IMPACTS OF DIETARY ALGAE SUPPLEMENTATION ON TURBOT POSTLARVAE PERFORMANCE

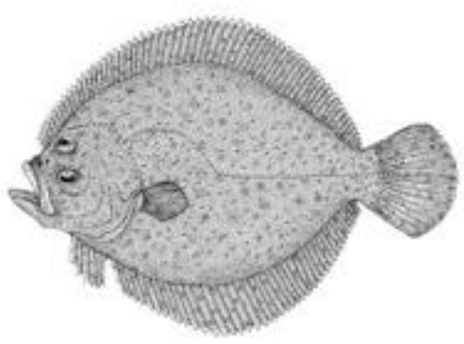
GreenCoLab
Joining the pieces in algal biotechnology.

Xavier, Maria João[1]
Engrola, Sofia[2]
Teodósio, Rita[2]
Pereira, Hugo[1]
Pinto, Wilson[3]
Conceição, Luís[3]
Gonçalves, Ana Teresa[1,3]

[1]GreenCoLab, Faro, Portugal
[2]CCMAR, Faro, Portugal
[3]SPAROS Lda. Olhão, Portugal

INTRODUCTION

Turbot (*Scophthalmus maximus*) is a fast-growing flatfish that has been commercially cultured for more than two decades.

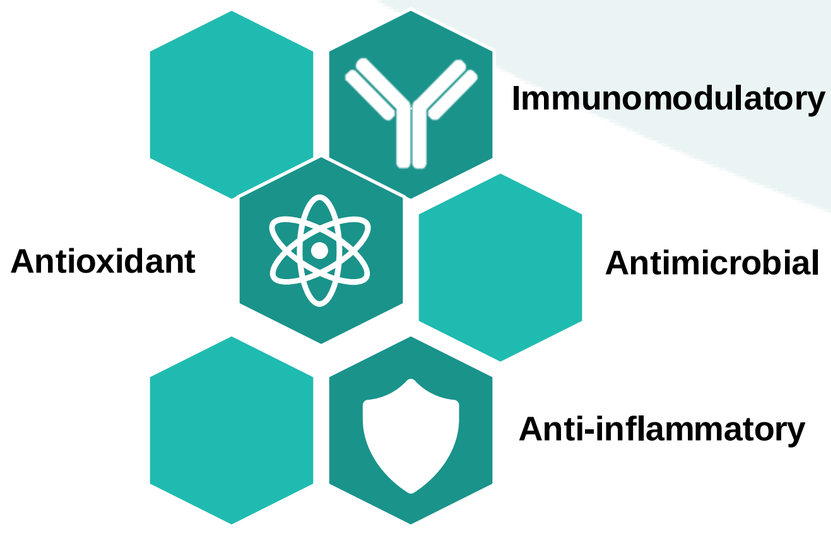


Several **constraints** remain in the mass production of **high-quality larvae**

- Variable survival rates
- High sensitivity to external conditions

Nutrition in the early stages is a key factor that tremendously impacts the growth, survival, and health status of fish larvae/post-larvae and later in fish life.

Algae has proven to be a rich source of structurally diverse and complex compounds know to display numerous **interesting bioactive properties.**



AIM: To evaluate dietary supplementation of micro- and macroalgae biomasses on fish antioxidant response and epithelium integrity to improve responses to the current challenges of marine hatcheries

MATERIALS & METHODS

Growth trial:

- Duration - 28 days
- Species - Turbot (*Scophthalmus maximus*)
- Age at start - 51 days after hatching (DAH)
- Culture system - Recirculating aquaculture system (RAS)

Treatments:

Fish were fed one of the four experimental diets:

- **CTRL** – Commercial-like diet
- **GRAC** – Commercial-like diet + *Gracilaria gracilis (broken cells)*
- **NANNO** – Commercial-like diet + *Nannochloropsis sp. (broken cells)*
- **BLEND** – Commercial-like diet + blend of the two algae

Analysis:

At the end of the growth trial fish were sampled to assess:

Zootechnical parameters

- Final body weight
- Survival rate
- FCR
- RGR

Gene expression – RT-qPCR

- Tissue - Anterior intestine
- Analyse - key biomarkers of fish health and robustness

