Effect of partially protected butyrate used as feed additive on growth and intestinal metabolism in sea bream (*Sparus aurata*)

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Abstract: Butyrate is a short-chain fatty acid extensively used in animal nutrition since it promotes increases in body weight and other multiple beneficial effects on the intestinal tract. Although such effects have been demonstrated in several species, very few studies have assessed them in fish. On the other hand, little is known about the metabolic processes underlying these effects. In the present work, growth parameters and changes in more than 80 intestinal metabolites (nucleotides, amino acids and derivatives, glycolytic intermediates, redox coenzymes and lipid metabolism coenzymes) have been quantified in juvenile sea bream fed a butyrate-supplemented diet. Results showed a significant increase in the weight of fish receiving butyrate, while metabolomics provided some clues on the suggested effects of this feed additive. It seems that butyrate increased the availability of several essential amino acids and nucleotide derivatives. Also, the energy provision for enteric cells might have been enhanced by a decrease in glucose and amino acid oxidation related to the use of butyrate as fuel. Additionally, butyrate might have increased transmethylation activity. This work represents an advance in the knowledge of the metabolic consequences of using butyrate as an additive in fish diets.

Keyword: Butyrate, Sea bream, Metabolomics, Amino acids, Growth