



The effect of non-starch polysaccharide composition and enzyme supplementation on growth performance and nutrient digestibility in Nile tilapia

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High levels of non-starch polysaccharides (NSP) and phytate in aquafeeds can affect the performance of fish through reduced nutrient digestibility. Results of studies assessing the effect of exogenous enzymes to enhance nutrient digestibility and improve growth are not always consistent. This could be through a mismatch between the supplied enzymes and the diet composition (e.g. type of enzymes specific to the substrate and their ratio). The presented study investigated, whether nutrient digestibility is affected by enzyme supplementation and if this effect is depended on the NSP composition.

An experiment with a 2 x 4 factorial design was used to test the above. Four diets were formulated differing in type of NSP by adding wheat bran (WB, 25.5%), sunflower meal (SFM 27.5%) and citrus pulp (CP 20%) to the reference diet (REF). The reference diet was formulated to be low in NSP and used as control diet. The ingredients were chosen for their high NSP content and their contrast in NSP composition; WB being relative rich in hemicellulose, SFM in cellulose and CP in pectins, respectively. These four diets were either supplemented with a placebo (demi water) or enzymes (phytase, 1000 FTU/kg and xylanase, 4000 U/kg). In total 24 tanks (3 replicates/treatment) were used with 30 (mean initial body weight 41g) fish each. Fish were restrictively fed the experimental diets by hand twice daily for 43 days. Hereby measuring growth and nutrient digestibility.

Factorial analyses showed that diet and enzyme supplementation affected growth ($P < 0.05$). The nutrient digestibility was affected by the NSP composition ($P < 0.05$) except for the starch and calcium digestibility. The NSP, energy, ash, phosphorous and calcium digestibility improved with enzyme supplementation. There was an interaction effect on growth, as well as the digestibility of energy and phosphorus ($P < 0.05$). This indicates that the effectiveness of the applied enzymes was dependent on the diet and thus the composition of the NSP fraction. The growth of the fish fed the WB and SFM diets was improved, while the REF and CP diets did not benefit. Therefore it is important that the enzyme supplementation is complementary with the diet composition.