First FutureEUAqua stakeholder meeting (Virtual)

10th September 2020

Åsa Maria Espmark, Nofima (Coordinator)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817737.

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1. 2018 - 2022
2. DT-BG-04-2018-2019: Sustainable European aquaculture 4.0: nutrition and breeding (FutureEUAqua, iFishIENCi, AquaIMPACT, NewTechAqua)
3. Innovation Action

   Focus on activities aiming at producing plans and arrangements or designs for new, altered or improved products, processes or services.

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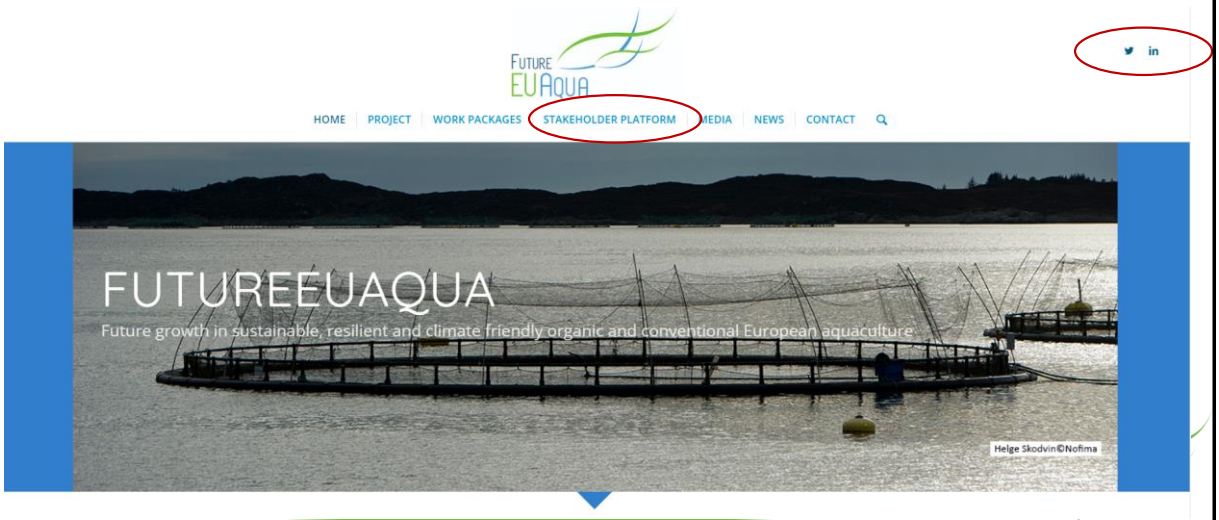
www.futureeuaqua.eu



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FutureEUAqua Stakeholder group – purpose

- Discuss issues related to FutureEUAqua and sustainable aquaculture,
- Contribute to impact and implementation of the FutureEUAqua concepts, methods, procedures and results.
- Enjoy early access to research results on sustainable aquaculture (without jeopardizing confidentiality),
- Attend FutureEUAqua Stakeholder platforms
  - 2 x SH meetings
  - SH platform – home page
  - Final conference
  - Collaboration with three other Aquaculture 4.0 projects
  - Discuss directly with FutureEUAqua researchers

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About FutureEUAqua

Overall objective

Effectively promote sustainable growth of resilient, environmentally friendly organic and conventional aquaculture to meet future challenges with respect to climate changes, growing consumer demand for high quality, nutritious and responsibly produced food.

Illustration: Oddvar Dahl©Nofima

FutureEUAqua will promote innovations in the whole value chain

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RTD

1. **Nofima (Coordinating)**
2. SLU - Swedish University of Agricultural Sciences
3. DTU Aqua - Technical University of Denmark
4. WR – Wageningen University
5. Alma mater Studiorum – University of Bologna
6. Università Politecnica delle Marche
7. Instituto Zooprofilattico sperimentale delle Venezie
8. University of Thessaly
9. HCMR - Hellenic Centre for Marine Research
10. University of Haifa
11. Cambden BRI
12. Panepistimio Dytikis Attikis

SME

1. Danish Salmon
2. SalMar Farming
3. Aller Aqua Group A/S
4. COISPA Tecnologia & Ricerca Scarl
5. Economia del Mare
6. Alintel Srl
7. AlmaPlasma
8. Tagliapietra e figli srl
9. Kefalonia Fisheries S.A.
10. Cibo e Salute Srl
11. Marin BIOGAS
12. Vork Dambrug
13. Osland Havbruk

