Salmon Farming Industry Handbook

2020

Forward-looking Statements

This handbook includes forward-looking statements that reflect Mowi's current expectations and views of future events. These forward-looking statements use terms and phrases such as "anticipate", "should", "likely", "foresee", "believe", "estimate", "expect", "intend", "could", "may", "project", "predict", "will" and similar expressions.

These forward-looking statements include statements related to population growth, protein consumption, consumption of fish (including both farmed and wild), global supply and demand for fish (and salmon in particular), aquaculture’s relationship to food consumption, salmon harvests, demographic and pricing trends, market trends, price volatility, industry trends and strategic initiatives, the issuance and awarding of new farming licences, governmental progress on regulatory change in the aquaculture industry, estimated biomass utilization, salmonid health conditions as well as vaccines, medical treatments and other mitigating efforts, smolt release, development of standing biomass, trends in the seafood industry, expected research and development expenditures, business prospects and positioning with respect to market, and the effects of any extraordinary events and various other matters (including developments with respect to laws, regulations and governmental policies regulating the industry and changes in accounting policies, standards and interpretations).

The preceding list is not intended to be an exhaustive list of all our forward-looking statements. These statements are predictions based on Mowi’s current estimates or expectations about future events or future results. Actual results, level of activity, performance or achievements could differ materially from those expressed or implied by the forward-looking statements as the realization of those results, the level of activity, performance or achievements are subject to many risks and uncertainties, including, but not limited to changes to the price of salmon; risks related to fish feed; economic and market risks; environmental risks; risks related to escapes; biological risks, including fish diseases and sea lice; product risks; regulatory risks including risk related to food safety, the aquaculture industry, processing, competition and anti-corruption; trade restriction risks; strategic and competitive risks; and reputation risks.

All forward-looking statements included in this handbook are based on information available at the time of its release, and Mowi assumes no obligation to update any forward-looking statement.

Mowi Salmon Farming Industry Handbook

The purpose of this document is to give investors and financial analysts a better insight into the salmon farming industry, and what Mowi considers to be the most important value drivers.

Table of content

1 Introduction

Introduction

Salmon is the common name for several species of fish of the family Salmonidae (e.g. Atlantic salmon, Pacific salmon), while other species in the family are called trout (e.g. brown trout, seawater trout). Although several of these species are available from both wild and farmed sources, most commercially available Atlantic salmon is farmed. Salmon live in the Atlantic and the Pacific Ocean, as well as the Great Lakes (North America) and other landlocked lakes.

Typically, salmon are anadromous: they are born in freshwater, migrate to the ocean, then return to freshwater to reproduce.

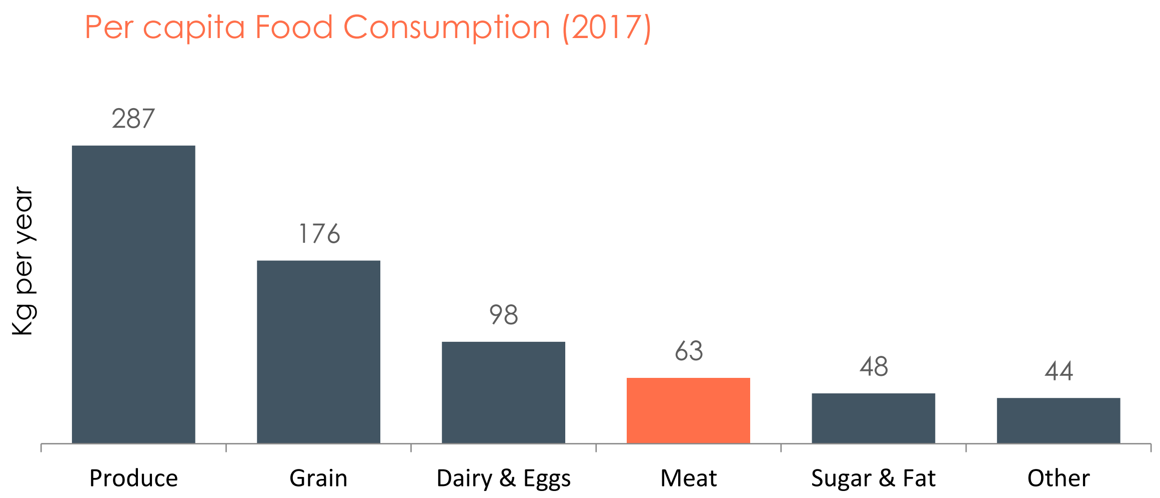
About 69% of the world's salmon harvest is farmed. Farming mainly takes place in large nets in sheltered waters such as fjords or bays. Most farmed salmon come from Norway, Chile, Scotland and Canada.

Salmon is a popular food. Salmon consumption is considered to be healthy due to its high content of protein and omega-3 fatty acids and it is also a good source of minerals and vitamins.

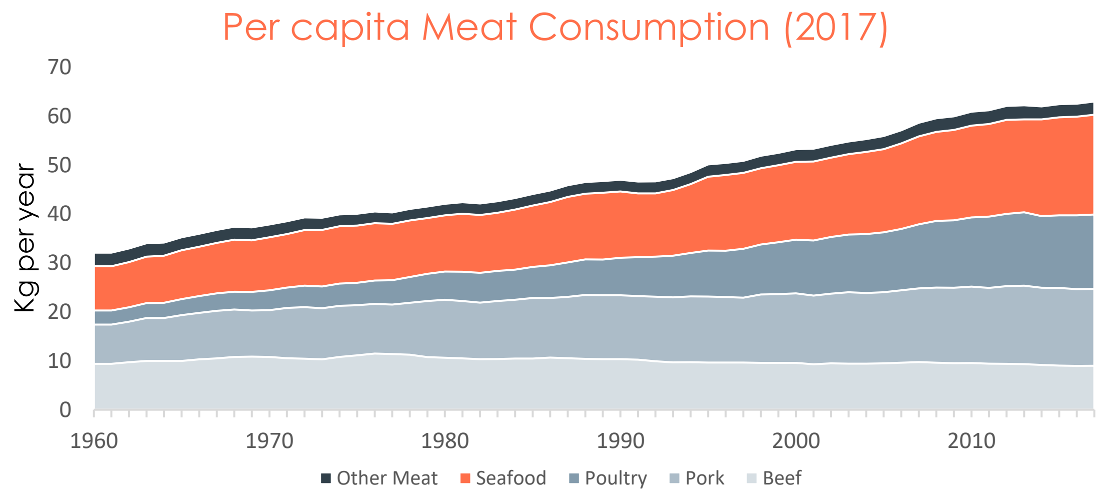
2 Positioning of Salmon

Positioning of Salmon

2.1 Seafood as part of food consumption



The average human eats around 716 kg of food each year. Most of this food is produce such as vegetables, fruits, and starchy roots. Animal protein, such as seafood, poultry, pork, and beef, amounts to 9% of the total diet.



Meat as a food source has gradually become more important. Global per capita consumption has more than doubled since 1960, and the seafood segment is a big contributor to this increase.

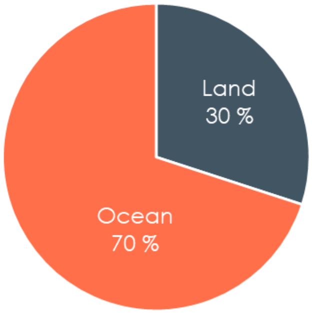
Source: FAO (2017) FAOstat Food Balance Sheets

MOWI

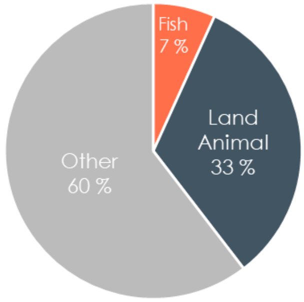
Positioning of Salmon

2.2 Seafood as part of overall protein consumption

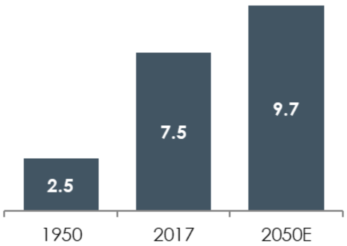
World Surface



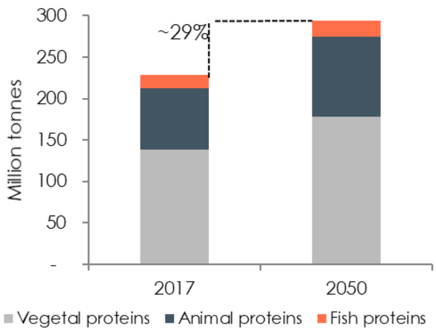
Protein Sources for human Consumption (2017)



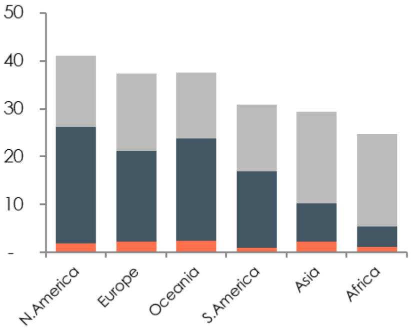
World Population (billion)



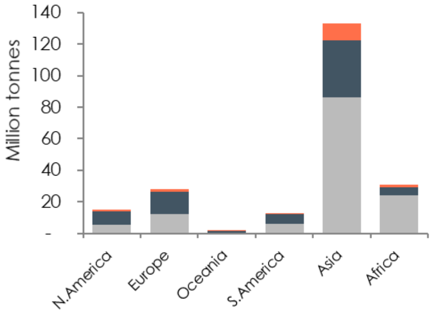
Implied protein consumption driven by population growth only



Protein consumption in kg per capita (2017)



Total protein consumption by continent (2017)



The UN estimates that the global population will grow to approximately 9.74 billion by 2050.

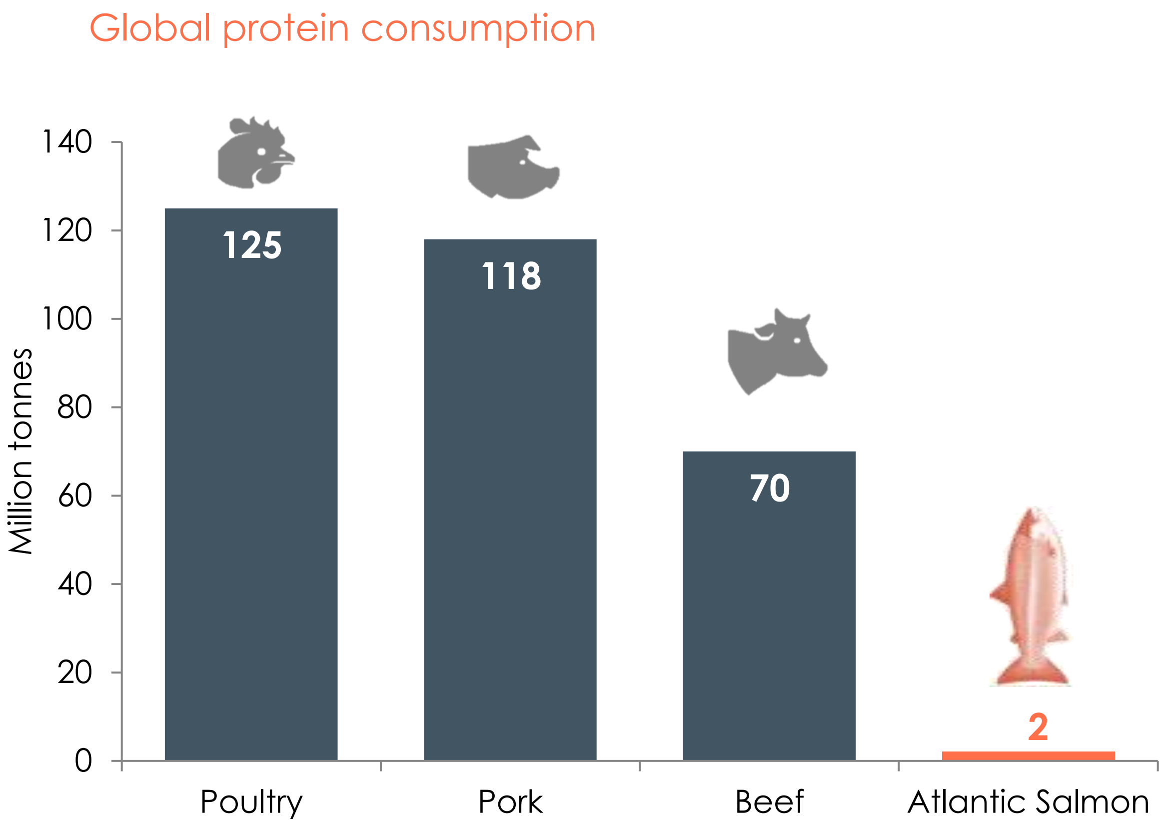
Although 70% of the Earth's surface is covered by the oceans, fish accounts for only 7% of the protein sources for human consumption.

Assuming consumption per capita stays constant, this implies a 29% increase in demand for protein. The UN however, estimates that demand will actually double. We know that resources for increased land-based protein production will be scarce, so a key question is how the production of protein sources from the sea can be expanded.

