Comparison of 4 slaughter methods for rainbow trout (Oncorhynchus mykiss) with regard to animal protection

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CONTEXT

❑ Fish consumption is rising, and is expected to reach 21.5 kg per person per year in 2030, compared with 13.4 kg during the 1986-1995 period (*FAO 2020*)
❑ Fish are sentient animals (*Brown, 2015*)
❑ Animal welfare and animal protection are major societal concerns
❑ Classification of the different methods of fish slaughter with regard to animal protection is neither simple nor uniform
❑ Lack of common lexicon

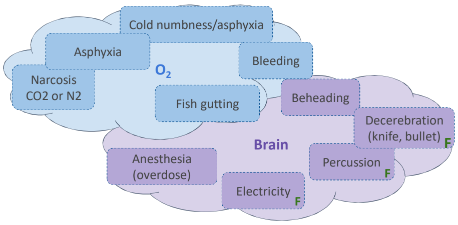


Fig: Different slaughter methods: actions on O2 levels or on brain levels
F : Fast slaughter method according to Robb et Kestin (2002)

OBJECTIVE OF THIS STUDY :

Compare Asphyxia (AS), Electricity (EL), Percussion (PS) and Ikejime (IK) as slaughter methods for rainbow trout

METHODOLOGY

APAFIS #35874-2022031317262890 v4 - Oniris experimental facilities (D 44 272)

Acclimatation (3 weeks)

3 tanks
200 Liters
25 fishes / tank
16 °C

Capture (net) and slaughter

Catch order : AS, EL, PS, IK
Catch order : AS, IK, EL, PS
Catch order : AS, PS, IK, EL
5 fish by slaughter conditions in each tank

Created with BioRender.com

Action on fish killed

- Blood sample
- Bleeding
- Fish gutting and filleting

Indicators

Stress indicators on plasma :
Cortisol, glucose, lactate

Quality indicators on filet :
Texture profile analysis (TPA), pH, microbiology, evaluation of fish freshness

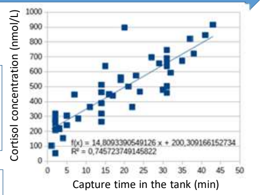


Fig: Cortisol concentration as a function of capture time in the tanks (without asphyxia AS condition)

Major effect of capture time

Modelling
R studio package « nlme »
Mixed-effect linear model

RESULTS

Stress indicators on plasma

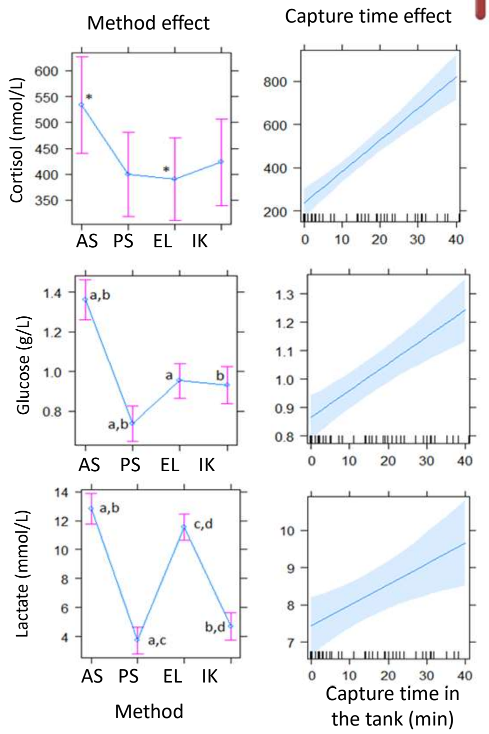
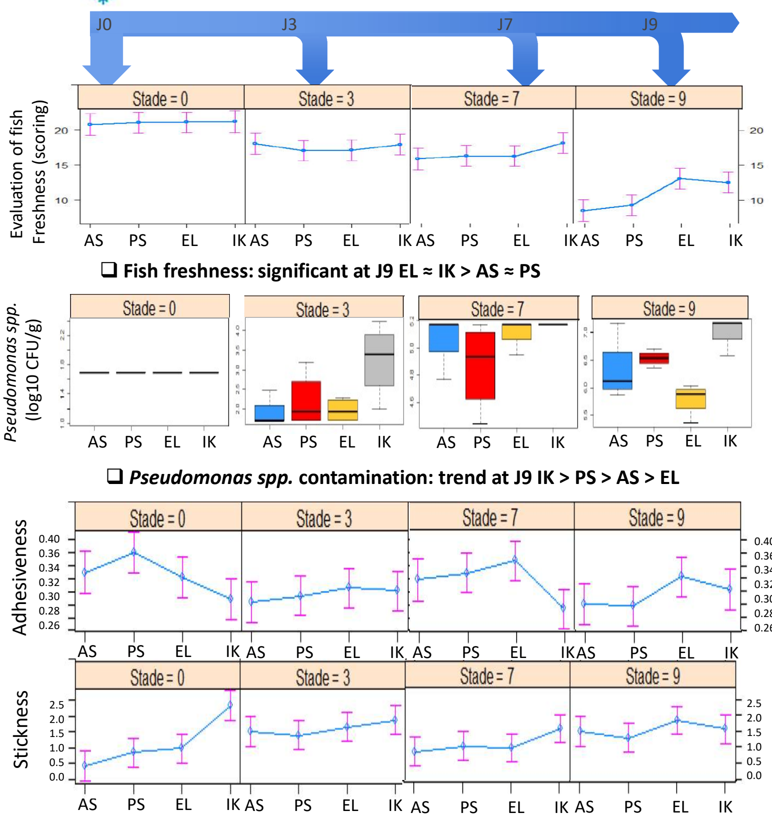


Fig: Average concentrations according to method corrected for the effects of capture time in the tank

❑ **Stress indicators: significant AS > EL ≥ IK ≥ PS**

Fig: Position of the 3 TPA measurement points on the fish fillet – ©Kévin Crouvisier -Urion

Quality indicators on filet



❑ **Fish freshness: significant at J9 EL ≈ IK > AS ≈ PS**

❑ ***Pseudomonas spp.* contamination: trend at J9 IK > PS > AS > EL**

❑ **Texture Profile Analysis (TPA): trend IK > EL ≈ AS ≈ PS**

FIRST CONCLUSIONS

❑ Importance of capture time in stress assessment
❑ Asphyxia is a stressfull slaughter method
❑ Effect on quality to be confirmed (sensory and instrumental studies)

❑ According to stress indicators, level of stress: **PS ≤ IK ≤ EL < AS**

Percussion > Ikejime > Electricity > Asphyxia — *Our study*

Ice-cold water > Percussion > Decerebration > Narcosis CO2 in water > Electricity > Asphyxia — *Poli et al. (2004)*

Electricity > Percussion ≈ Decerebration > Ice-cold water > Narcosis CO2 in water ≈ Asphyxia — *Robb et Kestin (2002)*

❑ **Comparisons between studies are difficult (protocols, indicators, definitions, …)**

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Brown, 2015 - DOI: 10.1007/s10071-014-0761-0
Robb et Kestin, 2002 - https://doi.org/10.1136/vr.150.10.302
Poli et al, 2004

Further discussion? Partnership?
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