OTHER

1. Salmobreed
2. Benchmark Genetics Norway AS
3. Galaxidi Marine Farm S.A.
4. Irida SA
5. Nireus Aquaculture SA

Associations

1. FEAP
2. IFOAM

FutureEUAqua has 32 Partners from 9 countries

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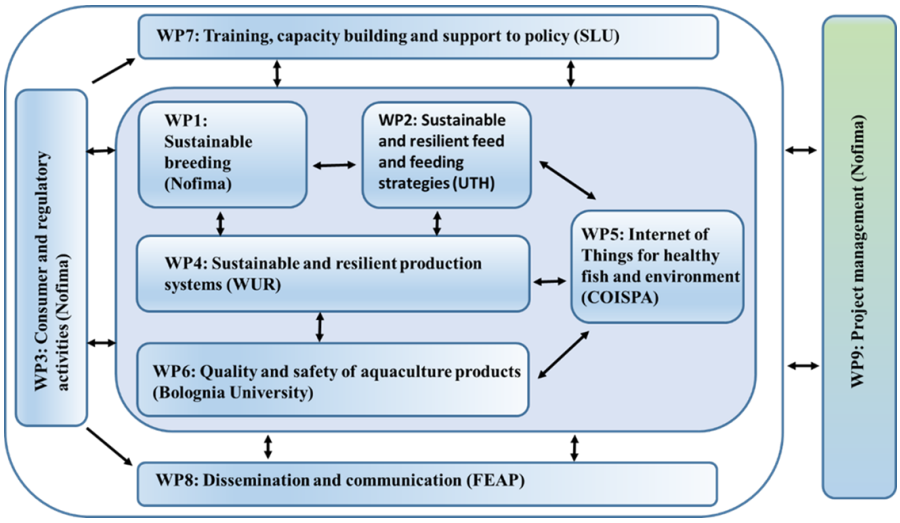
About FutureEUAqua



WP1-6: Innovations are developed

WP7-9: Innovations are evaluated, communicated, educated and implemented

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Nofima

WP1

Sustainable breeding of important European aquaculture species

Anne Helena Kettunen, Nofima – WP leader

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817737.

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Objectives

To **assess**, **validate** and **demonstrate** the ability of the current breeding programs, their breeding goals and methodologies in four of the main European aquaculture species to answer the future challenges of:

1. Increased need for utilization of alternative feed sources in aquaculture feeds.
2. Need for resilience in the face of climate changes.
3. Maintained and increased animal welfare through robustness and disease resistance.

- **Species**
  - ✓**Atlantic salmon; Benchmark Genetics, Norway**
  - ✓European seabass; Nireus
  - ✓Gilthead seabream; Nireus
  - ✓Rainbow trout; Osland stamfisk

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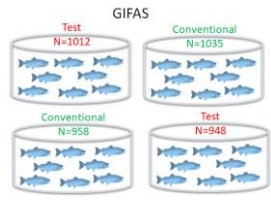
Work done and achieved results

Task 1.1. Alternative feeds: genotype x feed

SALMON:

- Ranking of families compared when fed alternative diets
  - whether current genetic material performs equally well in the changes of available feed ingredients
- Two isoenergetic diets formulated: conventional and futuristic
  - Futuristic diet utilized ingredients that BGN customers have reflected as most realistic for the future



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Work done and achieved results

Task 1.1

- NORTH experiment: Fish reared at Gildeskål Forsknigsstasjon AS (GIFAS) from October 2019 until August 2020
- Mortality difference between feed groups:
  - Futuristic 32.2% vs. conventional 19.4 %
- Massive mortality due to wounding in March and April
  - *Moritella viscosa* and *Tenacibaculum maritimum*
  - Wounds causing higher proportion of mortality in futuristic than conventional group
- Average weight at termination:
  - Futuristic 1371 g
  - Conventional 1581 g

Photo: https://gifas.no/smaskala-fou/

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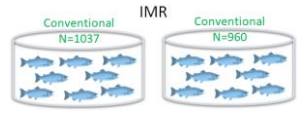
Work done and achieved results

Task 1.2. Climate resilience

SALMON:



- SOUTH experiment: Fish reared at Institute of Marine Research facility (IMR) from October 2019 until May 2020
  - SOUTH (IMR) and NORTH (GIFAS, Task 1.1) compared – same family origins
  - Mean weight at termination 956 g, total mortality 18 %