Source: FAO (2017) FAOstat Food Balance Sheets, UN (2019) World Population Prospects: the 2019 Revision

Positioning of Salmon

2.3 Atlantic Salmon as part of global protein consumption



Most animal protein in our diets comes from pork, poultry, and beef, with salmon consumption representing a small portion of global protein consumption.

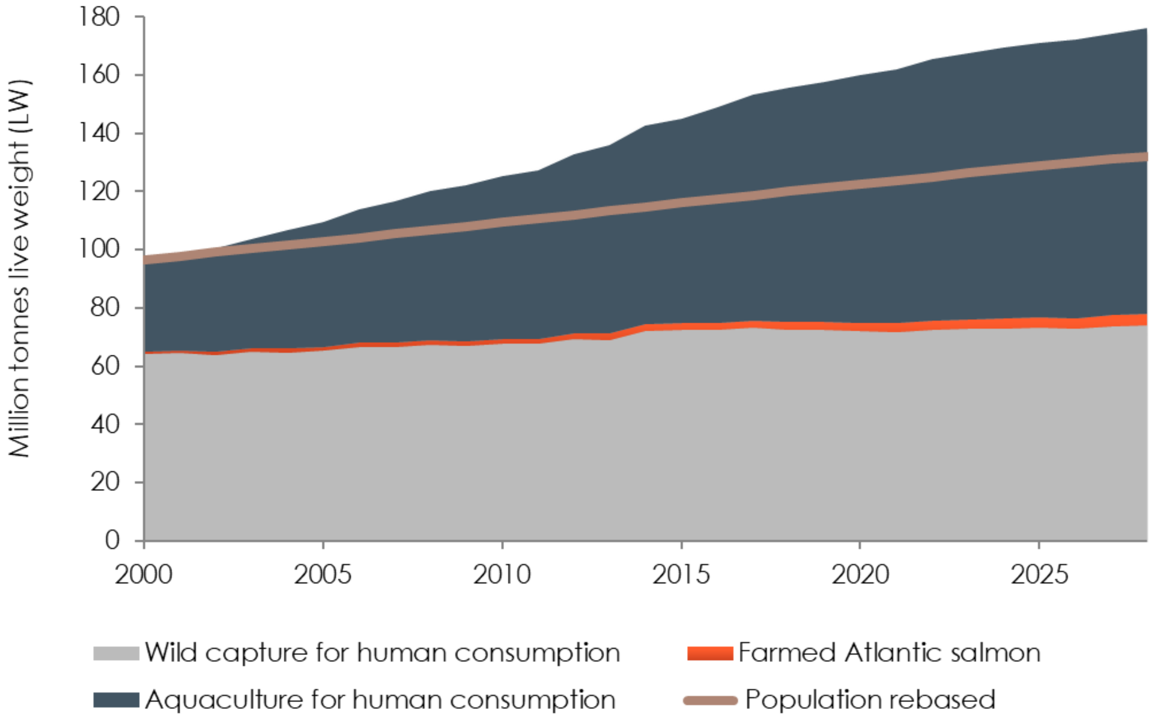
In 2019, FAO estimated consumption of 125 million tonnes product weight of poultry, 118 million tonnes of pork, and 70 million tonnes of beef and veal.

In contrast, the total consumption of farmed Atlantic salmon was around 2.3 million tonnes (GWT). This corresponds to about 1.6 million tonnes in product weight. If we combine all salmonids (both farmed and wild) it amounts to 3.4 million tonnes (GWT) in 2019.

Source: OECD-FAO (2019) *Agricultural Outlook 2019-2028, Kontali Analyse*

Positioning of Salmon

2.4 Stagnating wild catch – growing aquaculture



Over the past few decades, there has been a considerable increase in total and per capita fish supply. As the fastest growing animal-based food producing sector, aquaculture is a major contributor to this, and its growth outpaces population growth.

Great progress in breeding technology, system design and feed technology in the second half of the twentieth century has enabled the expansion of commercially viable aquaculture across species and in volume. In 2013-15, China alone produced 62% of global aquaculture output, while Asia accounted for 88%.

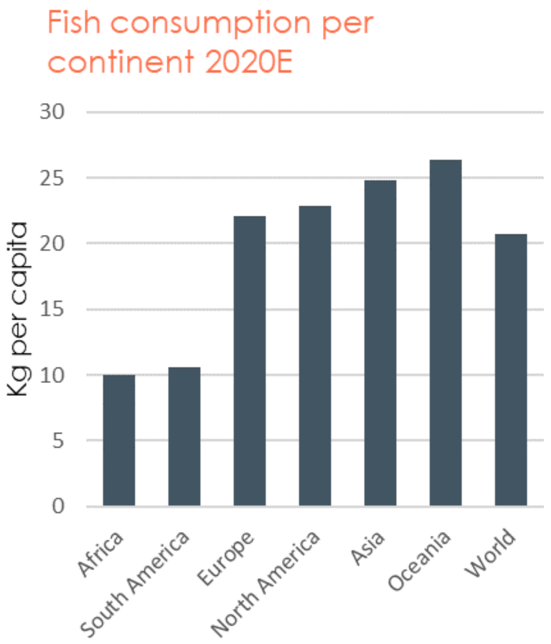
The World Bank developed a scenario analysis in their report *Fish to 2030* (2013) predicting that aquaculture will continue to fill the supply-demand gap, and that by 2030, 62% of fish for human consumption will come from this industry.

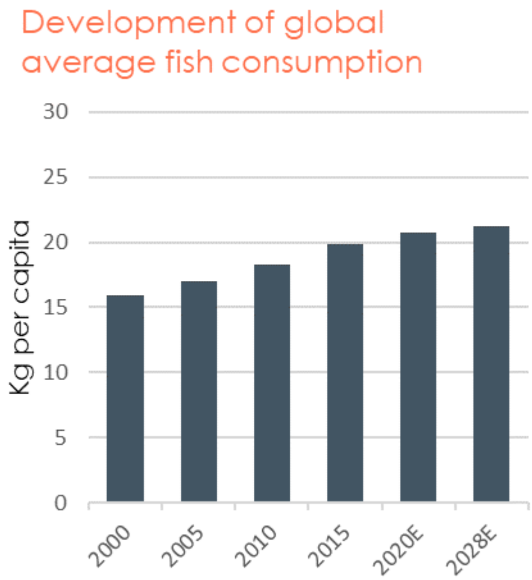
In 2019, aquaculture accounted for 85 million tonnes (LW) destined for direct human food consumption, while wild capture accounted for 72 million tonnes (LW). However, fish has been estimated to account for only 7% of global protein consumption (and about 17% of total fish and animal protein supply).

Sources: FAO (2013) *World Fisheries and Aquaculture*, OECD-FAO (2019) *Agricultural Outlook 2019-2028*, World Bank (2013) *Fish to 2030*, *Kontali Analyse*

Positioning of Salmon

2.5 Fish consumption





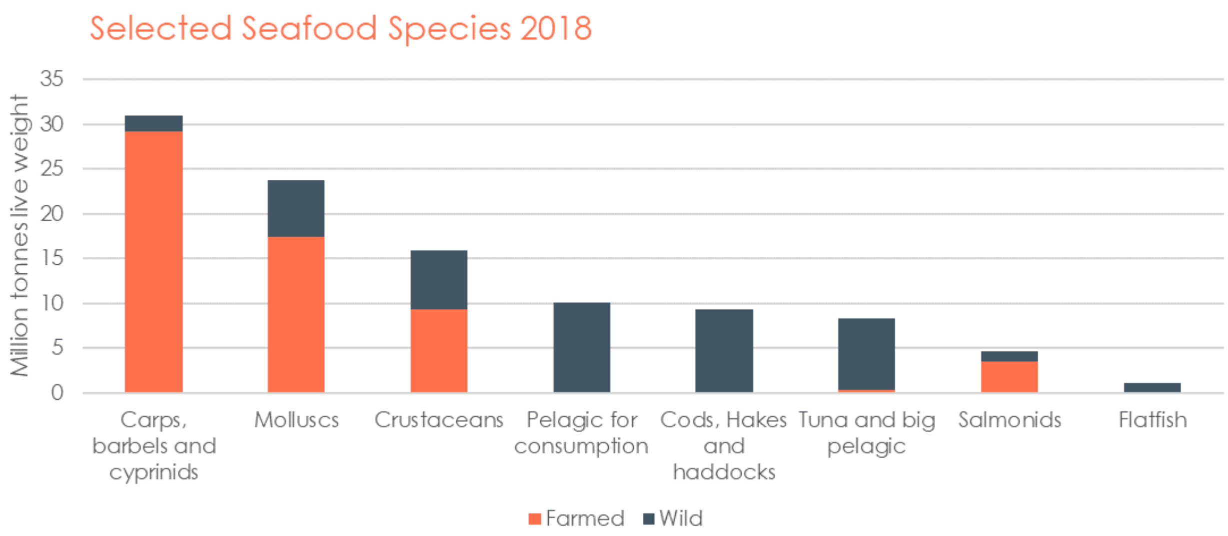
Given the expected *production* growth of 10% during 2019–2028 and the projected world *population* growth of 9% over the same period, we will most likely see a global increase in the average fish consumption level.

By 2028, per capita fish consumption is estimated to be 21.3 kg (vs. 9.9kg in the 1960s and 20.6kg in 2019). This is equivalent to another 18 million tonnes of seafood supply, which aquaculture is estimated to provide.

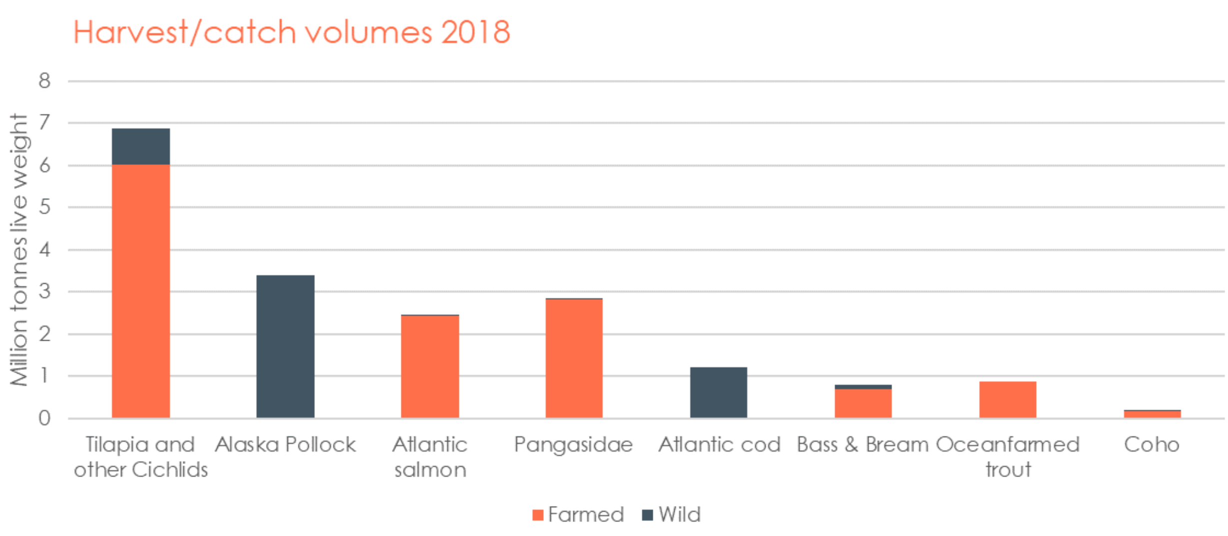
According to FAO, per capita consumption is expected to increase by 3% in the period 2019-2028. Latin America is expected to have the highest growth, whilst negative growth is anticipated in Africa. In general, per capita fish consumption is likely to grow faster in developing countries. However, more developed economies are expected to have the highest per capita consumption.

Sources: FAO (2018) The State of World Fisheries and Aquaculture, OECD-FAO (2019) Agricultural Outlook 2019-2087

2.6 Salmonids contribute 4.4% of global seafood supply



Although several salmon species are available from both wild and farmed sources, almost all commercially available Atlantic salmon is farmed. Even with an increase in production of Atlantic salmon of more than 1,000% since 1990, the total global supply of salmonids is still marginal compared to most other seafood categories (4.4% of global seafood supply). Whitefish is about ten times larger and comprises a much larger number of species.

