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

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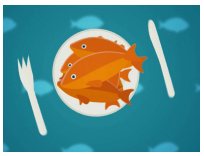
CONTEXT

- ❑ 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



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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?

METHODOLOGY

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

March — April — May — June 2023

Acclimatation (3 weeks)

24 tanks
200 Liters /tank
30 fishes / tank
15 °C

Enrichment impacts on fish welfare (2 months)

T1 + enrichments (8 conditions – triplicat) T2 T3

T = weight, size (all fishes) + stress indicators (cortisol, glucose, lactate) (5 fishes euthanasied)

Behavioural indicators (grid) 1 X week

Positive control (no enrichment + stress) | Negative control | Blue filter | Rubber hose | Rubber wall | Laminaria | Grass mat | Bubbles

Infectious challenge (10 days)

15 fishes / tank
16°C
Aeromonas salmonicida subsp salmonicida
Balneation – 24 hours
(Moreau et al., 2023)

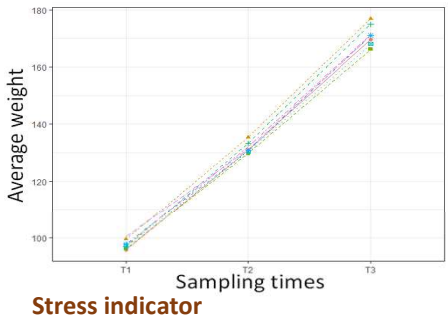
% Mortality, morbidity - cinetics

More details on our previous work?

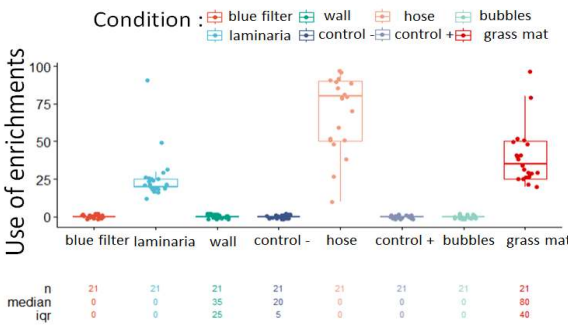
SCAN ME

RESULTS

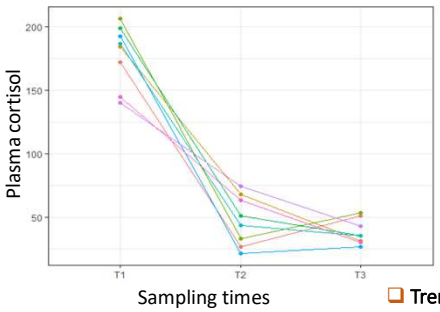
Growth performance



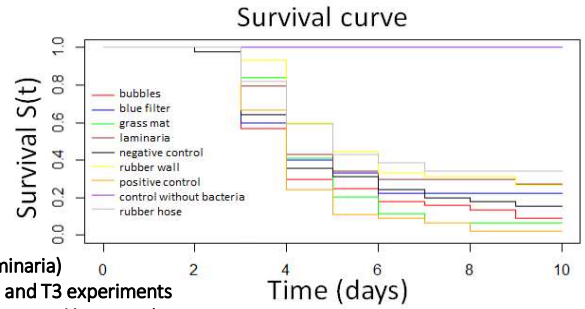
Behaviour



Stress indicator



Pathogens resistance



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)

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

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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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