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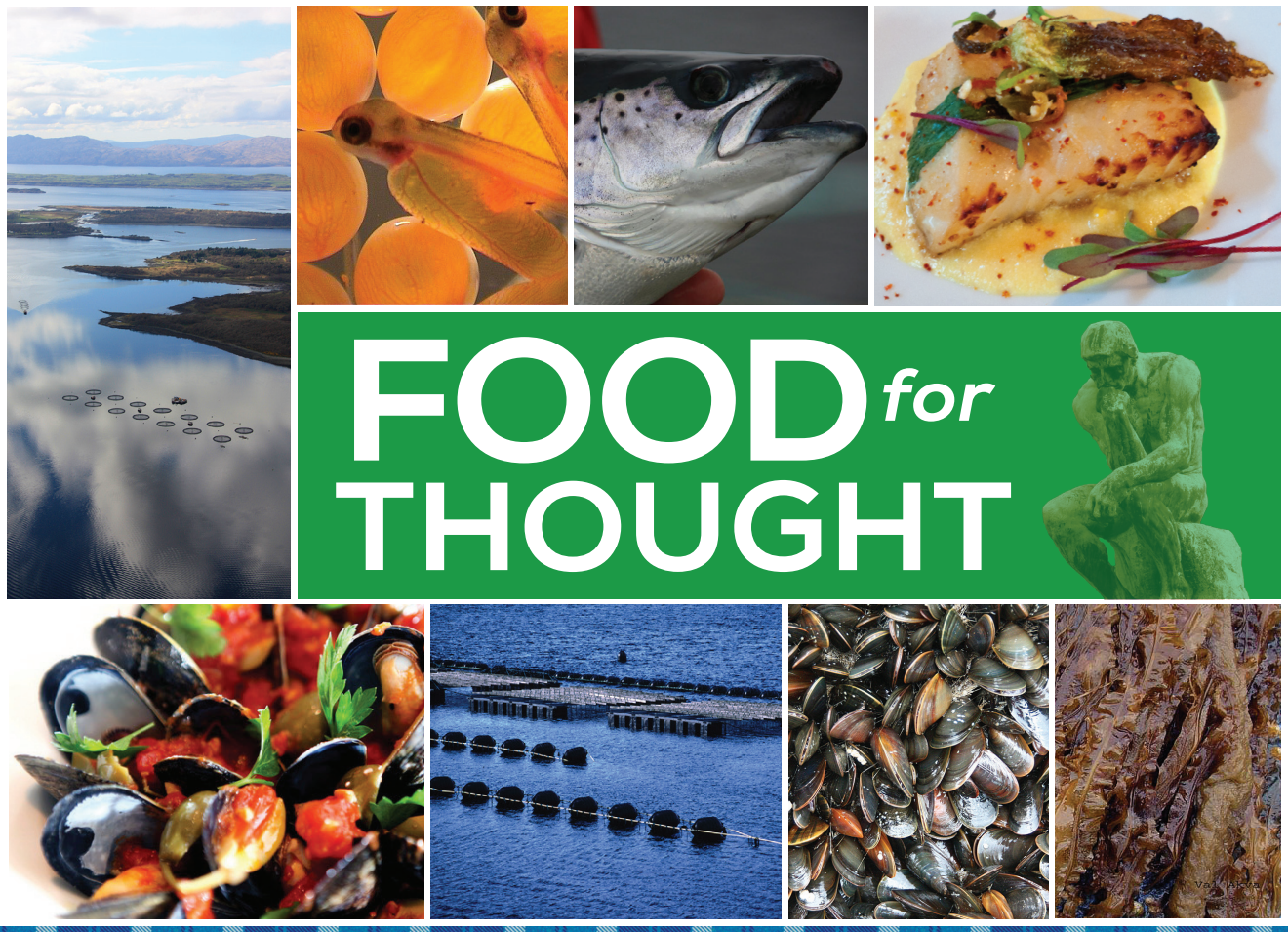


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# ABSTRACTS

# FASTING SHI DRUM (*Umbrina cirrosa*). EFFECT ON BIOMETRY, PROXIMATE COMPOSITION AND RHYTMICITY OF PLASMA METABOLITES

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## Introduction

The Shi drum (*Umbrina cirrosa*) is a fish of the family of meagre (Sciaenidae) of great interest for the aquaculture diversification. Nevertheless, scarce physiological knowledge of the same one exits.

