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Nationality: Spanish
Date doctoral degree: 10/03/2022

Orientation: Sustainable Use of Marine Resources
Specialization Area: Aquaculture
Research Area: 2.9 Feeding and nutrition in aquaculture

PhD project: **Characterization of amino acids and ketone bodies sensing systems in fish. Involvement in the control of food intake.**

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Summary: Food intake is a process regulated by several factors. At central level, in hypothalamus, different nervous signals, endocrine and metabolic are integrated in order to regulate food intake. Regarding metabolic signals, it has been demonstrated that different amounts of determinate nutrients increase or decrease food intake. In hypothalamus there are different nutrient sensing systems, which, when they are activated, modulate the expression of orexigenic and anorexigenic neuropeptides, respectively. In fish it has been characterized at central level sensors of glucose and fatty acids, but it is unknown the presence of amino acid or ketone bodies sensors. As for other nutrients, the increase in levels of specific amino acids such as leucine, inhibit food intake in mammals. This process occurs through activation of amino acid sensing systems mediated by activation of mTOR and/or inhibition of signaling pathway of AMPK, or by activation of metabolism of branched-chain amino acid. Moreover, deficiency of essential amino acid triggers an increase in food intake through systems mediated by control of GCN2 and eIF2alfa. In fish, it has not been studied the presence and functioning of putative amino acid sensing systems, nor the relation with the control of food intake. Its presence in central areas which regulate food intake is reasonable, considering that most of fish are carnivorous, and strongly dependent (much more than omnivorous mammals in which most studied has been made) of diets with protein/amino acids. Available studies in fish only demonstrated in peripheral tissues such as muscle or liver effects of changes in amino acids in mRNA abundance of mTOR. On the other side, an increase in levels of ketone bodies stimulate food intake. In mammals some possible mechanisms have been postulated, however in has not been characterized until now.
For this reason, the aim of this thesis is characterize possible amino acids and ketone bodies sensing systems and their relation with food intake using rainbow trout (Oncorhynchus mykiss) as model of teleost fish.