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INFLUENCE OF HATCHING TIME ON TIME OF FIRST FEEDING AND SUBSEQUENT GROWTH AND CANNIBALISM IN PIKEPERCH (*SANDER LUCIOPERCA*)

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Introduction

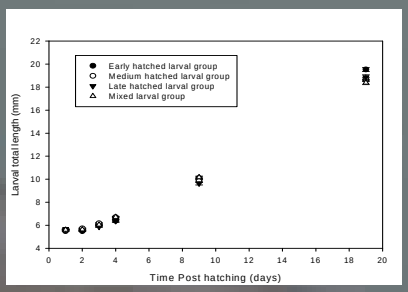
The high potential growth rates and preference of high temperatures makes pikeperch (*Sander lucioperca*) a promising candidate for intensive aquaculture. One problem identified that may hamper the expansion of intensive culture of this species is cannibalism (Kestemont et al. 2007) In e.g. salmonids, individual timing of the shift to exogenous feeding have been shown to predict social dominance, growth and life history strategy, where larvae reaching first feeding early may possess competitive advantages (Metcalfe and Thorpe 1992). In pikeperch, it is not known whether such a developmentally based differentiation takes place. If it does, a hypothesis could be that a large temporal variation in time of first feeding could lead to increased cannibalism, caused by the higher size variation within the batch.
Hatching of a batch of pikeperch eggs can span several days, giving rise to speculations on the effects of mixing early and late hatched larva during subsequent larval rearing, and possible implications of this on later observed cannibalism. It is not known though whether e.g. early hatching larvae reach first feeding before later hatched individuals.
The present study evaluates effects of intra batch hatching time on size, ontogenetic development, stress sensitivity and cannibalism in pikeperch

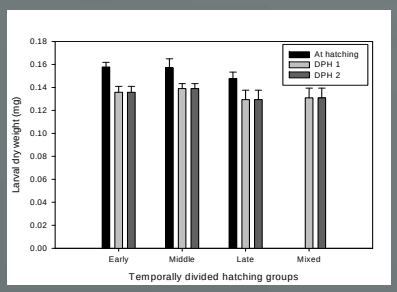
Methodology

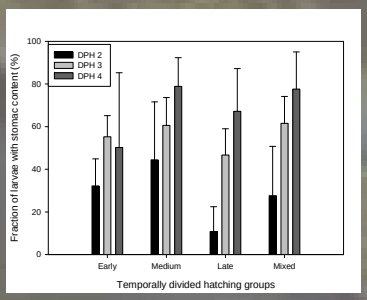
Wild mature pikeperch breeders were obtained from Mossø, Skanderborg, Denmark. Ripe eggs were obtained by stripping females within a few days. When hatching began, the larvae were divided into 4 groups in triplicate, i.e. early hatched, medium hatched, late hatched and a mixed group with equal numbers of larvae from each group. Larval rearing took place in a 12 tank recirculation system, each larval tank holding 150 litres. The larvae were fed AF *Artemia* the first 4 days followed by DHA Selco enriched EG *Artemia* thereafter. *Artemia* were harvested once a day in the morning, and were administered continuously for 3 periods of 6 hours by automatic dispensers holding a suspension of live *Artemia* in seawater. Total prey administration of *Artemia* to the rearing tanks was calculated to 3 Artemia ml -1 at each feeding. DPH 0 is defined as the time when the middle hatching group hatched.

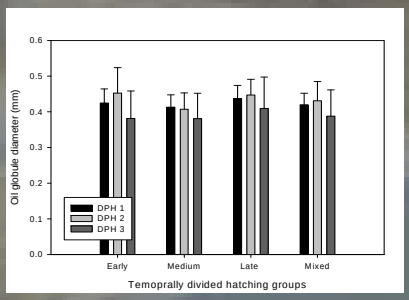
Larval growth

Larval growth estimated as larval length did not significantly depend on time of hatching (Nested Anova; (P> 0.06) On DPH 3 the late hatched larvae were significantly smaller than the medium group (Nested Anova; P=0.01) but this was not considered a consistent effect since it only took place on this day and not was supported by tendencies before or after.
Dry weight at time of hatching, on DPH 1 and on DPH 2 did not significantly depend on time of hatching (Anova P>0.08).









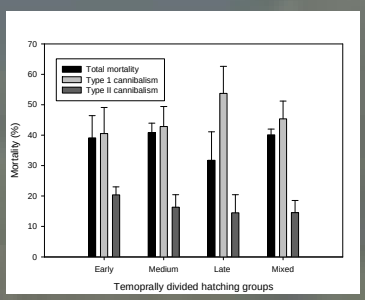
First feeding

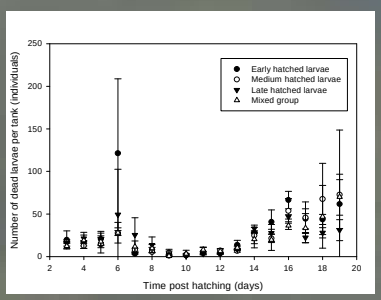
Already on DPH 2 some larvae in all larvae groups had ingested *Artemia*. On DPH 3 the majority of larvae had ingested *Artemia*.
The fraction of larvae with stomac content tid not differ significantly between the hatching groups (Nested Anova;P>0.18).
The diameter of the larval oil globule did not significantly differ between the larval groups (P>0.08). It seems as if larval development takes place at the same rate in pre- and post hatched larvae until all larvae have hatched.

Mortality and stress tolerance

Larval mortality spanned from 31.8 % in late hatched larvae to 40.8 % in medium hatched larvae but the differences between treatments were not significant.

Stress tolerance by confinement in fresh water or seawater did not have any effect on the fish. Full survival was observed in both treatments on both dates i.e. DPH 10 and 20.





Conclusion

Early or late hatched fish seemed to develop simultaneously. No effects of hatching time was identified on growth, time of yolk sack depletion, time of oil globule depletion or time of first feeding. Sensitivity to stress by confinement in 2 litres of fresh water or 10 ppt. seawater also did not differ between the e.g. early and late hatched larvae.
Consequently there seems not to be any beneficial effect of differentiating between larvae within a batch, or of forcing them to hatch within a shortened time interval.

References

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Metcalfe, N. B., Thorpe, J. E. 1992. Early predictions of life-history events: the link between first feeding date, dominance and seaward migration in Atlantic salmon, *Salmo salar* L. Journal of Fish Biology 41:93-99.