AQUA EXCEL 2020

AQUAculture infrastructures for EXCELlence in European fish research towards 2020

Project News

WELCOME TO ISSUE 2 OF THE AQUAEXCEL²⁰²⁰ PROJECT NEWSLETTER

IN THIS ISSUE:

AQUAEXCEL2020 News and Highlights

Introducing a Transnational Access Success Story: Super Additive Leading the Way To More Sustainable Aquaculture Feed

Fish farmers are always looking for sustainable feed that can make fish strong and healthy. A new study led by the Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC) in Spain concludes that marine feed ingredients in aquaculture can potentially be replaced by plant ingredients without detrimental effects, when appropriate feed additives are added.

The team of researchers at the Institute of Aquaculture Torre de la Sal (IATS-CSIC), in collaboration with scientific (Norwegian University of Life Sciences, Centro de Ciências do Mar) and industrial (BIOMAR, NOREL) partners, found that butyrate supplementation helps to preserve intestinal function in gilthead sea bream that are fed plant-based diets. The research was conducted within the European Union funded projects AQUAEXCEL, **AQUAEXCEL2020** and ARRAINA. Two Transnational Access (TNA) studies were carried out to define the most effective butyrate dose based on growth performance and measures of intestinal function, architecture and permeability.

The research was published in the scientific journal Plos ONE, **doi:10.1371/journal.pone.0166564.** For more information about the research and the **AQUAEXCEL2020** project, please visit: **www.aquaexcel2020.eu**.

To learn more about the **AQUAEXCEL2020** Transnational Access program and the next Call for Access, please see page 4!

In the lab at the Institute of Aquaculture Torre la Sal (IATS-CSIC) during the TNA project of AQUAEXCEL2020 ©Jaume Pérez-Sánchez (IATS-CSIC)

Sea bream ©Jaume Pérez-Sánchez (IATS-CSIC)

New Book on Fish Diseases

AQUAEXCEL2020 partner Galina Jeney is the editor of a new book entitled **"Fish Diseases: Prevention and Control Strategies"**, which is available now. Many contributions and chapters in the book come from colleagues in **AQUAEXCEL2020**. Key features include: (1) information on government restrictions on drug usage in aquaculture to address the strict demand for fish products free of pollutants/antibiotics, (2) best practice in fish farming to prevent disease and promote good health status and fish disease management, and (3) most recent research on fish diseases prevention, the pathogens most studied, and options for methods of treatment. To order the book, please visit ELSEVIER: **bit.ly/2kqn9d6**.
eBook ISBN: 9780128045855
Paperback ISBN: 9780128045640

AQUAEXCEL2020 Publication

Estensoro I, Ballester-Lozano G, Benedito-Palos L, Grammes F, Martos-Sitcha JA, Mydland L-T, Calduch-Giner JA, Fuentes J, Karalazos V, Ortiz Á, Øverland M, Sitjà-Bobadilla A, Pérez-Sánchez J. 2016. **Dietary butyrate helps to restore the intestinal status of a marine teleost *(Sparus aurata)* fed extreme diets low in fish meal and fish oil.** Plos ONE, doi:10.1371/journal.pone.0166564.

Past Events

We held our **AQUAEXCEL²⁰²⁰ Annual Meeting** in Heraklion, Crete (Greece) in October 2016. Two and a half days were packed with exciting discussions about virtual labs, new biosensors, research infrastructures, fish lines, standards and optimising experiments. Apart from the hard science, interactions and knowledge transfer between the project consortium and the aquaculture industry were the focus. Other key topics were effectively communicating the science pursued in **AQUAEXCEL²⁰²⁰** – to other researchers, industry, policy makers and the public, as well as training

a new generation of aquaculture researchers, which were passionately discussed. Despite an intense programme, participants found time for networking and enjoying the beautiful surroundings offered by Crete.

Upcoming Events

We already had four successful rounds of calls for Trans-national Access (TNA) since the start of the **AQUAEXCEL²⁰²⁰** project. The **fifth Call for Access** opened 6 March 2017 with an application deadline of 17 April 2017. So, hurry up, and apply for this fantastic opportunity! For more details, please go to the TNA section on page 4.

Aqua Nor, the world's largest aquaculture technology exhibition, will take place **15-18 August 2017** in Trondheim, Norway. For more information, please visit: **bit.ly/2bv1jFN**.

The Faculty of Fisheries and Protection of Waters of the University of South Bohemia in Czech Republic will hold another **International Summer School** from **26 June to**

21 July 2017, and currently invites applications. For more information, please visit: **bit.ly/2l1XhlC**.

Aquaculture Europe 2017 will take place in Dubrovnik, Croatia from **17-20 October 2017**. Abstract submission is now open under: **bit.ly/2lYbrYX**.

