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EcoXtract® green solvent increases rainbow trout performances and decreases susceptibility to VHSV

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The Farm to Fork Strategy of the European Green Deal strategy aims to make food systems fair, healthy and environmentally-friendly. The sustainability of aquaculture production has to face several challenges among which the maintenance of fish health and welfare, the fight against outbreaks of infectious diseases and the need to develop alternative fish feeds protecting the environment and the biodiversity. Soybean meal (SBM) is a common alternative, whose processing is based on hexane extraction. In 2021, 2-methyloxolane (EcoXtract®) was described as an alternative green solvent for production of soybean oil and defatted meal. Our study aims to evaluate the impact of the solvent used and SBM inclusion level on rainbow trout. Fish were monitored for survival, growth performance, digestibility of SBMs and diets, metabolism, gut health and robustness to infectious challenges. The results showed that fingerlings fed EcoXtract-extracted SBM presented statistically higher performance than those fed hexane-extracted SBM, with higher increasing at 15% inclusion rate. No significant effect was detected on the growth in juveniles, although, differences in gene expression were revealed for glycolytic and lipogenesis pathways in fish fed diets containing 40% SBM, likely related to the lower level of starch in these diets. Experimental infections of fingerlings by immersion with *Flavobacterium psychrophilum* did not reveal difference in fish susceptibility for the inclusion rates and the extraction methods. In contrast, fingerlings fed EcoXtract-extracted SBM showed significantly lower susceptibility to the viral haemorrhagic septicaemia virus compared to those fed hexane-extracted SBM, with a stronger phenotype at 15% inclusion rate. Analyses are in progress to evaluate the impact of these diets on the microbiota and the intestinal health of fingerlings by using innovative 3D histology method.

Environmental impact of aquafeed for rainbow trout containing alternative protein meals

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The study analysed the effect on global warming potential (Life Cycle Assessment) of the partial replacement of fishmeal (from by-products) by alternative protein meals in diets for rainbow trout. A total of 1,020 trout (17±7.5 g) were fed four diets (three tanks per diet) with fishmeal being partially substituted by alternative protein meals: a control diet (FM) with 307 g/kg fishmeal and three alternative diets where about 40% of fishmeal was replaced with poultry by-product meal (diet PBM), feather meal (diet FeM), or feather + rapeseed meals (diet FeM+RM). All diets contained also rapeseed oil, soybean protein concentrate and bacterial protein meal, among other ingredients. Final weight (191 g) and feed conversion ratio (1.05) did not differ among diets. The system boundaries included the impact of aquafeed production; 1 kg increase of fish was used as functional unit. Global warming potential, without (GWP) and with (GWP_LUC) emissions due to land-use change were calculated. Impact values were analysed by ANOVA with diet as a fixed effect. No differences among diets were found in term of GWP (1.74±0.07 kg CO_2-eq, on average) and GWP_LUC (2.75±0.10 kg CO_2-eq). In all diets, the major contribution to global warming was due to ingredients different from the four protein meals tested, i.e. rapeseed oil (25 and 31% of the total impact for GWP and GWP_LUC), followed by soybean protein concentrate (10 and 23%) and bacterial protein meal (20 and 12%). Among the protein meals tested, fishmeal provided the highest contribution (14% GWP and 9% GWP_LUC), while the contribution of the three alternative protein meals was limited (0.3 and 0.3% for poultry by-product meal; 2.8 and 1.8% for feather meal; 1.7 and 1.4% for rapeseed meal). In conclusion, the tested alternative protein meals are promising and sustainable ingredients for trout aquafeeds guaranteeing good growth rates and, compared to fishmeal from by-products, a lower contribution to global warming.