

ROLE OF WATER USED IN THE GROWING, HANDLING AND PROCESSING OF FRUITS, VEGETABLES AND HERBS ON THE SPREAD OF AMR

OC/EFSA/BIOHAW/2023/01

19th June 2023

The event will start at 15.00 CEST

AGENDA

Agenda of the day

15:00

Opening remarks

15:05

Presentation of the open call for tender on “Role of Water Used in the Growing, Handling and Processing of Fruits, Vegetables and Herbs on the Spread of Antimicrobial Resistance (AMR)”: Background, Objectives, Tasks & Deliverables, Criteria

15:40

Conclusions

Call for tender [OC/EFSA/BIOHAW/2023/01](#) published on 22 May 2023 on TED e-Tendering



HOW WILL THIS WEBINAR WORK

One way communication

Event recorded

Questions during the webinar

Answers after the webinar

Questions after the webinar

Survey on event

- Automatically connected, listening mode
- Recording available after the event on EFSA website & TED e-Tendering
- Use the chat box function
- Questions will be anonymized and answers will be provided in writing after the event on TED e-Tendering, Q&A section
- Further questions must be submitted by TED e-Tending, Q&A tab, "create a question" (registration to TED e-tending required)
- Provide your feedback on the event



PRESENTATION OF THE CALL

- Background
- Objectives
- Tasks
- Deliverables, meetings, deadlines
- Selection and award criteria



BACKGROUND

This call intends to:

- Generate data that can help to fulfill data **gaps identified in the [EFSA AMR Environment Opinion](#)**, further discussed at the “[tackling AMR in the food-producing environment](#)” session of the ONE – Health, Environment, Society – Conference 2022.
- **Complement ongoing tender** “Microbiological hazards associated with the use of water in the post-harvest handling and processing operations of fresh and frozen fruits, vegetables and herbs (ffFVH)” ([OC/EFSA/BIOCONTAM/2021/02](#))
- This call is based on EFSA Founding regulation ([Regulation \(EC\) 178/2002](#), amended by [Regulation \(EU\) 2019/1381](#)) and EFSA’s 2023 Draft Work Programme for grants and operational procurements ([Programming Document 2023 – 2025](#)).



BACKGROUND

- **Expected changes to the water availability** in parts of Europe (climate change), point to the **risk** that in some areas there may **be very limited water available for irrigation/washing** without considering **water re-use** ([EEA, 2021](#)).
- [Regulation \(EU\) 2020/741](#) on minimum requirements for water reuse (**Water Reuse Regulation**, see also [Commission Notice 2022/C 298/01 Guidelines](#)), seeks to facilitate and **encourage the practice of reusing water for irrigation in agriculture**, making the EU food system more sustainable and resilient, while protecting public health and the environment ([circular economy](#), [JRC technical guidance](#)).
- Based on the current legislation on the hygiene of foodstuffs ([Regulation \(EC\) No 853/2004, consolidated text](#)) **it is also possible to recycle water in the food processing environment**, as long as “recycled water used in processing or as an ingredient does not present a risk of contamination”.



BACKGROUND

- Irrigation of crops with reclaimed wastewater effluents and water reuse/recycling in food industry **may pose a risk of contamination of fresh FVH with ARB/ARGs. ARB to high priority critical important antibiotics present in reclaimed water** used for irrigation.
- **EU studies** focusing on these ARB/ARGs in **irrigation** and **processing water**, and on the **vegetables** produced and/or processed are **still scarce**.
 - **AMR monitoring/surveillance** targeting in food producing environments can **generate relevant data** to prioritise future preventive actions.
 - There is a **need to optimise suitable, sensitive and readily standardized culturomics/genomics-based detection methods** for currently important and emerging ARB/ARGs.
- There is still **lack of information on the efficacy/effect** of most commonly used **water reclamation/reconditioning treatments** for mitigation of spread of **ARB/ARGs**.
- Annex II of the **Water Reuse Regulation (EU) 2020/741** refers to the risk management measures in relation to reclaimed water quality and monitoring and **includes AMR among the additional requirements that could be considered**.



BACKGROUND ARB/ARG

ARBs/ARGs to focus on?











- Several ARB/ARGs prioritizations have been done depending on the context (clinical, veterinary, food, environment, One Health, new antimicrobials needed, etc.):
- **For the current procurement – ARBs/ARGs of “public health importance” considering a One Health approach.** (e.g. [EFSA AMR ENV](#), relevant in the food producing environments).
- There are several info gaps on the occurrence of some of these ARB/ARGs in irrigation/processing water and in the FVH themselves.