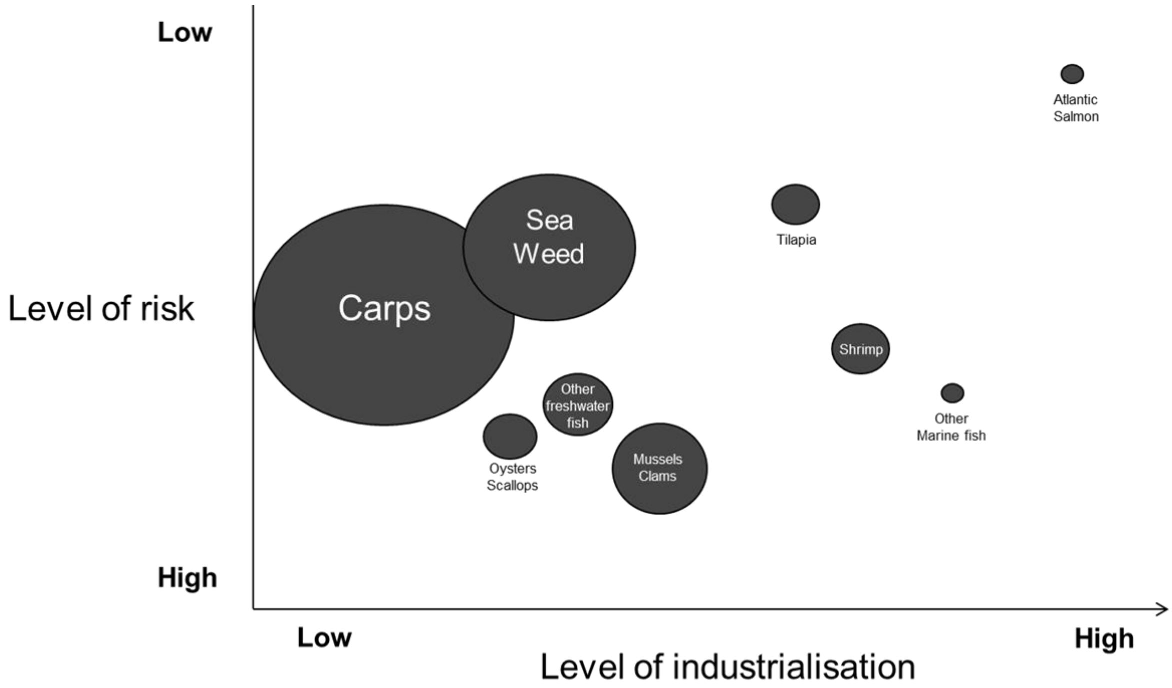


In 2018, more Atlantic salmon was harvested than Atlantic cod. However, the harvest of Atlantic salmon was only about 24% of that of two of the largest whitefish species, tilapia and Alaska pollock.

Note: Live weight (LW) is used because different species have different conversion ratios
Source: Kontali Analyse

Positioning of Salmon

2.7 Considerable opportunities within aquaculture

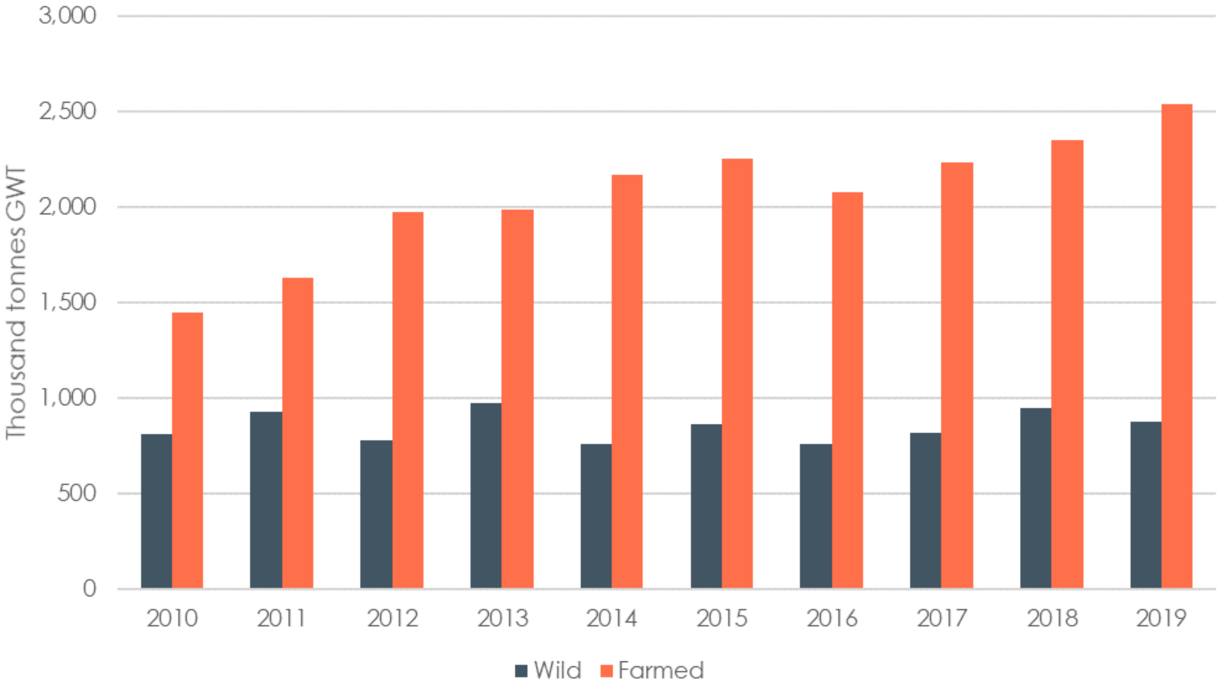


The illustration above shows that Atlantic salmon has the highest level of industrialisation and the lowest level of risk compared to other aquaculture species. The size of the circles indicates volume harvested.

Although Atlantic salmon is relatively small in harvest volume compared to other species, it is a very visible product in many markets due to the high level of industrialisation.

Source: Kontali Analyse

2.8 Supply of farmed and wild salmonids



The general supply of seafood in the world is shifting more towards aquaculture as the supply from wild catch is stagnating in several regions and for many important species. Wild catch of salmonids varies between 700,000 and 1,000,000 tonnes GWT, whereas farmed salmonids are increasing. The total supply of salmonids was first dominated by farmed in 1999. Since then, the share of farmed salmonids has increased and has become the dominant source.

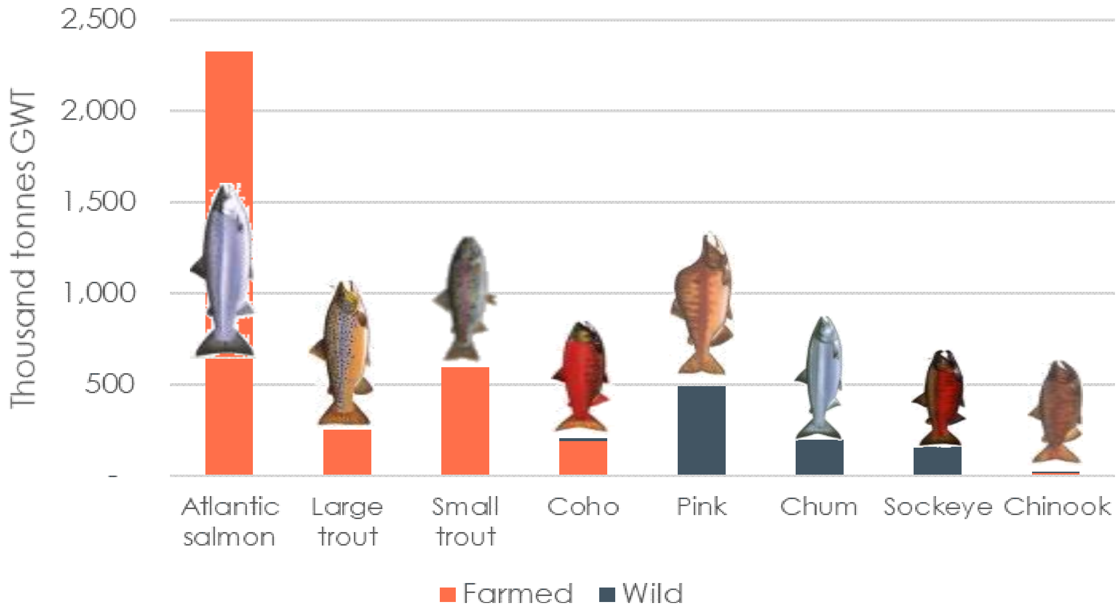
The total supply of all farmed salmonids exceeded 2.54 million tonnes (GWT) in 2019. The same year, the total catch volume of wild salmonids was a bit more than one third of farmed, with chum, pink and sockeye being the most common species.

Of the wild salmonids, pink is the most important species in terms of volume with a 56% share of global supply from wild catches.

Source: Kontali Analyse

Positioning of Salmon

2.9 Salmonids harvest 2019



Atlantic salmon: By quantity, the largest species of salmonids. Farmed Atlantic salmon is a versatile product, which can be used for a variety of categories such as smoked, fresh, sushi, as well as ready-made meals. The product is present in most geographies and segments. Due to biological constraints, seawater temperature requirements and other natural constraints, farmed salmon is only produced in Norway, Chile, UK, North America, Faroe Islands, Ireland, New Zealand and Tasmania.
Large trout: Produced in Norway, Chile and the Faroe Islands, the main markets are Japan and Russia. Trout is mainly sold fresh, but is also used for smoked production.
Small trout: Produced in many countries and most often consumed locally as a traditional dish as hot smoked or portion fish. Small trout is not in direct competition with Atlantic salmon.
Coho: Produced in Chile and is mostly used for salted products. It is a competitor of trout and sockeye in the red fish market. Although Russia has increased its import of this fish over the last few years, Japan remains the largest market.
Pink: Caught in USA and Russia and used for canning, pet food and roe production. Since quality is lower than the other species it is a less valued salmonid. The fish is small in size (1.5-1.7 kg) and is caught over a very short time period.
Chum: Caught in Japan and Alaska. Most is consumed in Japan and China. In Japan, it is available as fresh, while in China it is processed for local consumption and re-exported. Little chum is found in the EU market. The catch varies in quality and part of the catch is not fit for human consumption.
Sockeye: Caught in Russia and Alaska. It is mostly exported frozen to Japan, but some is consumed locally in Russia and some canned in Alaska. Sockeye is seen as a high quality salmonid and is used for salted products, sashimi and some is smoked in the EU.
Chinook/King: Small volumes, but highly valued. Alaska, Canada and New Zealand are the main supplying countries. Most quantities are consumed locally. Chinook is more in direct competition with Atlantic salmon than the other species and is available most of the year.

Source: Kontali Analyse

3 Salmon Demand

Salmon Demand

3.1 Global macro trends

The industry is a good fit with the global macro trends, as Atlantic salmon is a healthy, resource-efficient and climate-friendly product produced in the sea.

The global population is growing, resulting in increased global demand for food. The world's population is expected to grow to almost 10 billion by 2050.

The health benefits of seafood are increasingly being promoted by global health authorities. The EAT-Lancet Commission recommends increased consumption of fish, dry beans and nuts as sustainable, healthy protein sources. Farm-raised salmon is rich in omega-3 fatty acids, vitamins and minerals.

Global fisheries are to a large extent fully exploited, meaning the supply of wild fish has limited potential to meet the growing demand for marine protein.

The middle class is growing in large emerging markets, allowing more people to eat different, and more nutritious, protein rich foods, such as fish, meat and eggs. Consumption of high-quality proteins is expected to increase.

Another demographic trend driving shifts in demand is the aging population. Healthy eating becomes especially important as you grow older.

Climate change is the greatest environmental challenge the world has ever faced. Soil erosion is a growing issue for food production, challenging the world to investigate new ways of feeding the population. Concerns about climate change are influencing dietary choices. Increased consumption of fish can reduce global GHG emissions and improve human health.

Source: Ocean Panel (2019) The Ocean as a Solution to Climate Change: Five Opportunities for Action, UN (2019) World Population Prospects: the 2019 Revision, FAO (2018) The state of the world fisheries and aquaculture.

Salmon Demand

3.2 A healthy product

Atlantic salmon is rich in long-chain omega-3, EPA and DHA, which reduce the risk of cardiovascular disease. Data also indicates that EPA and DHA reduce the risk of a large number of other health issues.

Salmon is nutritious, rich in micronutrients, minerals, marine omega-3 fatty acids, high-quality protein and several vitamins, and represents an important part of a varied and healthy diet. FAO highlights that: "Fish is a food of excellent nutritional value, providing high quality protein and a wide variety of vitamins and minerals, including vitamins A and D, phosphorus, magnesium, selenium and iodine in marine fish".

The substantial library of evidence from multiple studies on the nutrients present in seafood indicates that including salmon in your diet will improve your overall nutrition and may even yield significant health benefits. Considering global obesity rates, governments and food and health advisory bodies around the world are encouraging people of all ages to increase their seafood intake, with particular focus on the consumption of oily fish, such as salmon. The U.S. Department of Health and the US Department of Agriculture recommend an intake of at least 237 grams of seafood per week for Americans in general. The UK National Health Service, the Norwegian Directorate of Health and several other national health organisations recommend eating fish at least twice a week.

Source: Mowi, FAO, WHO, The Norwegian Directorate of Health, Health and Human Services, US Department of Health (2016) *Dietary guidelines for Americans 2015-2020*

Salmon Demand

3.3 Resource-efficient production

Protein retention	28 %	37 %	21 %	13 %
Calorie retention	25 %	27 %	16 %	7 %
Edible Yield	73 %	74 %	73 %	57 %
Feed conversion Ratio (FCR)	1.3	1.9	3.9	8.0
Edible Meat per 100 kg fed	56 kg	39 kg	19 kg	7 kg

To optimize resource utilization, it is vital to produce animal proteins in the most efficient way. Protein resource efficiency is expressed as "Protein retention", which is a measure of how much animal food protein is produced per unit feed protein fed to the animal. Salmon has a protein retention of 28%, which is more efficient than pork and cattle (see table above).

Calorie retention is measured by dividing calories in edible portion by calories in feed. Salmon has a high calorie retention of 25%.

The main reason why salmon convert protein and energy to body muscle and weight so efficiently is that they are cold-blooded and therefore do not have to use energy to heat their bodies. Furthermore they do not expend energy on standing up like land animals do.

