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Effect of Diets with Different Non-Starch Polysaccharides Profiles on Gilthead Seabream (*Sparus aurata*) Growth and Appetite Regulation

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Abstract

Plant feedstuffs are the most established alternative to fish meal in the feed industry but although being readily available and economically viable, the presence of non-starch polysaccharides (NSPs) might impair their use.

Accounting the NSP profile of plant feedstuffs, a gilthead seabream (*Sparus aurata*) growth trial was run testing five isolipidic and isoproteic plant feedstuffs-based diets with 30% inclusion levels of soybean rapeseed, sunflower, or a mixture of these ingredients (10% each), and a control diet with none of those ingredients.

Growth and nutritional performance were assessed, and intestinal short chain fatty acids (SCFAs) were estimated as an indicator of gut microbiota metabolism. Moreover, appetite-related gene expression was evaluated in the hypothalamus, stomach, liver, and anterior intestine.

No mortality was recorded during the study, and no significant differences in growth parameters, feed utilization, body composition, and visceral somatic index were found among dietary treatments. Hepatosomatic index, lipid retention, and liver lipid composition results highlighted the role of dietary carbohydrates in liver lipid deposition, being significantly higher in fish fed the Control diet which possessed the highest starch level.

Acetate was the only SCFA detected with significantly higher concentration in the gut content of fish fed the Sunflower and Mix diets than in fish fed the Control and Rapeseed diets. Regarding appetite-related gene expression in hypothalamus, cocaine and amphetamine regulated transcript, neuropeptide Y and agouti-related peptide presented the same expression across treatments. In liver and stomach significant differences were not detected for leptin and ghrelin expression, respectively. In the anterior intestine, despite cholecystinin relative gene expression did not present significant difference, it underlined a similar trend to peptide YY where Soybean, Sunflower, and Mix diets presented significantly higher relative gene expression than in fish fed Control diet.

In conclusion, gilthead seabream presented a good performance when fed the plant feedstuffs-based diets rich in dietary fiber and NSPs. The diverse plant feedstuffs-based mixtures affected specific metabolic pathways, and microbial metabolism potentially affected appetite-related gene expression.