Give priority to include at least those bacteria of highest priority for public health in food-producing environments including, resistant *Klebsiella*, *Salmonella*, *E. coli*, *Enterococci*, *Acinetobacter*, MRSA, *Pseudomonas aeruginosa*, and ESBL/CPEs producers.

Other isolates previously obtained (monitoring/research projects) could be additionally included if they fulfill tasks requirements and permissions are granted.



BACKGROUND (EXAMPLES OF VEGETABLES TO FOCUS ON)

Food commodity	General commodity category (EFSA 2013*)	Crop type**	Examples of safety hazards
Carrot 	Root and tuberous vegetables	Root crops that can be consumed raw	Environmental factors, animal reservoirs, contamination, cross-contamination, agricultural water, soil microbiome
Lettuce 	Leaves (leafy greens)	Above low-ground crops that can be consumed raw	Surface contact exposure to introduce human pathogens
Strawberry 	Soft fruits	Above low-ground crops that can be consumed raw	Environmental factors, contact with animals, untreated compost, contaminated agricultural water (irrigation or chemicals), contamination and cross-contamination
(Bean) Sprouts 	Sprouted seeds	Above low-ground crops that can be consumed raw	Contamination: dry seed contaminated with bacterial pathogens, poor practices
Melon 	Melons	Above low-ground crops that can be consumed raw after peeling (edible part not in contact with the water)	Rind surfaces, ground spots greater microbial populations than non-ground spot areas. Cross-contamination during crop handling, water use during cooling
Basil 	Leaves (fresh herbs)	Above low-ground crops that can be consumed raw	Non-composted or incompletely processed manure used as fertilizer, irrigation water, and contact surfaces such as hands, crates, and processing equipment
Tomato 	Vegetable fruits	Above low-ground crops (edible portion at <25 cm above the soil surface) that can be consumed raw	Field site, land use, adjacent land use, agricultural inputs (e.g., irrigation waters, fertilizers), workers, production practises
Apple 	Fruits	Above-ground high-growing crops (fruit tree, edible portions at >50 cm above the soil surface, which therefore do not normally touch the soil) that can be eaten raw	Storage and transport as potential risk parameters to distribute AMR globally 9

*Scientific Opinion on the risk posed by pathogens in food of non-animal origin. Part 1 (outbreak data analysis and risk ranking of food/pathogen combinations). 2013. EFSA Panel on Biological Hazards (BIOHAZ)

**Water Reuse Regulation (EU) 2020/741 and Commission Notice 2022/C 298/01 Guidelines



OVERALL OBJECTIVE

Direct contract ...

...to gain insights on the **occurrence/variety of ARB** and resistance determinants (**ARGs**, covering resistance genes, plasmids and/or total resistome)...

...both of **reclaimed and reused processing water used during the preharvest and post-harvest handling and processing operations for fruits, vegetables and herbs (FVH)**,...

...as well as of the food products themselves...

...in order to help to **assess the role of this water in the spread of ARB and ARGs to FVH** in different European regions.

Maximum budget :
950,000 €
(36 months from
kick off meeting)



SPECIFIC OBJECTIVES

Objective 1. Optimization of suitable sensitive and readily standardised culturomics/genomics-based detection methods for ARB/ARGs in the FVH production sector at pre- and post-harvest including analysis of samples of reclaimed/reused processing water and the food products themselves.

Culture based, PCR-based, metagenomics

Objective 2. Generation of new data on the occurrence and potential spread of ARB and ARGs in FVH as a potential result of the use of reclaimed water for irrigation in pre-harvest and other activities at primary production (e.g. during harvest) in the EU/EFTA zone.

S02a, ...occurrence/potential reduction, in the wastewater/reclaimed water, intended to be used for irrigation, at the UWWTPs/reclamation facilities after different water treatments...

S02b, in the reclaimed water used for the irrigation or other activities at primary production (e.g. during harvest) of FVH.

S02c, in the FVH irrigated with reclaimed water.



Objective 3. Generation of new data on the occurrence and potential spread of ARB and ARGs in FVH as a potential result of the use of reused processing water in post-harvest processing activities in the EU/EFTA zone.