Fasting is an event that occurs on a regular basis in the life of many species, especially in winter, and even in fish farming. The study of fish responses to this situation provides basic knowledge on its physiological characteristics and response to the environment.

This study focuses on the effect of starvation on the proximate body composition, biometry and circadian rhythms of plasma metabolites of the animal; since these will reflect the adaptive metabolic changes to face a fast prolonged period of fasting.

## Material and methods

Specimen of *Umbrina cirrosa* of 206.3 ±1.7g of average body weight and 20 months of age, were distributed in 6 tanks of 2000L of capacity (60 fish per tank) provided with an open circuit of seawater (14.0±0.2°C, salinity 37‰ and photoperiod 12 l:12O).

Three tanks were fasted for 4 weeks, while that the other three were fed to satiation twice daily (9.00 h and 14.00 h), with a meagre commercial diet (brute protein 47.2%, fat 19.9%, minerals 6.1% and NFE 23.0%). After four weeks, fishes were sampled for 24 hours, at intervals of three hours (six fish of each experimental situation).

Blood was extracted from the caudal vein with a heparinized syringe, after sedation and sacrifice of fish by skull concussion. The blood was centrifuged at 1000xg for 10 minutes; plasma was separated and preserved at - 80 °C until analysis. Also nine fish were sampled at the start and at the end of experimental period; they were weighed and sized, dissected and liver and digestive tract weighed, and later used for the study of body composition.

The analysis of total lipids (LT), triglycerides (TG) and glucose (Glu) were carried out using commercial kits (LabKit, 30345, 30360 and 30333 respectively), while that amino acids (Aa) were determined by Ninhydrin colorimetric method and proteins (Prot) by the method of Bradford.

The analysis of proximate body composition was carried out on meal of fish, obtained by ground fish with blade mill after drying at 105 ºC. On these meals measurements of spectral reflectance (FORS) were realized by means of a portable spectroradiometer (FieldSpec ® Pro JR A 110080, Analytical Spectral Devices Inc., Boulder, CO), with a range of spectral reflectance of 350-2500 nm and a sampling interval of 1 nm. Previously the white level was calibrated with a Spectralón of reference (9 cm diameter) with 100 % of capacity of reflectance. Four spectra were captured by sample of fish. The samples of composition were compared through analysis of principal components (PCA) with The Unscrambler® software v.9.8 (CAMO). IBM software SPSS statistics 20.0 was used to carry out ANOVA and Tukey test on the temporal evolution of the data and Student's t test for comparison between two means.

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**Results and discussion**

Previously, we used multivariate analysis of partial regression by least squares (LSPR) between the spectral footprint of shi drum and their analytical values of proximate body composition, to calculate multiple regression equations in order to perform FORS chemometry of animals.

Principal components analysis of spectral footprint separates clearly fish fasted from fed ones. This difference is mainly based on the fat content of the fish that comes down from 22.3 to 16.2 g.100 $g^{-1}$ dm. There are also significant relative increases (though smaller) in protein content and in minerals. The lipids have been the main source of metabolic energy during the starvation period. Attending on the changes of composition and weight, *Umbrina cirrosa* seems to consume more energy for maintenance than other species of farmed fish in similar situations.

The biometric indices, Hepatosomatic Index (HIS) and Digestosomatic Index (DSI), indicate a use of the fat around digestive tract, as well of the hepatic reservations. So the liver of this species seems to represent an important functional reserve of lipids.

The studied metabolites, Glu, LT and TG, showed lower average values in plasma in animals after fasting. This fact has been previously reported in other cultured fishes under fasting. But plasma proteins show no change, while the plasma amino acids are increased significantly. This seems to indicate that after 4 weeks of starvation, lipids reserves have reached a critical value and the animals passed to the "third phase" of fasting, beginning to mobilize proteins and using amino acids as main energy source.

All metabolites studied in feeding conditions presents circadian rhythmicity. LT and TG display their acrophase during the dark period of day (scotophase); however, Glu, Aa and Prot reaches their higher value during the photophase. Interestingly, starvation suppresses the daily oscillations of plasmatic Glu, LT and TG values, but not of Aminoacids and protein ones. The plasmatic rhythms of amino acids and proteins are in phase between themselves and the fasting does not modify its phase. These changes are thus of endogenous nature and are not track with feeding, although they it might be with the photoperiod.

For the rest of metabolites measured, the question remains open as to whether the removal of its rhythms are due to the absence of the feed itself (of which would depend upon or which would be track) or to the depletion of lipids reserves.

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