Effects of chronic confinement stress on growth, survival, blood cortisol and glucose of perch (*Perca fluviatilis*)

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Introduction

Perch, *Perca fluviatilis*, is a newly cultured species in intensive conditions in RAS, but seems highly sensitive to aquacultural stressors compared to domesticated fish species (Acerete et al., 2004; Jentoft et al., 2005). The aim of the experiment is to assess if chronic confinement encountered in intensive rearing system is a stressful factor for perch.

Materials and methods

Preliminary Acute stress experience

- Initial mean body weight (MBW): 80g
- Volume: 100l
- 300 juveniles/m³ in duplicate
- T: 23°C, O_2>6ppm
- Handling stress

Chronic stress experience

- Initial MBW: 32g
- Initial heterogeneity (CV): 38%
- Volume : 144l, 800l and 1600l
- 500 juveniles / m³ in duplicate
- T: 23°C, O_2>6ppm
- Duration: 140 days

Blood collection and analysis

- 10 fish per batches
- Acute stress: 0h, 1h, 6h, 24h, 3days
- Chronic stress : day 110 and 136
- Blood collected into the caudal vein within 5 min.
- Cortisol analysis by ELISA
- Glucose analysis by spectrophotometry

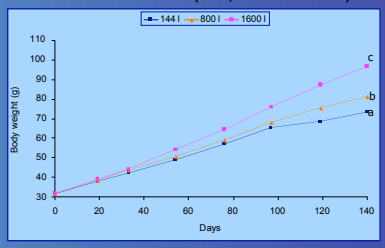
Results and discussion

Biometric parameters day 140

- Chronic confinement signicantly reduced growth rate and final body weight of juvenile perch
- Survival significantly decreased from 96 to 78% with the increase of confinement (from 1600 to 144l)

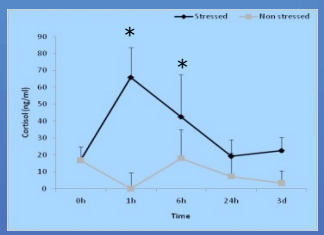
	Final MBW (g)	Final CV (%)	SGR (%/d)	Food conversion ratio	Survial (%)
144l	73.0±0.8^a	39	0.63±0.01^a	2.4±0.5^a	78±12^a
800l	81.0±0.7^b	42	0.71±0.01^{ab}	1.9±0.1^b	94±1^b
1600l	97.0±0.6^c	46	0.84±0.00^b	1.5±0.0^b	96±1^b

Comparative growth of juveniles perch reared under three level of confinement (144l, 800l and 1600l)



Blood parameters

- Acute stress of handling induced a significant increase of cortisol level 1 and 6 h after the stress.
- During the confinement stress, no significant differences were observed in cortisol levels throughout the study (from 0 ng ml^{-1} to 10,7 ng ml^{-1}).
- Confinement stress did not change the glucose levels (from 20,9 mg dl^{-1} to 46,8 mg dl^{-1}). Only a significant decrease from day 110 to day 136 was observed, whatever the confinement level.



Cortisol level of juveniles perch submitted to a handling acute stress (* sign.different from control)

Comparative glucose levels of juveniles perch reared under three level of confinement (144l, 800l and 1600l)

Conclusions

- Cortisol level is a good indicator of acute stress in perch but less sensitive in the case of chronic stress
- In some extent, chronic-confinement stress induced few physiological responses in Eurasian perch, as also reportedby Douxfils et al. (2011), but high confinement level may impair some metabolic pathways and thereby the overall fish welfare since low growth and survival rates were observed at the highest confinement level in this study.
- In conclusion, confinement could be a stressful factor in perch culture and should be take into account regarding perch welfare in intensive rearing conditions

References

Acerete L, Balasch JC, Espinosa E, Josa A, Tort L, 2004. Physiological responses in Eurasian perch (*Perca fluviatilis*) subjected to stress by transport and handling. Aquaculture 237, 167-178.

Douxfils J, Mandiki SMN, Marotte G, Wang N, Silvestre F, Milla S, Henrotte E, Vandecan M, Rougeot C, Mélard C, Kestemont P. 2011. Does domestication process affect stress response in juvenil Eurasian perch *Perca fluviatilis*? Comp. Biochem. Physiol. In press.

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