

Processing of Rapeseed into Protein Concentrates and their Usage in Aquaculture Nutrition

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Motivation

The aquaculture industry is already world's most important producer of fish for human consumption. However, its main problem is the provision of suitable and sufficient fish feed, because supply of most important protein source in aquaculture, fishmeal, is a limited resource. Wide availability, low prices, high protein content and a well-balanced amino acid profile have created enormous interest in by-products of rapeseed oil production as starting product for the production of protein concentrates to be used in fish nutrition.

Experimental setup

Small pilot scale processing procedures were performed to produce the rapeseed protein concentrates (RPC). The variety of rapeseed "Lorenz" was used in this investigation. The glucosinolate degrading enzyme myrosinase in the seeds was inactivated by heat treatment. The meal for protein isolation was prepared by pressing and hexane extraction. To avoid protein damage during the desolventizing/toasting, which is the most critical processing step, an innovative gentle meal processing by using a fluidized bed desolventizer was utilized. In order to reduce the antinutritional ingredients the oil free meal was ethanolic extracted. Rapeseed protein fractions were prepared by two-step aqueous extraction procedure, combined with ultrafiltration process to concentrate and purify the proteins, and followed by spray drying.

Results and conclusion

The investigated rapeseed protein extraction process provides rapeseed concentrates with high nutritional value and low values of antinutritive factors. From the nutritional point of view the produced RPC can be compared with the fishmeal. Their amino acid profile reflects the fish amino acid demands. The obtained RPC were utilized for experimental setups of fishmeal replacement in diets for rainbow trout, turbot, common carp and wels catfish. The highest fishmeal substitution level (up to 100 %) was observed in the feeding trials with rainbow trout. Therefore especially in the nutrition of rainbow trout, RPC was identified as an excellent fishmeal alternative.