- First results from salmon (Tasks 1.1 + 1.2):
  - ➢ Feed formulation does not affect palatability but indicates differences in growth and welfare of the fish (wounding)
  - ➢ SOUTH and NORTH: large differences in climate aggregate, results applicable on wide range of the Norwegian coast

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Impact

Current activities promising for the assessment of the urgency to develop targeted breeding lines for different climatic conditions and/or optimal performance for alternative feed ingredients

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FUTURE EUAQUA

WP2

Sustainable and resilient feed and feeding strategies

Elena Mente, UTH – WP leader

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817737.

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Objectives

- Verify the **breeding potential** for nutrition and health/welfare in fish that will enable sustainable and resilient aquaculture
- Fine-tune **feed formulations** for optimized and better performing conventional and organic aquaculture, ensuring nutritional quality and safety of the final product
- Verify the potential of innovative **low ecological footprint** aquafeeds in terms of fish performance and health in large scale farm level for well-established farmed species.
- Assess the potential of fish **microbiome** to enhance health and productivity of farmed species

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Select raw materials

FM and FO
Mineral and Vitamin premix
Novel ingredients

Design Feed formulation

Produce diets
Commercially relevant
Safe
Low ecological footprint
Species specific Nutritionally adequate

Test fish growth performance

Lab scale trial:
Weight increase
FCR, SGR
Feed consumption
Health
Quality

Validate the results in large scale trials

Operational environments
Propose amendments to the organic legislation

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Results - European Sea bass*

- Best growth and FCR for **conventional** and **trimmings,** mixted with **moderate** inclusion **of novel ingredients (bacterial protein, yeast meal, microalgae).**
- The results so far show that there is a significantly positive effect in sea bass performance of moderate dietary inclusion of **innovative ingredients** in the presence of minimum **10% conventional fish meal and 2.7% conventional fish oil**.
- In the absence of any kind of fish meal, and the highest inclusion level of bacterial, yeast, microalgae and sunflower meal, feed intake was lowest.

*A. Vasilaki, K. Kousoulaki, T.A. Samuelsen, G. Pyrenis, D. Kogiannou, K. Grigorakis, E. Fountoulaki, M. Henry, E. Mente, I. Nengas (2019). Effects of novel ingredients on growth performance in European sea bass, *Dicentrarchus labrax*. Book of abstracts of AE2O19 meeting. Presented at the Aquaculture Europe meeting, AE2019, Berlin.

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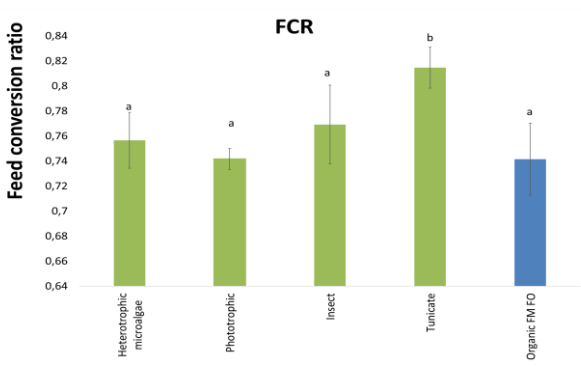
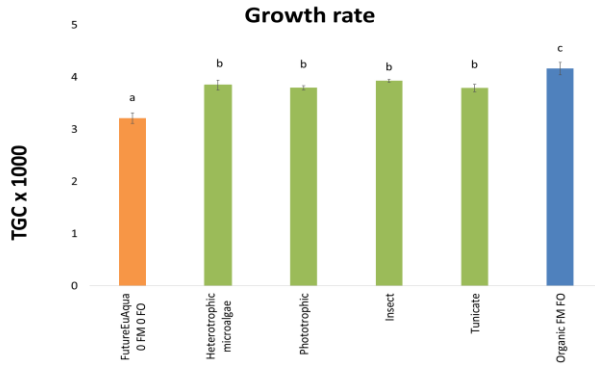
Salmon small scale
Organic and conventional experiments





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WP3

Consumer and regulatory activities

Pirjo Honkanen, Nofima – WP leader

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817737.

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Objectives

- Develop and test communication strategies that will increase **consumer awareness, perception and acceptance** of European aquaculture products and methods.
  - Conventional, organic, RAS, IMTA
- Assess regulatory challenges in Aquaculture production related to access to production sites

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817737.