Please note that the European Aquaculture Society's website has moved to: **www.aquaeas.eu**!

The first **AQUAEXCEL²⁰²⁰** industry brokerage event will be organised at Aquaculture Europe 2017. It will be hosted by EATiP and AquaTT. Further details will be posted on the project website **www.aquaexcel2020.eu** as they become available.

Please support the promotion of the important activities of the **AQUAEXCEL²⁰²⁰** project, including the many free training courses and TNA opportunities, by distributing this newsletter among your colleagues, organisations and wider networks.

AQUAEXCEL²⁰²⁰ Transnational Access (TNA)

TNA – Programme

A major feature of **AQUAEXCEL²⁰²⁰** is its TNA programme, allowing external teams to access the partners' facilities via submission of research proposals, which are funded based on the evaluation by an independent selection panel. Access is offered to 39 unique research facilities of the participating institutes, with experimental costs, travel and subsistence supported by **AQUAEXCEL²⁰²⁰**.

AVAILABLE RESEARCH FACILITIES COVER:

WATER ENVIRONMENTS
Freshwater, Marine, Cold, Temperate and Warm Water Environments

FISH SPECIES
Salmonids, Cold and Warm Water Marine Fish, Freshwater Fish and Artemia

FIELDS OF EXPERTISE
Nutrition, Physiology, Health & Welfare, Genetics, Engineering, Monitoring & Management Technologies
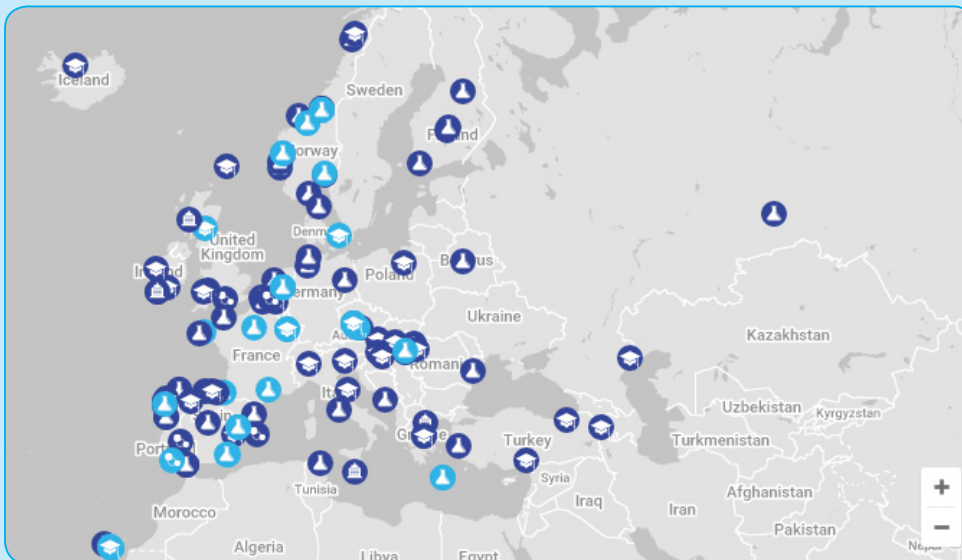
AQUACULTURE SYSTEMS
Cage, Pond, Recirculation, Flowthrough, Hatchery and Disease Challenge Systems

MULTIPLE SCALES
Small, Medium and Industrial Scales

Interactive map of Aquaculture Research Infrastructures (RIs) and Facilities from www.aquaexcel2020.eu.

AQUAEXCEL²⁰²⁰ invites all aquaculture facilities in Europe to register themselves on the **AQUAEXCEL²⁰²⁰** online Interactive Map: **www.aquaexcel2020.eu/interactive-map.**

Please contact Claudia Junge at **claudia@aquatt.ie** for any queries.

TNA – Calls for Access

AQUAEXCEL²⁰²⁰ calls for access are published on a regular basis. Calls for access invite proposals from European scientists who wish to utilise the facilities available at any of the participating aquaculture research infrastructures.

