Deliverable D5.2

Calibration of physiological sensors technologies

Electronic sensors are significantly improving the possibility to monitor fish condition and are emerging as key sources of information for improving aquaculture management practices. The goal of this part of the project is to exploit the potential of Internet of Things (IoT) to address the challenges of a sustainable and resilient aquaculture system that ensures profitability, maintains healthy aquatic ecosystems and strengthens capacity for adaptation to climate change.

Enhanced biological (e.g. behaviour, activity, energetic, feeding physiology) sensor data, collected by on-board electronic tags, will provide accurate fine-scale measurements of fish health and welfare during the large-scale demonstration activities in the project.

To this purpose, we firstly need to establish a baseline of information, for each of the target species, regarding:

i) muscular activity patterns linked to oxygen consumption;
ii) mass specific standard metabolic rate (SMR);
iii) maximum metabolic rate (MMR).

The results of the tests carried out with sea bream demonstrate that the fish size represents a critical factor for both the swimming activity and its relative energetic costs. Indeed, juveniles fish showed a more efficient oxygen consumption rate than adult ones at any given swimming speed. Also the critical swimming speed (U_{crit}), which is an indicator of the mass-specific costs of locomotion, resulted positively correlated with the fish size.

In order to find a calibration model of the tailbeat tag activity as a function of the i) critical swimming speed, ii) oxygen consumption and metabolic rate, iii) electromyograms, the acceleration of fish was measured by implanted tailbeat accelerometer tags. These tags will be extremely helpful to provide accurate information on the fish physiological state during the large-scale demonstration activities.

About Work Package 5

In Work Package 5 we are committed to develop and test a multiplatform tracking system for simultaneously monitoring the impact of innovative diets on fish health and welfare, as well as the main parameters of the environment where they are farmed, by using a wireless communication system.

To know more, please contact the WP5 Leader: Giuseppe Lembo (e-mail: lembo@coispa.it)

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