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Results – survey in UK, France, Germany, Italy and Spain

- ✓ Very low awareness of aquaculture among the consumers:
  - Young males in the UK, low education
- ✓ Perceived benefits of aquaculture:
  - Economic benefits create jobs, affordable food
- ✓ Perceived negative impacts:
  - Pollution and reduced fish welfare (except for organic – conflicts with other users)
- ✓ Quite high acceptance especially for organic
- ✓ Acceptance of feed ingredients: Microalgae and insects on top, GMO yeast/vegetables & purified proteins least accepted

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Impact

- **Improve consumers' awareness, perceptions and acceptability of the European aquaculture products and methods through**:
  - Existing literature
  - Survey to assess awareness, perceptions and acceptance today.
  - Communication experiments

→ Design and implement communication strategy

- **Adapting successful labelling strategies** (e.g. organic/eco labelling, ISO-EN standards) to consumer-driven market, putting the consumers' expectations as the priority for new aquaculture value chains.
- **Contribute to ongoing implementation of EU policies: Recommendations for the regulatory framework**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817737.

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WAGENINGEN UNIVERSITY & RESEARCH

WP4

Sustainable and resilient production systems

Wout Abbink, WR – WP leader

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817737.

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WP4 Objectives

- To investigate innovations on sustainability and resilience in the production systems:
  - Integrated Multi-Trophic Aquaculture (IMTA)
  - Recirculating Aquaculture Systems (RAS)
  - Conventional flow through cages (FT)
- Within the frame of and emphasis on
  - nutrient flows and treatment
  - water quality
  - economic profitability
  - environmental impact

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Status Task 4.1: Sustainable and resilient production in Integrated Multi-Trophic Aquaculture (IMTA) systems.

- Discussions with potential partner are currently underway to determine the scope of measurements (start spring 2021), to target the issues to investigate the prospects of IMTA over FT systems. Duration and sample frequency of the trials will cover relevant growth and development of target species and water parameters.
- Quantify ecosystem services associated with IMTA, in comparison to FT monoculture, with respect to:
  - biodiversity
  - fluxes of nutrients & particles
  - carbon sequestration (long-term storage)
- Carry out a risk assessment of IMTA

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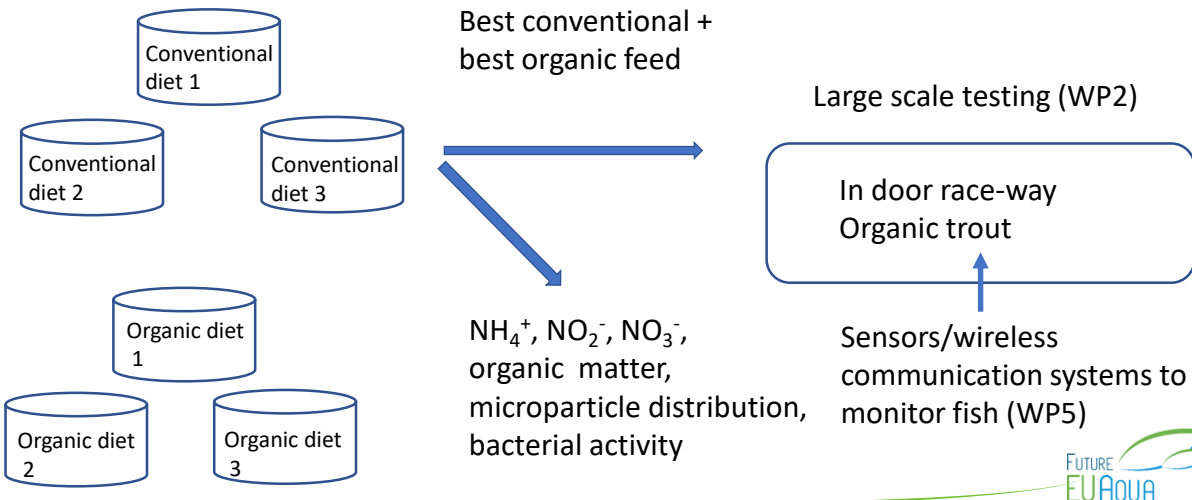
Task 4.2: Sustainable and resilient production in Recirculating Aquaculture Systems (RAS)



