



Ministry of Economic Affairs  
and Employment of Finland

## Arctic Economic Dialogue project – Iceland 8–10 April 2019



The objective of the **Arctic Economic Dialogue** project launched by the Ministry of Economic Affairs and Employment is to increase awareness and understanding of the new business opportunities becoming available in the Arctic region. This requires a better understanding of the Arctic conditions and the practical problems and challenges companies and organisations experience in their daily work. Once such an understanding has been acquired, it will be easier to create an agenda for joint development efforts, to engage in closer cooperation, and thereby to identify new solutions.

As part of the Arctic Economic Dialogue project, the Ministry of Economic Affairs and Employment organised a combined seminar and study visit themed on **Arctic fish farming to Iceland on 8–10 April 2019**. The visit was organised in collaboration with the Embassy of Finland in Iceland, Natural Resources Institute Finland, and local fish farming companies.

During their trip, the visitors learned more about fish farming in practice, and about the industry's challenges and plans in Iceland. Visitors had the opportunity to visit fish farms (both open ocean and recirculating aquaculture systems), various organisations using fish as a raw material for their products, and government, research and training organisations. Various themes related to fish farming were widely discussed, such as licensing practices, efficient and versatile use of fish as a raw material, ways of securing the supply of skilled labour, the challenges of fish farming and related solutions.

### *Fish farming increasingly important*

According to the statistics of the Food and Agriculture Organization of the United Nations (FAO), fish production was 171 million tonnes in 2016, with fish farming accounting for approximately a half. The volume of fish farming is predicted to grow to 201 million tonnes by 2030, with fish farming expected to account for most of the growth. The production volume of wild fish has not grown since the turn of the 1990s.

According to the FAO, factors contributing to the growing volume of farmed fish include an increase in the general income level, urbanisation, and better distribution channels. It is also likely that the changes in food consumption and production required to mitigate climate change, together with population growth and the limited availability of wild fish will further fuel the growth of fish farming. The change is dramatic, as indicated by the fact that farmed fish production overtook the global beef production a few years ago.

Norwegian companies are the largest farmed salmon producers. In 2018, Norway produced approximately 1.3 million tonnes of salmon, and the Norwegian Mowi ASA alone produced 370,000 tonnes of salmon in 2017.

In Iceland, the fish farming industry has seen significant growth particularly after 2015. According to Statistics Iceland, the volume of fish production grew from 8,400 tonnes in 2015 to more than 19,000 tonnes in 2018. Salmon production saw particularly dramatic growth, from 3,260 to more than 13,400 tonnes. Almost 5,000 tonnes of Arctic char was produced in 2018, and production growth has been more moderate compared to salmon. According to the Natural Resources Institute Finland, the farming volume of edible fish in Finland is about 13,000 tonnes, consisting mainly of rainbow trout.

### *Common challenges and development areas in fish farming*

The challenges of fish farming are largely similar regardless of the country. Ensuring and monitoring fish health and preventing the spread of fish diseases are key development areas. Concerns regarding the reconciliation of environmental protection and fish farming remain relevant even though steps to cut nutrient flows have been effective. Economic issues and profitability improvement continue to be important issues in fish farming, especially in recirculating aquaculture systems. There is a clear need and opportunities for joint development efforts in the sector involving new technologies and better use of such technologies.

Since feeding accounts for 60 per cent of the costs of salmon farming, special attention has been paid to the optimisation of feeding. Underwater cameras installed to monitor fish allow feeding to be stopped once the fish have had enough to eat. This helps to ensure that no more feed is provided than is necessary, allowing waste to be minimised. While helping to keep costs under control, optimised feeding also reduces the negative impact of fish farming on the environment.



*Vaccination of smolts*

It was frequently pointed out in connection with various visits that investment in fish processing plants and technologies should be encouraged. Modern, fit-for-purpose equipment and facilities ensure that the fish produced and sold is of high quality. To ensure full-scale operations, processing facilities must provide sufficient capacity. Investments for this are in the pipeline. Discussions revolved more around capacity increase than process development.

