STUDY OF THERMAL REGIME EFFECT ON FATTY ACID MOBILIZATION IN EUROPEAN EEL (*ANGUILLA ANGUILLA*, L.) FEMALES DURING INDUCED SEXUAL MATURATION

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Introduction

European eel (*A. anguilla*) is a highly valued species with a high demand both from European and Asian markets. To date, reproduction in captivity has not been achieved and, due to overfishing and environmental conditions, eel populations are decreasing. Many efforts are aimed to study eel reproduction and an important goal is increasing egg quality. Special attention should be paid to fatty acids and energy requirement, as eel is supposed to starve during the reproductive migration. This study focused on the effect of different thermal regimes during sexual induced maturation on fatty acid mobilization.

Material and methods

120 wild European eel females (b.w.: 847±28 g) were caught by local fishermen during reproductive migration to the sea from the Albufera Lagoon (Valencia) and moved to the UPV facilities. Fish were acclimated to sea water in 10 days, maintained one week more at different temperatures (10, 15 or 18 ºC) and then sampled as week 0. Later, hormonal maturation with weekly CPE injections during 12 weeks was performed. Three experimental groups were assessed: T10 group, with temperature increasing from 10 to 15 ºC; T15 group, with temperature increasing from 15 to 18 ºC; and T18 constantly at 18 ºC. Every 4th week samples of muscle, liver and gonad were obtained. Total fat and fatty acid content were determined. Development stages were established by histology.

Results

Eels responded to the treatment, as shown by GSI increase and development stages evolution (data not shown). T10 showed the slowest progression, T15 showed the most gradual progression, while T18 reached the highest GSI and the highest number of specimens in late vitellogenic stage, with a sudden increase in the last four weeks.

Total fat content in muscle decreased in T10 and T18, as evidenced statistically at 12th week, while T15 showed a similar pattern but without significant differences.

In liver, T10 and T15 showed increases in fat content between week 0 and 4, and week 4 and 8, respectively. In T18 liver, fat content increased in the 4th week and decreased in the 12th. As a result, liver fat content was different between treatments at week 12th.

In gonad, the lowest fat content in T10 group was found during the 4th week, T15 did not show changes, while in T18 a fat decrease was recorded during the treatment. T18 group showed the highest gonad fat content at 4th week and the lowest at 12th week.

Monounsaturated fatty acids (MFA) were the most abundant fatty acid group, followed by saturated (SFA) and polyunsaturated fatty acids (PUFA). The high amount of MFA was due especially to oleic acid (18:1n9), which was the most abundant one in all the tissues (in some tissues almost 40%), followed by palmitic acid (16:0) (16-27%).

In gonad of T18 an increase of AA/EPA ratio occurred during treatment weeks, probably as a consequence of an increasing trend of AA and a decreasing one of EPA (although neither of them significant).

Discussion and Conclusion

Hormonal treatment triggered maturation and progression differences among treatments confirmed temperature effect on eel maturation. Proportions among fatty acid classes in muscle were similar to those obtained in males. In female liver, PUFA was the less abundant fatty acid group, while in males PUFA were as abundant as SFA, becoming the most abundant one in the last treatment week (Mazzeo *et al*., 2010).

The decrease of fat content in the muscle (fig. 1A) can be a consequence of starvation and maturation process. No changes in T15 are consistent with results obtained by van Ginneken *et al*. (2005) and Ozaki *et al*. (2008), suggesting that not only lipids are consumed during maturation.

Transport of lipids from muscle to gonad through liver was supported by transitory fat content increase in liver (fig. 1B). During sexual development, liver synthesizes vitellogenin which is delivered to gonad. The increase of the ratio protein/lipid could explain the decrease in fat content in liver and gonad (Ozaki *et al*., 2008), especially evidenced in T18 at 12th week (fig. 1C) because the vitellogenin uptake was faster in this group from week 8th to 12th, when most females reached late vitellogenesis, while the rest of the groups were in middle vitellogenesis, with the exception of one specimen in T15. Fatty acid changes match with development progression due to thermal treatments.

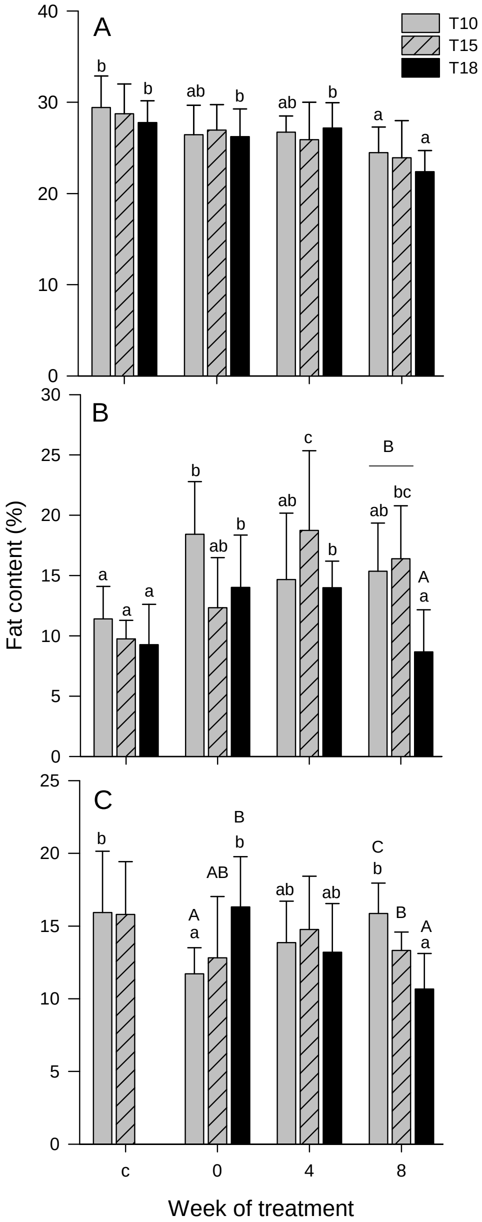

Fig. 1. Changes in the fatty acid content during hormonal treatment in muscle (A), liver (B) and gonad (C). Small letters means differences in a same treatment among weeks. Capital letters mean differences among treatments in a same week of treatment (p<0.05).

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