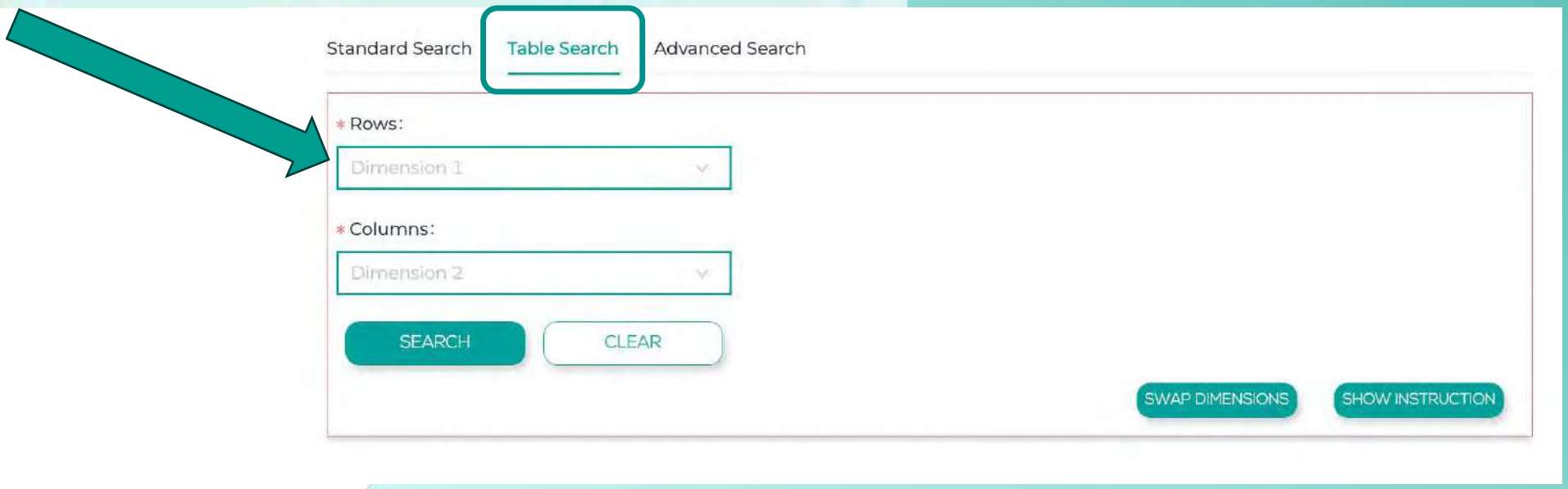


https://fnscloud.eu/catalogues



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FNS - Cloud
Food Nutrition Security

FNS-Cloud Final Event & Launch of FNSCloud Solution

Brussels - 12 Sept. 2023

FNS–Cloud Food Traceability & Metrology Search Engine: AUTH role as a data provider for olive oil authenticity, composition & labelling

Provision of analytical data for the traceability search engine: an example on olive oil

Maria Z.Tsimidou & Nikolaos Nenadis

Food Chemistry and Technology Laboratory (LFCT), School of Chemistry, Aristotle University of Thessaloniki (AUTH), 54124, Thessaloniki, Greece;

tsimidou@chem.auth.gr

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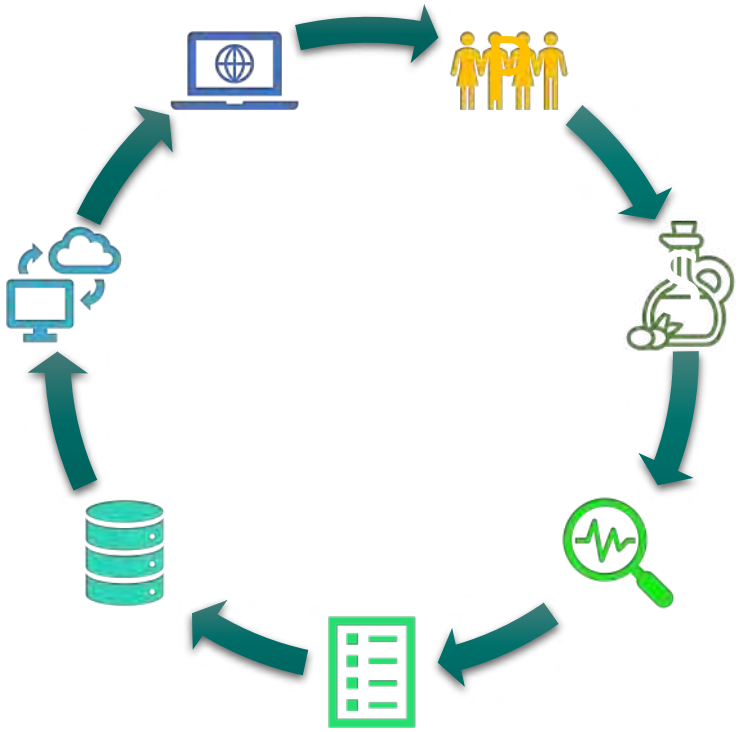
A Food Traceability & Metrology search engine for

edible VIRGIN OLIVE OIL (VOO) (Reg. (EU) 1308/2013, cons. 2020)

as an application model of food supply chain



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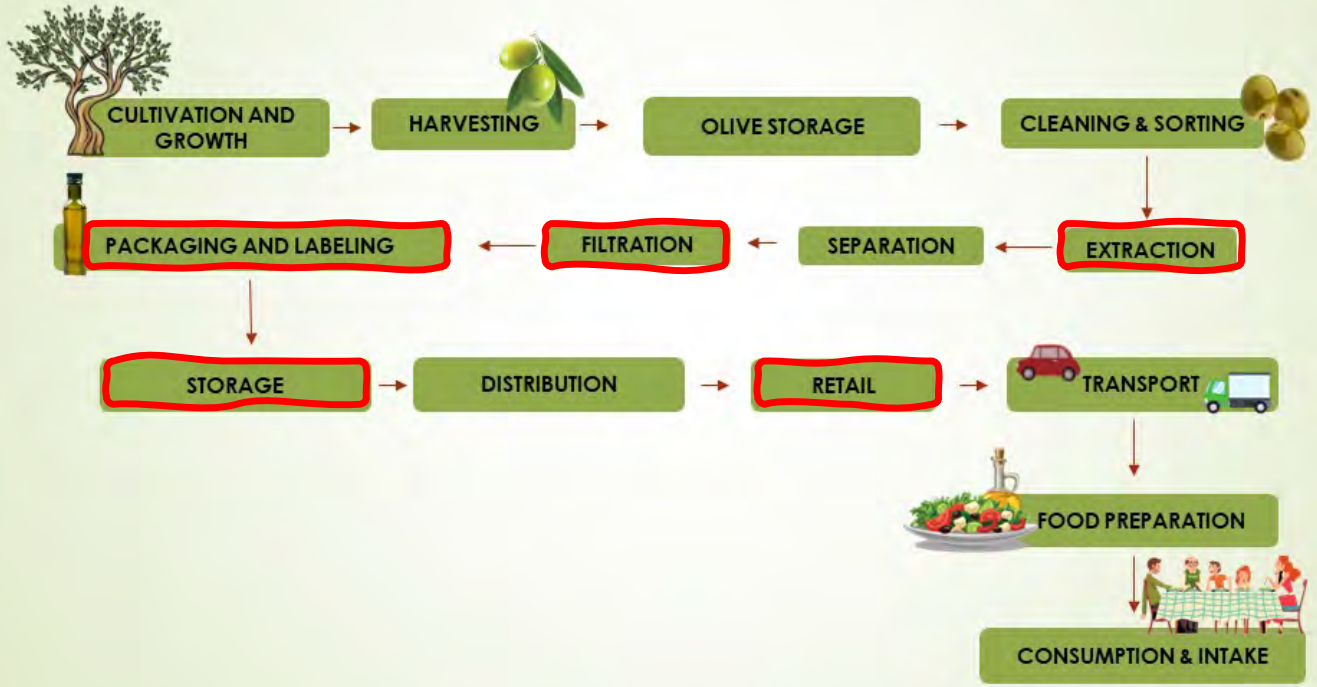
VIRGIN OLIVE OIL SUPPLY CHAIN