### *Natural conditions*

In Iceland, the harsh natural conditions pose their own challenges for offshore production plants. Production facilities must be able to withstand extreme conditions, such as 40-metre waves. The weather conditions in some parts of Iceland's coastline are so harsh that operating a production facility with current technology is not possible. However, new technology is emerging that might permit production activities in these regions. Natural conditions as such are not exceptional, and it was mentioned in the discussions that similar challenges were experienced on the Faroe Islands.

Natural conditions can also provide some advantages. Some areas around Iceland's fjords are protected from the worst storms. Relatively mild weather allows some of the onshore recirculating aquaculture systems to be

built under the open sky. The temperatures in Iceland (at least in the facilities we visited on the southern coast) are even enough to permit this, and temperatures rarely drop much below zero.

Clean water and geothermal heat were often mentioned as advantages to fish farming in Iceland. Rainfall is abundant, and the water filters through the lava rock. In addition, geothermal heat is a source of warm water and energy needed for farming.

It was generally thought that Iceland with its long coastline provides a good environment for fish farming. This is one of the reasons why Norwegians have shown an interest in the opportunities available in Iceland, and have invested in Icelandic companies.

### *Logistics*

Although Iceland is logistically within easy reach from the US, European and Asian markets, fast transport for fish continues to be a logistic challenge. It takes about 6–7 days to reach the markets. Sub-zero temperatures are used during transport. Air freight is used to transport fish, but it is more expensive to do that from Iceland than from Norway. For example, the cost of transporting fish by air freight from Iceland to the US is 25% higher than from Norway. Fish farmers pointed out that flights to and from Iceland are designed for passenger transport rather than for transporting fish.

The condition and maintenance of the road network presents a challenge for fast fish transport. The roads are narrow and wind up and down the fjord slopes. In the winter, some roads are closed. The drive from Reykjavik to the fish farming regions in the Westfjords takes about 8 hours.

### *Licences and other operating conditions*

Some of the fish farmers commented on the general opinion in Iceland being somewhat critical of fish farming. Sports fishermen in particular have expressed concerns of the damaging impact of fish farming on wild fish. Some of the fish farmers were under the impression that Iceland lacked a clear picture of what it wanted from fish farming. A large part of Iceland's coastal region - especially around salmon rivers - has been excluded from fish farming. This is to protect the salmon rivers and wild salmon stocks.

Licensing practices and policies are extremely important for the growth of fish farming, both in Iceland and in Finland. According to the Icelandic fish farmers, sufficient licensing enables growth and provides sufficient security to permit further investments. In their experience, sufficient licensing is a signal for investors, showing that operations provide long-term prospects and opportunities for expansion. Investors require positive future prospects in order to make a decision to invest.

The licensing practices in place in Iceland were considered to support growth: licences are granted to a few operators to enable business growth. This practice also prevents manipulation, i.e. applying for a licence without any intention to launch operations but only to re-sell the licence.

With regard to taxation (tax/resource tax), it was concluded that now is not the right time to impose taxes on fish farming. The industry is in its early growth stages, and no competitive advantage over the Norwegians has been gained. Licences are currently granted free of charge. This is considered to reflect the practice in Norway, where licence fees were introduced 30 years after the initial launch of operations, once the industry was showing healthy growth.

Discussions also revealed that the fish farming ecosystem and service providers have emerged in or followed Norwegian farmers to Iceland. The service ecosystem provides solutions for digital management and control, for identifying and preventing fish diseases, for environmental monitoring, and for environmental research regarding the location of new fish farming facilities and the use of offal and remains (for pet food, for instance).

Norwegian owners commented that there was little research cooperation in Iceland. Operators in Iceland rely on Norway to handle R&D, and simply wait to introduce new, tested solutions in practice. Norwegian owners are also responsible for the transfer of practical skills and knowledge. Employee training is mainly provided internally by companies, but there are plans to create a diploma programme together with educational institutions.

