Dietary oil modulates fatty acid profile in disease challenged barramundi

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There are interactions between fish lipid profile and their health and physiology. Fatty acids (FA) are required for normal growth and development and are important in immunity modulation and disease resistance. The *n*-3 and *n*-6 long-chain polyunsaturated fatty acids (LC-PUFA) affect immune response partly by affecting cytokine secretion and pro-inflammatory factors. Using plant oils, such as *Echium plantagineum* oil (EO), instead of fish oil (FO) in barramundi feed formulations may be useful as EO has potential to provide a precursor for synthesis of LC-PUFA. However, the immune system could be impaired as a result of changing the FA profile of fish fed on alternate oils. We therefore investigated the changes of FA depots in disease challenged barramundi fed on EO instead of FO on bacterial infection. Worldwide, bacterial infection with *Streptococcus iniae* is responsible for significant mortalities of warm water aquaculture species including barramundi. Fingerlings (50±2g) were kept at 30°C, 15 ppt salinity, 24 h light photoperiod and fed one of three dietary treatments differing only in their lipid source: FO, EO and canola oil (CO). Following 5 weeks, fish were challenged with *S. iniae* ($1\text{-}2\times10^5$ cfu/ml bathing exposure) causing sub-acute infection. FA profiles in muscle were compared in initial fish and after one week of challenging when fish showed signs of recovery. Feed intake dropped initially in infected fish and was paired with the control group which remained intact. Similar growth ratios were observed in all dietary treatments during the experiment as well as equal mortality rates following the bacterial infection, with EO-fed fish retaining SFA, MUFA, *n*-3 and *n*-6 PUFA depots better than FO and CO. When compared with the control group, fish fed alternatives to FO showed a comparable ratio of utilising *n*-3 and *n*-6 LC-PUFA depots while challenged and sustained the *n*-3: *n*-6 ratio through the infection period. These findings indicate efficient growth, survival and lipid metabolism in barramundi fed on plant oils as alternatives to FO with capacity to sustain flesh quality in unfavorable production conditions such as when bacterial infection occurs.

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