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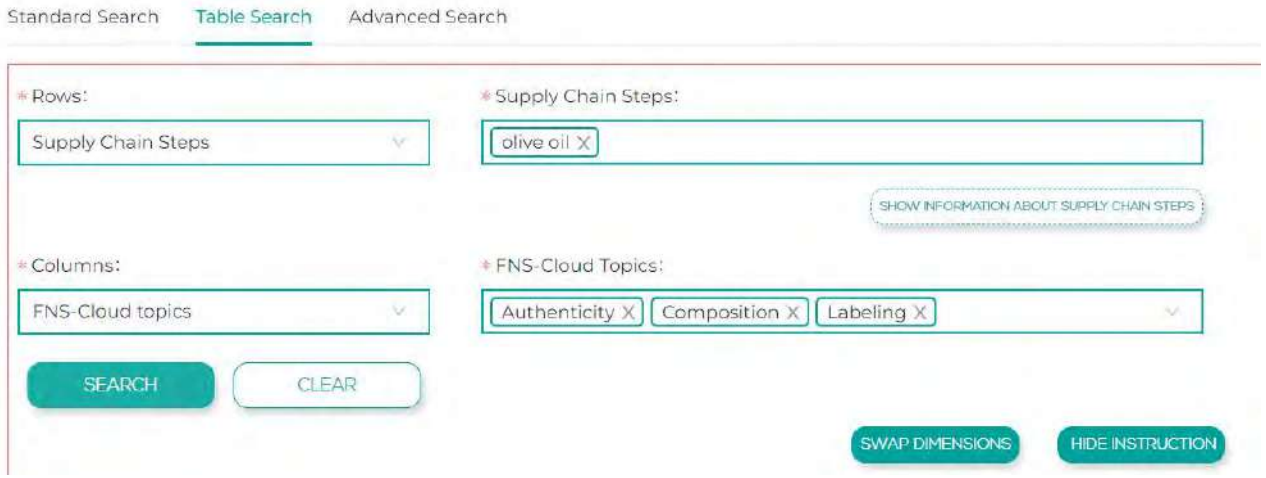
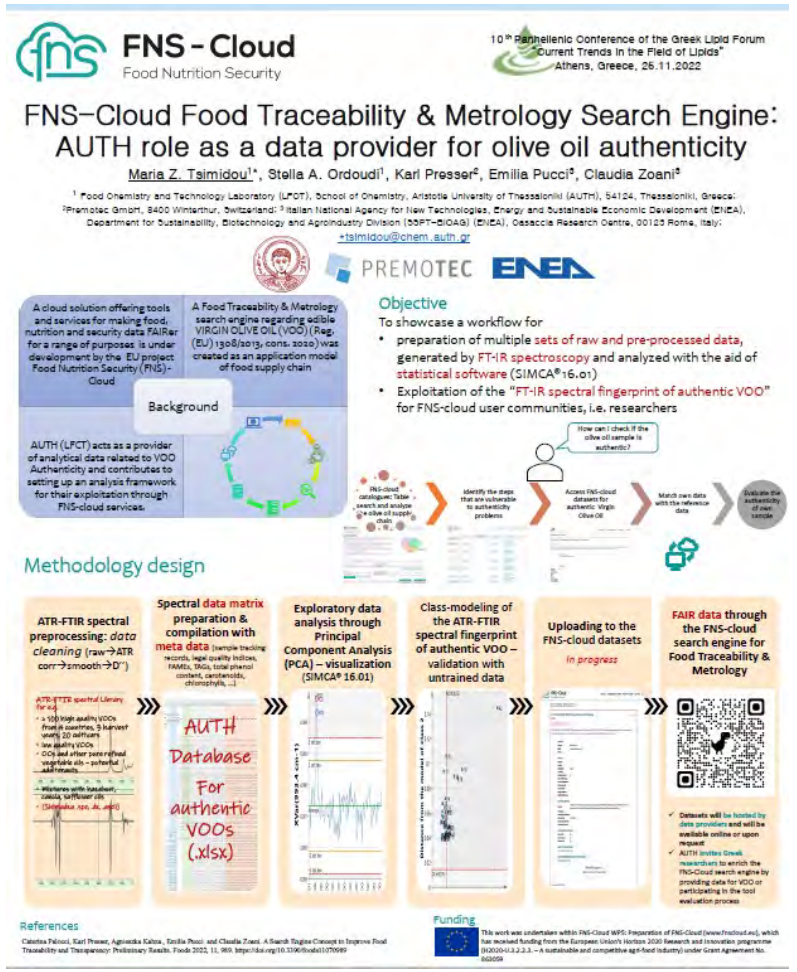
AUTH (LFCT) acts as a provider of analytical data related to Olive Oil Supply Chain & Agri-Food topics: Authenticity, Composition & Labelling





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AUTH datasets for more than **100 virgin olive oil samples**

metadata: geographical origin, supplier, variety, harvest season, filtration, storage period plus compositional and quality data

ATR-FTIR spectroscopic dataset (AUTHENTICITY)

Absorbance intensity values at 1868 different wavenumbers over the whole mid-infrared (MIR) spectral region, 4000-400 cm^{-1} (=1868 values per sample)

Data Sets for Total Polar Phenol Content (TPP)
Total Hydroxytyrosol & Tyrosol Content
(LABELLING –HEALTH CLAIM)

FNS – Cloud
Food Nutrition Security

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CASE STUDY: LABELLING – HEALTH CLAIM

Data Sets for Total Polar Phenol Content (TPP)

Total Hydroxytyrosol & Tyrosol

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The identity of the product: edible commercial categories of olive oil in the EU

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EU legislation

Nutrition and health claims are strictly regulated and are important tools to guide consumers to make meaningful choices among products of a certain kind

Van Bools and Bruns

Critical Reviews in Food Science and Nutrition, 55:1552–1560 (2015)

Overview of nutrition and health claims in regulation (EC) no 1924/2006

Regulation (EC) no 1924/2006					
	What it contains		What it does		
Type of claim:	NCs		HCs		
Name:	Content claims	Comparative claims	Function claims		Reduction of disease risk claims
Parameter:			Based on generally accepted scientific evidence	Based on newly developed scientific data	(includes claims on growth and development of children)
Reference:	Art. 8	Art. 9	Art. 13(1)	Art. 13(5)	Art. 14
Example:	*"Source of vitamin C"*	*"Light" or "Reduced sugar"*	*"Vitamin C increases iron absorption"*	*"Cocoa flavanols help maintain endothelium-dependent vasodilation, which contributes to normal blood flow"*	*"Plant sterols have been shown to lower/reduce blood cholesterol. High cholesterol is a risk factor in the development of coronary heart disease"*

FNS - Cloud Food Nutrition Security

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For the protection of consumers and fair trade any claim on a product should be proved ‘true’ by appropriate administrative and/or analytical means

- this is not a straightforward procedure.
- official approval of a claim or a trade mark does not always guarantee safe implementation for commercial purposes.
- a continuum of actions is needed for the benefit of all interested parties, in particular, at times of rising fraud incidences and tough competition.

FNS - Cloud
Food Nutrition Security

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Nutrition and health claims applicable to olive oil in EU legislation (Reg. 1169/2011 and Reg. 1924/2006)

Nutrition claims

1. mandatory

- (a) energy value; and
- (b) the amounts of fat, saturates.

2. supplementary information

- (a) mono-unsaturates;
- (b) polyunsaturates;
- © any of the vitamins listed in point 1 of Part A of Annex XIII, and present in significant amounts as defined in point 2 of Part A of Annex XIII.