Obtaining more added value from fish was mentioned as an important objective during a visit to the Codland organisation. Since the catch volumes are not growing, it would be essential to increase the added value. Efforts should be made to use all parts of the fish efficiently. Cod is a great example: after the fish has been filleted, it still has about 50–60 per cent of biomass left.

To raise the added value of cod:

1. Efforts will be made to make cod available to consumers when it's fresh, and processed for more convenience. This requires good cold chain management and more precise cutting and boning. New technology will be used to replace humans in the processing stage. This way, the cod fillet will be easier for the consumer to use, and they will be prepared to pay more for it.
2. Other ways to increase the added value from cod include developing new products in addition to the traditional food and feed. For instance, collagen produced from cod skin is a valuable, high added-value raw material that is used in the cosmetics and pharmaceuticals industries.
3. Another way of deriving higher added value is to seek alternative customers instead of just selling the raw material. Artefacts made from cod skin (such as wallets), the ALDA lemonade containing collagen, or dried cod heads sold to Nigeria were some of the examples mentioned. Meanwhile cod liver oil was given as an example of products sold directly to consumers.

#### *Discussion: Iceland College of Fisheries*

Fishing was previously not valued as an occupation and as a career choice. Typically people who had no other education would end up getting a job in the fishing industry. Fishing was not something young people wanted to study either. Initially, training and education to young people who had no other choice but to study fishing was planned together with companies in the fishing industry. However, attitudes are changing now that the industry employs 10,000 people.

Today, fishing is seen as a growing industry, and it has become one of the country's key industries with tourism. Traditional fishing as a primary industry is declining, but the fishing industry and related trade and services are growing. One of the key contributors to this development is fish farming, and its anticipated rapid growth. This change emphasises the importance of training and education that will support and drive the production of goods based on novel fish raw materials and products with a higher added value.

This involves certain challenges for training and education. Fish farming and aquaculture is an area where the Icelandic consider their skills and competence insufficient. Cooperation with the Norwegians is deemed invaluable to ensure high-quality education. Although education needs to address the fishing industry as a wider concept, the need for training in the traditional methods also continues to exist: training related to fishing equipment and technologies is planned in collaboration with the industry sector, and the courses attract participants from abroad, too.

Education has a strong practical approach, and training is often provided in workplaces. The course content is customised depending on the industry needs, and planned together with the sector's companies. Even though the education is very practical, providing an opportunity to pursue further studies is considered important. One of the objectives is to shape attitudes, and to make the fishing industry more attractive.

A two-year programme in fishing studies is offered, with an option to specialise in fish farming, coastal fishing, or aquaculture.

The need for cooperation between fish farming companies and universities was frequently mentioned in discussions with research institutes and the authorities. Practicality and a solution-focused approach were considered the best practice. Increasing added value is a common interest to all players. They emphasised the importance of fresh fish delivered directly to consumers on the one hand, and efficient use of offal and other by-products and their conversion into new raw materials on the other. Similarly, the service ecosystem that has emerged around fish farming and its significance in terms of support for the fishing industry and new product development was underlined. One of the most interesting places to visit in Reykjavik was the Iceland Ocean Cluster accelerator for start-ups, financiers and R&D&I <http://www.sjavarklasinn.is/en/>.

Icelandic lobbyists stressed the fact that fish farming, particularly salmon farming, was showing healthy growth, and that the annual production level of 40,000 tonnes will be achieved. The growth has been accelerated by e.g. the market entry of new salmon farmers. The growth of the fish farming industry is of major regional significance as it improves the economic situation in many less developed areas.

The Icelandic parliament has recently (July 2019) passed new decrees to supplement the law regulating fish farming, and the ministries will assess their practical impact. The first and foremost objective is to support fish farming all the while taking environmental issues into account. A proposed tax that would allow income from fish farming to be transferred to less developed areas was mentioned in the discussions.

Being a fish farming community about the same size as Finland and investing in supporting industry growth, Iceland serves as a good benchmark and cooperating partner for Finland. There will be a need to continue this dialogue in the future.