

# Cobia feed diversification

Douglas Tocher and Xiaozhong Zheng



Dr Xiaozhong Zheng, Dr Douglas Tocher, Professor Zhaokun Ding and Professor Youqing Xu enjoying a moment's relaxation during a recent programme in Nanning

The cobia is an exciting new species currently being developed for aquaculture in several parts of the world including China. It is a warm-water marine fish with a very high growth rate, growing from egg to 6kg in one year, a rate around 3-fold higher than in Atlantic salmon. However, this development is taking place against a background of diminishing global marine resources dictating that the traditional fat source in aquaculture diets, fish oil (FO), be replaced with sustainable alternatives, namely vegetable oils (VO). A major problem though, is that VO lack the long-chain omega-3 polyunsaturated fatty acids found in FO that are essential nutrients for marine fish and highly-prized in human nutrition. Thus, feeding VO may impact on growth rates, fish health and the nutritional value of the final product for the human consumer. Consequently, a team of researchers at IOA, led by Dr Douglas Tocher, are investigating fatty acid metabolism in cobia focussing on the pathways of long-

chain omega-3 synthesis. Key to this work is collaboration with the research team of Professor Zhaokun Ding at Guangxi University, Nanning City, PR China, initiated by the cobia project leader in Stirling, Dr Xiaozhong Zheng, who obtained funding from the Royal Society of Edinburgh (RSE) in the form of an RSE-NNSFC (National Natural Science Foundation of China) Joint Project Grant. This scheme aims to develop and promote research links between Scotland and China. Drs Tocher and Zheng travelled to China in 2007 and trained Prof Ding and his team of post-docs and PhD students in the methods of RNA extraction, purification, and PCR gene cloning. Back in Stirling, Dr Zheng was supported by Drs Oscar Monroig and Sofia Morais, and continued to direct the work in China via e-mail and telephone. As a result of these joint efforts, fatty acyl desaturase and elongase gene cDNAs have been successfully cloned and will be further studied to determine their function and tissue expression in cobia during the reciprocal visit of Prof Ding to Stirling later this year.

While in China, Dr Tocher (with Xiao translating) and Dr Zheng both gave presentations on the application of molecular technologies to the study of lipid and fatty acid metabolism in fish at Guangxi University and also at the Chinese Ministry of Agriculture Feed Industry Centre at the China Agricultural University in Beijing on the return journey. The Feed Industry Centre was a well-funded and equipped facility having

a range of departments, and analytical and research portfolios reflecting our own at the Institute of Aquaculture including external facilities such as an experimental farm, albeit their target species was the pig! However, the Centre also has a pilot-scale feed plant and so the possibility of future collaboration in developing sustainable fish diets was discussed. China is, of course, the world's largest producer of aquaculture products albeit largely through extensive culture. However, intensification of fish farming activities in China must be achieved using sustainable feeds, which will necessitate the use of plant meals and VOs. The present work and the existing and, hopefully, future collaborations with research groups in China will contribute to this aim and help to maintain the pre-eminent and global role of the Institute of Aquaculture, University of Stirling as leading providers of research and teaching activities in aquaculture. Dr Zheng's unique knowledge of both UK and, especially, Chinese systems and customs will be an invaluable asset in this goal.

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## AquaMax Update

Following on from the introductory article in the last edition of *Aquaculture News*, Gordon Bell gives us a further insight into the project which is looking at alternatives to fish meal and fish oil in fish diets.

AquaMax starts from the premise that fish play a unique role in human nutrition and well being, not only for the well known beneficial effects of their long chain omega 3

fatty acids, but also because they are a source of high quality readily digested protein, vitamins including especially vitamins A, D and E, and minerals including selenium and iodine. Fish are quite simply a unique and high quality human food. The specific objectives of the project are being pursued in four separate but inter-related Programmes, each comprised of a series of defined Work Packages (WPs), as follows.

Programme 1, the bed rock of AquaMax, is directed by Professor Sachi Kaushik of the National Institute for Food Research (INRA) at

its laboratories in St Pee-sur-Nivelle in France. The Programme, consisting of 13 individual WPs and 23 participants (detailed on [www.aquamaxip.eu](http://www.aquamaxip.eu)), seeks to develop feeds based on sustainable alternatives to fish meal and fish oil to produce healthy and minimally contaminated fish that are highly nutritious and acceptable to consumers.

The Nutrition Group at Stirling is involved in 9 of these 13 WPs and includes the following; The first involves a 55 week ongrowing trial, the "Lean/Fat trial", and uses strains of salmon smolts from Landcatch Natural Selection