



Aquaponics from WAstewater REclamation



REMOVAL OF CONTAMINANTS OF EMERGING CONCERN



 **Universidad Rey Juan Carlos**
Cristina Pablos

We measured Contaminants of Emerging Concern in reclaimed water at 3 steps of treatment:

- A) after tertiary treatment
- B) after ozonation
- C) after vacuum UV

Quaternary treatment (B, C) showed a **removal of 60% of the Contaminants of Emerging Concern** which were detected in at the inflow

Contaminant	A	B	C	CONTAMINANT	A	B	C
10-Hydroxycarbazepine	x	-	-	Irbesartan	x	x	x
4-Nitrophenol	x	x	x	Ketamine	x	x	-
2,4-diamino-6-methyl-1,3,5-triazin	-	-	x	Lamotrigine	-	-	x
2,4-Dinitrophenol	x	x	-	Lidocaine (Diocaine)	x	x	-
3-Hydroxylidocaine	-	-	x	Metadone	x	x	-
3,5-di-tert-butylsalicylic acid	x	-	-	Metoprolol	x	x	-
8-Hydroxychinolin (8-Hydroxyquinoline)	-	-	x	Naphtalene sulfonic acid	-	x	-
8-Chlorotheophylline	x	-	-	Niflumic acid	x	x	-
Acetamidoantipyrine	x	x	-	Nimesulide	-	x	-
Alfuzosin	x	x	-	O-Desmethylvenlafaxine (Desvenlafaxine)	x	x	-
Amantadine	x	x	-	O-DT / O-Desmethyltramadol	x	x	-
Amisulpride	x	x	-	Olmesartan	x	x	-
Bicalutamide	x	x	-	Pantoprazole	-	x	-
Candesartan	x	-	-	Sotalol	x	x	-
Carbamazepine	x	x	-	Sucralose	x	-	x
Carbamazepine 10,11-epoxide	x	-	-	Sulfamethoxazole	x	x	-
Cetirizine	x	-	-	Sulfapyridine	x	x	-
Clarithromycin	x	x	-	Sulpiride	x	x	-
Chloraminophenamide	x	x	-	Tapentadol	x	x	-
Chlorothiazide	x	x	x	Telmisartan	x	x	-
DEET / Diethyltoluamide	x	-	-	Terbuthylazine-2-hydroxy (Terbutmenton-desethy	-	-	x
Denatonium	x	x	x	Terbutryn	x	x	-
Diclofenac	-	x	-	Topiramate	x	x	x
Dinoterb	-	x	-	Toraseamide	x	-	-
Diuron	x	x	-	Tramadol	x	x	-
Embutramide	-	-	x	Trans-10,11-Dihydroxy-10,11-dihydrocarbazepr	x	-	-
Fipronil	x	-	-	Tributoxyethyl phosphate	x	-	-
Flecainide	x	x	x	Tributyl phosphate	x	-	x
Fluconazole	x	x	x	Trifluoroacetic acid	-	x	-
Hydrochlorothiazide	x	x	-	Tris(2-chloroethyl)phosphate	-	x	x
lomeprol	x	x	x	Venlafaxine	x	x	-
Iopromide	-	-	x	Xylenesulfonate	x	x	-

AQUAPONIC SYSTEM DESIGN



Uses 9 m3 of reclaimed water.
Produces 75 Kg of fish, yearly.
Produces 300 Kg of salad, yearly.
Has a capital investment of € 35k.



Loïc Le Gouëff

Our pilot farm is producing Tilapia and Iceberg lettuce. The system has been designed after the commercial model “Blue Garden” from our project partner Green in Blue.