- Edible yield is calculated by dividing edible meat by total body weight. Atlantic salmon has a high edible yield of 73%.
- Feed conversion ratios measure how efficiently the different animal proteins are produced. In short, this tells us the kilograms of feed needed to increase the animal's bodyweight by one kg. Feed for Atlantic salmon is high in protein and energy which accounts for Atlantic salmon's feed conversion ratio being even more favourable than its protein and energy retention when compared with the production of other land animal proteins.
- Edible meat per 100kg of feed fed is the combination of the FCR ratio and edible yield and presents salmon as giving a favourably high quantity of edible meat per kg of feed fed.

Source: Fry et al (2018) Feed conversion efficiency in aquaculture: do we measure it correctly?

3.4 Climate friendly production

In addition to its resource-efficient production, farmed fish is also a climate-friendly protein source. It is expected to become an important solution to providing the world with vitally important proteins while limiting the negative effect on the environment.

According to SINTEF the carbon footprint of farm-raised salmon is 7.9 kg of carbon equivalent per kg of edible product, compared with 12.2 kg of carbon equivalent per edible kg of pork and 39.0 kg per edible kg of beef. For the consumer, replacing pork and beef with fish would significantly reduce their personal carbon footprint (daily greenhouse gas (GHG) emissions).

Freshwater is a renewable but limited natural resource, and human activities can cause serious damage to the surrounding environment. Farmed Atlantic salmon requires 2,000 litres per kg of freshwater in production which is significantly less than other proteins.

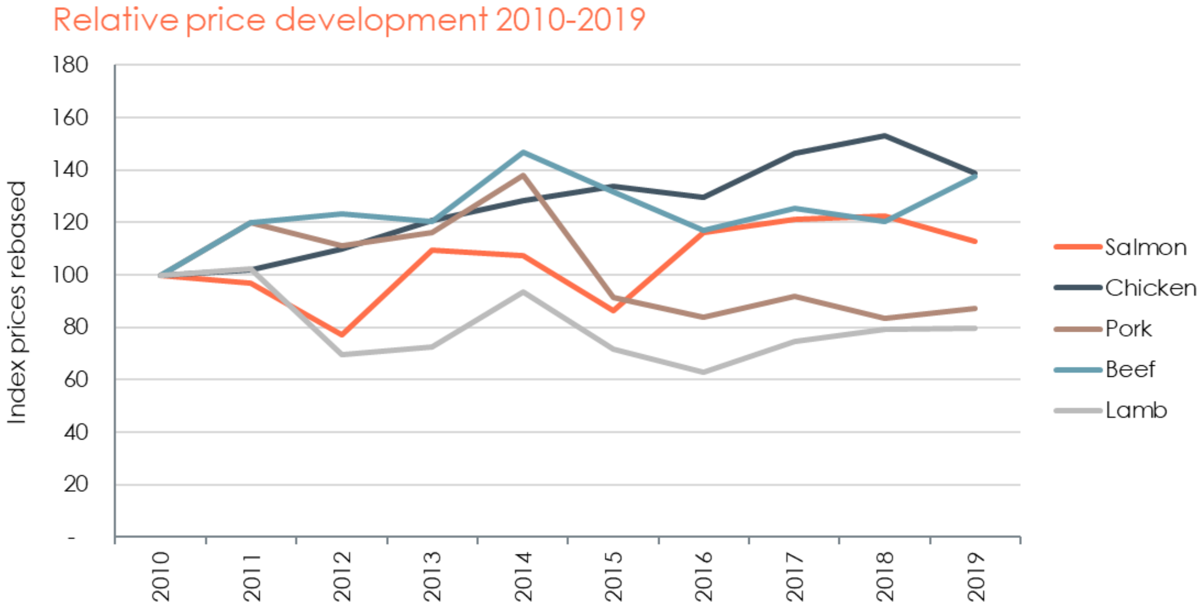
Carbon Footprint				
Kg CO2 / Kg edible meat	7.9 kg	6.2 kg	12.2 kg	39.0 kg
Water consumption				
Litre / Kg edible meat	2,000*	4,300	6,000	15,400

**Total water footprint for farmed salmonid fillets in Scotland, in relation to weight and content of calories, protein and fat.*

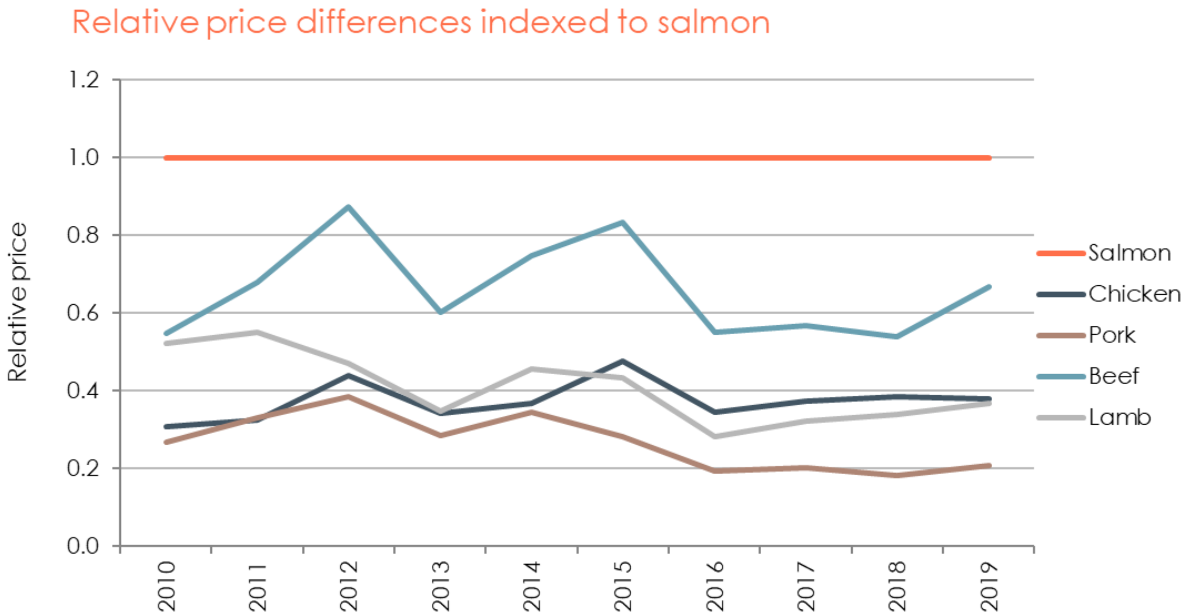
Source: SINTEF (2020) Greenhouse gas emissions of Norwegian seafood products in 2017, Mekonnen, M.M. and Hoekstra, A.Y. (2010) The green, blue and grey water footprint of farm animals and animal products, SARF (2014) Scottish Aquaculture's Utilisation of Environmental Resources

Salmon Demand

3.5 Relative price development of protein products



Along with beef and chicken prices, salmon prices have become relatively more expensive over the last decade.



Salmon has historically always been a rather expensive product on the shelves.

MOWI

4 Salmon Supply

Salmon Supply

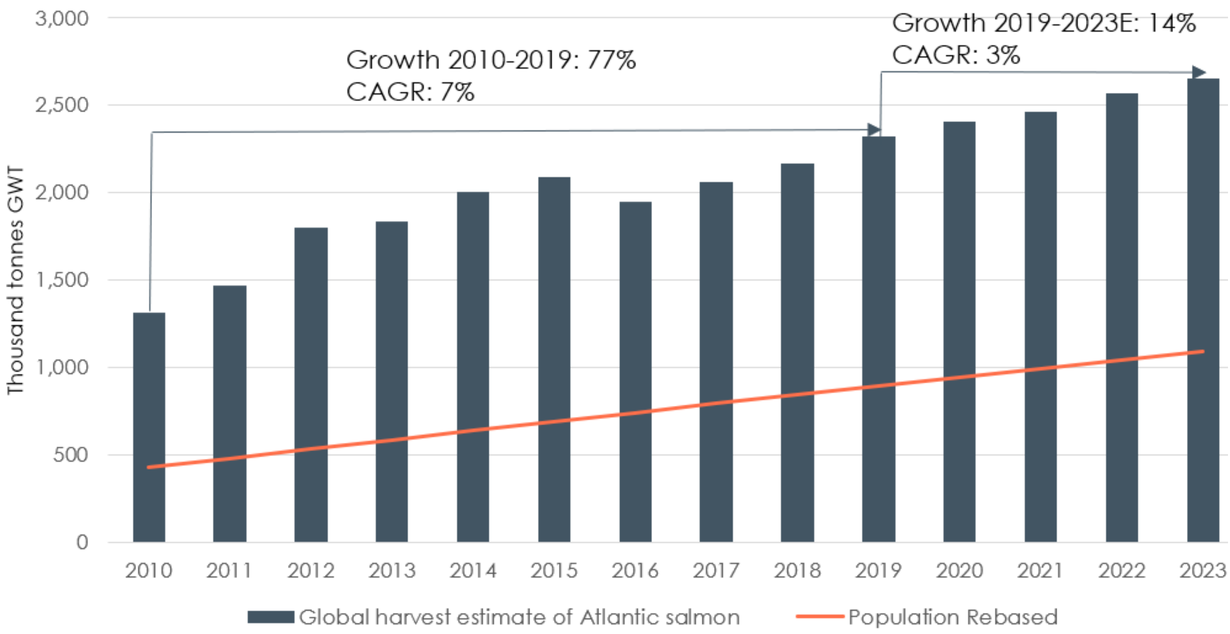
4.1 Total harvest of Atlantic salmon 2000-2019

CAGR	Global	Norway	Chile	UK	North America	Others
2000-2019	6 %	6 %	8 %	2 %	2 %	7 %
2010-2019	7 %	4 %	20 %	3 %	1 %	9 %
2019-2023E	3 %	3 %	0 %	3 %	4 %	12 %

Note: Figures are in thousand tonnes GWT and "Others" includes the Faroe Islands, Ireland, Tasmania, Iceland and Russia.
Source: Kontali Analyse

Salmon Supply

4.2 Diminishing growth expectations



Supply of Atlantic salmon has increased by 478% since 1995 (annual growth of 8%). The annual growth has diminished in recent years with 7% annual growth in the period 2010-2019. Kontali Analyse expects growth to diminish further, and has projected 3% annual growth from 2019 to 2023.

The background for this trend is that the industry has reached a production level where biological boundaries are being pushed. It is therefore expected that future growth can no longer be driven only by the industry and regulators as measures are implemented to reduce its biological footprint. This requires progress in technology, development of improved pharmaceutical products, implementation of non-pharmaceutical techniques, improved industry regulations and intercompany cooperation.

Too rapid growth without these measures in place adversely impacts biological indicators, costs, and in turn output.

Note: Mowi does not provide guidance of industry supply except from guidance depicted in quarterly presentations.
Source: Kontali Analyse, UN (2019) World Population Prospects: the 2019 Revision

Salmon Supply

4.3 Few coastlines suitable for salmon farming

The main coastal areas adopted for salmon farming are depicted on the above map. The coastlines are within certain latitude bands in the Northern and Southern Hemispheres.

A key condition is a temperature range between zero and 20°C. The optimal temperature range for salmon is between 8 and 14°C.

Salmon farming also requires a certain current to allow a flow of water through the farm. The current must however be below a certain level to allow the fish to move freely around in the sites. Such conditions are typically found in waters protected by archipelagos and fjords and this rules out many coastlines. However, offshore farming is an emerging approach. Offshore farms are positioned in deeper and less sheltered waters, where ocean currents are stronger than they are inshore, and they therefore require more robust cages.

Certain biological parameters are also required to allow efficient production. Biological conditions vary significantly within the areas adopted for salmon farming and are prohibitive in certain other areas.

Political willingness to permit salmon farming and to regulate the industry is also required. Licence systems have been adopted in all areas where salmon farming is carried out.

Land based salmon farming (full cycle) has attracted increased investments in the past years. To date, only limited volumes have been harvested on land, however, this could change going forward as new production technologies continue to mature.

5 Sustainable production

Sustainable production

The ocean is one of the main systems of our planetary biosphere. It accounts for almost half of the planet's biological production, but a much smaller proportion of human food – about 2% of overall calorie intake and 15% of protein intake. This includes both farm-raised and wild-caught fish. We know that global consumption of farm-raised seafood will increase in the future, both in terms of overall volumes and as a percentage of the global food supply, for the following reasons:

- The global population is growing at an unprecedented rate.
- The middle class is growing in large emerging markets.
- The health benefits of seafood are increasingly being promoted by global health authorities.
- Aquaculture is more carbon-efficient than land-based livestock production.
- The supply of wild fish has limited growth potential.
- Soil erosion necessitates new ways of thinking about how to feed the world.

These global trends offer the seafood industry a unique opportunity to deliver food that is both healthy and sustainable. Salmon farming companies are increasingly developing their sustainability strategies. Mowi's sustainability strategy is called Leading the Blue Revolution Plan.

Source: EU (2017) Food from the Oceans

Sustainable production

5.1 UN's Sustainable Development Goals

The SDGs, which were agreed by all 193 UN member states in 2015, guide governments, civil society and the private sector in a collaborative effort for change towards sustainable development. Out of the 17 SDGs, the industry can contribute significantly to at least ten: good health and well-being; gender equality; decent work and economic growth; reduced inequalities, sustainable cities and communities; industry, innovation and infrastructures; responsible consumption and production; climate action; life below water and partnerships for the goals.

