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Section for Aquaculture
25/02/2012 → present
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Projects:

Environmental neutral aquaculture water treatment (MIVANAK) (39295)
Despite a transition from flow-through systems to more advanced open water reuse aquaculture systems (e.g. model trout farms), the need for water treatment still exists. In brackish and saltwater reuse systems, blooms of toxic microalgae in an example of a recently new challenge.

The purpose of this project is to further develop current aquaculture water treatment practice and reduce the total amount of disinfectants used.

The project includes 3 different work packages, investigating
- ecological consequences of continuous application of peroxyacetid acid.
- toxicological effects of easy degradable disinfectants.
- alternative biological methods to control / avoid blooms of toxic heterotrophic dinoflagellates.

Trials will include mesocosmos experiments where disinfectants are added continuously or by daily pulses over a prolonged period of time where phyto- and zoo-plankton abundance and compositions will be investigated. Other trials will be made in batch experiments with pure algae cultures, as will prolonged continuous peroxyacid application experiments be made.

This project is coordinated by DTU Aqua.

The project is funded by the Environmental Protection Agency's Programme for Pesticide Research.

National Institute of Aquatic Resources

Section for Aquaculture
Period: 01/08/2015 → 31/12/2017
Number of participants: 9
Research areas: Aquaculture & Marine Populations and Ecosystem Dynamics
Project participant:
Pedersen, Per Bovbjerg (Intern)
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Sproegel, Ulla (Intern)
Frandsen, Dorthe (Intern)
Møller, Brian (Intern)
Larsen, Ole Madvig (Intern)
Jensen, Rasmus Frydenlund (Intern)

Project Manager, organisational:
Pedersen, Lars-Flemming (Intern)

Phd Student:
Rojas-Tirado, Paula Andrea (Intern)

Proteins of the future in feed for recirculating aquaculture systems (ProffAqua) (39274)
There is an increasing shortage of available high quality proteins for feed. More than half of all aquatic species is now produced by aquaculture. Aquaculture production will double in the next 15 years and so will the need for protein into aquafeed. As substantial amount of worldwide wild fish catch is processed into fishmeal and fish oil for feed production, raising concerns regarding the sustainability of this arrangement. The industry’s growing need for feed therefore requires
new approaches. This project focuses on turning waste streams into valuable products. Organic chemicals found in pulp mill streams for cellulose fibre production can be used to grow fungi and turned into Single Cell Proteins (SCP), suitable as protein-rich components in fish feed. Due to the low protein content of waste materials from agriculture and fish processing, this raw material is not suitable for direct use in fish feed. The black soldier fly larvae (BSF) are very efficient in transforming such waste streams into high quality protein and oil ingredients. Based on the available waste streams, several thousand tonnes of both SCP and BSF can be produced at a very favourable price compared to the current price and quality of fish meal.

The role of DTU Aqua in the project is to evaluate BSF and SCP as protein sources in fish feeds by performing digestibility and growth trials using the two types of protein sources at several inclusion level in the diets. DTU Aqua participates in the project by performing feeding trials using contaminated feed for Atlantic salmon and seabass respectively. Furthermore, the project also investigates potential effects of microplastic incorporated into feed pellets, on accumulation and elimination of the selected priority contaminants. The feeding trials consist of a 12 week to 15 week accumulation period for seabass and salmon respectively and a 8 week depuration period where all groups are fed control feed. The results obtained from the trial will be used to develop mathematical models estimating accumulation and elimination of priority contaminants in fish meal.

This project is coordinated by Matís Itd., Icelandic Food and Biotech R&D. This project is funded by Nordforsk, Nordic Council of Ministers.
The project is funded by the Danish Ministry of Food, Agriculture and Fisheries through the Green Development and Demonstration Program (GUDP).

National Institute of Aquatic Resources
Section for Aquaculture
Mycometer A/S
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Period: 01/02/2014 → 01/07/2016
Number of participants: 9
Research area: Aquaculture
Project participant:
Rojas-Tirado, Paula Andrea (Intern)
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Møller, Brian (Intern)
Nielsen, Sara Møller (Intern)
Frandsen, Dorthe (Intern)
Larsen, Ole Madvig (Intern)
Jensen, Rasmus Frydenlund (Intern)
Project Coordinator:
Pedersen, Lars-Flemming (Intern)

Priority environmental contaminants in seafood: Safety assessment, impact and public perception (ECSafeSEAFOOD) (39039)

Seafood has been recognized as a high-quality, healthy and safe food type and is one of the most important food commodities consumed worldwide. However, seafood, like other types of food, can also be a source of harmful environmental contaminants with potential to impact on human health.

