EVALUATION OF *TETRADESMUS* EXTRACTS PRODUCED FROM AGRICULTURAL EFFLUENTS AS FUNCTIONAL INGREDIENTS IN MARINE FISH LARVAE DIETS

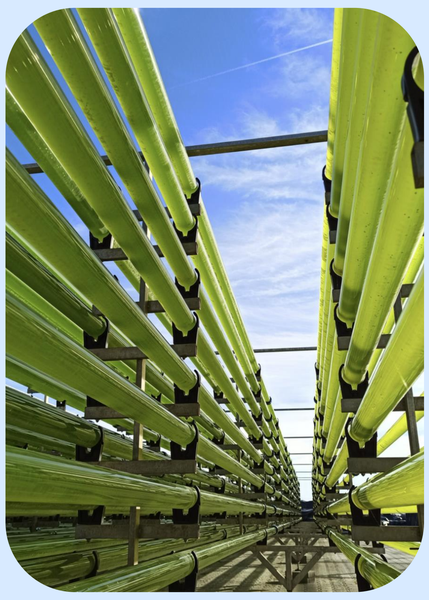
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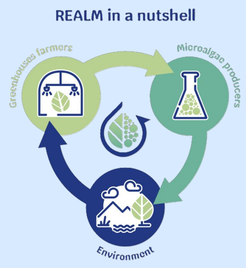
STUDY GOAL



- PROMOTE CIRCULAR USE OF AGRICULTURAL EFFLUENTS BY PRODUCING MICROALGAE FOR AQUAFEED APPLICATIONS.
- EVALUATE SAFETY AND FUNCTIONAL POTENTIAL OF EFFLUENT-DERIVED *TETRADESMUS* EXTRACTS IN LARVAL DIETS OF GILTHEAD SEABREAM AND MEAGRE.

necton
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REALM

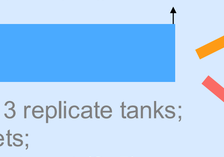
REALM in a nutshell



EXPERIMENTAL DESIGN



Meagre
Argyrossomus regius



Gilthead seabream
Sparus aurata

Stress transport test (mortality)
Bacterial exposure (mortality)

CHALLENGE

Start of the trial — Intermediary sampling — End of the trial

GROWTH TRIAL

- Each treatment allocated to 3 replicate tanks;
- Control + 4 experimental diets;
- Three replicate tanks per treatment (3x5);
- Experimental unit: **tank**.

Intermediary sampling — Final sampling

LONG TERM TRIAL

- Each treatment allocated to the same tank;
- Control diet provided to all tanks;
- Experimental unit: **individual fish**.

TESTED DIETS

CTRL
Commercial diet
0% algae extract

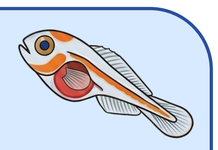
RET0.5
0.5% *Tetradesmus*
0.2mm

RET0.2
0.2% *Tetradesmus*
0.2mm

PERM0.4
0.4% *Tetradesmus*
0.6mm

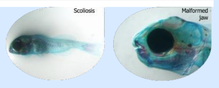
PERM0.2
0.2% *Tetradesmus*
0.6mm

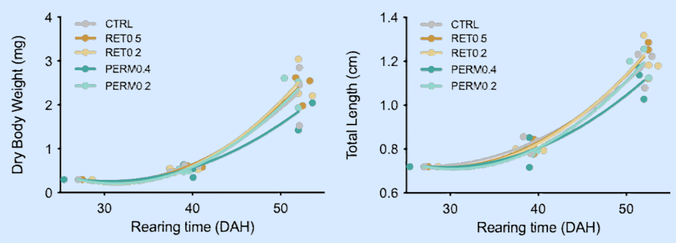
RESULTS *Sparus aurata*



GROWTH TRIAL

Endpoint assessed	Results
ZOOTECHNICAL PERFORMANCE	
Survival	No effect (69 -78%)
Growth (weight, length)	No effect
GENE EXPRESSION	
GR1, GR2, NRF2, HSP70, CAT, SOD, GPX4	No effect
OXIDATIVE STRESS ENZYMES	
CAT, LPO, GPX	No effect
SKELETAL MALFORMATIONS	
Incidence of malformations	No effect (30 - 44%)
Incidence of severe malformations (scoliosis, malformed jaw)	No effect (18 - 26%)