Health claims

1. article 13 claims" (functional claims)

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

2. article 14 claims"

- reduction of disease risk claims

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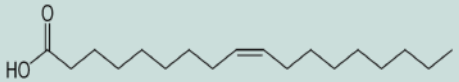
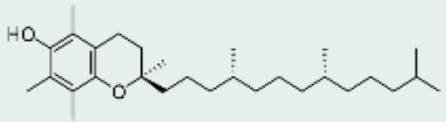
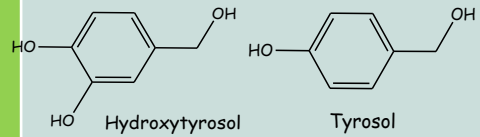
In particular, the health claims applicable to olive oil from the list of permitted health claims made on foods, (EU REG. 432/2012) other than those of art. 14

Nutrient, substance or food category EU Reg 432/2012	Claim	Conditions of use of the claim/restrictions of use/reasons for non-authorisation
UNSATURATED FATTY ACIDS MUFA:65.2–80.8 PUFA:7.0-15.5	Replacing saturated fats in the diet with unsaturated fats contributes to the maintenance of normal blood cholesterol levels. Oleic acid is an an unsaturated fat 	The claim may be used only for food which is high in unsaturated fatty acids, as referred to in the claim HIGH UNSATURATED FAT as listed in the Annex to Regulation (EC) No 1924/2006. **This health claim can be used for food in which unsaturated fatty acids represent at least 70% of total fatty acid content and provide more than 20% of the energy of the product**
Vitamin E	Vitamin E 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 E 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 **This health claim can be used for food that is a source of vitamin E (at least 15% of 12 mg, which is the daily reference intake value for vitamin E supplied by 100 g of the product)**
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**

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1. Hydroxytyrosol/[(3,4-dihydroxyphenyl)ethanol]/ 3,4-DHPEA, Htyr

2. Hydroxytyrosol acetate/4-(Acetoxyethyl)-1,2-dihydroxybenzene

3. 4-β-D-glucoside of hydroxytyrosol

4. 3-β-D-glucoside of hydroxytyrosol

5. Hydroxytyrosol-glucoside

6* β-Hydroxytyrosol ester of methyl malate

7. Oleuropein aglycon

8. Aldehydic form of oleuropein aglycon (2 stereoisomers)

9. Dialdehydic form of oleuropein aglycon/ oleuropeindial

10. Enolic tautomer of the dialdehydic form of oleuropein aglycon

11. Decarboxymethyl form of oleuropein aglycon

12. Dialdehydic form of decarboxymethyl elenolic acid linked to 3,4-DHPEA/oleacein

13. Oleuropein

14. 10-Hydroxy-oleuropein

15. 10-Hydroxy-oleuropein aglycon

16. 10-Hydroxy-decarboxymethyl oleuropein aglycon

17**.1-Phenyl-6,7-dihydroxyisochroman

>30 compounds comprise the 'olive oil polyphenols

1. Tyrosol/ [(p-hydroxyphenyl)ethanol])/ p-HPEA, Tyr

2. Tyrosol acetate

3. Ligstroside aglycon

4. Aldehydic form of ligstroside aglycon/ ligstral (2 stereoisomers)

5. Dialdehydic form of ligstroside aglycon/ligstrodial

6. Enolic tautomer of the dialdehydic form of ligstroside aglycon

7. Decarboxymethyl form of ligstroside aglycon

8. Dialdehydic form of decarboxymethyl elenolic acid linked to p–HPEA/oleocanthal

9. Ligstroside

~~benzoic & cinnamic acids, flavonoids, lignans and certain artifacts~~

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Focusing on the most controversial health claim for olive oil

Authorization of the health claim aroused enthusiasm and was considered by the SMEs in the producing countries as a means to convey more benefits from virgin olive oil consumption to consumers and also to gain better prices for their products. Such an interest had not been expressed by producers, industry and mass media so far for important health claims regarding virgin olive oil that are easily grasped by the consumers. For example, it is far clearer to them that (a) olive oil is a good source of alpha-tocopherol, the most bioavailable tocopherol form that is found at an optimum ratio of unsaturated fatty acids/tocopherol content; (b) it contains the highest content of monounsaturated fatty acids among all natural plant oils [11]. A health claim, and especially a proprietary health claim, seems to be more attractive than a nutrition claim in marketing and may partially justify why industry urges to speed up authorization process. However, technical gaps may cause considerable delays, from authorization to the implementation of a particular claim and can practically jeopardize benefits anticipated by the applicants.

Editorial M.Z. Tsimidou, D. Boskou

The health claim on "olive oil polyphenols" and the need for meaningful terminology and effective analytical protocols

EJLST, 2015, 117. 1091-94

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Since the EFSA Scientific Opinion on the substantiation of a health claim related to polyphenols in olive and maintenance of normal blood HDL cholesterol concentrations (ID 1639, further assessment) pursuant to Article 13(1) of Regulation (EC) No 1924/2006, [2012, EFSA Journal 10(8),2848] literature is increasing on this issue.

A number of sophisticated or simple analytical approaches appeared but till now EU authorities have not adopted one or more of them.

For this purpose within the OLEUM project we developed a fit for the purpose analytical protocol

In house validation

Pre-trial

Proper trial

Oleum

molecules

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In House Validated UHPLC Protocol for the Determination of the Total Hydroxytyrosol and Tyrosol Content in Virgin Olive Oil Fit for the Purpose of the Health Claim Introduced by the EC Regulation 432/2012 for "Olive Oil Polyphenols"

by Maria Z. Tsimidou [1,*], Michaela Sotiroglou [1], Aspasia Mastralexi [1], Nikolaos Nenadis [1], Diego L. García-González [2] and Tullia Gallina Toschi [3]

[1] Laboratory of Food Chemistry and Technology, School of Chemistry, Aristotle University of Thessaloniki (AUTH), 541 24 Thessaloniki, Greece

[2] Instituto de la Grasa (CSIC), Ctra. de Utrera, km. 1, Campus Universitario Pablo de Olavide-Building 46, 41013 Seville, Spain

[3] Department of Agricultural and Food Sciences, Alma Mater Studiorum-University of Bologna (UNIBO), Piazza Goidanich, 60, I-47521 Cesena (FC), Italy

* Author to whom correspondence should be addressed.