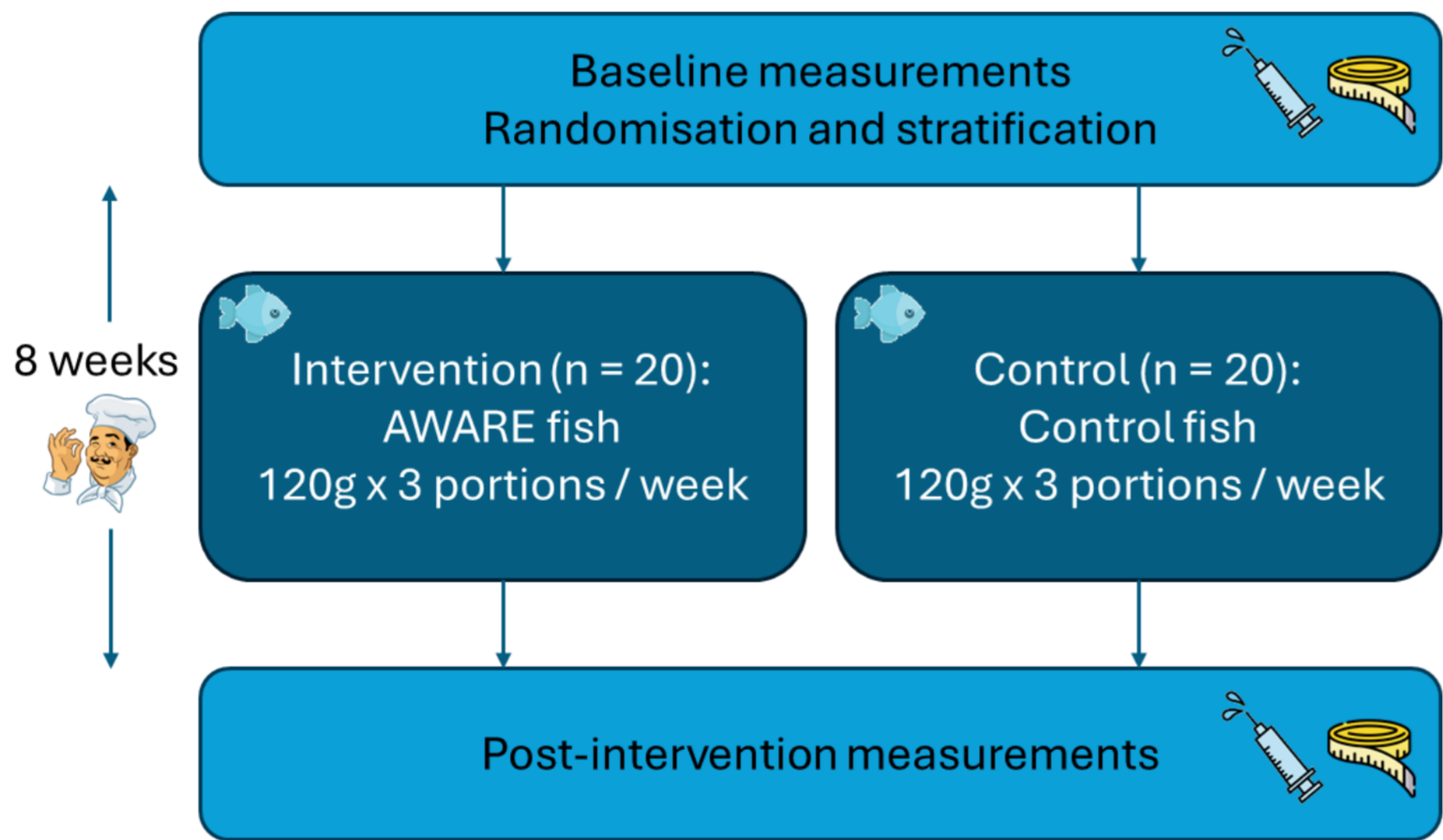
- 1 Fish tank
- 2 Mechanical filter
- 3 Sump tank
- 4 Media bed
- 5 Cultivation bed

HUMAN TRIALS DESIGN



 **Ulster University**
Helene McNulty

We plan an 8-week double-blinded randomised controlled equivalency trial. 70 participants will be recruited using predetermined inclusion and exclusion criteria. Participants will receive fish produced in our system with reclaimed water



Design	RCT double-blind non-inferiority trial
Primary outcomes	Omega-3, Vitamin D and Vitamin B12
Secondary outcomes	Micronutrients: Selenium, iron, iodine, Vitamin B6, phenolics Clinical health: Body composition, blood pressure, lipid profile
Inclusion criteria	Adults, 18-50 years; Non regular fish oil or micronutrient supplement user
Exclusion criteria	Medicines interfering with nutrient bioavailability; Liver, gastrointestinal, or haematological conditions; Particular dietary requirements or food intolerances; Pregnant or lactating
Stratification	Sex; fish intake

ANIMAL WELFARE



Marta Lopez Cabo

Fish welfare encompasses various aspects such as health, nutrition, environmental conditions, and behavior, ensuring fish live in a stress-free and healthy setting. The aim to reduce suffering, prevent diseases, and promote natural behaviors

Indicator index of animal welfare	
Growth performance / weight gain	overall fish growth
Condition factor	relation of weight and length
HSI Hepatosomatic index	fat accumulation in the liver
SSI Spleen somatic index	indicative of lesions or infections
VSI Visceral somatic index	indicative of health and condition