Do you have a project idea but need help to find the right facility? Please contact the orientation committee of **AQUAEXCEL²⁰²⁰** at **aquaexcel-OC@inra.fr**

Upcoming calls in 2017:

Call#	Activity	Date
Call 5	opens	06 March 2017
	deadline	17 April 2017
Call 6	opens	31 May 2017
	deadline	12 July 2017
Call 7	opens	14 August 2017
	deadline	25 September 2017
Call 8	opens	31 October 2017
	deadline	12 December 2017

AQUAEXCEL²⁰²⁰ Transnational Access Facilities

In the Spotlight: TNA Facility #2: INRA - Pisciculture Expérimentale Inra des Monts d'Arrée (PEIMA)

PEIMA is an **AQUAEXCEL²⁰²⁰** facility which is available to research teams who would like to work on trout. PEIMA maintains biological material and skills that allow for integrated and trans-disciplinary programmes in the various fields of genetics (genomics, quantitative genetics), physiology (growth, reproduction, behaviour), nutrition and health. All of these topics are available in the TNA program.

Location: Sizun, France
Website: www6.rennes.inra.fr/peima
Contact: Mr Laurent Labbé, laurent.labbe@inra.fr

Equipment
The PEIMA equipment allows the study of all stages, from the egg to the processed product, and includes:

• Four hundred tanks (Flow-through System) adapted to the age and size of the fish.

• A Recirculating Aquaculture System (RAS) of 10 tanks (7 m³ each) coupled with an aquaponic production system (floated raft or media filed).

• An experimental processing station equipped with a water-regulated and temperature-regulated smoker.

• A platform dedicated to the study of fish behaviour.

INRA PEIMA facility ©INRA

PEIMA supports and participates in the conservation and characterization of INRA's aquatic genetic resources. PEIMA has a European health certification. It is free of viral haemorrhagic septicaemia (VHS), infectious hematopoietic necrosis (IHN), and infectious salmon anaemia (ISA). Currently, PEIMA maintains: 2 strains of rainbow trout diverging in muscle-fat content, and 1 strain selected for its ability to ingest plant-based diet and 20 isogenic lines of rainbow trout.

Expertise
PEIMA is managed by a specialised team of people with skills in the following areas:

• **Food management**

• **Reproductive biotechnologies**

• **Proficiency of fish cutting and processing**

• **Management of RAS**

AQUAEXCEL²⁰²⁰ Training Courses

AQUAEXCEL²⁰²⁰ training courses aim to educate a new generation of aquaculture researchers and industry stakeholders to use their new knowledge, skills and tools to advance an innovative and sustainable aquaculture sector. In total, nine unique **state-of-the-art** training courses will be offered between April 2016 and September 2020. Course registration and attendance is **FREE of charge** but participants are expected to cover their own travel and subsistence costs. All courses are open to anyone interested in the subjects offered. For an overview of all courses and further details please visit the **AQUAEXCEL²⁰²⁰** website: **www.aquaexcel2020.eu**.

Successful AQUAEXCEL²⁰²⁰ Courses in 2016

AQUAEXCEL²⁰²⁰ Course 1: "Experimental data management: from generating protocols to sharing data"

Course type: Distance learning - **ONGOING**
Organisers: University of South Bohemia (Czech Republic)

Online Course Registration, please visit:
www.aquaexcel2020.eu/training-courses/upcoming-training-courses-apply-now

AQUAEXCEL²⁰²⁰ Training Courses

## Successful AQUAEXCEL²⁰²⁰ Courses in 2016

AQUAEXCEL²⁰²⁰ Course 2: "Recirculating Aquaculture System (RAS) Technology"

Course type: Face-to-face
Organisers: Ifremer (France) and Wageningen University (the Netherlands)

This course will be offered again in September 2018 at Wageningen University, the Netherlands. For more details, visit: **www.aquaexcel2020.eu/training-courses/aquaexcel2020-training-courses**.

"Excellent course on both theoretical and practical aspects thanks to the organizers who designed a very relevant programme covering all aspects of recirculated aquaculture. The mixed audience with consultants, producers, researchers in the different fields was a great added value to this week with a good room devoted to very rich exchanges between scientists." *(course participant)*
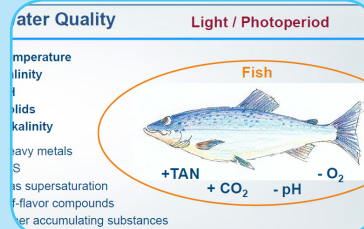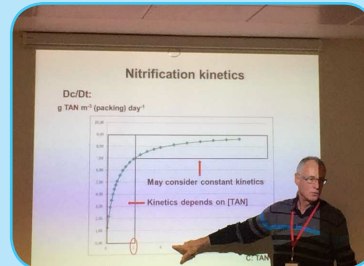
All photos ©Jean-Paul Blancheton

Fish'n'Co.