S03a, ...in the reused processing water in the processing plants when this water is not subjected to disinfection treatments...

S03b, ...in the FVH processed with reused processing water that was not subjected to disinfection treatment in the processing plant.

S03c, ...in the reused processing water when this water was subjected to different disinfection treatments

S03d, ...in the FVH processed with reused processing water that was subjected to different disinfection treatments....



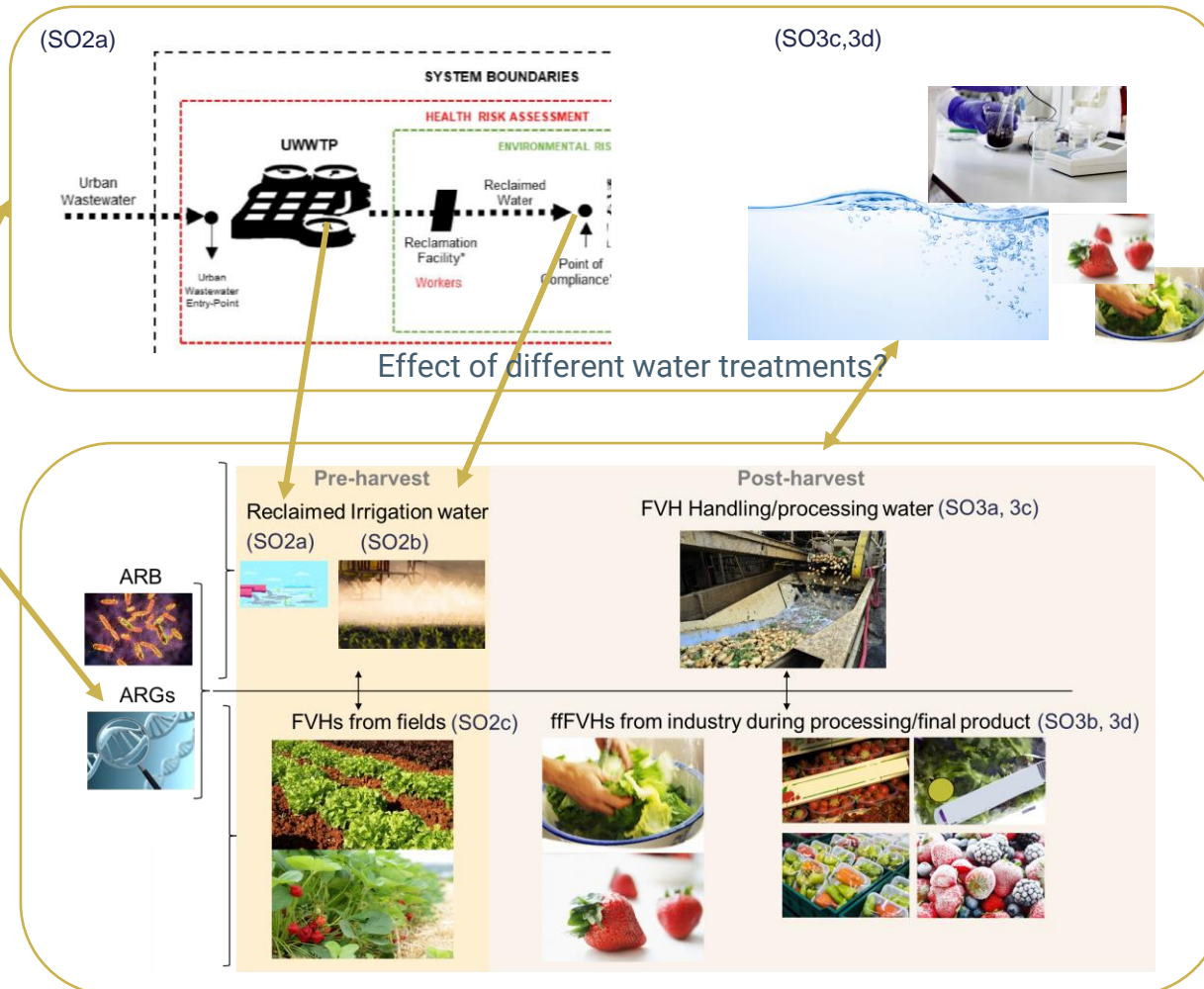
OBJECTIVE

Objective 2: Occurrence ARB/ARGs, using reclaimed water for irrigation

Objective 3: Occurrence ARB/ARGs using recycled water during handling/processing

Objective 1:
Optimize Detection methods:

