

project news

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AQUAEXCEL (Aquaculture Infrastructures for Excellence in European Fish Research) is an EU FP7 project that aims to integrate key aquaculture research infrastructures across Europe in order to promote their coordinated use and development.

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AQUAEXCEL Annual Meeting 2014

The 3rd Annual Meeting of **AQUAEXCEL** took place in Vodňany, Czech Republic, from 3-6 March 2014, and was kindly hosted by the Faculty of Fisheries & Protection of Waters of the University of South Bohemia (JU). Forty-six participants attended this 3rd Annual meeting.

The meeting's objectives were to provide all participants with an overview of the progress of the project

so far, to carry out Work Package (WP) workshops in order to establish actions plans, and to prepare **AQUAEXCEL's** presence at the Aquaculture Europe 2014 (AE2014) conference which will be held in October in San Sebastian, Spain.

Results presented at the meeting included: a live demonstration of the experimental data repository solution, with the **AQUAEXCEL** partnership testing the BioWES database to ensure repeatability and correctness of biological experiments; suggestions for actions to further integrate European aquaculture Research Infrastructures; technical solutions, guidance materials and testing protocols for the standardised implementation of the **AQUAEXCEL** e-infrastructure; a new Bio-informatic tool ("Fish and Chips") adapted to enable meta-analysis of microarray data obtained in fish; effects of different sized experimental tanks and cages on performance indicators of Atlantic salmon and sea bass and phenotypic analysis of gynogenetic and androgenetic individuals in salmon, carp and sea bass.

There was a special session with **AQUAEXCEL's** ethics advisor Prof. Felicity Huntingford on isogenic strains and how to maximise the benefits of using them.

On the final day of the meeting, participants visited the JU facilities, which are part of the Transnational Access infrastructures.



AQUAEXCEL 3rd Annual Meeting participants

Development of E-Infrastructures for Aquaculture Research



Gunnar Senneset,
SINTEF

The objectives of **AQUAEXCEL** WP6 are to develop, implement and evaluate technical solutions (e-Infrastructure) for providing remote access to highly specialised aquaculture research facilities, and facilitate cooperation within the consortium. WP6 Leader, Gunnar Senneset, SINTEF, provides background and an update on the progress so far.

Q. What are the benefits of e-Infrastructure solutions?

The **AQUAEXCEL** e-Infrastructure solutions are focused on providing remote access to research facilities in the consortium. The solutions basically consist of three layers:

- A common web portal providing information on available services, login procedures, contact persons, etc., for each facility
- Facility-dependent technical solutions and services for remote access to sensors, video feeds, databases, etc., taking into account the ICT security policies of each facility
- Standardised relational database solution for storing water quality parameters during experiments as a basis for remote access and automated transfer of data

For external users, for example through an **AQUAEXCEL** TNA (Transnational Access) project, this makes it possible to monitor experiments from their own offices. Other benefits can be automated transfer of data, improved communication with local staff, etc. It is worth noting that internal staff can also benefit from e-Infrastructure solutions, as they enable remote access from home or when travelling. While these solutions have so far been implemented and tested for a limited number of facilities, the technical solutions described for the **AQUAEXCEL** e-Infrastructure should also be useful for facility administrators considering implementation of e-Infrastructure solutions for their own facilities.



AQUAEXCEL e-Infrastructure web portal

Q. What technical requirements have you had to take into account when developing the e-Infrastructure?

When starting this work in **AQUAEXCEL**, a survey of all facilities was carried out to get an overview of both the most important functional requirements and the technical infrastructure in each facility. Based on the survey, the main technical requirements the e-Infrastructure must provide can be summarised as follows:

- Accommodate a wide range of systems
- Suitable for a wide range of bandwidths
- Handle various data formats

There are also organisational constraints to consider, for example security policies concerning remote access and what kind of data should be accessible. In practice this means that each facility will be responsible for its own user administration and for maintaining technical solutions for remote access.

Q. What effect has the creation of the e-Infrastructure had on the day-to-day operations at the different facilities?

So far, five facilities are accessible through the **AQUAEXCEL** e-Infrastructure website. The actual process with systematic analysis of requirements, installation and testing has been useful in itself. In addition to being available for the facilities' own staff and students, the solutions are also ready for use in TNA projects. As a concrete example, the cooperation between NOFIMA and SINTEF/ACE in **AQUAEXCEL** research activities has benefited from the e-Infrastructure, making coordination between tank and sea cage experiments much more efficient. One research task was to evaluate the performance of salmon (growth, survival and feed utilisation) using different experimental scales (different tank sizes and industrial scale sea cages). The daily transfer of temperature data and feeding data from SINTEF/ACE to NOFIMA was automated in order to obtain the same experimental conditions in the tanks as in the sea cages.



Facilities open for TNA access using e-Infrastructure

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Q. What impact has the e-Infrastructure had on facilitating collaborations and standardising experimental design across the different institutions?

