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## Effects of physical or sensory enrichments on rainbow trout (*Oncorhynchus mykiss*) welfare

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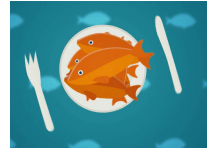
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## CONTEXT

- ❑ Fish consumption increased and is becoming an important part of the protein intake with a global fish consumption expected to reach 21.5 kg per person per year in 2030, compared to 13.4 kg in the period 1986-1995 (FAO 2020)
- ❑ World aquaculture production increases reaching 90 millions tons today (FAO 2020)
- ❑ Intensive production and altered environmental conditions could be responsible of stress and pathologies
- ❑ Animal welfare is an important societal consideration

## OBJECTIVES OF THIS STUDY

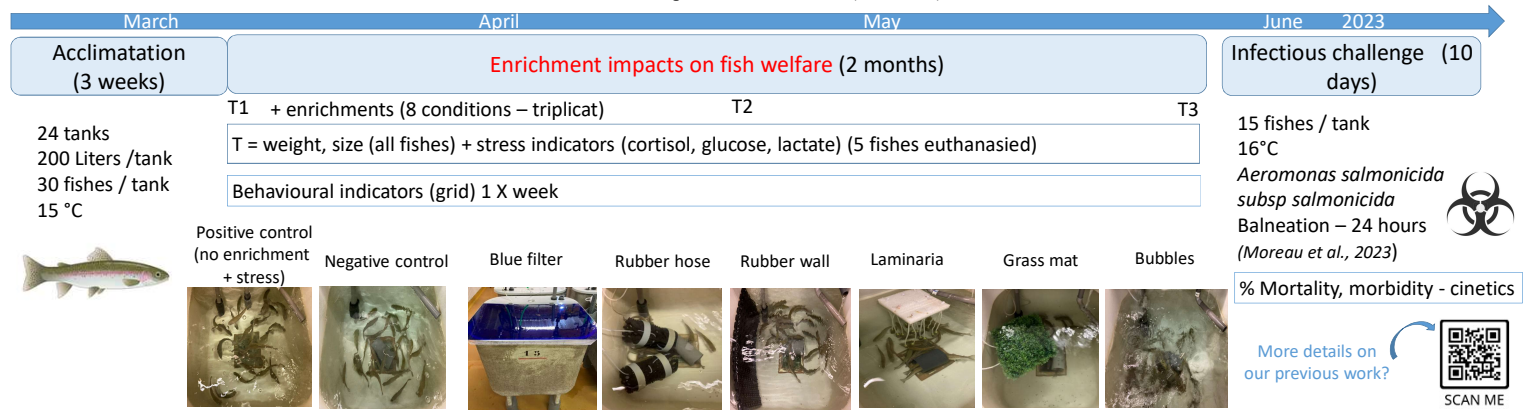
- ✓ Influence of rearing environmental enrichment :
  - on the welfare of rainbow trout (stress and behavioural indicators)
  - on the pathogens resistance of rainbow trout (response to a bacterial challenge)
- > **How can enrichment improve the welfare of fish (rainbow trout)? What indicators should be assessed?**
- Which enrichments should be studied?**



<https://vimeo.com/346815935/22785b0ebf>

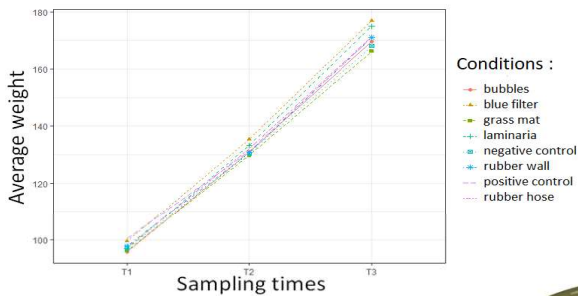
## METHODOLOGY

APAFIS #40967-2023021514284658 v4 - Oniris experimental facilities (D 44 272)

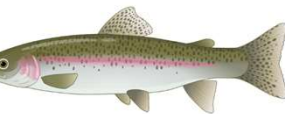
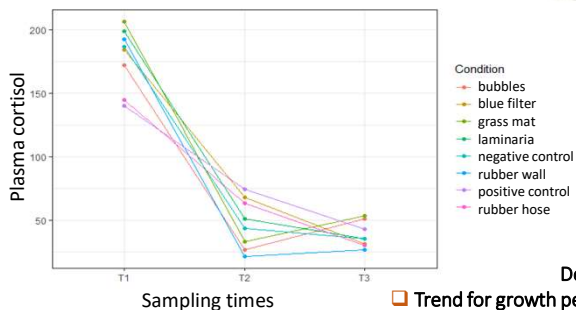


## RESULTS

### Growth performance



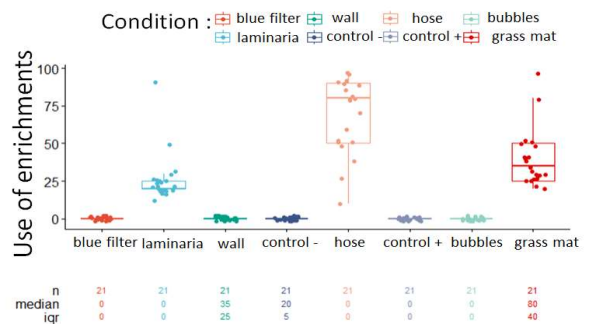
### Stress indicator



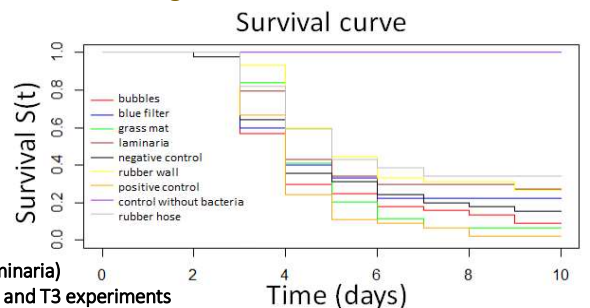
Depending on conditions :

- ❑ Trend for growth performance (better: blue filter and laminaria)
- ❑ No significant difference in blood cortisol levels, but lower levels in T2 and T3 experiments
- ❑ Significantly different use of enrichment (better: rubber hose, grass mat and laminaria)
- ❑ Significant differences in percentage mortality and disease onset kinetics (best: rubber hose)

### Behaviour



### Pathogens resistance



## FIRST CONCLUSIONS

- ❑ Rubber hose, blue filter and "laminaria seaweed" appear to be relevant enrichment strategies
- ❑ Behavioural indicators and infectious challenge appear to be relevant
- ❑ Conventional stress indicators (cortisol, glucose, lactate) do not appear to be relevant

Pos. Control < Neg Control < Bubbles = Rubber wall < Grass mat < Laminaria = Blue filter = Rubber hose

## IN PROGRESS - FUTURE

- ❑ Cortisol in scales
- ❑ Genes expression in brain and blood

## FUNDINGS

French funding account CASDAR (Compte d'Affectation Speciale Développement Agricole et Rural) under grant agreement n° 19AIP5919.

## REFERENCES

FAO, 2020 - <https://doi.org/10.4060/ca9229en>  
Moreau et al., 2023 - DOI: 10.1016/j.fsi.2023.108664

Further discussion? Partnership?  
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