Culture-based,
PCR-based,
metagenomics-based



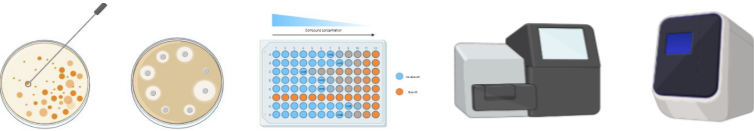
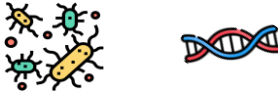







TASKS per objective



TASK 1

To fine tune the study design...

Detection methods to be tested	
Target bacteria/genes	
Countries	EU/EFTA 
Number of samples, sampling points, sampling times	
Compartments-UWWTPs/reclamation facilities, fields, handling/processing plants	
Commodities, types of crops and foods (fresh, fresh cut, frozen)	
Water treatments (e.g. chemical, physical, combinations)	



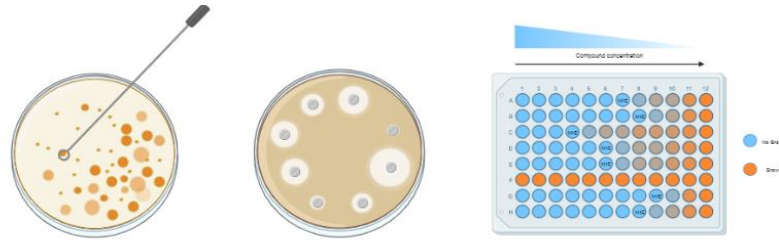


Objective 1. Optimization of suitable sensitive and readily standardised culturomics/genomics-based **detection methods for ARB/ARGs** in the FVH production sector at pre- and post-harvest including analysis of samples of reclaimed/reused processing water and the food products themselves.

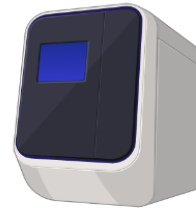


OBJECTIVE 1: TASKS 2, 3, 4

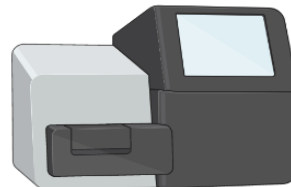
- **Task 2.** To optimize culture-dependent detection methods...



- **Task 3.** To optimize the PCR-based detection methods (e.g. qPCR, ddPCR, HT-PCR...)...



- **Task 4.** To optimize metagenomics-based detection methods (e.g., targeted metagenomics)...



...to detect specific ARB/ARGs of highest priority for public health

development of protocols





Objective 2. Generation of new data on the **occurrence and potential spread of ARB and ARGs in FVH** as a potential result of the **use of reclaimed water for irrigation** in pre-harvest and other activities at primary production (e.g. during harvest) in the EU/EFTA zone.

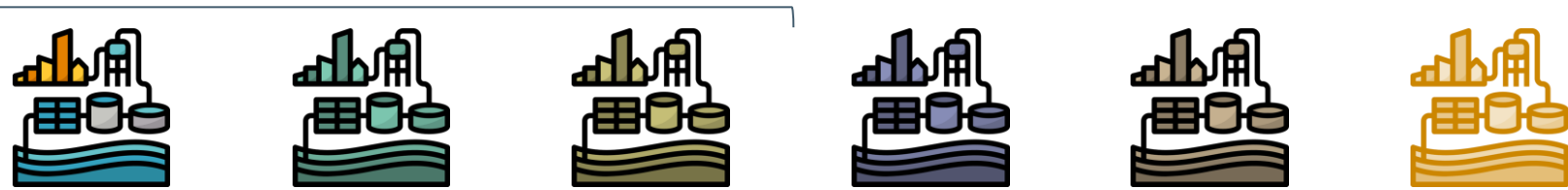


SUBOBJECTIVE 2A: TASK 5

T5. To generate data on the occurrence of ARBs/ARGs in the water along the water reuse system, to assess the effect of different water treatments during the waste water reclamation process when producing water intended for irrigation purposes.



6x At least 3 should provide the water for tasks 6 and 7



Reclaimed water
Different water treatments



Different sampling points (raw influent, secondary effluents, tertiary effluents and/or final effluents, etc.)

