Position paper

In the frame of The European Green Deal and the Farm to Fork Strategy – New innovations in freshwater aquaculture for expansion of profitable and environmentally friendly production

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This position paper contributes to the development of the European Green Deal and the Farm to Fork strategies with the aim of a more comprehensive and sustainable EU food policy as well as stronger economy and cleaner environment.

Natural Resources Institute Finland (Luke) and Finnish fish farming sector support the view that for the benefit of the European society and environment, as well as EU's economic prosperity and competitiveness, strong and strategic research and innovation investments are necessary for the aquaculture sector.

Moreover, **interactive communication to increase citizens' and regulator's awareness** on the sustainability and advancements of aquaculture are important to encourage policy coherence, and to support healthy and sustainable consumption choices.

- Globally, aquaculture is one of the fastest growing food-producing sectors and now accounts for 50 percent of the world's fish that is used for food. However, growth of aquaculture in EU is slow and needs to be addressed.
- **Farmed fish are among the most resource efficient farm animals**, in terms of better feed conversion ratio, protein production, energy retention efficiency, and the lowest water consumption compared to poultry, pig and beef production. Carbon footprint for fish farming is one of the lowest in animal production.

KEY MESSAGES

1 EUTROPHICATION AND ITS RELATION TO LICENCING OF AQUACULTURE FARMS

- Clean water and healthy aquatic ecosystems have large-scale positive effects on wild life, aquatic ecosystems, biodiversity, aquaculture, fisheries, tourisms, and recreational activities.
- In many areas, agriculture, forestry, and human societies are major sources of nutrient loading to aquatic environments. For instance, in 2008–2012, agriculture produced 52–78%, forestry 1–16%, human societies 12–24%, and aquaculture 1–8% of the phosphorus loading from Finland to the Baltic Sea (Source SYKE 2015; Antti Räike).
- Nutrient loading and/or low quality of waters are **major obstacles restricting licencing of the aquaculture** operations, and hence the growth of the industry.
- **R&I solutions combining agriculture, forestry, human societies, fisheries and aquaculture are needed to reduce nutrient loading to aquatic environments**. These solutions may include recycling, landscape management, farm-level practices, feeds, feeding and genetically improved animal and plant material across aquaculture, agricultural and forestry sectors. In Finland, aquaculture has been able to reduce specific nitrogen and phosphorus loading by over 70% by the development of feeds, farm practices and fish material.

2 FRESHWATER AQUACULTURE

- Aquaculture in **freshwater and coastal areas is a vital part of the modern expanding blue bioeconomy**.
- Over 20% of EU's aquaculture is produced in freshwater.
- In several EU countries, domestic fish production is fully dependent on freshwater aquaculture, or costal aquaculture, and the fish supply chain is based on juveniles produced by freshwater broodstock farms.
- In many countries, aquaculture governance and legislation is complex, as also highlighted by the European Aquaculture Technology and Innovation Platform EATiP
- The development of more functional, reliable and disease-free freshwater farms are fundamental for the success of the aquaculture industry.

3 RECIRCULATING AQUACULTURE SYSTEMS (RAS)

- In RAS, water used for aquaculture is recycled 50-100 times by filtering and redirecting the water back to fish tanks typically located on land.
- RAS needs limited amount of water and can be combined with nutrient removal from water. Hence, RAS discharges less nutrients and can be located at unconventional sites.
- RAS is increasingly used for production of Atlantic salmon smolts in fresh water, but successful operations in producing market-sized fish are still lacking.
- RAS requires high investments, deep knowledge in designing the technology and highly skilled management teams. R&D and education are vital for further development.
- **RAS complements current farming and does not replace it**. RAS is at initial phase of development and requires further development work on profitability, optimal ways to merge different forms of RAS with current aquaculture practices, energy usage, specific feeds and fish adapted to RAS, reduced C02 footprint, and product quality.

4 GENETICS AND BIOTECHNOLOGY IN AQUACULTURE

- **Selective breeding and genomic tools are key cost-effective methods** to improve fish welfare, production efficiency, adaption to climate change and new production systems, and to make production more environmentally friendly and more profitable.
- Further improvement of genomic selection and genomic laboratory technologies need to be developed in tight co-operation with companies. This is an area that has been **a break-through in animal breeding**, including recent advancements in aquaculture, and continues to develop at a rapid pace also outside EU.
- This is in line with FABRE TP Farm Animal Breeding & Reproduction Technology Platform, and their report on '*Contribution of Breeding and Genetics to increased sustainable aquaculture production in the EU*'. Luke has been contributing to this strategic view.

5 ADDED-VALUE AQUATIC PRODUCTS AND NON-FOOD USES

- It is necessary to improve understanding of the applicability of under-exploited aquatic raw materials and side-streams. Novel easy-to-eat products and high-value functional ingredients for specialised products can be developed from these materials.
- This would support **the principles of circular economy and zero waste**.
- Most of the fish companies in Finland (90%) already utilize the whole fish, all raw materials and side-streams, in 100%, so there are already multiple solutions to obtain zero waste practices.

Natural Resources Institute Finland (Luke) solves local and global challenges through research

STATISTICS

55 ‣ 167

Statistics ‣ releases

STATUTORY SERVICES

110 The annual tree growth in Finland's forest is 110 million cubic meters according to the latest National Forest Inventory measurements.

11 Game population assessments

7 Estimates of fish stocks

CONSERVATION OF GENETIC RESOURCES:
21 animal breeds , **13** tree species, **19** fish species and **952** plant species

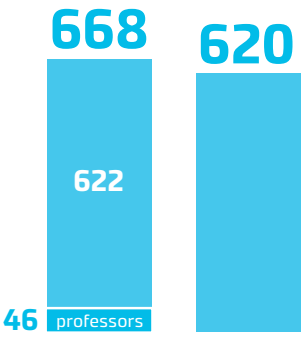
SCIENCE

EU funded projects

589

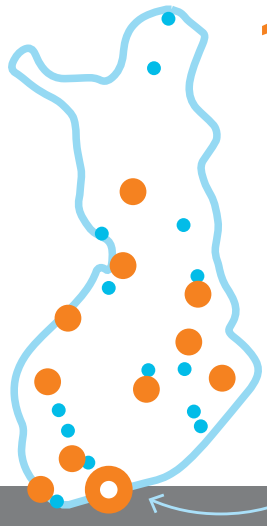
Scientific peer reviewed articles

PERSONNEL



Research staff

Other experts



12 Research locations

8 Experimental stations

5 Aquaculture infrastructures

HEADQUARTERS
in Viikki, Helsinki

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