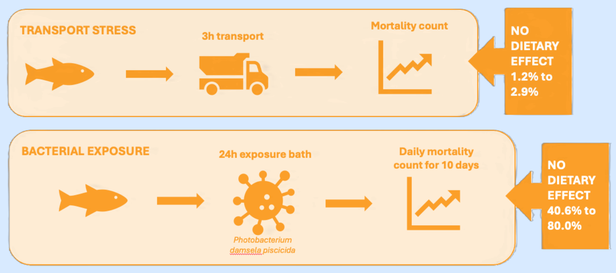




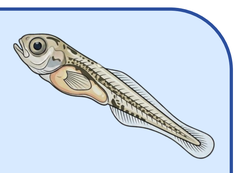
LONG-TERM

Endpoint assessed	Results
ZOOTECHNICAL PERFORMANCE	
Wet weight (WW)	**RET0.2** > RET0.5, PERM0.4
Total length (TL)	**RET0.2** > other exp diets
SKELETAL MALFORMATIONS	
Incidence of malformations	No effect
Scoliosis	No effect
Malformed jaw	No effect

CHALLENGE

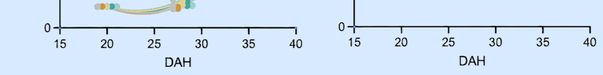


RESULTS *Argyrosomus regius*



GROWTH TRIAL

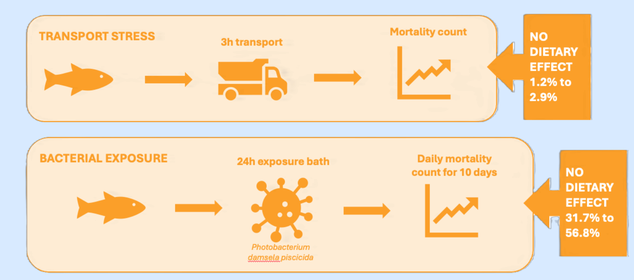
Endpoint assessed	Results
ZOOTECHNICAL PERFORMANCE	
Survival	No effect (87 - 92%)
Growth (weight, length)	No effect
GENE EXPRESSION	
Post stress: *TRH, METii GST3, PRDX3, CAT, GPX, HSP90*	No effect
Post-infection: *COX2, LYS, MXP, MYD88*	No effect
OXIDATIVE STRESS ENZYMES	
SOD, CAT, GPX, LPO	No effect
SKELETAL MALFORMATIONS	
Incidence of malformations	No effect (51 - 64%)
Incidence severe malformations	No effect (29 - 44%)
Average malformations / fish	No effect (1.0 - 1.4)



LONG-TERM

Endpoint assessed	Results
ZOOTECHNICAL PERFORMANCE	
Wet weight (WW)	No effect
Total length (TL)	**PERM0.2** > PERM0.4
Survival	No effect (94 - 99%)

CHALLENGE



MAIN CONCLUSIONS

- NO NEGATIVE EFFECTS WERE DETECTED, INDICATING THAT THE EXTRACTS ARE **SAFE FOR USE IN LARVAL DIETS** AT THE TESTED INCLUSION LEVELS.
- THE ABSENCE OF FUNCTIONAL IMPROVEMENTS SUGGESTS THAT **HIGHER DOSES, DIFFERENT EXTRACT FRACTIONS, OR FURTHER REFINEMENT** MAY BE REQUIRED TO ACHIEVE MEASURABLE BIOACTIVE EFFECTS.

Presenting author:
Pedro Pousão-Ferreira



Acknowledgments:

REALM project was funded by the European Union (Grant agreement ID: 101060991); Interface Mission project was co-funded by PRR - Plano de Recuperação e Resiliência by the European Union (operation code 01/C05-i02/2022.P148).

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REALM
Funded by the European Union
Financiado pela União Europeia NextGenerationEU
PRR Plano de Recuperação e Resiliência
REPÚBLICA PORTUGUESA
MISSÃO INTERFACE
AGÊNCIA NACIONAL DE INOVAÇÃO

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