

## **Swimming to optimize production (FITFISH)**

The session 'Swimming to optimize production' was organised as event of the COST Action FA1304 FITFISH: Swimming of fish and implications for migration and aquaculture ([www.fitfish.eu](http://www.fitfish.eu)), with the purpose to introduce the Action and its objectives to the aquaculture community (scientists, industry and policy makers). The session comprised 8 oral presentations and 2 poster presentations that illustrated both the current status of research and applications as the topics that require more attention in order to intensify fish production in sustainable manner by application of swimming exercise.

Optimal swimming speeds for optimal growth can be predicted from oxygen consumption profiling for several salmonids, yellowtail kingfish and zebrafish while seabream shows swimming enhanced growth at lower than optimal swimming speeds. Swimming exercise can be applied to accelerate growth (generally up to 40-50%) and decrease FCR (30% in yellowtail kingfish). The exercise-induced changes in the muscle composition may have important consequences for flesh quality. These changes include hypertrophy and hyperplasia and development of the white muscle towards a more aerobic phenotype. Besides the strong effects on the muscle, swimming exercise modulates the formation and remodelling of the skeleton in growing fish such that they can better cope with mechanical loads. Swimming may extend the growth period by suppression of sexual maturation as indicated for seabass. Aerobic exercise was shown to increase the cardiac capacity of Atlantic salmon and to improve disease resistance, both under experimental conditions in the laboratory as in a 50 m long floating raceway located at a depth of 25 m. The effects of flow and exercise on the 160,000 smolts in the Preline Fishfarming System on seaice specifically, and on FCR, disease and mortality rates in general, were spectacular. Exercise training makes more robust fish that show increased ability to cope with environmental challenges. When applied optimally, exercise increases fish' welfare status by lowering baseline cortisol levels and reducing levels of aggression. A very practical example of the use of swimming exercise for the benefit of aquaculture, particularly in RAS, was how exercise can be used to shorten the period required to depurate geosmin and 2-methylisoborneol from off flavoured European eel and Atlantic salmon. A topic that requires research attention is how to adjust feed formulations for exercising fish.

The presentations again illustrated that exercise can be a tool to farm fit fish in aquaculture and to improve health, welfare, growth and filet quality. The COST Action FITFISH will continue to explore the opportunities for implementation of exercise in aquaculture together with industry and policy makers for the next three years.