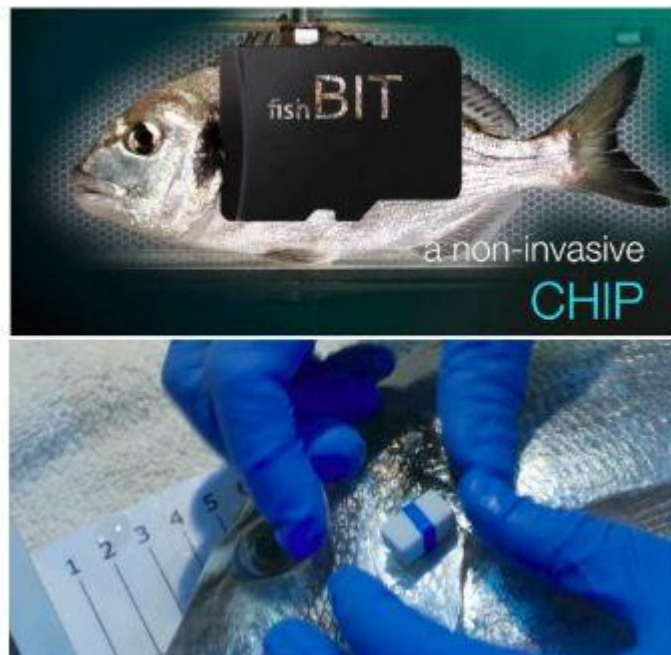


Researchers develop intelligent device to monitor behavior of farmed fish

Researchers from the Spanish National Research Council (CSIC) are carrying out the proof of concept of a device that measures the physical activity and respiration frequency of farmed fish.



Researchers from the Institute of Aquaculture Torre de la Sal of the CSIC, the Microelectronics Institute of Barcelona and the National Microelectronics Center, and from three Institutes (IU-ECOQUA, IUMA and iDetic) of the University of Las Palmas de Gran Canaria, have developed an intelligent device to individually monitor, in a non-invasive way, the accelerations and the respiratory frequency of the fish in aquaculture farms.

The results of the research study, which can be applied to improve the production and welfare of farmed fish, are published in the journal *Frontiers in Physiology*.

Biosensor technology is increasingly used as a non-invasive measurement system in experimental studies related to health, animal welfare and genetic selection. The AEFishBIT device has been developed within the framework of the European project AQUAEXCELH2020, funded by the framework program H2020,



thanks to the collaboration of biologists, computer scientists and engineers from the CSIC and the University of Las Palmas de Gran Canaria.

CSIC researcher and project leader Jaume Pérez Sánchez explains that the new device is composed of an accelerometer, a microprocessor, a small battery and a passive identifier that associates each device with a specific individual.

"The current version of the prototype is small, with a maximum weight in the air of approximately one gram, once encapsulated for complete isolation of the aquatic environment in which the measurements are made," he details.

Researchers from the Torre de la Sal Institute of Aquaculture have carried out several tests with the AEFishBIT device on young specimens of sea bream and sea bass. The device is implanted in the operculum of the fish - the external bone plate that covers the gills - to measure the accelerations of movement in the X and Y space axes, which allows to know the physical activity. The device records the beats of the operculum on the Z axis, which serves as a measure of the respiratory rate. The anchoring of the device is very simple and it is done using a metal clip that allows the device to be immobilized as if it were just another part of the animal's body.

Exercise tests

"We have carried out exercise tests in metabolic chambers with the studied fish and we have observed that oxygen consumption by animals subjected to different degrees of exercise increases to maintain their position swimming against the current. In parallel, oxygen consumption also increases, both types of measures being highly correlated with the records provided by the AEFishBIT device," adds Jaume Pérez Sánchez.

Data processing is carried out by means of algorithms loaded in the device itself, which minimizes the consumption of memory and energy. In this way, the autonomy of the system is six hours of continuous recording, with the possibility of different programming times over a few days or several weeks.

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