Sustainable production

5.2 Sustainability along the supply chain

Salmon farmers are heavily affected by social issues such as workers' rights and public acceptance of fish farming. Climate change, environmental regulations and certification requirements may have an impact on the supply chain by affecting the availability of both farming areas and raw ingredients used to produce feed. Trade barriers may have a significant impact on our products' availability in different markets.

In turn, the industry has an impact on people and the environment along its value chain. Salmon farmers create jobs and contribute to the economic development of local communities. In addition, the health benefits of our products clearly have a positive impact on people and society in general.

Health and safety issues and labour rights are also key contributors to the social impact that industry players have both in their own operations and at their suppliers. Farmers also influence social and environmental standard-setting. In terms of environmental impact, salmon farmers contribute to greenhouse gas emissions along the supply chain, and affect the local ecosystem in the vicinity of farming operations. However, investment in new technology and infrastructure will lead to more sustainable farming methods that could also be relevant to other fish species.

MOWI

5.3 Environmental impact of aquaculture

It is important to understand the impact on the environment as a result of aquaculture in order to be sustainable.

Carbon footprint
Fish farming is among the most climate-friendly forms of animal husbandry. The carbon footprint is only 7.9 kg of carbon equivalent per kg of edible product, compared with 6.2 kg of carbon equivalent per edible kg of poultry, 12.2 kg per edible kg of pork and 39.0 kg per edible kg of beef.

The largest contributor to the carbon footprint is fish feed. See chapter 3.3.

Genetic changes in wild salmon
Most escaped farmed salmon disappear into the open sea. They are likely to die from starvation or disease, or be eaten by predators. Still, some survive after escaping, and migrate into the rivers each year, posing a risk of genetic changes in a river's wild salmon population.

The Institute of Marine Research considered seven out of 13 production areas in Norway to be at high risk for further genetic changes. Three production areas are considered to be at moderate risk and three production areas are considered to be at low risk.

Environmental effects of discharges of dissolved nutrients
Dissolved nutrient salts are released into coastal waters by population (sewage), industry, agriculture and aquaculture. In aquaculture, when salmon eat, dissolved nitrogen and phosphorus will be released via the gills and also a smaller proportion in the form of urea. Even though increased concentrations of dissolved nutrients in coastal waters may cause adverse ecosystem changes, the risk of regional environmental impacts as a result of dissolved nutrients from fish farming is considered low in all production areas according to the Institute of Marine Research.

Environmental impact on the seabed as a result of particulate organic emissions
Open pens release organic particles directly into the environment in the form of faeces from the fish, and feed that is not eaten. The discharges can affect the environment to a greater or lesser extent around the fish farm. However, the emissions mainly consist of easily degradable compounds, the impact is reversible, and the seabed can fully regenerate over a few months to a few years. Farmers are obliged by law to monitor the seabed continuously in accordance with NS 9410 or other national regulations, so that the environmental impact of aquaculture is within acceptable limits. If the

---

Source: SINTEF (2020) Greenhouse gas emissions of Norwegian seafood products in 2017, Institute of Marine Research (2019) Risk assessment of Norwegian fin fish aquaculture 2019 environmental impact on the seabed is not acceptable, the site may be fallowed, production reduced or the site reallocated to a different location.

Based on reporting made through today's monitoring system, the condition of soft-bottom sites is considered to be good in all production areas in Norway and the risk of unacceptable environmental impacts due to particulate organic emissions is low. As of today, there is no good monitoring of hard-bottom sites and this has therefore not been evaluated.

Mowi measures the potential impact of organic loading on the seabed according to national seabed quality standards. Results show that, on average, 90% of its sea sites surveyed in 2019 have a minimal impact on faunal communities and/or sediment chemistry near to the fish pens.

Environmental effects on non-target species when using medicine

Sea lice belong to the animal group of crustaceans, and medicine that treats sea lice can also affect other species.

There are differences in the way treatments affect non-target species. Bath treatments provide a short-term effect, while oral treatment may affect non-target species over a longer period of time. Bath treatments include hydrogen peroxide, azamethiphos, cypermethrin and deltamethrin, and the treatment takes place either directly in the pen or in the well boat. If treatment is done in pens, the bath treatment is released directly into the sea. When the treatment takes place in a well boat, the bathing agent is released while the vessel is in motion. However, purification systems that remove the medicine used in well boat-delivered bath treatments have come to the market in recent years. The oral treatment considered is diflubenzuron, teflubenzuron and emamectin, which can be released to the environment via feed and faeces.

The Institute of Marine Research's risk assessment is a comprehensive assessment and emphasizes, among other things, total consumption, toxicity and occurrence in the environment in Norway. Of the treatments considered, azamethiphos is considered to have low risk, while hydrogen peroxide, cypermethrin, deltamethrin, diflubenzuron, teflubenzuron and emamectin are considered to have moderate risk. However, the number of prescriptions was highest in the years 2014 and 2015, respectively 3,477 and 3,285, whereas for 2018 this was reduced to 501. Overall, this presents a reduced risk of environmental impact.

Mowi only uses medicines when other measures are not sufficient or when fish welfare may be compromised. In 2019, 68% of sea lice treatments were non-medicinal, compared with 12% in 2015, showing the significant reduction in the use of medicines to manage sea lice, itself made possible by the increased use of non-medicinal tools.

Source: Institute of Marine Research (2019) Risk assessment of Norwegian fin fish aquaculture 2019, Mowi

Sustainable production

Fish welfare
In Norwegian farm pens, there is a maximum of 200,000 fish per pen at any given time. These are individuals which, according to the Animal Welfare Act, have the right to be kept in an environment that provides good welfare based on species and individual needs, and the opportunity for stimulating activity, movement, rest and other natural behaviour. Farmers must also ensure that feed is of good quality and meets the fish's needs, and that the farmed fish is protected against injury, disease and other hazards. The farmed fish must be robust enough to withstand farming conditions, and they should not be subjected to unnecessary stress.

The Institute of Marine Research's risk assessment shows that welfare for salmon in pens is considered good for production areas 6–11, while it is considered moderate for production areas 2–5 and 12–13.

The challenges in the north are primarily related to low temperatures and bacterial wound infections, while Western Norway has challenges with PD and injuries in connection with frequent lice treatment.

Survival rate is commonly used as a measure of animal health and welfare. Improved survival can be achieved through good husbandry and management practices, vaccination etc. In 2019, the average monthly survival rate of farmed salmon in Norway was 99.0%. According to Vetnosis' animal balance sheet, the monthly survival rate for poultry was 98.8%, for pork 99.5% and for beef 99.8%.

Monthly survival rate*	99.0 %	98.8 %	99.5 %	99.8 %

* *Average monthly survival (Individuals) / Inventory beginning of year (Individuals)*
Source: Institute of Marine Research (2019) Risk assessment of Norwegian fin fish aquaculture 2019, Vetnosis (2019) STORM FORECASTS: 2019-28, Directorate of Fisheries, Mowi

5.4 Material sustainability efforts

Carbon footprint
The industry is constantly working to make the value chain more energy efficient and has set targets for reducing greenhouse gas (GHG) emissions. Sourcing of feed raw materials is the largest contributor of GHG emissions in salmon farming.

Plastic management
The presence of microplastic in the world's ocean is an emerging issue that fish farmers have started to focus on. Fish farmers are undertaking various initiatives to reduce plastic waste, such as improving waste management, engaging in beach clean-up events around the world, using improved packaging and monitoring the presence of microplastics and plastic-related contaminants in fish.

Escape prevention
Because escaped farm-raised salmon may have a negative impact on the environment due to interactions and interbreeding with wild populations, fish farmers have a target of zero escapes.

Sea lice
Effective sea lice management is important for fish welfare and to ensure sea lice on our farms do not negatively impact wild salmonids. Farmers work intensively to improve their approach to sea lice management and minimise the number of adult female sea lice, especially during the period when wild salmon migrate to sea. A number of non-medicinal tools have been developed over the last years reducing significantly the use of medicines to manage sea lice.

Medicine use
Licensed medicines may have a negative environmental impact if used too frequently. Farmers use antimicrobial medicines only when fish health and welfare are at risk from bacterial infection and only when absolutely necessary. Antimicrobials are not used for growth promotion, prevention of infectious diseases or for control of dissemination.

Fish health and welfare
Caring about fish welfare is an ethical responsibility. The industry works every day to safeguard the health and welfare of fish through effective sea lice management, and to reduce medicine use by optimizing fish survival and preventing disease.

Biodiversity
The industry needs healthy oceans to drive sustainable salmon farming and farmers must pay attention to the critical and highly sensitive environment they operate in. In all farming countries there are regulations in place to safeguard farming's impact on the seabed by monitoring the physical, chemical and biodiversity characteristics of the benthic environment.

5.5 Sustainability of fish feed

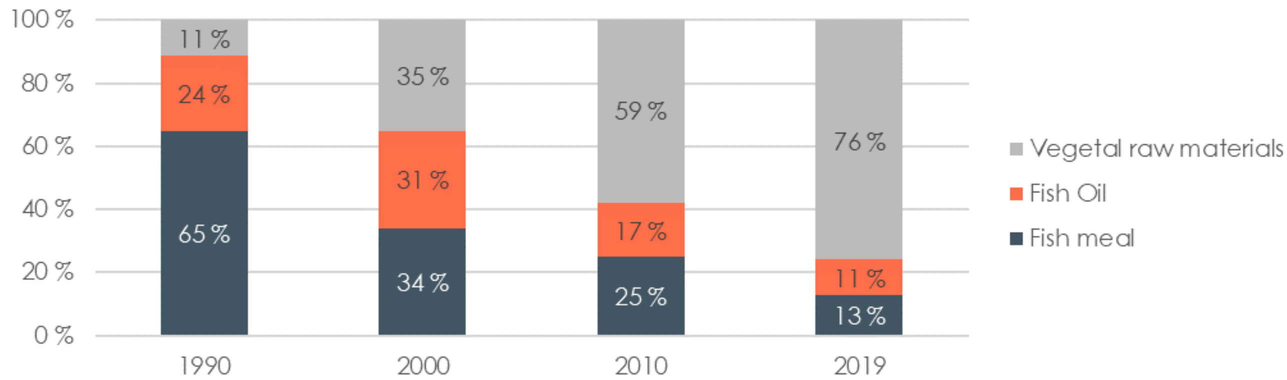
Fish feed is a key component in ensuring the best possible fish health and performance. In any life cycle assessment (LCA)* of salmon farming, feed also makes the largest contribution to its environmental footprint. Important parameters for the carbon footprint arising from feed consumption are feed efficiency and feed ingredients.

Feed efficiency
The feed conversion ratio (FCR) describes the amount of feed used to produce a certain amount of salmon. Efficient feeding, releasing the minimum of feed beyond what is actually eaten is important since the footprint of the feed released dominates the overall carbon footprint of the product. Improvements in feed formulations and in feed manufacture, combined with better on-farm feed management, can hugely reduce the quantity of feed (and thus the feed raw materials) used per kilogram of farmed aquatic food produced.

Feed ingredients
The current carbon footprint of farmed salmon shows that it is critical to change what the salmon is fed. Simply shifting between existing feed inputs, such as from marine to terrestrial inputs only leads to trade-offs between environmental impact categories.

The average Norwegian salmon diet in 1990 contained 65% fish meal and 24% fish oil. Marine ingredients have been reduced over time and in 2019 Mowi used 11% fish oils and 13% fish meal in its salmon feed. The species used in fish meal and fish oil production are from reduction fisheries and trimmings not used for human consumption.

Development of raw matierals in salmon feed in Norway



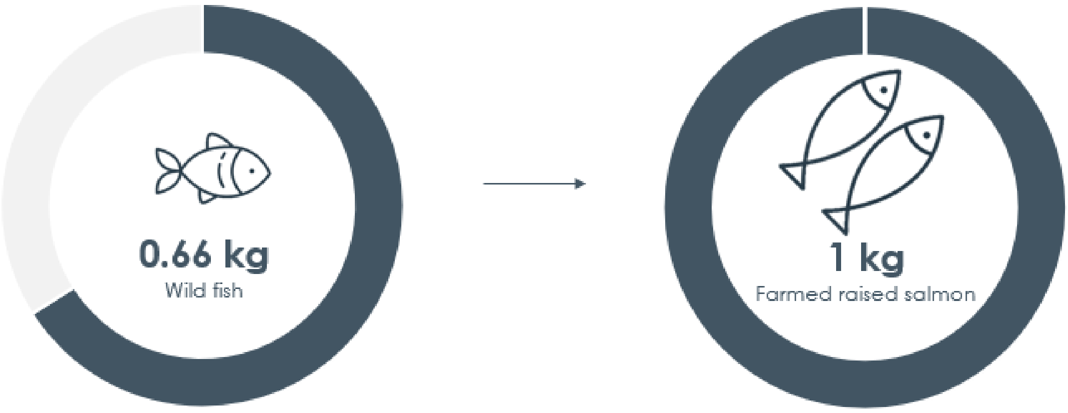
* Life Cycle Assessment (LCA) determines the environmental impacts of products, processes or services, through production, usage, and disposal
Source: SINTEF (2020) Greenhouse gas emissions of Norwegian seafood products in 2017, Ytrestøyl T., Aas T.S., Åsgård T. (2014) Resource utilisation of Norwegian salmon farming in 2012 and 2013, NOFIMA, Mowi

Sustainable production

Fish in- fish out (FIFO)

Fish in- fish out (FIFO) express the number of kg of wild fish (excluding trimmings) it takes to produce 1 kg of salmon. In 2019 Mowi used 0.66 kg of low consumer preference wild fish (like anchovy and sardine) to produce 1 kg of Atlantic salmon.