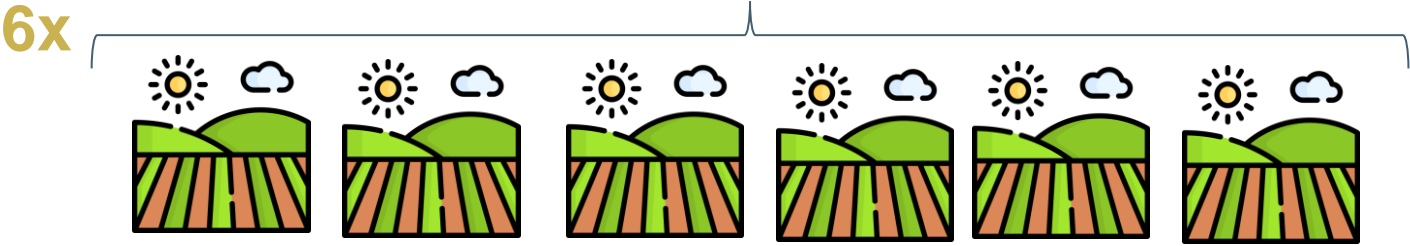
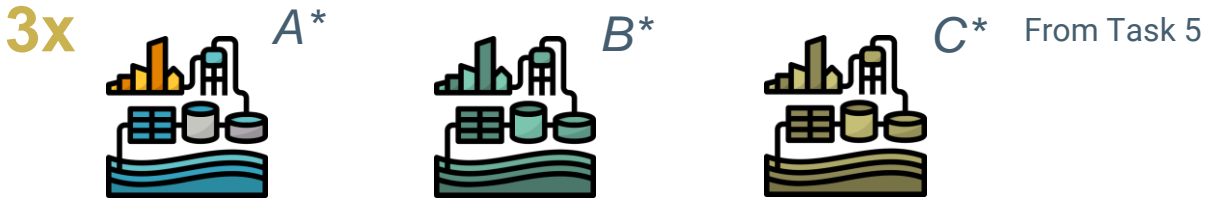


Different time points (different days along the year)



SUBOBJECTIVE 2B: TASK 6

T6. To generate data on the occurrence of ARB/ARGs in reclaimed water used for agricultural irrigation (and other activities at FVH primary production).



From which the food commodities will be analyzed in Task 7

Different sampling points at points of irrigation

Different time points (different days along the year)



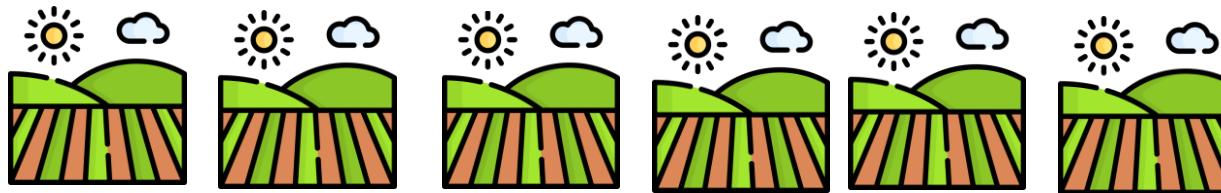
*Ideally, different water qualities as referred to in the [Water Reuse Regulation \(EU\) 2020/741](#) and [EC Commission Notice 2022/C 298/01 Guidelines](#)

SUBOBJECTIVE 2C: TASK 7

T7. To generate data on the occurrence of ARB/ARGs in FVH growing in the field when irrigated with reclaimed water



6x



Irrigated with different water reuse systems

3x



Different crop types



Different sampling points in the field



Different time points (different days along the production)



