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## 1H-NMR METABOLOMIC INVESTIGATION OF THE EFFECT OF ALTERNATIVE DIETS ON *Rainbow trout* PLASMA PROFILES

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Fish farming needs high quality feeds to support the growing global demand for fish. Over the last two decades, the development of sustainable feeds based on plant feedstuffs has strongly reduced the use of marine resources. However, full plant-based feeds still reduce growth performances in carnivorous species such as salmonids. Thus, active research programmes are conducted on alternative feedstuffs in order to provide sustainable feeds for aquaculture especially trout farming.

Our project aims at establishing a link between feed composition and plasma metabolome of rainbow trout (*Oncorhynchus mykiss*) through *i*) the characterization of plant-based diets devoid of marine resources complemented with insect, micro-algae or yeast products, and *ii*) the analysis of trout plasma metabolome fed these alternative diets.

Fish were fed *ad libitum* for three months with nine, iso-proteic and iso-energetic experimental diets: a control plant-based diet (PB) and eight diets containing 5%, 10% and 15% of either insects (INS), micro-algae (SPI) or yeast (YST). Ethanolic extracts of diets were prepared and analysed. Fish blood was collected 48 h after feeding and centrifuged to obtain plasma. The 1D <sup>1</sup>H-NMR profiles of both diet extracts and plasmas were acquired on a 500 MHz NMR spectrometer. Spectra were processed to select and integrate spectral regions with NMRProcFlow ([nmrprocflow.org](http://nmrprocflow.org)) and statistical analyses were realised with BioStatFlow webtool ([biostatflow.org](http://biostatflow.org)).

Diet extract <sup>1</sup>H-NMR spectra showed specific compounds for INS and SPI diets compared to PB. These signals were related to triglyceride residues and organic acids and account for the origin of feedstuff and the effect of process. Multivariate analysis of plasma spectral data showed a classification of individuals based on diets according to highly discriminant signals variables. Several specific signals showed an increasing trend with graduate incorporation of alternative feedstuffs.

Integrative metabolomics combining diet and trout plasma characterization highlights the significance of the soluble fraction of alternative diets and their extended impact on plasma metabolome.

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