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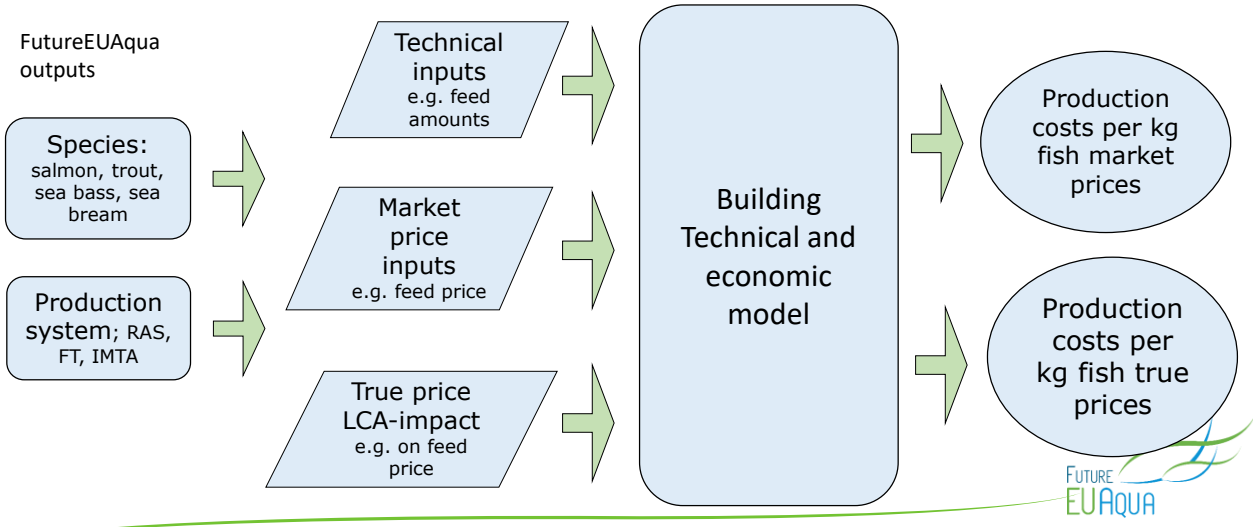
Task 4.3: Economic profitability and environmental impact of production systems



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COISPA Tecnologia & Ricerca
Stazione Sperimentale per lo Studio delle Risorse del Mare

WP5

Internet of Things for healthy fish and environment

Giuseppe Lembo, COISPA – WP leader

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817737.

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Objective

Monitoring the impact of housing environments and innovative diets on the fish health and welfare during large-scale demonstration activities, **by using a wireless communication system** to integrate Key Performance Indicators (KPIs).

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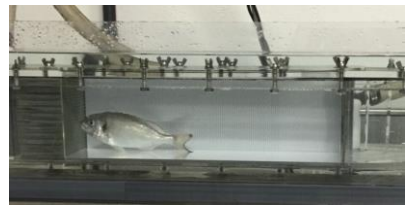
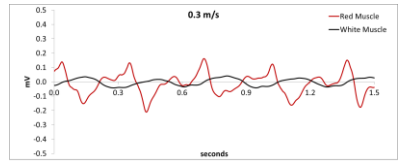
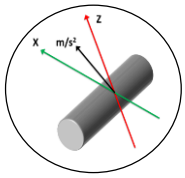
Task 5.1.2 - Calibration of physiological sensor technologies

- **Critical swimming test (U_{crit})**
- **Metabolic rate**
- **EMG hard-wire: electromyogram**
- **Accelerometer tags: calibration**



U_{crit} challenge

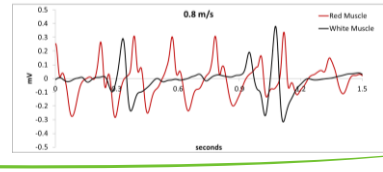




Accelerometer tag

Electromyograms

Real time monitoring fish health and welfare on farm



red and white muscle activity

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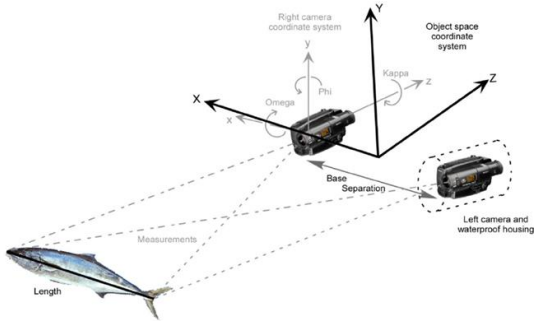
Task 5.1.3 - Development of biomass estimation sensing system



To develop a biomass estimation system the UTH group is testing:

❖Intel RealSense D435i stereo camera

❖OpenCV computer vision library for object detection and classification

❖Most importantly, it allows to load and use externally trained Neural Network models for object detection and provides tools to make use of the resulting detections

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Impact

Real-time interaction between farm and farmers

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ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

WP6

Quality and safety of aquaculture products

Francesco Capozzi, UNIBO – WP leader

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817737.