Molecules **2019**, *24*(6), 1044; https://doi.org/10.3390/molecules24061044

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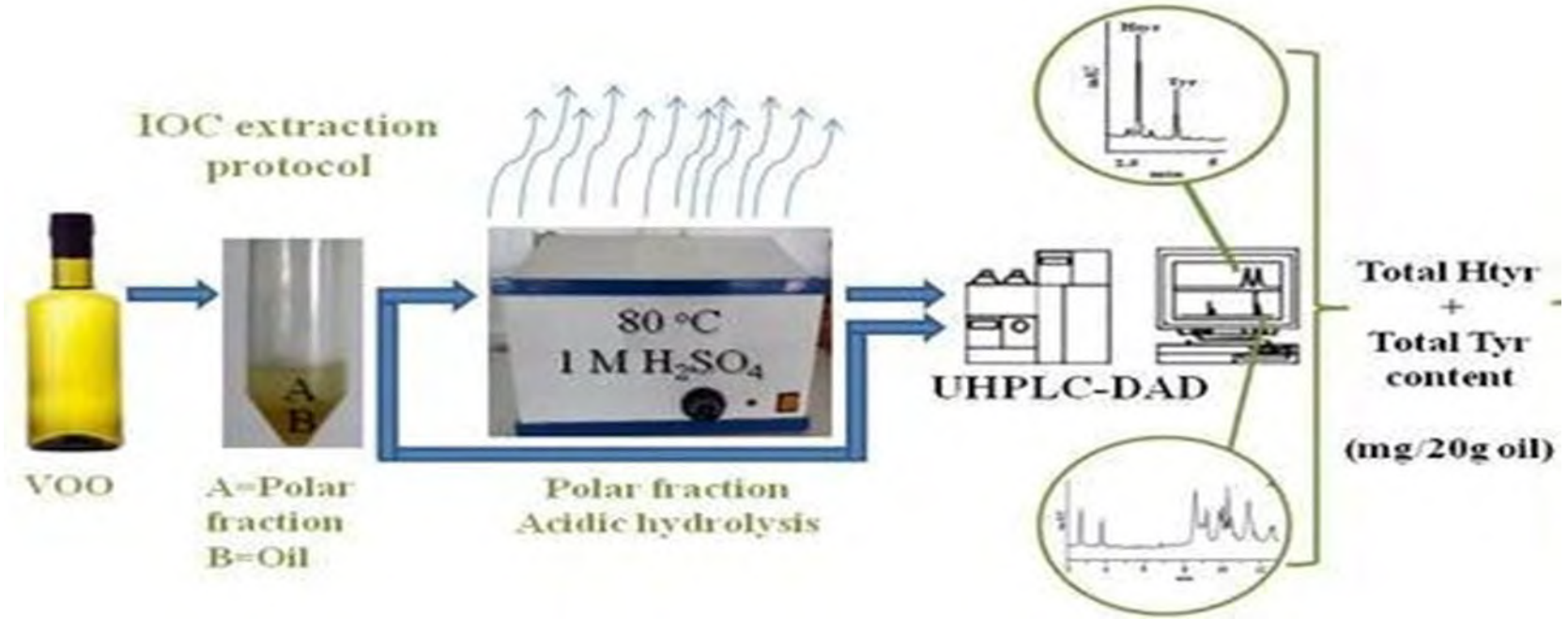
Principle of the proposed method

The UHPLC profile of the **extracted polar fraction** (PF) of the oil **before and after acid hydrolysis** is recorded by means of **diode array detection (280 nm)**. Acid hydrolysis of bound forms of **Hydroxytyrosol (Htyr)** and **Tyrosol (Tyr)** gives rise to free **Htyr** and **Tyr**, the content of which can then be accurately quantified using commercially available standards.



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Within the FNS CLOUD WP5 scope for olive oil labelling we developed a data set for the total hydroxytyrosol and tyrosol content for more than 120 virgin olive oils

db code	SAMPLE CODE		SAMPLE	CULTIVAR	GEOGRAPHICAL ORIGIN	FILTRATION PARAMETER	TOTAL PHENOLS mg/Kg	TOTAL OH-TYR & TYR mg/20g
1	AUTH_T3.4_1		Blekas_2015	CHALKIDIKIS	CHALKIDIKI	NF	138	2.36
2	AUTH_T3.4_2		Bllekas_2016	CHALKIDIKIS	CHALKIDIKI	NF	96	1.44
3	AUTH_T3.4_3		Spiliopoulou_2015	KORONEIKI	MESSINIA	NF	289	7.62
4	AUTH_T3.4_4		Tsimoula_2015	CHALKIDIKIS	KOZANI	F	258	6.89
5	AUTH_T3.4_5		TSEPLETIDIS_2015	CHALKIDIKIS	SERRES	F	328	10.99

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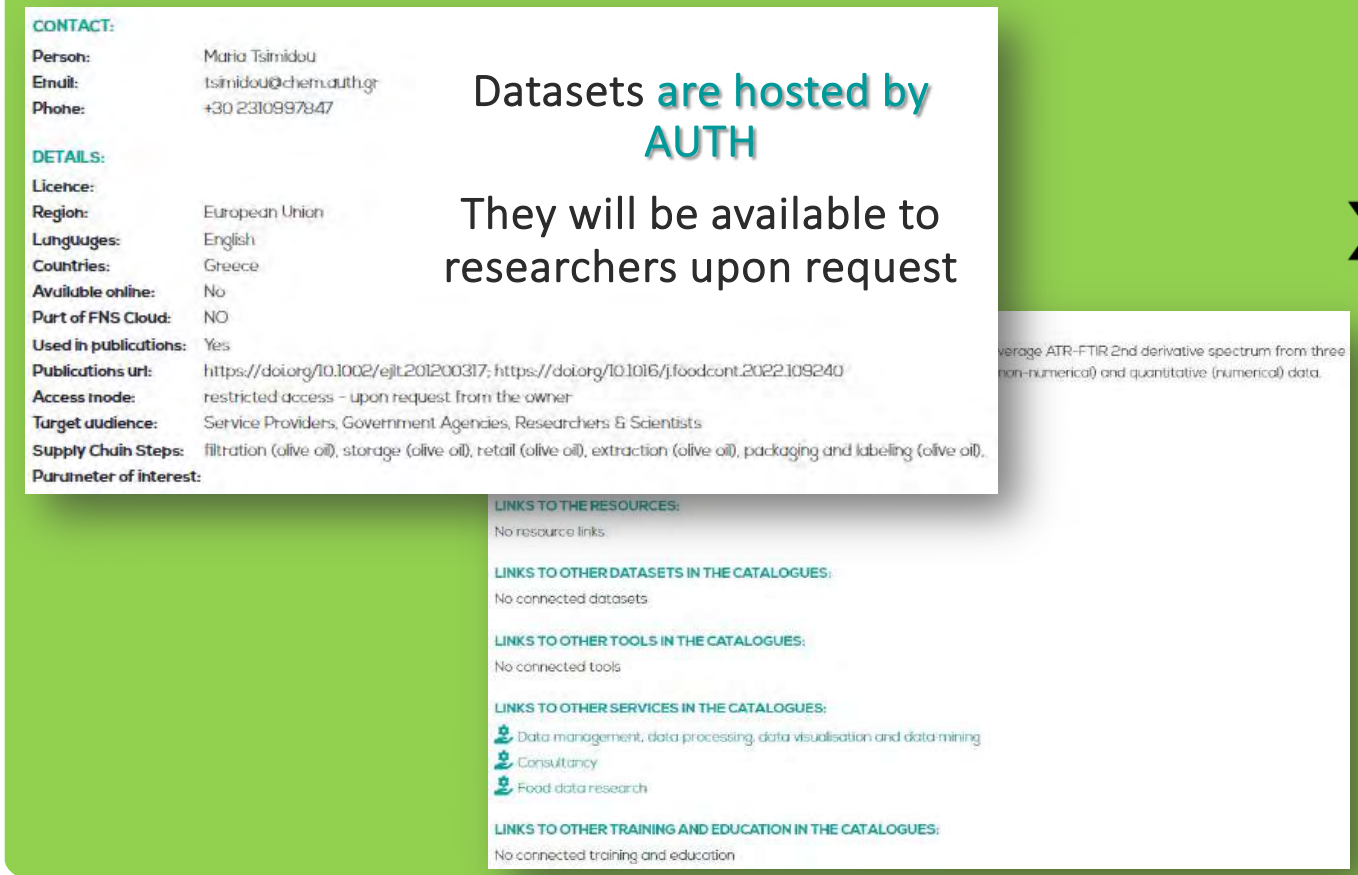
Application to the FNS-cloud search engine

Tagging resources to the FNS-cloud datasets



CONTACT:

Person:	Maria Tsimidou
Email:	tsimidou@chem.auth.gr
Phone:	+30 2310997847

DETAILS:

Licence:	
Region:	European Union
Languages:	English
Countries:	Greece
Available online:	No
Part of FNS Cloud:	NO
Used in publications:	Yes
Publications url:	https://doi.org/10.1002/ejlt.201200317; https://doi.org/10.1016/j.foodcont.2022.109240
Access mode:	restricted access - upon request from the owner
Target audience:	Service Providers, Government Agencies, Researchers & Scientists
Supply Chain Steps:	filtration (olive oil), storage (olive oil), retail (olive oil), extraction (olive oil), packaging and labeling (olive oil).
Parameter of interest:	

Datasets **are hosted by AUTH**

They will be available to researchers upon request

Communication with other FNS-cloud search engines

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• Thank you for your attention!