Fish in - Fish out 2019



Substitution of marine raw materials has not been found to have any negative effect on growth, susceptibility to disease, or quality of the fish if the fish's own nutrient requirements are being covered.

Major reductions in carbon footprint could potentially come from exploring and developing feed ingredients that close the nutrient loop in the salmon industry (that increase overall resource efficiency) and developing ingredients from resources that are not utilized today. For example, products derived from insects, alcohol fermentation, CO_2 capture and forestry are currently being explored.

Traceability is important to make sure that no raw materials originate from illegal, unregulated and unreported (IUU) catches, or from fish species classified as endangered on the International Union for the Conservation of Nature (IUCN) red list. Sustainable sourcing of vegetable feed raw materials like soy is ensured by purchasing deforestation-free Proterra.

5.6 Global sustainability initiatives

Achieving a sustainable future will require concerted action and new forms of partnership. Example of key partnership is the Global Sustainable Seafood Initiative (GSSI). GSSI plays an important role in providing clarity on seafood certification. Third-party certifications can give consumers and stakeholders confidence that a product is sustainable. The Aquaculture Stewardship Council (ASC) and Global G.A.P. are examples of third-party certifications.

Global Sustainable Seafood Initiative (GSSI) aligns global efforts and resources to address seafood sustainability challenges. Governed by a Steering Board representing the full seafood value chain – companies, NGOs, governments and international organizations, including the FAO – GSSI promotes sector-wide collaboration to drive forward more sustainable seafood for everyone.

The Aquaculture Stewardship Council (ASC) is an independent non-profit organisation with global influence. ASC aims to be the world's leading certification and labelling programme for sustainably farmed seafood. The ASC's primary role is to manage the global standards for responsible aquaculture. ASC works with aquaculture producers, seafood processors, retail and foodservice companies, scientists, conservation groups and consumers. The ASC logo sends a strong message to consumers about the environmental and social integrity of the product they are purchasing.

Global G.A.P. is a recognized standard for farm production. Its goal is safe and sustainable agricultural production to benefit farmers, retailers and consumers throughout the world.

Source: Mowi, www.ourgssi.org, www.asc-aqua.org, www.globalgap.org

5.7 Transparency

Transparency builds trust. Being transparent about our environmental, social and product performance is key for building trust with our stakeholders and correcting misinformation. Our sustainability data is audited by third parties and reported according to global standards such as CDP (formerly the Carbon Disclosure Project) and FAIRR.

CDP is a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts. CDP supports thousands of companies, cities, states and regions to measure and manage risks and opportunities relating to climate change, water security and deforestation.

The FAIRR Initiative is a collaborative investor network that raises awareness of the material ESG risks and opportunities caused by intensive livestock production. The Coller FAIRR Index ranks the largest global meat, dairy and fish producers by looking at risk factors ranging from use of antibiotics to deforestation and labour abuses. The Index is the world's only benchmark dedicated to profiling animal protein producers and showcasing critical gaps and areas of best practice in the sector. Mowi is ranked as overall best performer, and there are three salmon producers in the top five.

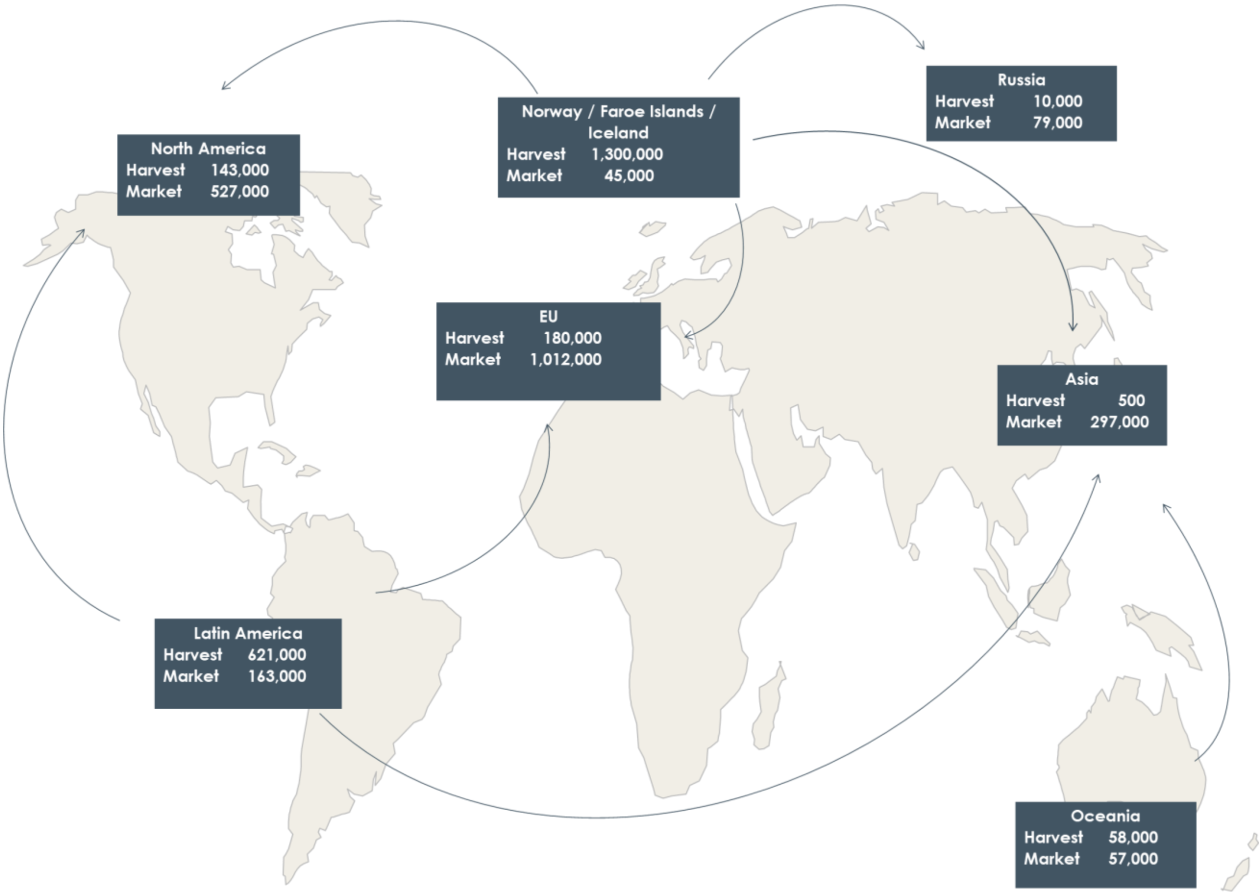
The WBA **Seafood Stewardship Index** (SSI) measures the world's 30 most influential seafood companies and presents an overall ranking based on the results in five measurement areas. These areas reflect where stakeholders expect corporate action, pinpointing where companies can have the most impact; Governance and management of stewardship practices, Stewardship of the supply chain, Ecosystems, Human rights and working conditions and Local communities. Mowi ranks 2nd in the benchmark and demonstrates a strong performance in all measurement areas.

Source: www.cdp.net, www.fairr.org, www.seafood.worldbenchmarkingalliance.org

6 Salmon Markets

Salmon Markets

6.1 Global trade flow of farmed Atlantic salmon



Historically, the main markets for each production origin have been:

- Norway – EU, Russia (before import ban in 2014) and Asia
- Chile – USA, South America and Asia
- Canada – USA
- Scotland – mainly domestic/within the UK

Each producing region has historically focused on developing the nearby markets. As salmon is primarily marketed as a fresh product, time and cost of transportation have driven this trend.

A relatively high price differential is therefore required to justify transatlantic trade as this incurs the cost of airfreight. Such trade varies from period to period and depends on arbitrage opportunities arising from short-term shortages and excess volumes from the various producing countries.

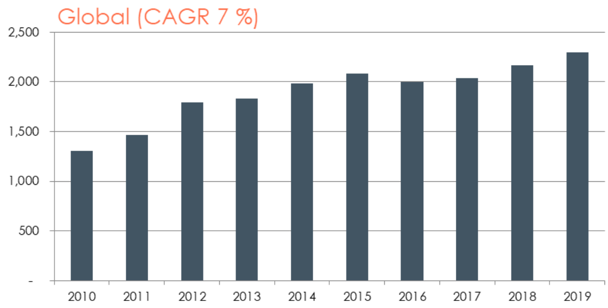
The Asian market is generally shared as transportation costs are broadly similar from all producing regions.

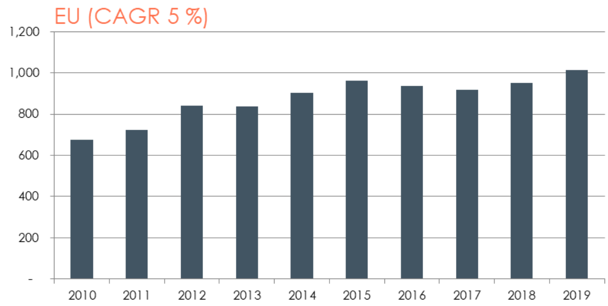
Distribution of frozen salmon is much more straightforward, but this category is decreasing in size.

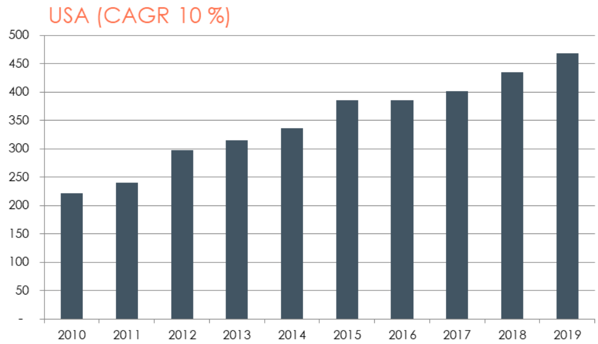
Note: Figures from 2019 and in thousand tonnes GWT. Not all markets are included
Source: Kontali Analyse