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Objective

The main aim of WP6 is the development of innovative high quality and minimally processed fish products and related packaging conditions, in order to valorise aquaculture raw materials.

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Tasks and progress

Task 6.1: Development of new minimally processed fish products

- Novel non-thermal processes;
- New formulations and valorisation of fish and fish by-products;
- Nutritional Assessment of the new products.

Task 6.2: Product quality and shelf-life:

- Safety and shelf-life modelling;
- Quality evaluation of the raw material and fish products by metabolomics indicators.

Task 6.3: Rapid evaluation of fish texture via system identification and modelling techniques:

- Tests and improvements of prototype;
- Industrial validation of prototype.

Task 6.4: Development of new packaging solutions.

Protocols made and initial testing performed

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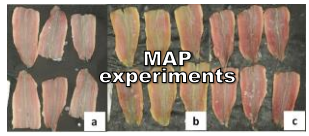
Innovation value

Cold-gas plasma



Freshness device

NMR spectrometer for omics

	Starting TRL	Arrival TRL	Products
WP6.1	4	8	New processed seafood products
	6	8	New fresh seafood products
	5	8	PEF technology for mass transfer increase
	4	7	Cold-gas plasma for fresh fish sanitation
WP6.2	6	7	Devices for freshness monitoring
	4	6	Quality grading score based on "omics biomarkers"
WP6.3	6	9	Innovative packaging solutions
	5	7	Flesh texture predictor

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WP7

Training, capacity building and support to policy

Magnus Ljung, SLU – WP leader

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817737.

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Objective

WP7 will develop a set of activities and tools in order to build capacity among key actors, and by this support them in implementing innovations and best practice.

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Tasks

Task 7.1 Knowledge transfer tools for improved products, process or services:

- practical summaries on the main results of the project for businesses and policy makers;
- inventory of successful cases and innovative solutions developed;
- best practice guidelines.

Task 7.2 Training for increased capacity:

- develop programmed learning activities and tools, eg. internet courses and physical training sessions (including modular training materials on specific themes and training materials on measures).

Task 7.3 Implementation and exploitation:

- applying an Interactive Innovation approach this task aims to support implementation and exploitation of project outputs, focusing on the stakeholder platform and the dynamic development of an exploitation plan.

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WP8

Communication and Dissemination

Szilvia Mihalffy, FEAP – WP leader

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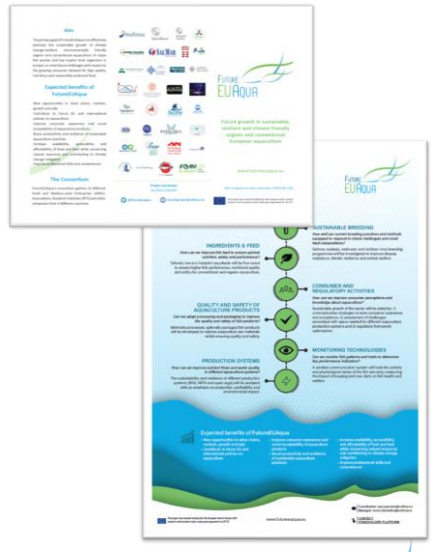
Tasks

1. Develop and use of a range of support tools and social media for communication.
   1. www.futureeuaqua.eu
   2. Twitter
   3. LinkedIN
   4. Newsletters
   5. Leaflet
   6. Infographic for online communication
   7. Videos
2. Develop and implement outreach strategies for identified target audiences and stakeholder groups.
3. Assure wide-scale communication and dissemination activities within and across project boundaries, gearing activities and actions to target groups and interests.
4. Promote the uptake of project outcomes by stakeholders and policy-makers.
5. Measure the effects of communication and dissemination activities and monitor project impact and outcome uptake.



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Thank you!

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