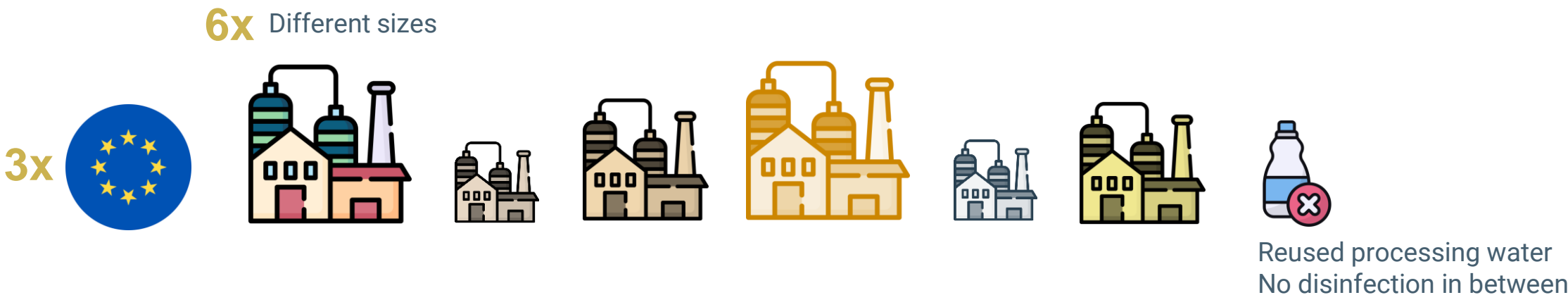




Objective 3: Generation of new data on the **occurrence and potential spread of ARB and ARGs in FVH** as a potential result of the use of **reused processing water** in post-harvest processing activities in the EU/EFTA zone.



SUBOBJECTIVE 3A: TASK 8

T8. To generate data on the occurrence of ARB/ARGs in the reused processing water used in FVH handling and/or processing operations when the water has not been subjected to disinfection treatments



-  Different sampling points in the processing line
 -  Different time points in the same day/different days
 - Different commodities
 - Different types of food (fresh, fresh cut, frozen)
- } Analyzed in Task 9

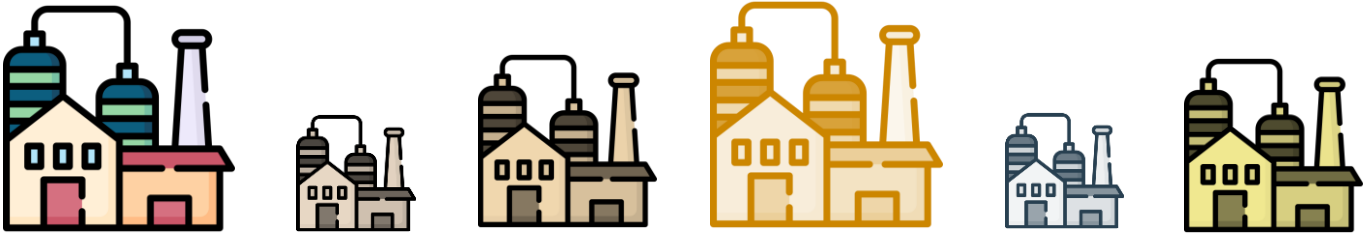


SUBOBJECTIVE 3B: TASK 9

T9. To generate data on the occurrence of ARB/ARGs in the FVH during/after handling and/or processing operations in processing plants that use reused water that it is not subjected to disinfection treatments



6x Same from Task 8



Reused processing water
No disinfection in between

Commodities: at least 2
(from task 7)



Types of food: 3



(fresh, fresh cut, frozen)



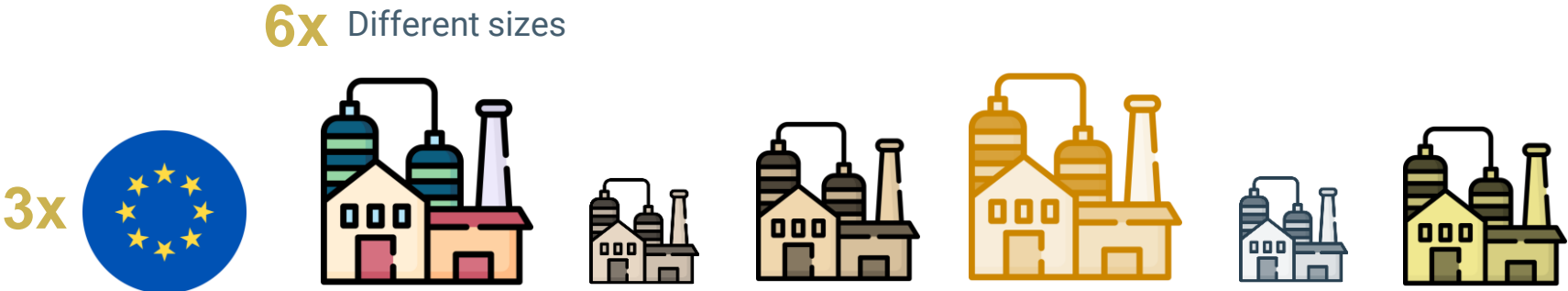
Different sampling points: before washing, after washing, after packaging, etc.