The work on development and testing of technical solutions has actually benefited from the e-Infrastructure. The solution for document sharing implemented by IMARES has been used for collaboration on reports and other documents, making the development more efficient. The same goes for developing the common web portal, where all partners have entered and edited information about available services and logon procedures. As mentioned earlier, the e-Infrastructure also facilitated a common protocol for experimental conditions in the tank and sea cage salmon experiments done by NOFIMA and SINTEF/ACE, respectively.

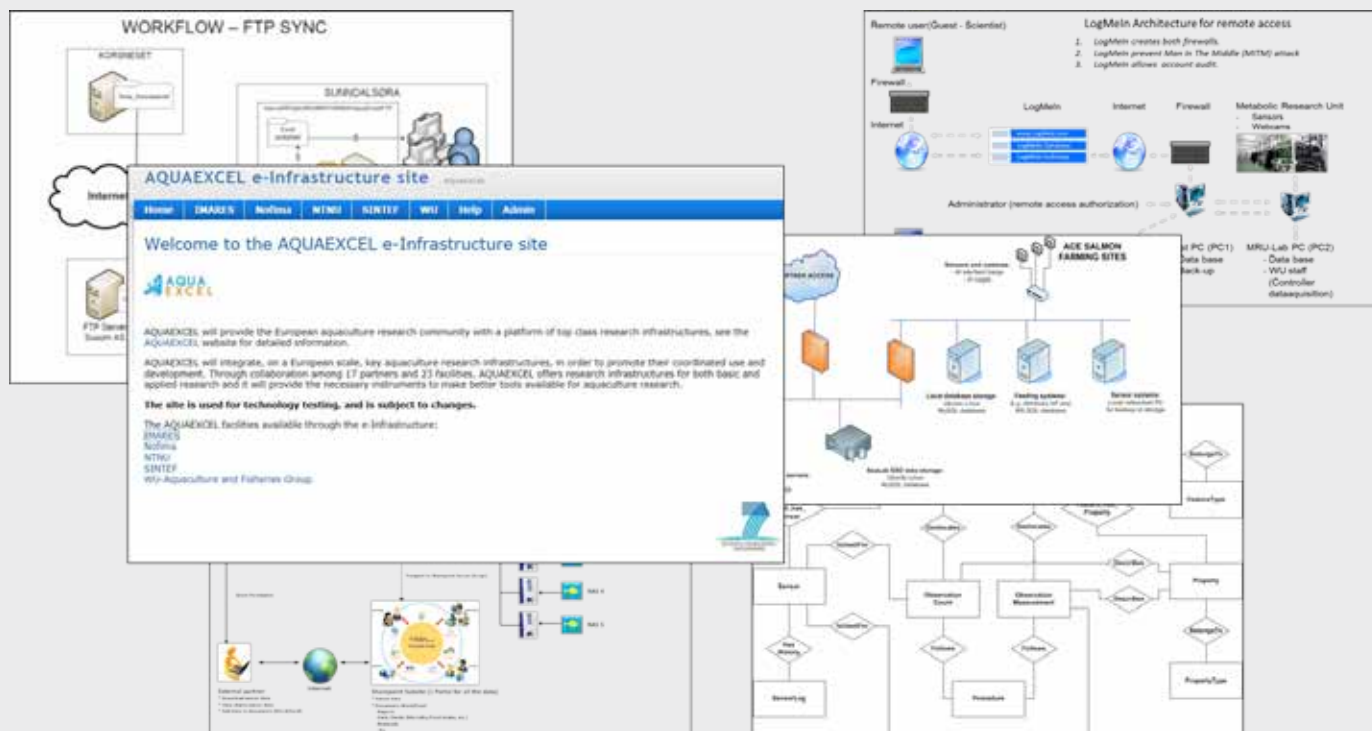
Q. How are the Intellectual Property Rights of the individual facilities being addressed?

As part of the design criteria for the e-Infrastructure solutions, it was decided that all experimental data should be stored locally in each facility. It is also the responsibility for each facility to provide access to external users, including

how results from experiments can be accessed and possibly transferred. In principle, this means that the IPR issues must be handled in the same way whether the e-Infrastructure is used or not.

Q. What steps have been taken to coordinate the e-Infrastructure with other research infrastructures around Europe?

Before the work on the **AQUAEXCEL** e-Infrastructure began, we conducted a survey regarding work on e-Infrastructures in other relevant EC projects. We also established contact with some of these projects to obtain information on their solutions and look for possible synergies. We found that interesting solutions were under development, but many were based on cooperation between facilities with similar equipment and similar technical infrastructure. As the **AQUAEXCEL** consortium consists of a wide variety of aquaculture facilities aimed at research within a broad range of disciplines, it was not considered practical to impose such common solutions within the consortium.



Local technical solutions

Development of New In Vivo Fish Phenotyping in Research Infrastructures



Dr. Patrick Prunet, INRA (France), is the leader of AQUAEXCEL's WP7 on developing new methodologies or protocols to improve in vivo fish phenotyping. Here he explains the aims and objectives of the work being undertaken.

Dr. Patrick Prunet, INRA

Q. What is the aim of WP7?

Fish aquaculture research has to answer complex questions raised by the aquaculture industry and global change; for example in relation to adaption to fluctuating environmental situations, reduction of their impact on the environment, or selection for those fish phenotypes better adapted to the changing environment. In this context, it is essential to provide new methodological approaches that can provide the maximum amount of information for characterising fish welfare, health and performance, with the minimum amount of fish.