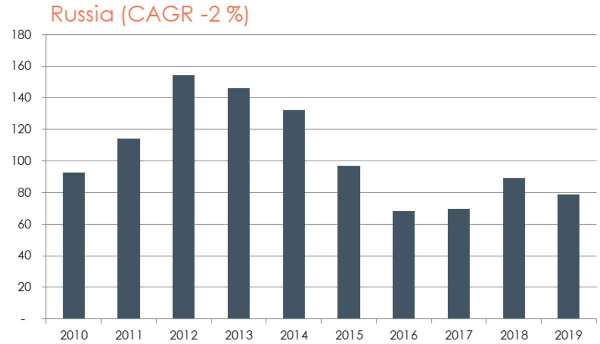
Salmon Markets

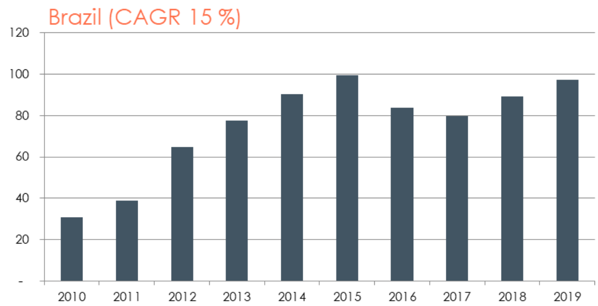
6.2 Farmed Atlantic salmon by market

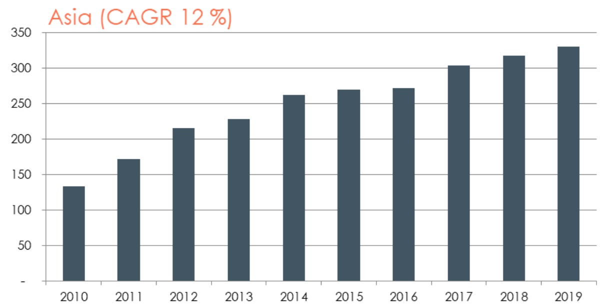








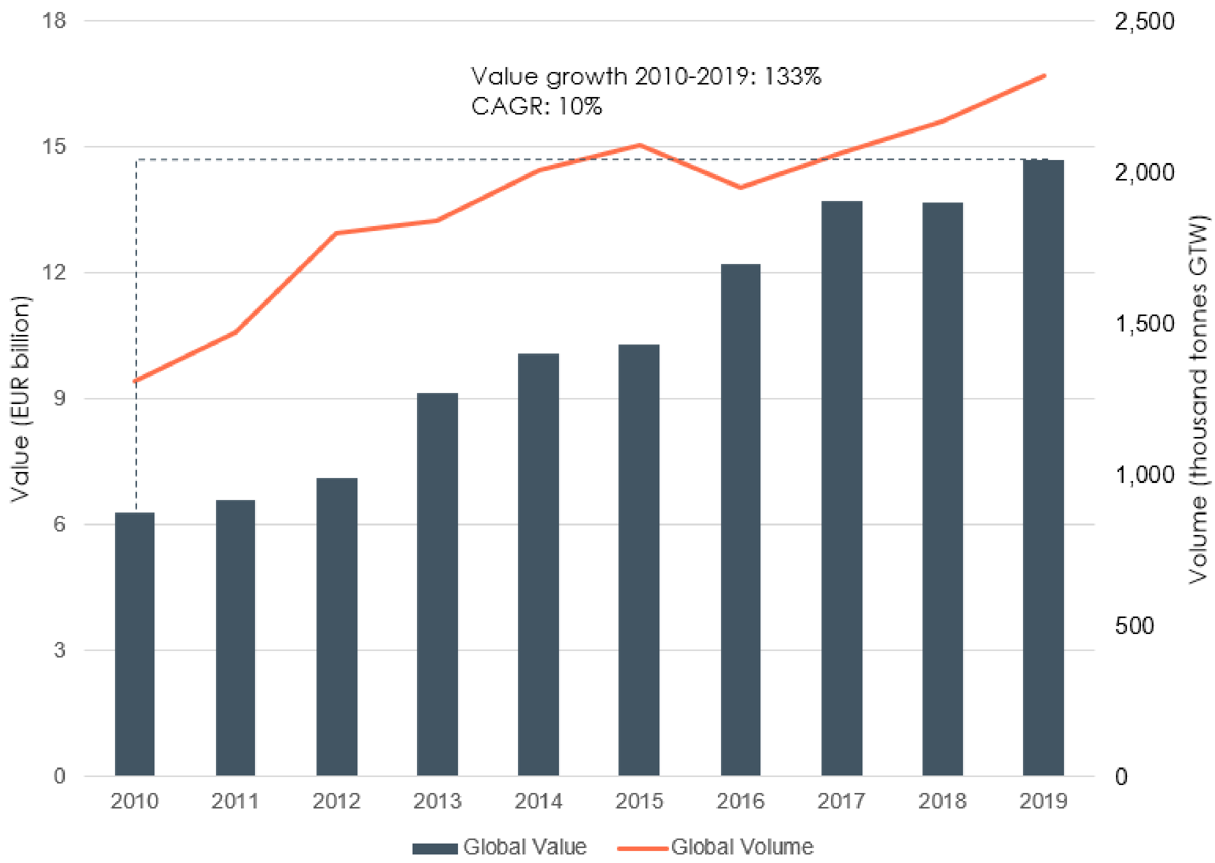




Europe (incl. Russia) and North America are by far the largest markets for Atlantic salmon. However, emerging markets are growing at significantly higher rates than these traditional markets. On average consumption of Atlantic salmon has increased by 7% in all markets over the last 10 years and by 6% over the last 20 years.

Note: Figures are in thousand tonnes GWT
Source: Kontali Analyse

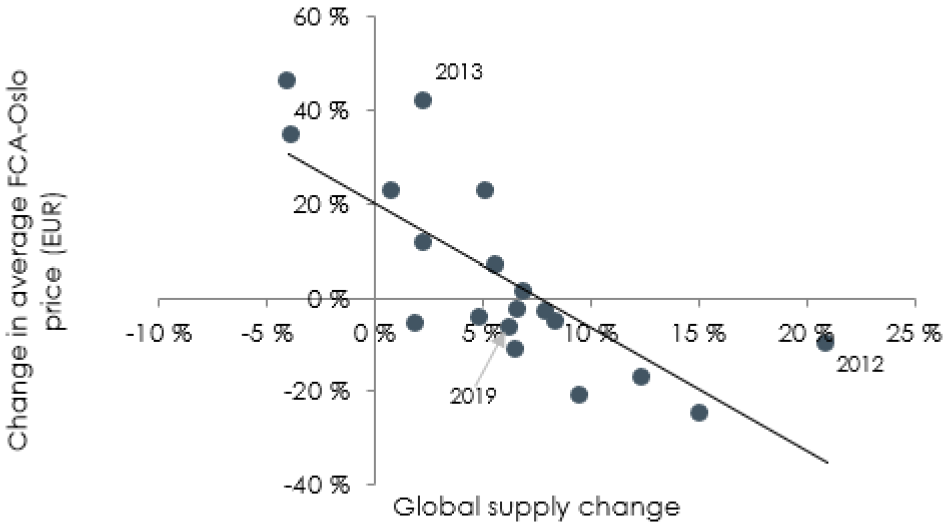
6.3 Development of value vs. volume



The value of salmon sold in 2019 has increased by 133% from 2010, while the volume increased by 77% (CAGR 7%) in the same period, illustrating the strong underlying demand for salmon.

Source: Kontali Analyse

6.4 Price neutral demand growth - historically 6-7%



Year	Global supply growth	Change in avg. price FCA Oslo (EUR)
2001	15 %	-25 %
2002	8 %	-3 %
2003	7 %	-11 %
2004	6 %	7 %
2005	5 %	23 %
2006	1 %	23 %
2007	10 %	-21 %
2008	7 %	1 %
2009	2 %	12 %
2010	-4 %	35 %
2011	12 %	-17 %
2012	21 %	-10 %
2013	2 %	42 %
2014	8 %	-5 %
2015	5 %	-4 %
2016	-4 %	46 %
2017	2 %	-5 %
2018	7 %	-2 %
2019	6 %	-6 %

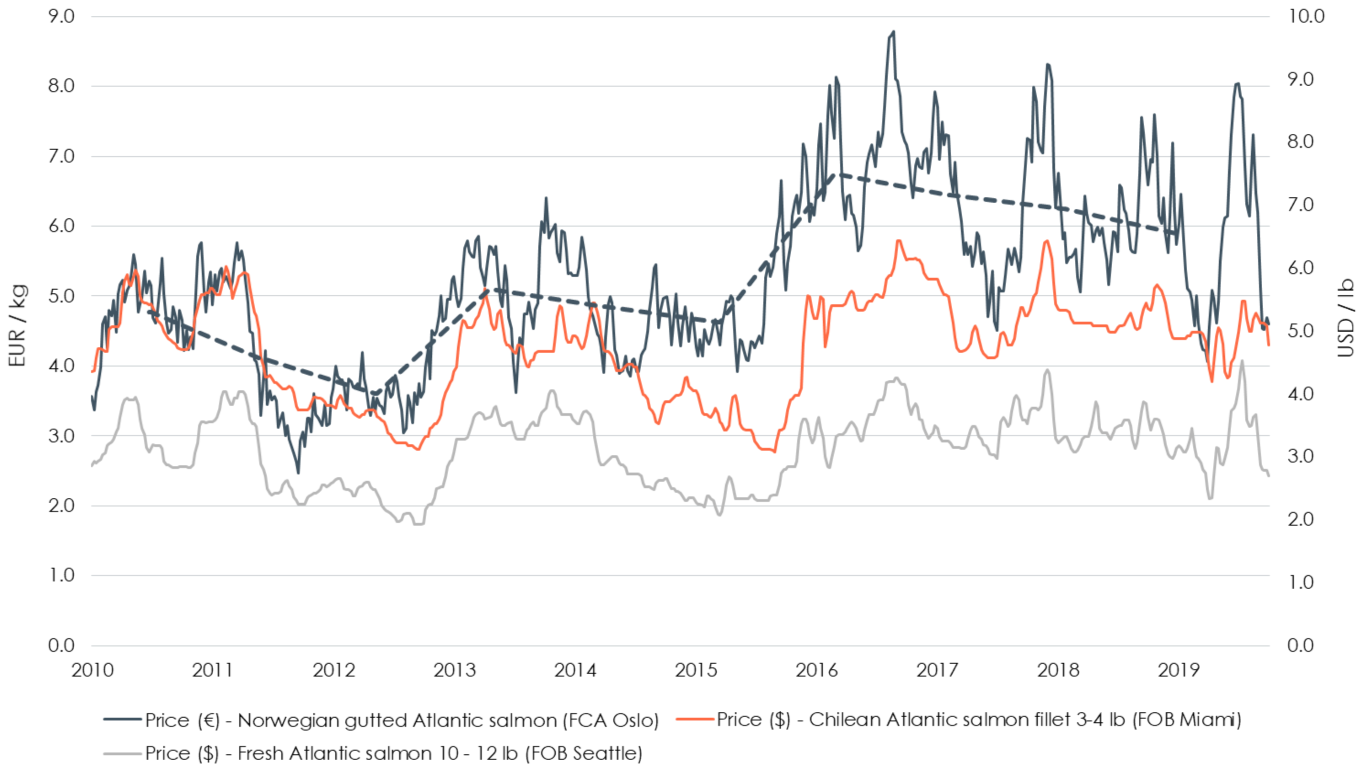
The correlation between change in global supply and average FCA Oslo price (EUR) is very strong. In the period 2000-2011, change in supply explained 84% of the change in price using linear regression. In 2012 and 2013 demand for salmon significantly overperformed.

Price correlation across regional markets is generally strong for Atlantic salmon.

Growth in global supply of Atlantic salmon was 198% in the period 2000-2019 (CAGR 6%), varying between -4% and 21% annually. Variation in growth rates has been the main determinant for the variation in prices. Annual average prices have varied between EUR 2.42 (2003) and EUR 6.61 (2016).

Source: Kontali Analyse

6.5 Historic price development



As salmon is perishable and marketed fresh, all production in one period must be consumed in the same period. In the short term, the production level is difficult and expensive to adjust as the planning/production cycle is three years long. Therefore, the supplied quantity is very inelastic in the short term, while demand shifts according to the season. This is the main reason for the price volatility in the market.

Factors affecting market price for Atlantic salmon are:
Supply (absolute and seasonal variations)
Demand (absolute and seasonal variations)
Globalisation of the market (arbitrage opportunities between regional markets)
Presence of sales contracts reducing quantity available for the spot market
Flexibility of market channels
Quality
Disease outbreaks
Food scares

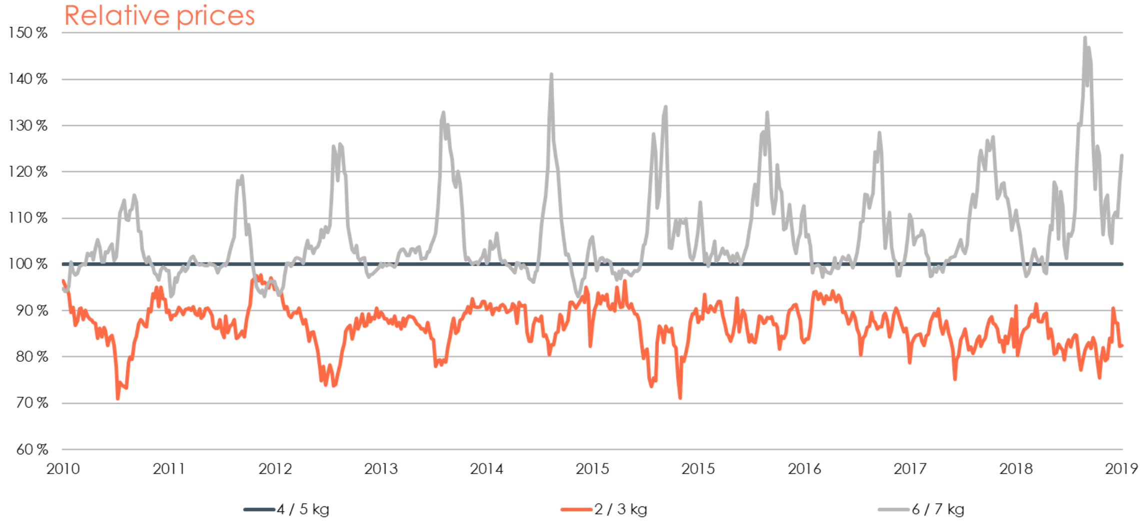
Comparing FCA Oslo, FOB Miami and FOB Seattle, there is a clear indication of a global market as prices correlate to a high degree.

As in most commodity industries, producers of Atlantic salmon experience high volatility in the price achieved for the product. The average price (GWT based) for Norwegian whole salmon since 2010 has been about EUR 5.2/kg, for Chilean salmon fillet (3-4lb) USD 4.7/lb (USD 10.4/kg), and for Canadian salmon (10-12lb) USD 3.1/lb (USD 6.9/kg). The pricing of Scottish and Faroese salmon is linked to the price of Norwegian salmon. The price of Scottish salmon normally has a premium to Norwegian salmon. Faroese salmon used to trade at a small discount to Norwegian salmon. However, due to geopolitical events in recent years, salmon from the Faroes now trades at a premium over Norwegian salmon in selected markets.

Note: Dotted line represent annual average FCA Oslo
Source: Kontali Analyse, Nasdaq, Urner Barry

6.6 Different sizes – different prices (Norway)

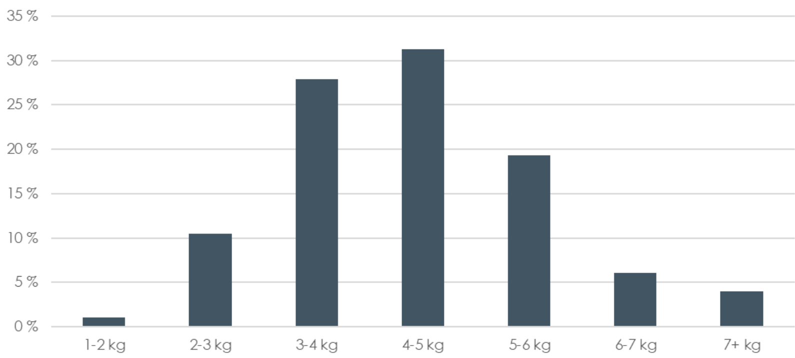
Relative prices



The main reason for differences in size is the biological production process in which individual fish grow at different speeds. A farm holding fish at harvestable size will show a normally distributed size distribution. This leads to the majority of fish being harvested at 4/5 kg GWT and smaller quantities of smaller and larger fish.