RESULTS & DISCUSSION

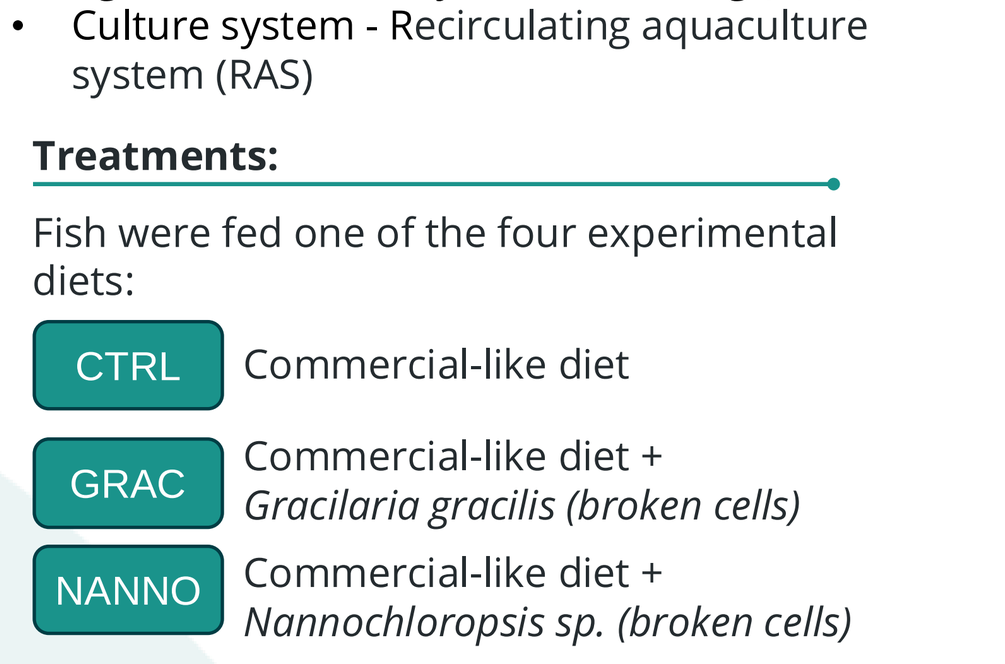


Fig 1. Score plot (left), and variable loads (right) of the discriminant analysis applied to the different groups based on the assessed gene panel. Blue dots indicate group centroids and the Mahalanobis distance between BLEND and CTRL treatment was significantly different (Fisher-test, $p<0.05$).

- Growth performance indicators and survival of turbot post-larvae were similar between dietary treatments
- BLEND diet promotes overall difference from CTRL mainly due to the upregulation of genes related to primary antioxidant defences (*CAT* and *SOD2*) and gel-forming mucins (*Mucin2)* in the intestine.

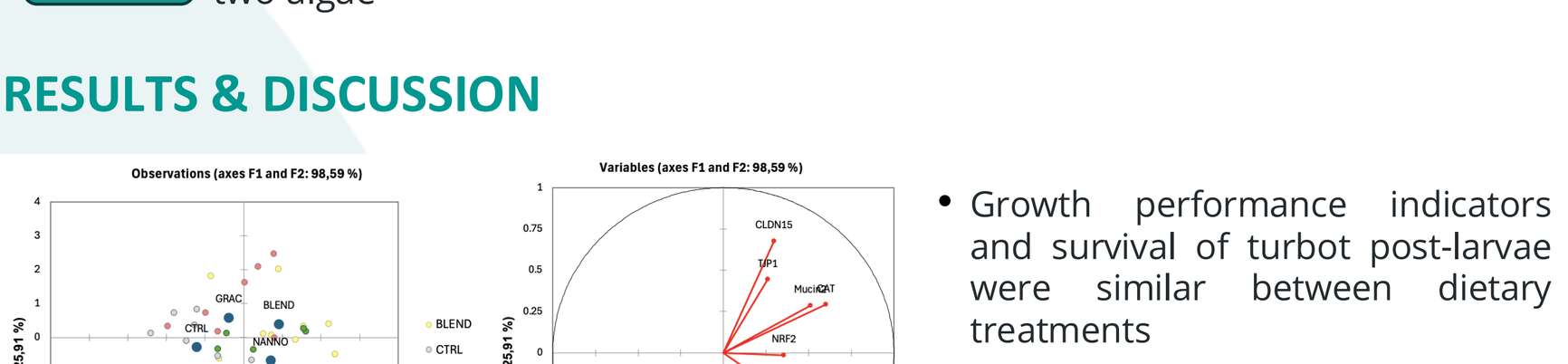


Fig 2. Relative expression of biomarkers related to epithelium integrity and antioxidant response - *Claudin 15* (*CLDN15*), *Tight junction protein 1* (*TJP1*), *Mucin 2* (*MUCIN2*), *Catalase* (*CAT*), *Superoxide dismutase 2* (*SOD2*) and *Nuclear factor erythroid 2- related factor 2* (*NRF2*) in gilthead seabream intestine fed different dietary treatments. Values are expressed as mean ± SE. No differences were observed between dietary treatments (One-way ANOVA, $p>0.05$)

CONCLUSIONS

Overall, this work provides evidence that dietary **supplementation of *Gracilaria gracilis* and *Nannochloropsis* sp.** (broken cells) blend could be a nutritional strategy to **enhance marine fish larvae' robustness** at early life stages of development.

Acknowledgments

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