The research objectives of ECsafeSEAFOOD have been formulated from the research questions addressed in the specific objectives of the European research programme topic on building a Knowledge-Based Bio-Economy (KBBE.2012.2.4-01: Contaminants in seafood and their impact on public health (The Ocean of Tomorrow)). This topic aims to assess food safety issues related to priority contaminants present in seafood as a result of environmental contamination, including those originating from harmful algal blooms and those associated with marine litter and evaluate their impact on public health. ECsafeSEAFOOD will provide scientific evidence to serve as a basis for further development of common food safety, public health and environmental policies and measures, by seeking to establish a quantitative link between the contamination of the marine environment and that of seafood.

The specific objectives of the ECsafeSEAFOOD project include:
- Monitor the presence of priority environmental contaminants in the environment and seafood and prioritise those that are real hazards for human health.
- Quantify the transfer of relevant priority environmental contaminants between the environment and seafood, taking into account the effect of climate change.
- Study the effect of processing/cooking on the behaviour of priority contaminants in seafood.
- Understand the public health impacts of these chemical hazards, through toxicological characterisation in realistic conditions.
- Perform risk assessment to measure the potential impact of seafood contaminants on public health, using in-depth probabilistic exposure tools.
- Develop mitigation measures for risk managers, such as an online tool for different stakeholders, guidelines, phycoremediation (the use of algae to remove pollutants) and processing.
- Develop, validate and provide new, easy and fast tools to assess the presence of environmental contaminants in seafood.
- Confirm/refine the European Maximum Reference Levels in seafood for contaminants that are real hazards and for which no legislation exists or information is still insufficient.

DTU Aqua participates in the project by performing feeding trials using contaminated feed for Atlantic salmon and seabass respectively. Furthermore, the project also investigates potential effects of microplastic incorporated into feed pellets, on accumulation and elimination of the selected priority contaminants. The feeding trials consist of a 12 week to 15 week accumulation period for seabass and salmon respectively and a 8 week depuration period where all groups are fed control feed. The results obtained from the trail will be the used to develop mathematical models estimating accumulation and elimination of priority contaminants in filet.
The project is coordinated by Portuguese Institute of Sea and Atmosphere (IPMA), Portugal.

This project is funded by EU, Framework Programme 7.

National Institute of Aquatic Resources
Section for Aquaculture
National Food Institute
Portuguese Institute for the Sea and Atmosphere
AZTI-Tecnalia
University of Maribor
Ghent University
National Veterinary Institute
Catalan Institute for Water Research
Institute for Agricultural and Fisheries Research
University of Porto
Institute of Research and Technology in Food and Agriculture
Hortimare Projects & Consultancy BV
Wageningen IMARES
TecnaTox. “Rovira i Virgili” University
Aeiforia Srl
Aquatt
Agency for Marine Research and Valorisation
Polintell
Dan Salmon
Period: 15/02/2013 → 15/02/2017
Number of participants: 3
Research area: Aquaculture
Project participant:
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Project Manager, academic:
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Sustainable technologies to control microalgae in land based saltwater recirculating systems (39032)

Land based salt water recirculating systems is a potential alternative to fish farming in net pens. This purpose of this project was to test different solutions on how to control unwanted microalgae growth thereby addressing a potential challenges associated with land based farming.

A high degree of water reuse and the associated nutrient accumulation may favour growth of microorganisms and thereby deteriorate the biological water quality.

The project included:
- Test of improved mechanical filtration (application of pilot scale protein skimmers on small to medium sized RAS, and application of full scale 4 meter vacuum airlift; an innovative treatment technique tested in full scale RAS)
- Test of chemical water treatment routines using easy degradable disinfectants (Peracetic acid, chloramine-T, hydrogen peroxide) to control and inhibit toxic microalgae,
- Test of electrochemical oxidation disinfection technology to assess the efficacy (radical formation and algicidal effects) of boron doped diamond electrodes.

Numerous batch and pilot scale experiments were made at the section for Aquaculture, Hirtshals. In addition, intensive, diurnal sampling/monitoring and analysis on location was performed on a commercial pike perch RAS facilities facing toxic algae problems.
The project is coordinated by DTU Aqua.

The project was funded by the National Environmental Protection Agency through Programme for Development and Demonstration of Bio-technologies (MUDP).

National Institute of Aquatic Resources
Section for Aquaculture
University of Copenhagen
AquaPri Innovation
Billund Aquaculture Service Aps
Electrocell

Environmental Protection Agency
Period: 01/01/2013 → 30/11/2013
Number of participants: 8
Research areas: Aquaculture & Marine Populations and Ecosystem Dynamics

Project participant:
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Pedersen, Per Bovbjerg (Intern)
Sproegel, Ulla (Intern)
Frandsen, Dorthe (Intern)
Møller, Brian (Intern)
Larsen, Ole Madvig (Intern)
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Project Coordinator:
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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 Ronoyme®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
Novozymes A/S

DSM Nutritional Products
Period: 01/01/2008 → 31/12/2010
Number of participants: 6
Research area: Aquaculture
Project participant:
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Sproegel, Ulla (Intern)
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Project