FNS-Cloud Final Event & Launch of FNSCloud Solution

Brussels - 12 Sept. 2023

Don’t forget to follow us:

@FNSCloudEU FNSCloudEU FNS-Cloud @FNSCloudEU2019

www.fns-cloud.eu
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www.myfnscloud.eu

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Food Traceability Search Engine

Hands-on Activity

Table search

IFA team

Katherine Flynn, Luis Mayor and Sofia Reis

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Find datasets about:

- Authenticity
- Safety
- Composition

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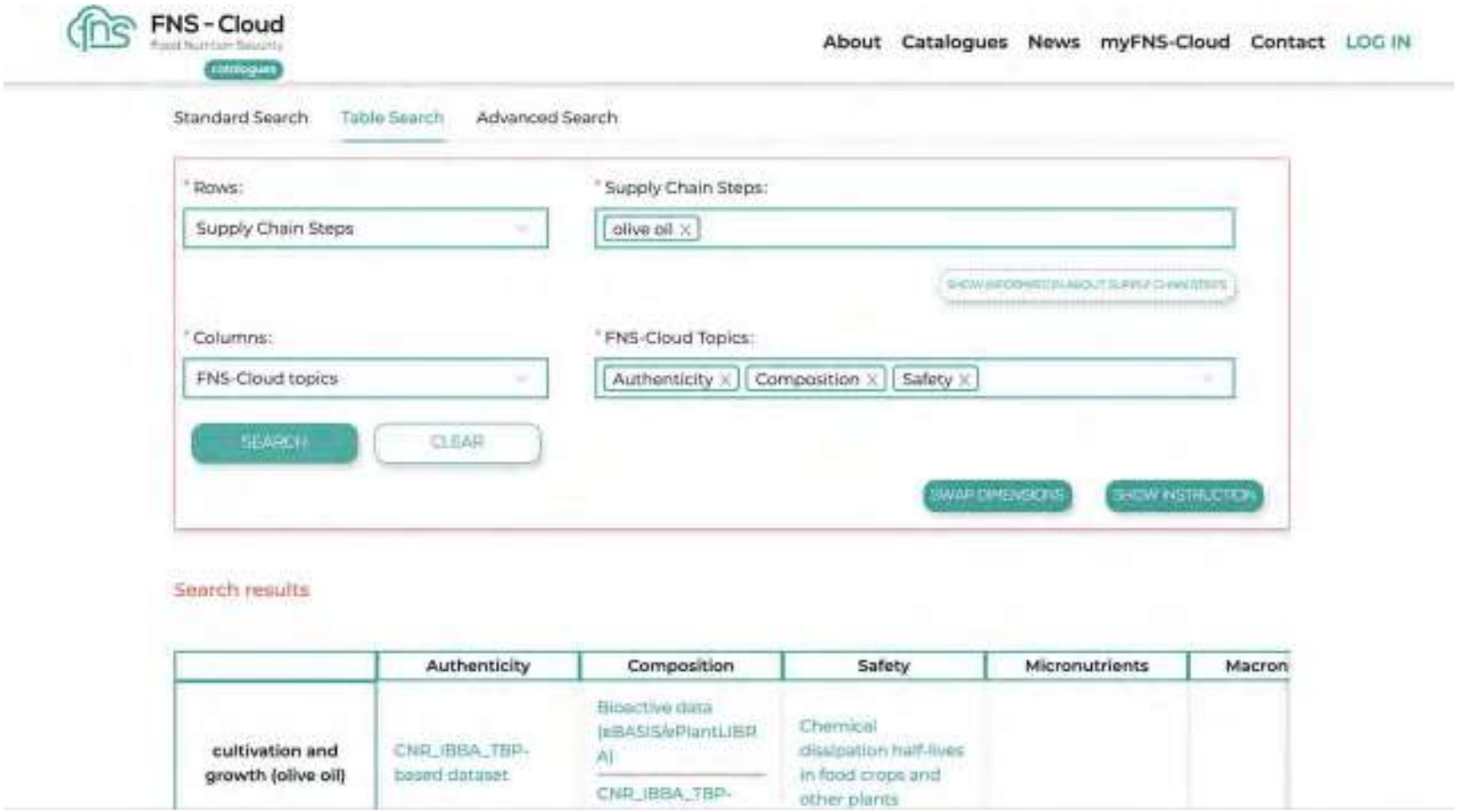
Option 1



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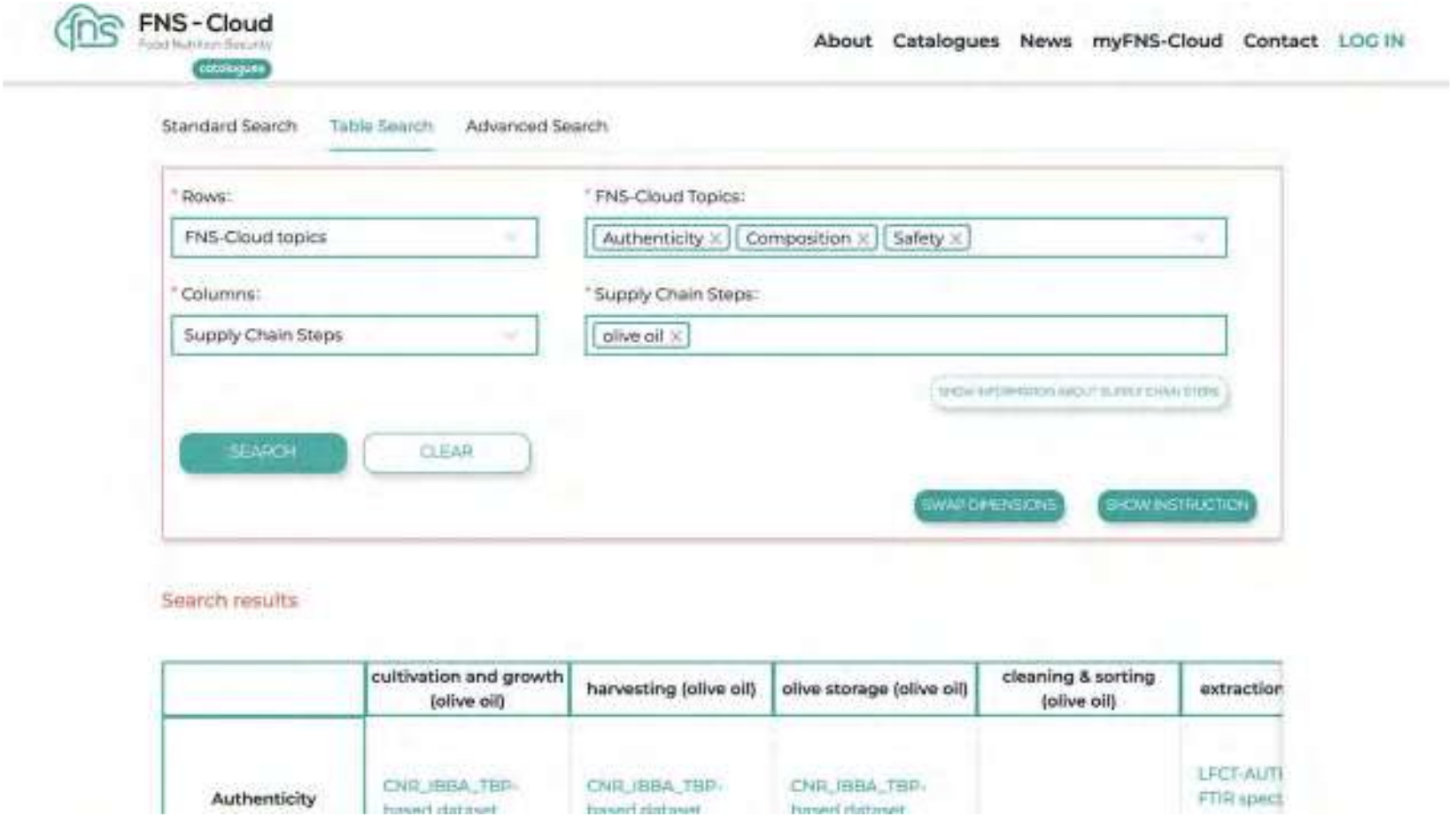
Option 2



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1. How many datasets did you find, related to the authenticity of olive oil?