The multidisciplinary approach developed in this WP provides more accurate and relevant information from experimental fish and will make new, non-invasive, non-lethal and more focused methods available to the scientific community. Moreover, phenotyping at the level of individual fish will allow us to get accurate information on the variability of the traits measured. Altogether, such approaches will improve the quality of the conclusions drawn from experiments, when testing new husbandry technologies, systems or fish lines.

Q. What success have you had so far in developing new phenotyping methods?

WP7 is still in progress but we already have achieved several results. One of our main achievements is the development of a bioinformatics tool (named "Fish and Chips"; see the

article on the next page) aiming to develop a meta-analysis of several sets of existing gene expression data coming from different experiments and published in a public database. This tool has been used to select genes which are relevant for characterising welfare and health status in fish. Another success of this WP is the development of non-lethal tagging tools and procedures for larvae and juvenile fish (from 15 to 100mm) allowing individual monitoring of any event of early larval development. These systems have been validated in sea bream and sea bass.

Q. What challenges have you encountered?

A WP such as this, involving several partners working on the same question but using different fish species, is always a challenge: we have to rely on the ability of the participants to integrate information from various experiments obtained in different places and to produce outcomes which reflect such integrative processes. Annual meetings of the project are very important opportunities for discussing issues and reaching a common consensus on practical outcomes.

Q. What benefits does phenotyping have for the aquaculture industry?

The new regulation of animal farming will require increasing assessment of the health, welfare, reproductive status and disease resistance of fish. In that context, the phenotyping methods we are developing will be very valuable.

Q. How will the results affect future breeding programmes?

Selective breeding researchers are now very much focused on complex traits such as disease resistance, robustness or adaptation to new food. Such programmes already require refined phenotyping methods which would complement high-throughput screening methods for such traits.



Members of the 'Stress and adaptation' team from INRA LPGP working on the 'Fish and Chips' bioinformatic tool: Dr. P. Prunet, Dr. I. Leguen, Y. Echasseriau, J. Montfort.

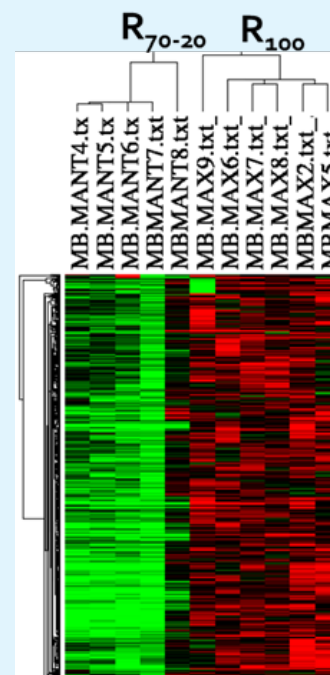


Members of the 'Stress and adaptation' team from INRA LPGP collecting samples at the PEIMA INRA infrastructure: C. Valotaire, Dr. P. Prunet

AQUAEXCEL Partners Present an Online Tool for Meta-Analysis of Fish Genomic Data



Prof. Jaume Pérez-Sánchez and colleagues at Instituto de Acuicultura Torre de la Sal (IATS-CSIC)



Cluster of genes grouped by Fish and Chips that clearly discriminate experimental groups



AQUAEXCEL partners, Institut National de la Recherche Agronomique (INRA) and Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC), headed by Profs. Patrick Prunet and Jaume Pérez-Sánchez, respectively, have been applying the bioinformatic tool Fish and Chips (<http://fishandchips.genouest.org/index.php>) to meta-analysis of data from genomic studies on fish. This tool, which is dedicated to the analysis of fish transcriptomic data, has been developed by Yann Echassierau (INRA Rennes) through a close collaboration with medical researchers (Dr. D. Baron and R. Houlgatte) who initially developed the approach for human health disease questions.

Fish and Chips is an online resource funded by **AQUAEXCEL** and contains all the public transcriptome data related to fish species in various physiological conditions (currently

more than 350 microarray experiments). These data have been re-normalised and re-analysed to perform global studies by searching for common gene signatures in diverse experimental scenarios.

Fish and Chips has been presented to the scientific community in a publication entitled "Transcriptional assessment by microarray analysis and large-scale meta-analysis of the metabolic capacity of cardiac and skeletal muscle tissues to cope with reduced nutrient availability in gilthead sea bream (*Sparus aurata* L.)" to be published in Marine Biotechnology (DOI:10.1007/s10126-014-9562-3). In this study, clusters of differentially expressed genes from muscle tissues of sea bream facing a nutritional stress (reduced ration size) were used for a meta-analysis across experiments in Fish and Chips.

This approach highlighted the role of mitochondria-related genes and Gene Ontology terms in a diverse array of sea bream tissues and stress conditions. These results confirmed the role of mitochondria as key responders to environmental and nutritional stress in gilthead sea bream, and indicate the importance of mitochondria genes as reliable subcellular markers of stress phenotyping in fish.

