WHO IS CARRYING OUT THIS ACTION?

CIIMAR - Interdisciplinary Centre of Marine and Environmental Research - is a leading research and advanced training institution of the University of Porto (Portugal), working at the frontier of Ocean Knowledge and Innovation.

CIIMAR fosters an integrated approach to Ocean and coastal areas promoting the un-derstanding and knowledge of Biological, Physical and Chemical dynamics of these environments and the impact of natural and human activities, aiming to unravel the links between these processes, grasp Ocean and ecosystems functioning and responses to Global Changes.

ciimar
Interdisciplinary Centre of Marine and Environmental Research

ABOUT ACCESS2SEA

Aquaculture has the potential to boost economic development and job creation especially in the seafood sector by the sustainable exploitation of the Atlantic Area natural assets. Creating new sustainable farms is a key element for the blue economy in the region.

ACCESS2SEA improves the attractiveness of the Atlantic shore for aquaculture SMEs by enabling new business opportunities and providing sustainable and easier access to it.

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COMPETITIVE AND SUSTAINABLE BLUE GROWTH IN THE ATLANTIC AREA

PILOT 5
FEED INTAKE SIMULATION MODEL

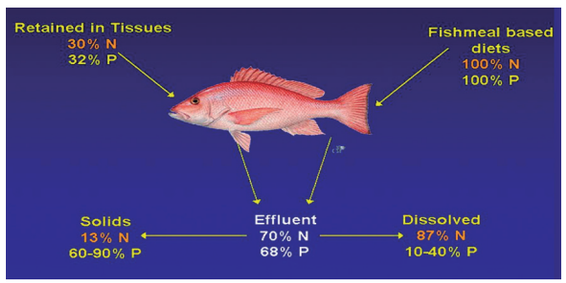
WHAT IS THE MAIN OBJECTIVE OF THIS PILOT ACTION?

As the aquaculture activity has been expanding, its commercial success is overshadowed by the growing impact that this sector has had on marine and coastal resources through the discharge of pollutants.

Over 50% of the nitrogen supplied through the aquafeed is lost to the aquatic environment, either directly from the unconsumed feed or from the oscillations in fish feed efficiency due to environmental changes and feed quality (Figure 1).

Since the production of fish biomass is ultimately based on the feed consumption of individual fish, a model that can simulate feed consumption on the basis of available fish species reared under different husbandry conditions (e.g. water quality, diet composition and feeding strategies) would be extremely useful to reduce waste discharges from aquaculture fish farms.

During the past decades, several explanatory simulation models for fish growth of a wide variety of freshwater species have been developed from basic concepts underlying growth. To date, limited predictive tools were developed for marine fish species using regulatory mechanisms controlling feed intake. Feed intake is an essential input for any explanatory model of fish growth processes. Understanding how fish control their feed intake may help the aquaculture sector designing feed and feeding strategies to optimize production, minimizing feed waste. However, little effort has been devoted to the prediction of maximum feed intake in marine fish under different husbandry conditions.

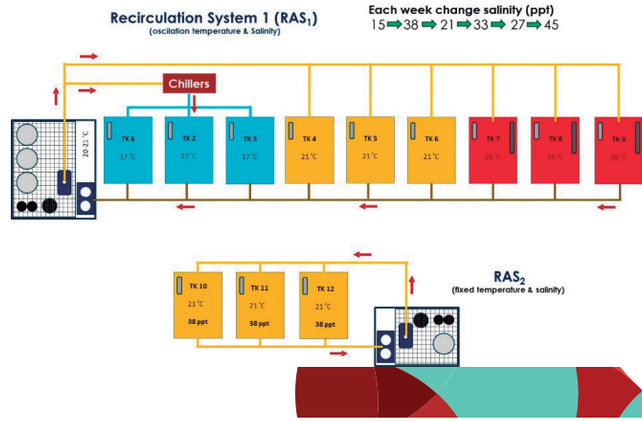


FATE OF NITROGEN (N) AND PHOSPHORUS (P) IN FEED (FIGURE 1)

HOW WILL IT BE CARRIED OUT?

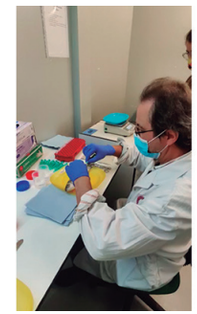
The Pilot Action 5 of WP7 is inserted in the strategy for development of the Aquaculture in Portugal, the so called Operational Program Fisheries 2007 -2013 (PROMAR) (Portaria n.º 424-B, 13 of June 2008). Among a wide range of factors involved in feed intake regulation, water temperature and salinity are the main variables. The overall hypothesis is that feed intake and conversion rates are tightly linked to fish size and water temperature and salinity.

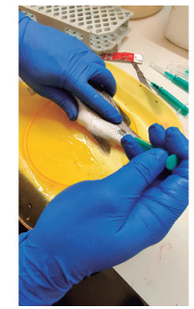
The aim of Pilot Action 5, that will be led by CIIMAR, is to minimize the waste of unconsumed fish feed and reduce the operational costs, by developing a simulation model based on experimental data. The model foresees feed intake, by considering some of the regulatory mechanisms related to water temperature and salinity. This supportive tool intends to provide information and guidance for the aquaculture stakeholders to optimize fish feeding, through minimum waste production and reducing production costs.
In this regard, three fish trials are being carried out for 18 weeks (6 weeks per trial) at the fish facility of CIIMAR (Matosinhos, Portugal). In these trials, the cross-effects of water temperature (17 ºC, 21 ºC, and 26 º C) and salinity (15, 21, 27, 33, 38, and 45 ppt) are being tested, using twelve tanks of 200 L, distributed in two Recirculation Aquaculture System.

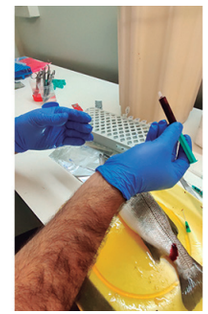


The following fish size range were selected: trial 1 (20-50 g) trial 2 (80-150 g) and trial 3 (200-280 g). The size range were selected to be within the pre-commercial sizes. The RAS 2 system is running in parallel with RAS 1 (oscillatory condition), in which three tanks have fixed temperature (21 ºC) and salinity (38 ppt), used as a control condition.

At the end of each fish trials, we are carrying out tissue samplings to perform a variety of biochemical analyses. Such results are complementary to the predictive model output.







EXPECTED RESULTS

Minimize the waste of unconsumed fish feed and reduce the operational costs, by developing a simulation model based on experimental data on some of the regulatory mechanisms of feed intake as a tool for providing information and guidance for the aquaculture stakeholders to minimize waste and reduce production costs.