#2: Sea breams – Gilthead sea bream
(Sparus aurata)

Photos ©Jaume and CSIC

The Sparidae are a family containing 155 fish species commonly called sea breams and porgies. Most sparids are deep-bodied compressed fish with a small mouth separated by a broad space from the eye. They are found in shallow temperate and tropical waters and are bottom-dwelling carnivores.

The gilthead sea bream (*Sparus aurata*) is common throughout the Mediterranean and is also found along the Eastern Atlantic coasts, from the United Kingdom to the Canary Islands. Its Latin name comes from the characteristic golden band between its eyes. It can live in marine waters as well as in the brackish waters of coastal lagoons.

This species is hermaphrodite, maturing as a male throughout the first or second year of its life and then as a female throughout the second or third year. It is typically found at depths of 0–30 metres, but may occur up to 150 m, seen singly or in small groups near seagrass or over sandy bottoms, but sometimes in estuaries during the spring. It feeds on molluscs, crustaceans and small fish.

Gilthead sea bream are farmed extensively in lagoons, or intensively in tanks or cages. The species has become one of European aquaculture's main fish species.

Fish Quiz: Can You Connect The Dots and Guess This Fish Species?

Connect the dots and find out which fish species is hiding here. Be as creative as you like!
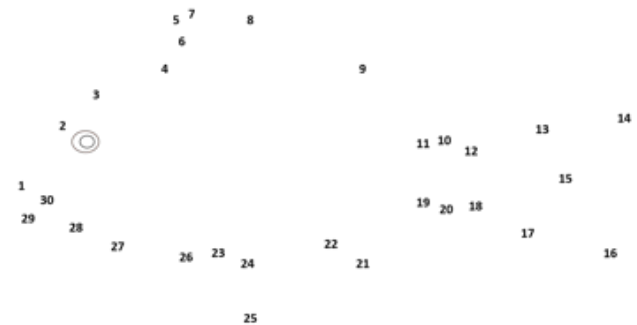
Send your work of art to **claudia@aquatt.ie**. The first fish we receive will feature in our next newsletter.

Production (EU-28*) – 83 995 tonne (2014); 53% of global production.
Value (EU-28*) – EUR 521 million (2014).
Main EU producer countries – Greece, Spain, Italy.
Main producer countries worldwide – Greece, Turkey, Spain, Egypt.

*EU-27: comprises all current member states of the EU.

To download the EC Fact Sheet on gilthead seabream, please visit: **ec.europa.eu/fisheries/marine_species/farmed_fish_and_shellfish/seabream**.

Dorada a la sal, picture and recipe from www.spain-recipes.com

Fish in salt crust ©Alberto …. On flickr C.C. by 2.0. Modified.

Satisfy your taste buds!

Tasty Recipe #2 – Dorada a la sal

Dorada – or gilthead sea bream – is usually prepared by baking it in a salt crust. Most Spanish food experts believe the method originated in Murcia, but it is now common practice in Andalusia as well. Don't be put off by the large amount of salt. It seals in the juices of the fish, resulting in a succulent dish that delivers pure fish flavour without a trace of saltiness.

Ask your fishmonger to clean the viscera from the fish without cutting the belly open, which can usually be done by pulling them through the gills. Also, make sure the fish is not scaled. During baking, the salt forms a hard crust that adheres to the scales, so that when you break the crust before serving the fish, the skin stays attached to the crust, peeling away easily to expose the juicy, succulent flesh underneath. The salt must be coarse, too - fine salt just won't work.

Figure in 15 minutes per 0.5kg for baking. Serve the fish with boiled potatoes.

See more at: www.spain-recipes.com/dorada-a-la-sal.html#sthash.vdBqh8HP.dpuf.

INGREDIENTS

(serves 4)

4 pounds coarse salt

1 (4-pound) gilthead sea bream

1/2 pound boiling potatoes, boiled and kept hot (optional)

PREPARATION

Preheat the oven to 230 °C.

RECIPE

Select a baking pan only slightly larger than the fish and cover the bottom of the pan with a layer of salt 4cm deep. Place the fish on top and cover completely with the rest of the salt. With your fingers, press the salt against the fish to ensure that it is completely enclosed.

Bake the fish for 1 hour. Remove it from the oven and let rest for 5 minutes. With a general-utility knife (chef's knife), crack the salt crust open lengthwise along the centre of the fish. First lift one half of the crust in one piece, then the other. The skin should be attached to the crust. Gently remove any skin remaining on the fish. Using a spatula, lift the top fillet of the fish and divide it between 2 warm plates. Remove the central bone and discard it. Carefully lift the bottom fillet and divide between 2 additional warm plates.