AQUAEXCEL Training Courses

AQUAEXCEL has organised four new pioneering technical training courses that focus on different aspects of aquaculture experimentation. These courses are the only ones of their kind putting emerging aquaculture infrastructure centres of excellence at the forefront. Participation in these courses represents a unique opportunity for researchers and technicians in this field as course attendance is free, thanks to EC FP7 funding. To date three of the courses have been completed. The first course, *Recirculating Aquaculture System (RAS) Technology*, was profiled in issue 2 of AQUAEXCEL Project News. Course 2, *Contribution of Genomic Approaches to the Development of Sustainable Aquaculture for Temperate and Mediterranean Fish*, and Course 3, *The Application of Chromosome Set Manipulations and the Importance of Gamete Collection and Management in Aquaculture*, are profiled in this issue, with participants providing their feedback. Course 4, *Efficient Utilisation of New Monitoring and Control Systems in Fish Experiments*, is due to be held in May 2014 and will be profiled in the next issue of AQUAEXCEL Project News.



Contribution of Genomic Approaches to the Development of Sustainable Aquaculture for Temperate and Mediterranean Fish **16-18 October 2013**

Organised by INRA with the expertise of CSIC & IATS



Name: Dr. Karl Andree
Position: Research Scientist
Institute: Instituto de Investigación y Tecnología Agroalimentarias (IRTA), San Carlos de la Rapita, Spain

Originally I am from California, in the US. Before moving to Spain I worked as a postdoctoral researcher for the United States Department of Agriculture (USDA). I did research for my PhD on parasites of fish and there was little work being done with aquaculture within the USDA, so I moved to Spain. I have been working at IRTA since 2005 as an aquatic animal health specialist at their aquaculture research facility in the south of Tarragona. My investigations increasingly take me more in the direction of nutrigenomics research and other areas of genetics as it relates to aquaculture.

What were your reasons for applying for this course?

I applied to this course to update my knowledge in genomics research and to get first-hand knowledge from those actually

working in the field. The reputation of INRA is well known and there are highly qualified experts to provide the course information. I was particularly interested in knowing more about Quantitative Trait Locus (QTL) assignment for selected breeding purposes.

What was your overall impression of the course?

The course was broad in content and was a good introduction for those getting their first exposure to this type of content. The course material was also very current in that it demonstrated some of the latest techniques that appear in current literature. I look forward to future course offerings from AQUAEXCEL.

What part of the course did you enjoy the most?

I very much enjoyed the contact with the other students in the course who came from different countries and arrived to the sessions with various expectations and goals. Everybody, not just the instructors, provided new insight into the course material in this way. Also the pacing of the course was quite good to provide time for questions and exchanges among students as well as with the instructors.

What do you feel is the most useful thing you have learned on the course and why?

The information about "next generation" sequencing technologies and the various pros and cons of each method was useful. The overview of selection of quantitative traits was also useful. I realise more clearly the complexities involved in the process. There was also some very good information presented on mitochondrial genome analysis for assessment of nutritional status. This last part was especially useful for my work.



Name: Ana Navarro
Position: Research Scientist
Institute: Grupo de Investigación en Acuicultura (GIA) of the University of Las Palmas de Gran Canaria

I am working on genetic improvement of gilthead sea bream (*Sparus aurata* L.). I performed my PhD in the GIA, which I completed in 2009.

What were your reasons for applying for this course?

Currently, our group is working in close collaboration with the aquaculture industry on genetics of sparid species, specifically we are developing a genetic improvement programme at Spanish national scale for gilthead sea bream (PROGENSA®) in which we would like to implement some genomic tools. This course was an opportunity to get up to date on the use of genomic tools, mainly as it is rare to find specialised courses focused on genetics in aquaculture.

What was your overall impression of the course?

I think that the course was very complete, well structured and with a lot of variety of issues, and mainly well organised (before and during the course). I believe the lecturers were, in general, very good and helpful and the students were very participatory. I felt that the atmosphere of the course was very successful.

What part of the course did you enjoy the most?

The last day, in which the main topics were summarised and a discussion was developed. It was good to hear the thoughts of the other participants and to learn more about their own activities in this area. The lunches were also an enjoyable opportunity to meet other researchers and to network.

What do you feel is the most useful thing you have learned on the course and why?

Learning more about the possibilities of genomics in aquaculture, as well as getting to know other researchers who are working in this area.

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The Application of Chromosome Set Manipulations and the Importance of Gamete Collection and Management in Aquaculture

18-22 November 2013

Organised by the University of Stirling with additional input from INRA and IMR



Name: Ágnes Ösz
Position: PhD student
Institute: Department of Aquaculture, SZIU, Hungary

I am currently doing my PhD at the Department of Aquaculture of Szent István University, Hungary. Mainly I am dealing with genetic markers of brown trout. One of our aims is preparing a genetic marker-assisted breeding system in the unique Hungarian broodstock of brown trout in Lillafüred.

What were your reasons for applying for this course?

