Projects:

**Enzymes in fish feed: Optimization of protein digestibility in fish production (38396)**

The demand for aquaculture products is increasing globally and is expected to keep increasing in proportion with the growth in the global human population. A limiting factor for the expansion of the aquaculture industry is the dependency of fish meal, which is the primary protein source in feed for carnivorous fish (trout, salmon, turbot, cod etc.). Increasing world market prices on quality fish meal is reflected in the price of fish feed, and has intensified the international competition for finding ways to optimise the use of alternative plant-based proteins in fish feed.

Enzymes are catalysts that increase the speed of the processes in which they are involved. A high degree of specificity makes enzymes an excellent tool for increasing specific reactions, e.g. the degradation of complex feed ingredients to digestible nutrients. The addition of enzymes to fish feed has the potential of improving the nutritional value of the feed, reducing production costs and loss of valuable nutrients to the environment. Enzymes are already widely used in feed for broilers and pigs, while only phytases have been approved for commercial fish production.

The objective of this project was to promote the use of industrial enzymes in fish feed as a means to improve the utilization by the fish of existing and/or alternative protein sources. The project consisted of four work packages: 1) Identification of relevant enzymes and feed ingredients; 2) Feed production; 3) Test of feed quality in a digestion model; 4) Data analyses, reporting and preparing publications. Low-grade soybean cake, sunflower cake and rapeseed cake were chosen as alternative plant-based protein sources in three diets. The effects of three exogenous enzymes in liquid form (Ronozyme®VP (β-glucanase, pectinase), Ronozyme®WX (xylanase) and an experimental protease) on nutrient digestibility was examined. The study showed that Ronozyme®VP and the experimental protease were able to significantly improve the nutrient digestibility primarily in the soybean cake diet at doses of 150-300 mg kg⁻¹. No clear effect of RONOZYME®WX on nutrient digestibility was observed with any of the ingredients tested. The overall conclusion of the project was that Ronozyme®VP and the experimental protease have potential to increase the nutritional and energetic value of proteinaceous plant-based feed ingredients in fish feed.

The project was coordinated by DTU Aqua.

National Institute of Aquatic Resources
Section for Aquaculture
BioMar A/S
Novozenes A/S
DSM Nutritional Products

**Research area: Aquaculture**

**Period:** 01/01/2008 → 31/12/2010
**Number of participants:** 6

**Research area: Aquaculture**
**Project participant:**
**Pedersen, Per Bovbjerg (Intern)**
**Poulsen, Erik (Intern)**
**Larsen, Ole Madvig (Intern)**
**Sproegel, Ulla (Intern)**
**Frandsen, Dorthe (Intern)**
**Project Manager, academic:**
**Dalsgaard, Anne Johanne Tang (Intern)**

**Project**