Different times: along the day/different days

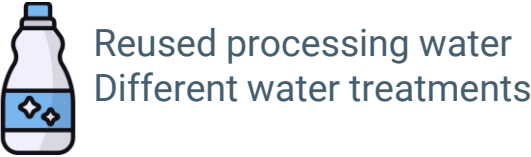


SUBOBJECTIVE 3C: TASK 10

T10. To generate data on the occurrence of ARBs/ARGs in the reused processing water used in FVH handling and/or processing operations when this water is subjected to different disinfection treatments, in order to assess the effect of the treatments on AMR (e.g. reduction of ARB/ARGs load, variety)



Same as for Task 8 but using different water treatments



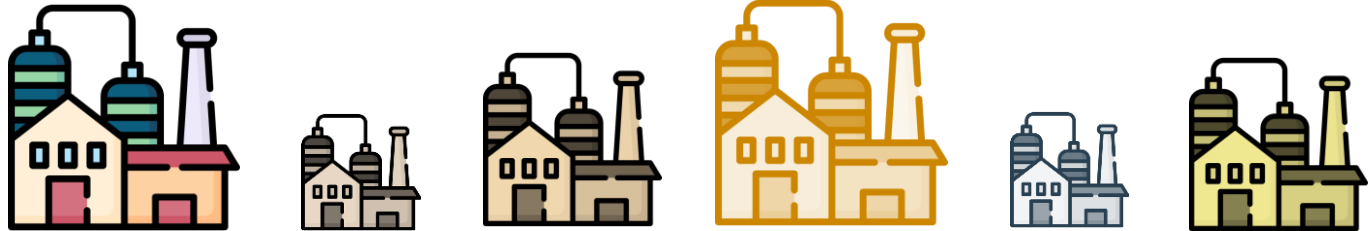
SUBOBJECTIVE 3D: TASK 11

T11. To generate data on the occurrence of ARB/ARGs in the FVH during/after handling and/or processing operations in processing plants that use reused water subjected to different water disinfection treatments



6x At least the same from water samples taken for Task 10

3x



Same as for Task 9 but using different water treatments, in line with Task 10



Reused processing water
Different water treatments



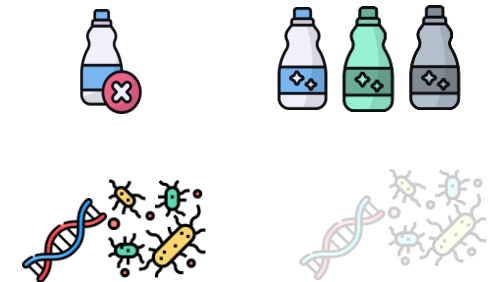
TASK 12

T12. To integrate the results of the studies performed to achieve Objective 2 and 3, comparing the results obtained with the ones available from other published studies, in order to identify:

i) potential links between the occurrence of ARB/ARGs in...



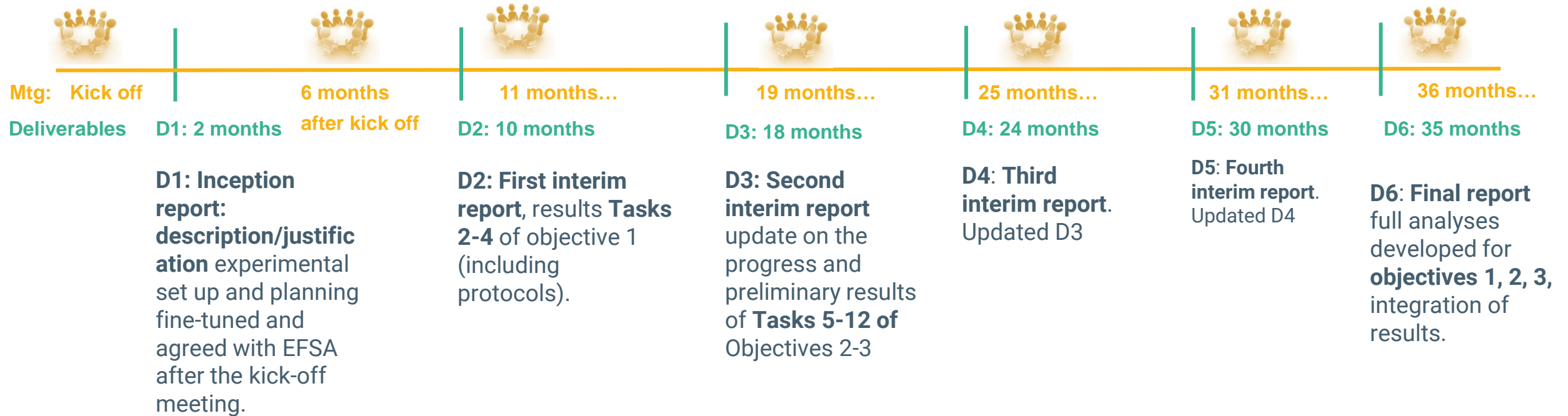
ii) potential differences in the effect on the spread on AMR of: different water treatments