I am interested in chromosome set manipulation, and we have a project to prepare gynogenetic fish in our department. I thought this course would be profitable for our project and would help me

to improve my knowledge because Stirling University's Institute of Aquaculture and the course lecturers have significant background experience in these topics. I also thought that the course would be a good opportunity to meet new people in the sector.

What was your overall impression of the course?

The course was well organised, there was a good balance between the lectures and the practical sessions, which were useful and interesting. I have enjoyed the whole course and have learned a lot. The people were very open-minded, and in my opinion every participant benefited from the course.

What part of the course did you enjoy the most?

I really enjoyed visiting the trout farm and the fish processing plant. I have not been to such a high capacity factory before. The meal times were a good opportunity to talk with each other and the final lunch was a great experience for me because of the amazing setting and meals.

What do you feel is the most useful thing you have learned on the course and why?

The most important thing for me in the course was to see the chromosome set manipulation methods in practice, e.g. gamete UV irradiation and preparing triploid eggs by pressure shock. My colleagues have also gotten some useful advice for their work in cryopreservation.



Name: Jenni Prokkola, M.Sc.
Position: PhD student
Institute: Department of Biology, University of Turku

I've been working on my PhD since 2011, studying the physiological responses of fish to different simultaneously occurring environmental stressors, such as chemicals and hypoxia, and how circadian rhythms are related to these responses.

What were your reasons for applying for this course?

Based on the topic of the course I expected to learn new and useful techniques that could also be applied to research outside aquaculture.

What was your overall impression of the course?

The atmosphere on the course was enthusiastic and relaxed.

Students and teachers were interacting throughout the course, which had a very positive impact on learning.

What part of the course did you enjoy the most?

The practical sessions were interesting and beneficial, and the visit to the fish processing plant was very good for providing a new perspective. I'd say that I enjoyed the course as a whole since the people and activities were great for giving a big picture of aquaculture and creating new contacts.

What do you feel is the most useful thing you have learned on the course and why?

Getting a good idea of the steps in making isogenic lines, since it could be fascinating to implement this technique in evolutionary research questions one day.



Name: Heikki Koskinen
Position: Fish Biologist
Institute: Finnish Game and Fisheries Research Institute

After completing my MSc degree in applied zoology, I worked for a few years as a teacher and a researcher at the University of Eastern Finland, Kuopio. During the Fish Array research project a cDNA micro array for rainbow trout was developed and applied to the research of stress in aquaculture fish species. Before moving to my current position, I worked for a year as a project manager in the Fish Innovation Centre (FIC) in Finland. Since 2006 I have been employed by the Finnish Game and Fisheries Research Institute where I work as a fish biologist. My work consists of the maintenance and development of the national selective breeding programme for rainbow trout and European whitefish.

What were your reasons for applying for this course?

The content of the course seemed to be almost tailor made for me.

I felt that the training course would enable me to develop and build on my existing skills and would give me the necessary experience to develop and build upon my role as an aquaculture specialist.

What was your overall impression of the course?

As expected, the course was well organised. The lectures were interesting and given by true experts. There was a nice balance between theory and practical training. Unfortunately, it was not possible to visit private salmonid farms due to the phase of their production cycle.

What part of the course did you enjoy the most?

The good team spirit that developed right away among participants. The practicals that supported the lectures were especially useful.

What do you feel is the most useful thing you have learned on the course and why?

It is very difficult to name only one! Maybe the chromosome set manipulation practical was the most useful for me because it directly benefits my work.

TNA Researcher Profiles

On a regular basis, the **AQUAEXCEL** project invites proposals from European research groups for scientific research that utilises the facilities of any of the participating Aquaculture Research Infrastructures. The **AQUAEXCEL** project unites major aquaculture experimental facilities with the capacity to undertake experimental trials on a selection of commercially important fish aquaculture species and system types. These facilities are made available to the research community for Transnational Access (TNA) with the support of the European Union 7th Framework Programme for Research and Technological Development (Infrastructures). The 8th Call for Access will open on 28 April 2014. The deadline for this call is the 13 June 2014. Here, several researchers who have accessed the programme describe their work and experiences using TNA to further their research.



Names: Oğuz TAŞBOZAN, lead researcher, Mahmut Ali GÖKÇE researcher from Çukurova University, Fisheries Faculty, Department of Aquaculture, Turkey
Project: Hazelnut oil in meagre diets

Aquaculture Infrastructure Accessed: Hellenic Centre for Marine Research - Institute of Aquaculture (HCMR Aqualabs), Crete, Greece

Type of research:

This study is concerned with the investigation of fish oil replacement by hazelnut oil in meagre feed. The study was conducted in HCMR Aqualabs, utilising hazelnut oil of Turkish origin. Six levels of oil replacement (0, 20, 40, 60, 80, 100%) were tested in triplicate groups of fish. Thirty fish (*Argyrosomus regius*) of 15g initial body weight were stocked into each tank and the

experiment lasted for 12 weeks. The effect of the substitution was evaluated in terms of specific growth rate, feed conversion efficiency, feed consumption and whole body proximate composition. The first stage of the study has been completed and the laboratory analysis of samples is in progress.