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1. How many datasets did you find, related to the authenticity of olive oil?

CNR_IBBA_TBP-based dataset

LFCT-AUTH/ATR-FTIR spectroscopic dataset

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2. Do these datasets also provide information on the other FNS Cloud topics selected (composition, safety)? Which ones?

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2. Do these datasets also provide information on the other FNS Cloud topics selected (composition, safety)?

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3. In which supply chain steps did you find no datasets at all?

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4. Find the dataset that provides information about organic contaminants, pesticides and toxins.

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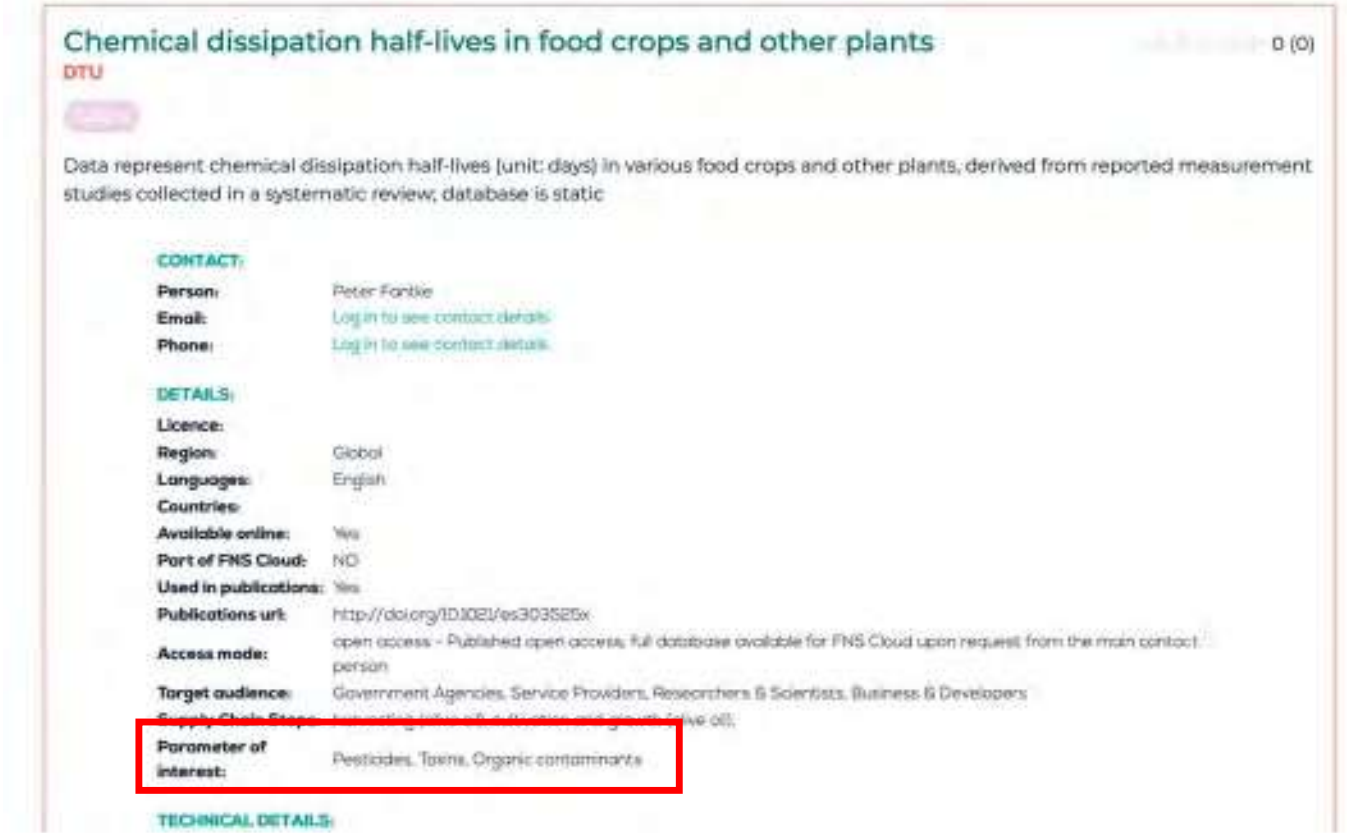
4. Find the dataset that provides information about organic contaminants, pesticides and toxins



Chemical dissipation half-lives in food crops and other plants

0 (0)

DTU

Data represent chemical dissipation half-lives (unit: days) in various food crops and other plants, derived from reported measurement studies collected in a systematic review; database is static

CONTACT:

Person:	Peter Fantke
Email:	Log in to see contact details
Phone:	Log in to see contact details

DETAILS:

Licence:	
Region:	Global
Languages:	English
Countries:	
Available online:	Yes
Part of FNS Cloud:	NO
Used in publications:	Yes
Publications url:	http://doi.org/10.1021/es303525x
Access mode:	open access - Published open access; full database available for FNS Cloud upon request from the main contact person
Target audience:	Government Agencies, Service Providers, Researchers & Scientists, Business & Developers
Parameter of interest:	Pesticides, Toxins, Organic contaminants

TECHNICAL DETAILS:

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5. Who would you contact for this dataset, is an email available?

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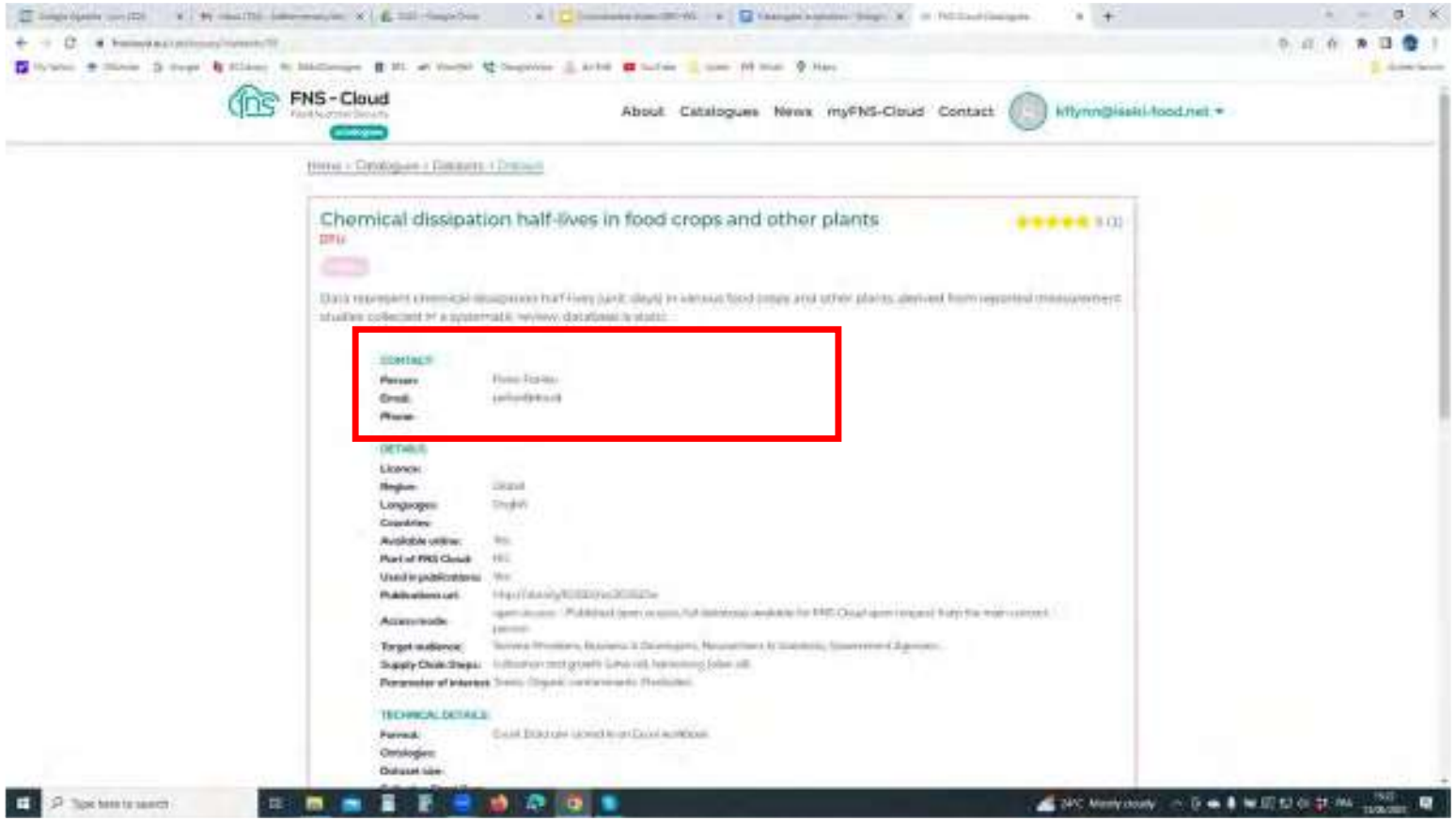