Serve the fish immediately with the boiled potatoes.

Serve and enjoy!

Tip: Enjoy with a nice glass of Verdejo from the Rueda D.O. It is a crispy, dry white with citrus aromas and very nice minerality. Cheers! *(Suggested wine pairing brought to you by your coordinator and wine enthusiast, Marc)*

Dr Marc Vandeputte ©AquaTT

Implanted Biosensors for Remote Fish Monitoring (Work Package 8)

In conversation with Dr Jaume Pérez-Sánchez from the Institute of Aquaculture Torre de la Sal (IATS-CSIC) in Spain.

Dr Jaume Pérez-Sánchez

What exactly are implanted biosensors, and what can you measure with them?

"Implanted biosensors are devices capable of monitoring the physiological status of a fish in a minimal invasive manner measuring biochemical or physical parameters.

In Work Package 8 "Implanted biosensors for remote fish monitoring" of the **AQUAEXCEL²⁰²⁰** project, we want to develop biosensors to monitor overall performance of fish. We can measure physical activity through things like respiration rate for example, to get an idea if a fish might be hyperactive and potentially stressed or if it shows barely any activity at all, which also indicates a problem. This is important because understanding if the fish in your aquaculture facility are healthy and thriving is vital information. If they are not, you have a problem."

This sounds exciting, when do you plan to test your first biosensors?

"Our plan is to have the first prototype ready by the end of this year. It can then be tested in different species and settings. What we want to achieve by the end of our work in **AQUAEXCEL²⁰²⁰** is that we have a proof of concept of this new type of biosensor. It means that we want to demonstrate that our design concept works and that the product is useful for fish farmers, and last but not least, that it is available at low cost, to make it economically feasible to use."

Not small ambitions you have there. What do you see as the challenges during the developmental phase of these sensors?

"Well, to start with, those biosensors need to be very small as they will need to fit under the gill cover (operculum) of the fish. Its size is dependent on the size of the animal, but generally not very large. We have managed so far to reduce the size from our starting point of 20x20mm to now only 4x4mm, which is fantastic. This allows us to use them also in small species and juvenile fish. Now we are working on optimising the use of space on each microchip. The next step will be to test the full functionality in this size.

The next challenge we are dealing with is the question of how to fix the sensors to the operculum of the fish to ensure they stay on tight. We will try different methods in different sized fish under various swimming conditions to find the best solution."

So, once the sensors are small enough and hold tight under the operculum of the fish, what will be your next step?

"There are several different modifications and applications we want to explore further. For example, we are planning to adapt the shape of the biosensor to the specific operculum of different aquaculture species like sea bass, sea bream, trout and salmon. We also hope to be able to develop a biosensor with higher autonomy that can record data longer and is capable of broadcasting in real time.

One very exciting future application could be the use of these biosensors to identify fish that are more aerobic, that is, those with higher growth and development potential. Those individuals could then be chosen to selectively breed fish with favourable physiological genes. This could be highly valuable and profitable for the aquaculture industry."

What is your vision?

"Our research team wants to see our biosensors used in all fish farms! Of course, it doesn't mean that every fish will wear one, on the contrary, our biosensors are developed for monitoring the performance of a fraction of fish within an aquaculture tank to flag potential issues arising for all fish within this particular tank. They are, so to speak, 'sentinels' for the others. Fewer than 1% of all fish will need to wear a biosensor."

Who is involved in this research journey?

"A total of eight **AQUAEXCEL²⁰²⁰** partners from six countries are involved in the development of this new technology. CSIC (Agencia Estatal Consejo Superior de Investigaciones Científicas, Spain) in close collaboration with ULPGC (Universidad de Las Palmas de Gran Canaria, Spain) is leading the work. Other collaborating partners are CCMAR (Centre of Marine Sciences of the Algarve, Portugal), INRA (Institut National de la Recherche Agronomique, France), IMR (Havforskningsinstituttet, Norway), NOFIMA (Nofima AS, Norway), WU (Wageningen University, the Netherlands) and DTU (Technical University of Denmark, Denmark)."

We are curious, is there anything you can already show us? What about a name?

"Yes, we decided on the name "FishBIT" - a new way to monitor fish health, welfare and nutritional condition via biosensors. We have just finished the first in a series of three videos on the development of these biosensors for remote fish monitoring. The video explains the process and a roadmap for the biosensor development."

To watch the video, please visit the **AQUAEXCEL²⁰²⁰** project website, here: **www.aquaexcel2020.eu/media-centre/media.**

FishBIT video

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Designed & developed by AquaTT