Has AQUAEXCEL's Call for Access been beneficial for your Project? If so, please outline why:

AQUAEXCEL's call has been very beneficial for our research team as it provided us with the opportunity to work on an emerging aquaculture species, *Argyrosomus regius*, on the hot topic of the use of plant origin in aquafeeds. Also, we had a chance to work with our colleague Dr. Stavros Chatzifotis at a reputed institute, HCMR Aqualabs, equipped with good research facilities. This has been the first collaborative study between the HCMR Crete-Greece and the Fisheries Faculty of Cukurova University Adana-Turkey and we hope to continue our cooperation in the future.



Dr. Stavros Chatzifotis



Experimental Unit



Left to right: Mahmut, Stavros, Oğuz



Name: Laura Gasco
Institute: Department of Agricultural, Forest and Food Sciences (University of Turin, Italy)
Position: Researcher
Project: Substitution of fish meal by *Tenebrio molitor* meal in the diet of *Dicentrarchus labrax* juveniles

Position with the project: Coordinator

Aquaculture Infrastructure Accessed: Hellenic Centre for Marine Research - Institute of Aquaculture (HCMR Aqualabs), Crete, Greece

Type of research:

Our research focuses on the investigation of alternative sources of proteins for cultured fish. In this particular project we were interested in evaluating the use of a novel protein source (TM) - derived from the insect *Tenebrio molitor* - on growth,

feed efficiency and body composition on European sea bass (*Dicentrarchus labrax*).

Three experimental diets (isonitrogenous and isocaloric) were prepared by replacing fish meal by graded levels of TM. Four hundred and fifty sea bass were individually weighed and randomly distributed in nine circular fibre glass tanks (500L) supplied by borehole sea water. Each diet was assigned to triplicate groups of 50 fish and feed was distributed to apparent satiation by hand, twice a day for seven days per week. At the end of the feeding trial, the performance traits of weight gain, specific growth rate, feed conversion ratio and feed consumption were evaluated. The diets and the whole body composition of 10 pooled fish per replicate group were analysed for proximate composition, gross energy and fatty acid composition.

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The results showed that for up to 25%, the inclusion of TM meal in diet did not lead to adverse effects on weight gain, while at 50% level, TM induced growth reduction and less favourable outcomes for both specific growth rate and feed consumption ratio. Protein efficiency ratio and feed consumption were not affected by the inclusion of TM. The whole body proximate composition analysis did not show any differences between treatments. On the other hand, TM inclusion influenced the fatty acid composition of body lipids. In particular, a decrease in the contents of eicosapentaenoic acid (EPA) (from 395.07 to 164.10mg/100g) and docosahexaenoic acid (DHA) (from 619.88 to 203.26mg/100g) were observed with the increase of the inclusion to 50% TM.

Has AQUAEXCEL's Call for Access been beneficial for your project? If so, please outline why:

The pressing need for feed sources is a real concern for aquaculture. At present, fish meal remains the optimal protein source in feeds due to its high protein content and balanced amino acid profile. Nevertheless, this raw material is no longer sustainable and the search for alternative protein sources with good nutritional quality is required.

Recently, there has been an increasing interest in the use of animal protein ingredients with limited relevance in human nutrition. Based on cost effectiveness, availability and crude protein content, insect larvae seem to have immense potential as a good protein source for fish.

Insects have good nutritional value (high protein and energy contents) and, being of animal origin, they can adapt easily to the digestive



Name: Marcelino Herrera
Institute: IFAPA Centro Agua del Pino
Position: Coordinator
Project: Effects of dietary tryptophan and phenylalanine on stress response in cod (*Gadus morhua*)

Aquaculture Infrastructure Accessed: National Cod Breeding Centre (NCBC), from NOFIMA

Type of research:

The objective was to determine the dietary tryptophan and phenylalanine requirements in order to improve the stress response in cod (*Gadus morhua*) juveniles. For this, we analysed the physiological stress response of juvenile cod depending on experimental diets containing different tryptophan and phenylalanine concentrations.

Has AQUAEXCEL's Call for Access been beneficial for your project? If so, please outline why.

AQUAEXCEL gave me the opportunity to develop the experimental culture in optimal conditions. The NCBC facility is equipped with innovative culture systems and provided me with the necessary material and experimental tanks, as well as fish batches. Thanks to this opportunity, I learnt about issues related to cultured cod physiology and zootechnics.

My contact people at NCBC hosted me warmly and kindly, and helped me during my stay, on both private and professional terms. The NCBC staff kindly assisted me during the experimental process and their help was remarkable. I can say the same about



Facilities at HCMR Aqualabs

physiology of fish. Furthermore they do not contain anti-nutritional factors and some have specific nutrients/chemicals that may exert specific dietary nutritional outcomes. Some research has been carried out on the potential use of insects as feed for fish but there is an urgent need for additional research to enhance the existing framework.

The AQUAEXCEL call has been very useful because it has allowed us to benefit from the invaluable expertise of Dr. Stavros Chatzifotis aquaculture field and enabled us to perform a trial on species, while at our facilities we can only work with freshwater fish.

the NOFIMA headquarters and laboratories, my stay was made more comfortable thanks to the great team there.