different commodities, types of crops, irrigation methods, regions...



DELIVERABLES, MEETINGS, TIMELINES



SELECTION AND AWARD CRITERIA

SELECTION CRITERIA

(Section 2.4 tender specifications)

Professional capacity

1. Experience at overall at organizational level
 - a-c) **Applied research on AMR, water reuse, molecular detection and analysis** of microorganisms/genes, bioinformatics.
 - d) **Problem formulation** (e.g. writing reports)
 - e) **Project management** dealing with multidisciplinary teams.
2. Ability to provide a team of experts compliant with the following specific expertise requirements
(at least 4 experts, one expert can cover more than one area of expertise)
 - a) **1 expert**, at least 5 years in **AMR (Water and FVHs)**
 - b) **1 expert**, at least 5 years in **food (FVH) and water microbiology**.
 - c) **1 expert**, at least 5 years in **water reuse** (reclaimed water used for irrigation, processing water, water treatments to diminish/eliminate microbial load and/or AMR, etc).
 - d) **1 expert**, at least 5 years in **molecular ARB/ARGs detection** (WGS, qPCR and metagenomics...).
 - e) **1 expert**, at least 3 years in **bioinformatics** (WGS and/or metagenomic analyses).
 - f) **1 expert**, at least 5 years, in **drafting scientific reports/publications**.
 - g) **1 expert**, acting as project leader, 5 years in **project management** in the area of public health or food/feed safety. Contact point with EFSA.

Technical, capacity

Overall at organizational level, the tenderer must have:

- a) **technical equipment, resources** and tools to perform analysis.
- b) **access to different establishments** (growing fields, handling/processing plants, and water reclamation/wastewater facilities) from different EU/EFTA countries.
- c) **library services/databases**
- d) **digital collaboration** platform, document management systems.

AWARD CRITERIA

(Section 2.6 tender specifications)

Quality

1. Understanding of the assignment and tasks required (maximum 25 points, minimum threshold 60%)
2. Methodology proposed for implementation (maximum 40 points, minimum threshold 60%)
3. Project management and organization of tasks within project team (maximum 20 points)
4. Risk Management (maximum 10 points)
5. Measures to guarantee quality of deliverables (maximum 5 points)

Overall threshold: 70 out of 100 points

Best Price-Quality ratio

Formula on page 47 tender specifications



THANK YOU FOR ATTENDING THE EVENT



Call deadline
21/08/2023
14:30 CEST

The recording of this event will be available on the [EFSA website](#) and on [Ted e-Tendering](#) in a few days. Any question collected, will be anonymised and answered in writing and published on Ted e-Tendering, Q&A section, shortly after the event.



STAY CONNECTED

SUBSCRIBE TO

efsa.europa.eu/en/news/newsletters
efsa.europa.eu/en/rss
[Careers.efsa.europa.eu](https://careers.efsa.europa.eu) – job alerts



LISTEN TO OUR PODCAST

Science on the Menu – Spotify, Apple Podcast and YouTube



FOLLOW US ON TWITTER

[@efsa_eu](https://twitter.com/efsa_eu) [@methods_efsa](https://twitter.com/methods_efsa)
[@plants_efsa](https://twitter.com/plants_efsa) [@animals_efsa](https://twitter.com/animals_efsa)



FOLLOW US ON LINKEDIN

[Linkedin.com/company/efsa](https://linkedin.com/company/efsa)



FOLLOW US ON INSTAGRAM

[@one_healthenv_eu](https://instagram.com/one_healthenv_eu)



CONTACT US

efsa.europe.eu/en/contact/askefsa