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6. What is this dataset about?

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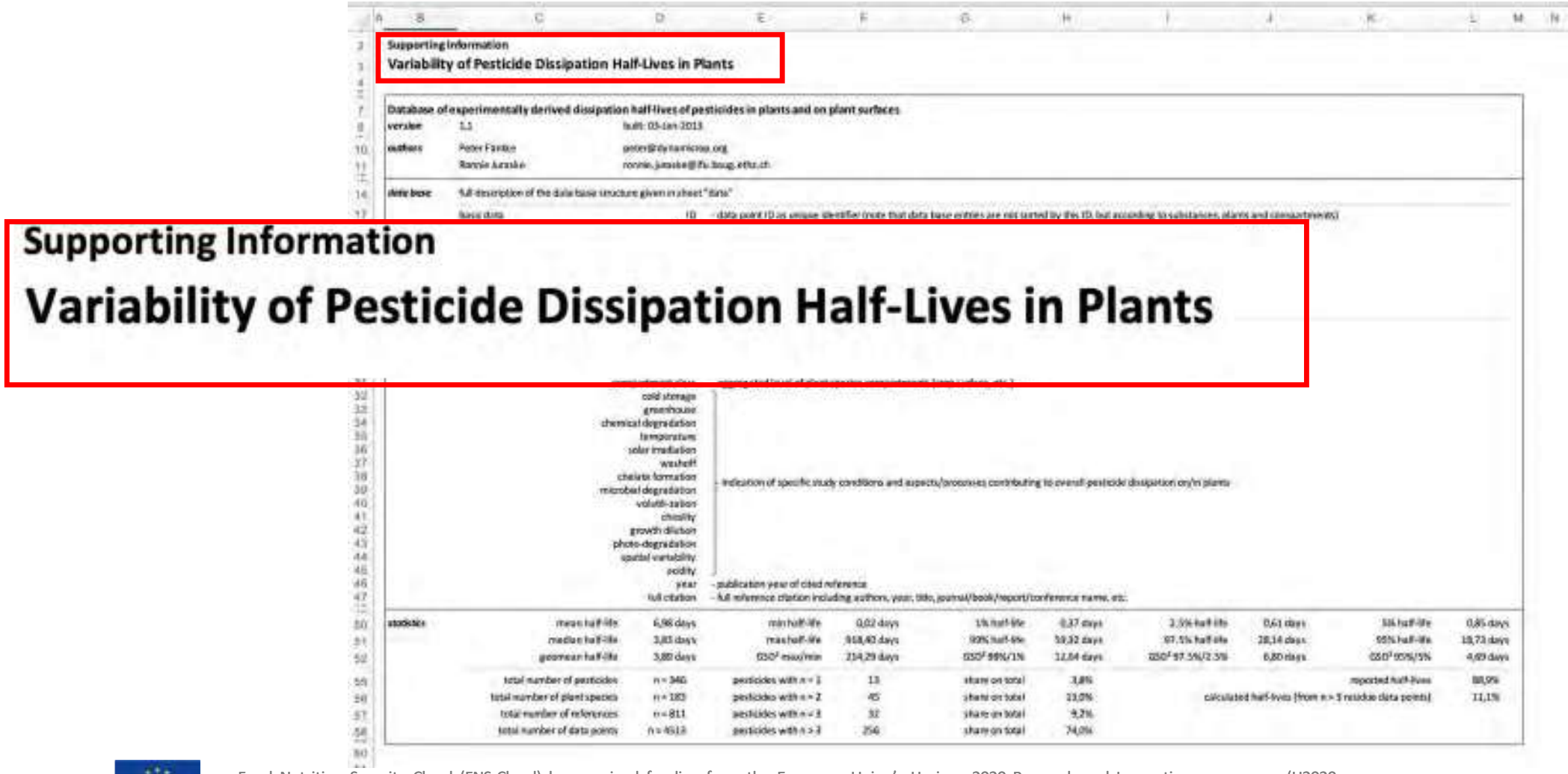
6. What is this dataset about?



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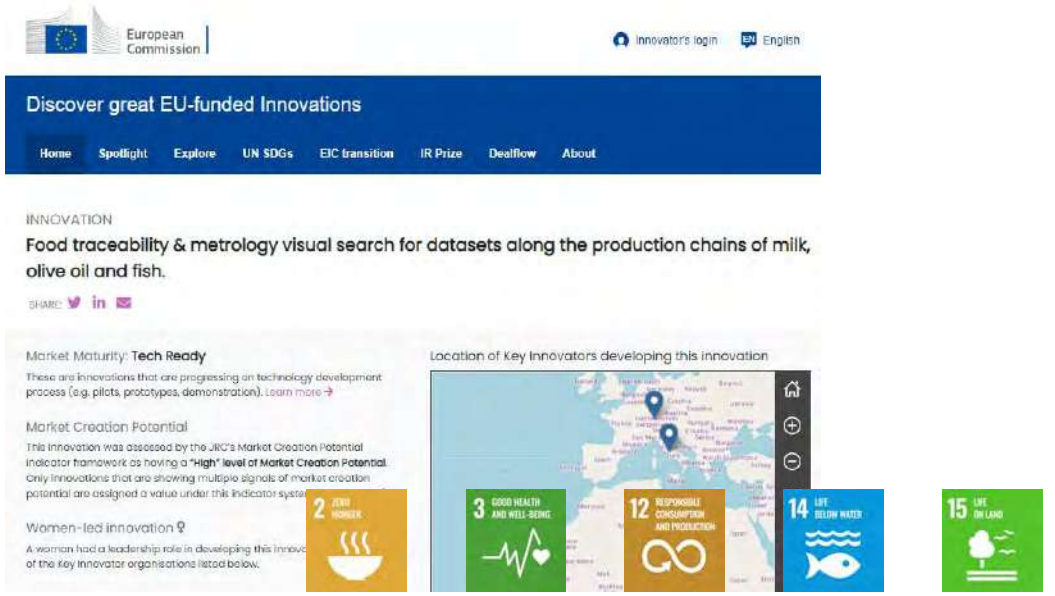
What we reached

Collecting, organising, making available and integrating data and metadata on food quality, safety, traceability, transparency, and the authenticity of products along the food supply chain, following the FAIR approach.