Undoubtedly, I would stay there again and hope this experience is the first step for further collaborations in R&D projects and other research activities.



NOFIMA's headquarters in Tromsø (Norway)



Cod juvenile during size sampling



Experimental fish tanks used in the project

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Name: Catarina Cortes Valente de Oliveira
Institute: University of the Algarve, Portugal
Position: Coordinator
Project: Cloning and ontogeny of the KISS system in gilthead sea bream, *Sparus aurata*
Aquaculture Infrastructure Accessed: Institute of Aquaculture of the University of Stirling, UK

Type of research:

My project intended to clone the KISS system of genes in gilthead sea bream, and to do further analysis of their expression during larval ontogeny and the reproductive season; thus investigating the role of this system in these key life stages of this species.

Has AQUAEXCEL's Call for Access been beneficial for your project? If so, please outline why.

Yes, it has actually been very beneficial to my work, since these experiments were very important for my post doctoral research.

Through this programme I had the opportunity to visit a state of the art centre for aquaculture, which had an added value both on a personal and professional basis. I had the opportunity to learn new techniques in the lab, and become familiar with an emerging tool and also to work with a very talented team in my field of work.

Dr. Hervé Migaud's group has the skills and the laboratory facilities to perform the experiments. The results obtained have added value for increasing the knowledge on the roles exerted by the KISS system in gilthead sea bream. The cloning of the genes KISS2 and GPR54 in this species allows further research to be done concerning these genes, and the results obtained in fish larvae and in broodstock tissues allows for a better understanding of the role of this system in both ontogeny and reproduction season. As such, the present results will be used to perform further investigation concerning this issue, deepening the available knowledge.



Name: Maria Filipa Bento de Oliveira Falcão
Institute: University of the Algarve, Portugal
Project: Linking coping styles and appraisal in farmed Atlantic salmon (*Salmo salar*)
Position: Coordinator
Aquaculture infrastructure accessed:

IMR Matre research station, Norway

Type of research:

My main areas of research are coping styles, behaviour, stress physiology and metabolism in farmed fish. I am currently a PhD student within the European research project COPEWELL. My PhD project deals with the plasticity of coping styles in farmed fish:

Behavioural and Neuro-endocrine profiling.

Has AQUAEXCEL's Call for Access been beneficial for your project? If so, please outline why

The **AQUAEXCEL** project gave me the support to work outside my country, which would have been impossible without this help. The fish welfare group at the Institute of Marine Research is very strong, and the facilities are very good. In Matre research station I was able to work with fish in twelve tanks connected to cameras, and to discuss the research with the other scientists during the study. It was also interesting to work with salmon, which was a new species for me, and of course it was nice to experience another country and meet new people.



Name: Sabine Rehberg-Haas
Institute: Gesellschaft fuer Marine Aquakultur mbH, Germany
Project: Utilisation of the microalga *Pavlova* sp. in marine fish larvae nutrition
Position: Research group leader
Aquaculture Infrastructure Accessed: NTNU

CodTechLab, Trondheim, Norway

Type of research:

In this first feeding experiment the potential of the microalga *Pavlova* in cod larvae nutrition in comparison to other commonly used enrichment products was tested. Newly hatched cod larvae were fed with the differently enriched live feed organisms (rotifers, brine shrimp) over a period of six weeks. The growth performance and condition of the cod larvae were evaluated by means of standard length, dry weight and RNA/DNA analysis. The prolonged effects of early larval feeding history were also assessed for a time-period after weaning. *Pavlova* represents a readily available microalgae species with a high content of the essential fatty acids, DHA and EPA, and other micronutrients of significant importance for both fish larval and human nutrition.

Has AQUAEXCEL's Call for Access been beneficial for your project? If so, please outline why

The access to the NTNU CodTech Lab was very important for my research and my PhD project. The NTNU CodTechLab provided an

ideal infrastructure for my study by offering automated start-feeding CodTech rigs, in-house cultures of relevant live prey organisms (rotifers, brine shrimp) and fully equipped laboratories. In particular, the knowledge and experience of the NTNU CodTech research group in innovating and improving first feeding experiments related to the cultivation of marine fish species contributed to a successful conduction and exploitation of this study.



Experimental set up - NTNU CodTechLab

Continued on page 11

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Name: Marc Suquet
Institute: Ifremer, France
Project: Moving sperm
Position: Coordinator
Aquaculture Infrastructure Accessed: University of South Bohemia, Faculty of Fisheries and Protection of Waters, Vodnany, Czech Republic

Type of research:

AQUAEXCEL funding supported common work between Czech and French scientists. The facilities and observation techniques of the Faculty of Fisheries and Protection of Waters in Vodnany were well adapted to the requirements of these experiments. Furthermore, the Czech researchers' background knowledge of sperm biological

characteristics in aquatic species, and the French researchers' knowledge of Pacific oyster (*Crassostrea gigas*) biology, gave great support to this research. Apart from flooding there were no difficulties during this visit.

Further cooperation, not only on Pacific oyster sperm but also on the sperm biology of freshwater mollusc invasive species, may be suggested.

Has AQUAEXCEL's call to access been beneficial for your project? If so, please outline why

Yes, **AQUAEXCEL** provided me with a good opportunity. The **AQUAEXCEL** TNA programme is very helpful and useful for such research stays.

Is Your Aquaculture Research Infrastructure on the Map Yet?

The **AQUAEXCEL** Aquaculture Research Infrastructure Map is an integrated online infobase listing all aquaculture research infrastructures in Europe and associated countries, including non-**AQUAEXCEL** partners. The infobase will grow to be a viable European aquaculture research infrastructure directory and a powerful tool to identify European facilities, genetic and human resources, and to promote mutual collaboration. If your research infrastructure does not appear on the map, you are encouraged to register and upload information about the facilities and expertise at www.aquaexcel.eu/rimap.

This will increase the visibility of your infrastructure and include it in planned studies of infrastructure needs and strategies in the aquaculture RDI sector.

To add your Research Infrastructure to the AQUAEXCEL online infobase, go to:

www.aquaexcel.eu/rimap or go to www.aquaexcel.eu and select the interactive map from the menu (please note that the system is best viewed in Mozilla Firefox or Google Chrome)

1. Click on "Login / Register"
2. Click on "Register to map"
3. Complete your details and submit
4. You will be sent a confirmation e-mail with your login details
5. Complete the fields
6. **AQUAEXCEL** will check the information and publish your entry when approved

For more information please check out www.aquaexcel.eu



For more details about the **AQUAEXCEL** Aquaculture Research Infrastructure Map, please contact:

Marieke Reuver, AquaTT, telephone: +353 1 644 9008,
 e-mail: marieke@aquatt.ie,
 or Gilles Lemarié, Ifremer, telephone +33467130408,
 e-mail: Gilles.Lemarie@ifremer.fr

Eighth Call for Access - Access Top Aquaculture Facilities

The eighth Call for Access will open on 28 April with a deadline of 13 June 2014.

Applicants are advised to read the guidelines carefully and to properly address all the questions on the application form. Detailed discussion with the manager of the host infrastructure and/or collaborating scientists whilst preparing the proposal is strongly recommended. The ethical implications of the work must also be considered thoroughly for any experiments involving animals (fish). It is not sufficient to report that the experimental work has been approved by one or both of the organisations involved. Applicants are also advised to allow at least three months between the deadline for applications and the planned start date for the project.

Further details and the application form can be found at

www.aquaexcel.eu/call_for_access

Proposal for the Establishment of a Research Infrastructure Working Group (RI WG) under EATiP



Unlocking the growth potential of the European aquaculture industry depends on achieving an efficient and research-based production along the entire value chain. The primary goal of the EATiP working group is to provide European aquaculture stakeholders with the best suitable tools to reach the research and innovation goals as defined in the EATiP Strategic Research Agenda (SRA).

As part of the Knowledge Management thematic area, EATiP aims to ensure the availability and efficient use of aquaculture research infrastructures across all boundaries to benefit the industry, by:

- Ensuring international and inter-regional cooperation to develop research infrastructures that can meet emerging needs
- Increasing the awareness of existing research infrastructures for all stakeholders

The EATiP RI WGs mandate is to secure implementation of these objectives through:

- Strengthening collaboration between aquaculture RIs in Europe
- Mapping of existing aquaculture RIs in Europe
- Gap analysis of aquaculture RIs compared to the needs as expressed in the EATiP SRA
- Opening publically-owned aquaculture RIs for use by SMEs by facilitating their access
- Stimulating joint academic-industrial use of aquaculture RIs
- Clarifying issues of property rights when managing data in publically-owned RIs
- Communicating a consolidated aquaculture RI strategy to

- decision makers on a national and European level
- Strengthening international cooperation with aquaculture RIs outside Europe

The EATiP RI WG will act as the single European contact point for infrastructure issues in the aquaculture sector representing the views of both facility providers and users. It will fulfill the following tasks:

- Coordination of collaboration actions with established projects and networks of relevance such as **AQUAEXCEL**, EMBRC, JPI Oceans, NACEE.
- Communication of RI relevant issues and results to the EATiP members.
- Collection of RI relevant input from EATiP members for use in R&I projects and strategic processes.

The EATiP RI WG is suggested to consist of members with representation from RI providers (from the public and private sector), RI users and coordinating organisations. Only EATiP member institutions can take part in the RI WG. They will report to the EATiP Board.



Participants at the 2014 EATiP AGM



AQUAEXCEL Vimeo Channel (vimeo.com/user25398383)

AQUAEXCEL has established its own Vimeo channel. In addition to the AQUAEXCEL introductory video (vimeo.com/91313604), five instructional videos are available on how to use the AQUAEXCEL e-Infrastructure developed by WP6.

- Part 1: The AQUAEXCEL e-Infrastructure web site - vimeo.com/87454289
- Part 2: Access to SINTEF/ACE - vimeo.com/87456015
- Part 3: Access to IMARES - vimeo.com/87456016
- Part 4: Access to Nofima NCRA - vimeo.com/87456017
- Part 5: Access to WU-MRU - vimeo.com/87456018