Have a graphical visualisation of the entire food supply chain and the possibility to carry out different types of searches, on different dimensions alone or in combination between them and their different tags.



Query several data sources and present appropriate visualisation.

Support a food systems approach to research and innovation.

Address researchers' needs especially in data intensive fields.

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Further developments and engaging user communities

- Inclusion of additional datasets (*improving data findability*) newly developed and/or from outside the consortium
- More search options (extended supply chain) and integration with more info about definitions, matrices, parameters, current legislation, available RM, reference and official methods, PT scheme (e.g., METROFOOD-RI RM-App)
- Possibilities of integration with other tools (*integration e.g., for data processing)*
- Possibilities of extension to other food chains
- Collaboration with other communities and Research Infrastructures

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METRO FOOD
INFRASTRUCTURE FOR PROMOTING METROLOGY IN FOOD AND NUTRITION

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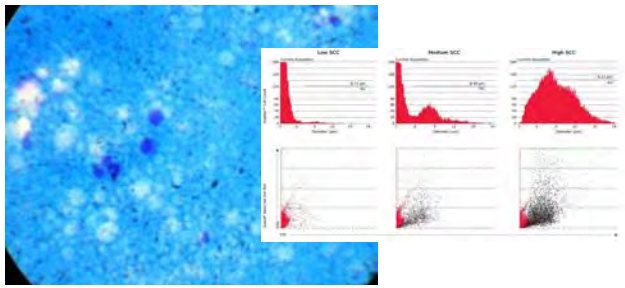
Calculation model for Somatic Cell Counting in milk with probabilistic assessment of SCC PT

Food safety

MILK

- Somatic cells in milk are one of the most important parameter of udder health. This parameter is used for milk payment scheme for genetic selection and hygiene food legislation. The determination of somatic cell in milk is done routinely by flow cytometry technique optimized to analyse raw milk.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
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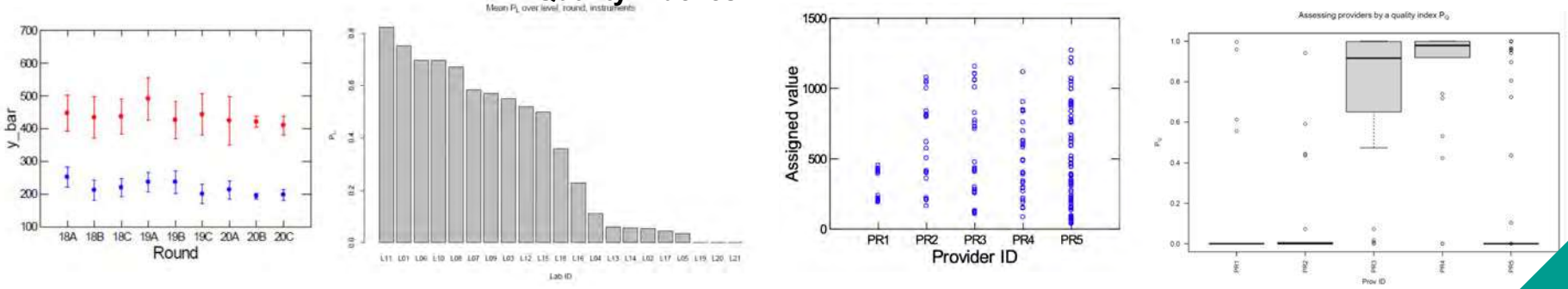
2	Prov_ID	Round_date	Lab_ID	Instr_ID	Level	θ	σ_{pt}	b	a	RM_ID	ȳ	s_r	s_R	n
3	PR1	18A	L01	EQ01_01_05	low	237.54	19.99	1.00	0.00		238.80	10.20	34.13	15
4	PR1	18A	L01	EQ01_01_10	low	237.54	19.99	1.00	0.00		243.80	9.56	34.13	15
5	PR1	18A	L02	EQ05_02_01	low	237.54	19.99				248.00	16.24	34.13	15
6	PR1	18A	L03	EQ01_03_01	low	237.54	19.99	1.00	0.00		234.30	6.69	34.13	5
7	PR1	18A	L03	EQ01_03_03	low	237.54	19.99	1.00	0.00		237.70	12.36	34.13	5
8	PR1	18A	L03	EQ01_03_04	low	237.54	19.99	1.00	0.00		251.70	6.39	34.13	5
9	PR1	18A	L03	EQ01_03_05	low	237.54	19.99	1.00	0.00		242.30	14.10	34.13	5
10	PR1	18A	L03	EQ01_03_06	low	237.54	19.99	1.00	0.00		239.70	7.57	34.13	5
11	PR1	18A	L03	EQ01_03_07	low	237.54	19.99	1.00	0.00		234.00	8.26	34.13	5
12	PR1	18A	L04	EQ03_04_01	low	237.54	19.99				325.80	5.94	34.13	15

- Collection of data on SCC
- Comparison of Laboratories
- Comparison of PTs

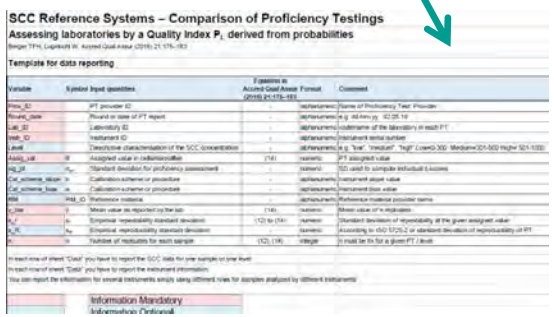
Quality Indexes



FNS - Cloud
Food Nutrition Security

Food Nutrition Security Cloud (FNS-Cloud) has received funding from the European Union's Horizon 2020 Research and Innovation programme (H2020-EU.3.2.2.3. – A sustainable and competitive agri-food industry) under Grant Agreement No. 863059 – www.fns-cloud.eu

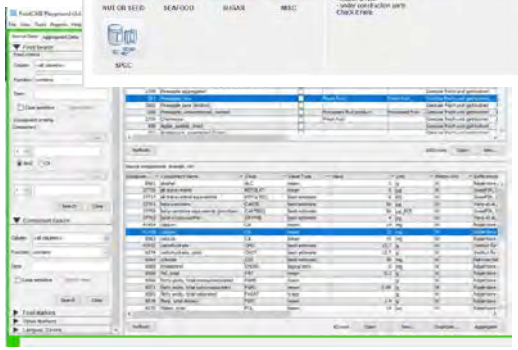
Possibilities of integration with other tools



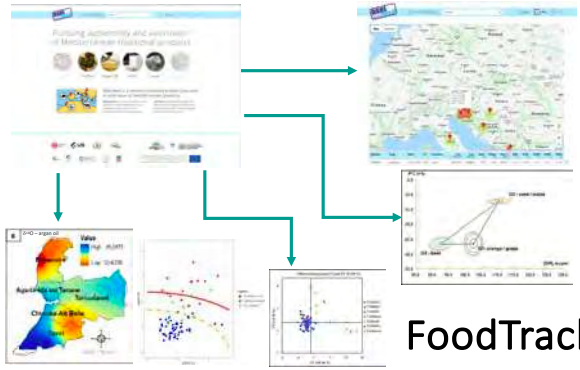
Calculation model for SCC

EuroFIR
European Food Information Resource

FoodExExplorer



FOODCASE



FoodTrack Database

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THANK YOU!

FNS-Cloud Final Event & Launch of FNSCloud Solution

Brussels - 12 Sept. 2023

Don’t forget to follow us: @FNSCloudEU FNSCloudEU FNS-Cloud @FNSCloudEU2019

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