The processing industry in Europe mainly uses 3-6 kg GWT but niche markets exist for smaller and larger fish. As these markets are minor compared to the main market, they are easily disrupted if quantities become too large. Generally, small fish are discounted, and large fish are sold at premium as shown in the graph above.

Size distribution



The graph to the left shows Norwegian harvest distribution for 2019, with the harvest size of 4-5 kg (GWT) being the most frequent. In addition to catering for production process and market requirement, another driver behind this size fluctuation is that farmers want to balance out market risk and biological risk. Drivers behind smaller harvest size can be disease, early harvest when there is a need for cash flow, or early harvest to realise ongoing capacity. Larger fish (6-7kg+) may be a result of economies of scale/lower production costs, production for niche markets or other market requirements.

Source: Kontali Analyse

MOWI

7 Industry Structure

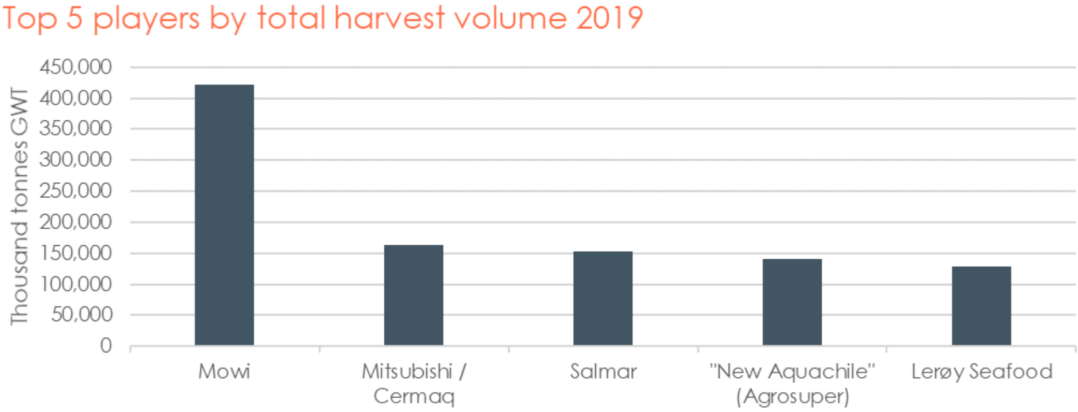
Industry Structure

7.1 Top 5-10 players of farmed Atlantic salmon 2019

	Top 10 - Norway Company	H.Q. HOG	Top 5 - United Kingdom Company	H.Q. HOG	Top 4 - North America Company	H.Q. HOG	Top 10 - Chile Company	H.Q. HOG
1	Mowi	236,900	Mowi	65,400	Cooke Aquaculture	56,500	"New Aquachile" (Agrosuper)	141,300
2	Salmar	153,100	Bakkafrost (SSC)	33,800	Mowi	54,400	Salmones Multiexport	77,600
3	Lerøy Seafood	128,700	Scottish Sea Farms	25,900	Mitsubishi / Cermaq	17,800	Mitsubishi / Cermaq	71,900
4	Mitsubishi / Cermaq	73,000	Cooke Aquaculture	23,400	Grieg Seafood	14,100	Mowi	65,700
5	Grieg Seafood	57,600	Grieg Seafood	11,300	*		Australis Seafood	53,500
6	Nova Sea	46,000	*				Camanchaca	48,300
7	Nordlaks	35,000					Salmones Antartica	27,100
8	Sinkaberg-Hansen	30,500					Salmones Blumar	25,700
9	Alsaker Fjordbruk	30,500					Salmones Austral	22,800
10	Norway Royal Salmon	30,500					Yadran	22,500
	Top 10	821,800	Top 5	159,800	Top 4	142,800	Top 10	556,400
	Others	378,300	Others	5,400	Others	5,100	Others	64,800
	Total	1,200,100	Total	165,200	Total	147,900	Total	621,200

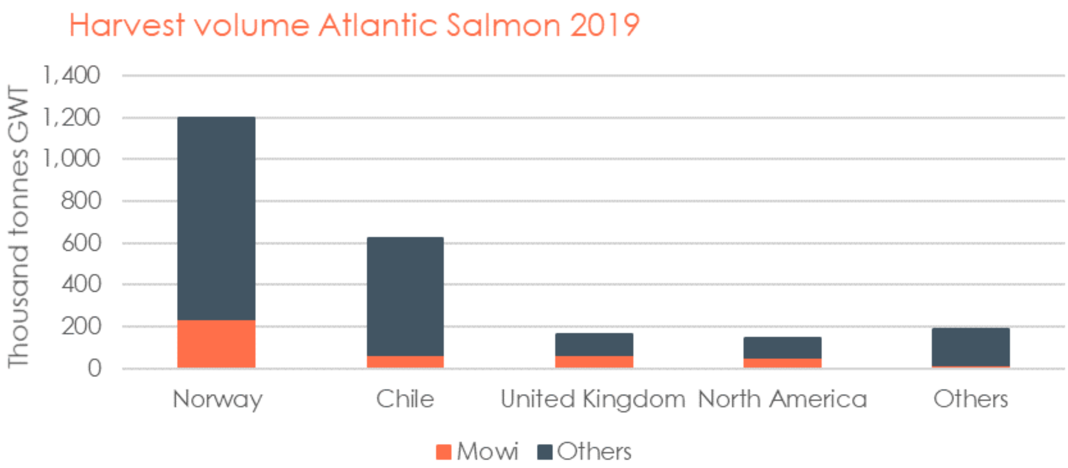
All figures in tonnes GWT

* The industry in the UK and North America are best described by the top 5 and top 4 producers, respectively.



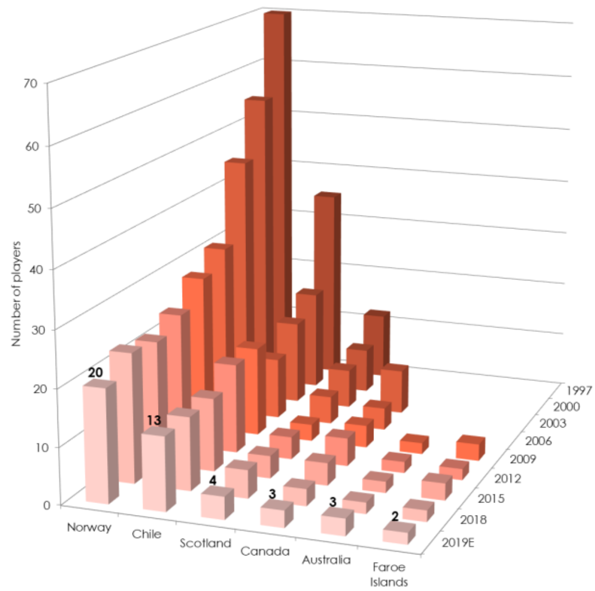
Mowi Group represents the largest total production, harvesting around one fifth of the salmon produced in Norway, two fifths of the total production in the UK and a bit more than one third of the total production in North America.

In Norway and Chile there are several other producers of a significant quantity of Atlantic salmon. In Chile, several of the companies also produce other salmonids, such as Coho and large trout.



MOWI

7.2 Number of players in producing countries



The graph shows the number of players producing 80% of the farmed salmon and trout in each major producing country.

Historically, the salmon industry consisted of a larger number of smaller firms. As illustrated above, this was the case in Norway, and to some extent in Scotland and Chile.

During the last decades the salmon farming industry has been through a period of consolidation in all regions and this is expected to continue.

There are approx. 120 companies owning commercial licences for salmon and trout in Norway, however some of these are controlled by other companies. The total supply is produced by around 90 companies (directly or through subsidiaries).

There are approximately 1,360 commercial licences for the on-growing of Atlantic salmon, trout and Coho in Chile. Around 90% of these are held by 13 companies with the 10 largest firms accounting for 83% of the total licences. Only between 300 and 350 licences are in operation.

Note: See appendix for some historical acquisitions and divestments
Source: Kontali Analyse

8 Salmon Production and Cost Structure

Salmon Production and Cost Structure

8.1 Establishing a salmon farm

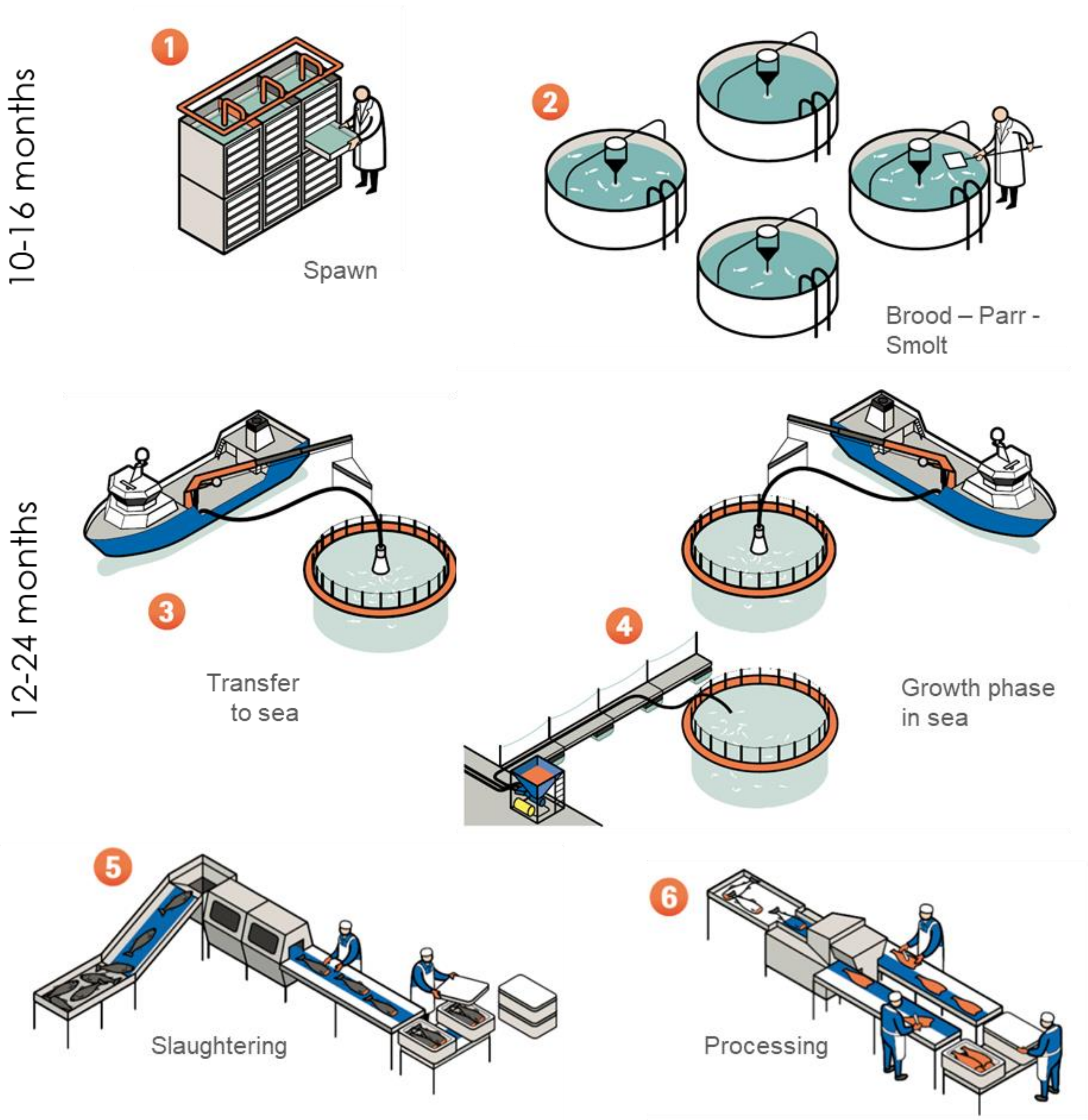
The salmon farming production cycle is about 3 years.
During the first year of production eggs are fertilised and fish are grown to approximately 100-250 grams in a controlled freshwater environment. In recent years, the industry has invested in freshwater facilities that can grow the smolt larger, up to 1,000 grams, thus shortening the time at sea.

The fish are then transported to seawater cages where they are grown to around 4-5 kg over a period of 12-24 months. The growth of the fish is heavily dependent on seawater temperatures, which vary by time of year and across regions.

When they reach harvestable size, the fish are transported to processing plants where they are slaughtered and gutted. Most salmon is sold gutted on ice in a box (GWT).

Salmon Production and Cost Structure

8.2 The Atlantic salmon life/production cycle



Note: See appendix for more information on the Atlantic salmon production cycle
Source: Mowi

Salmon Production and Cost Structure

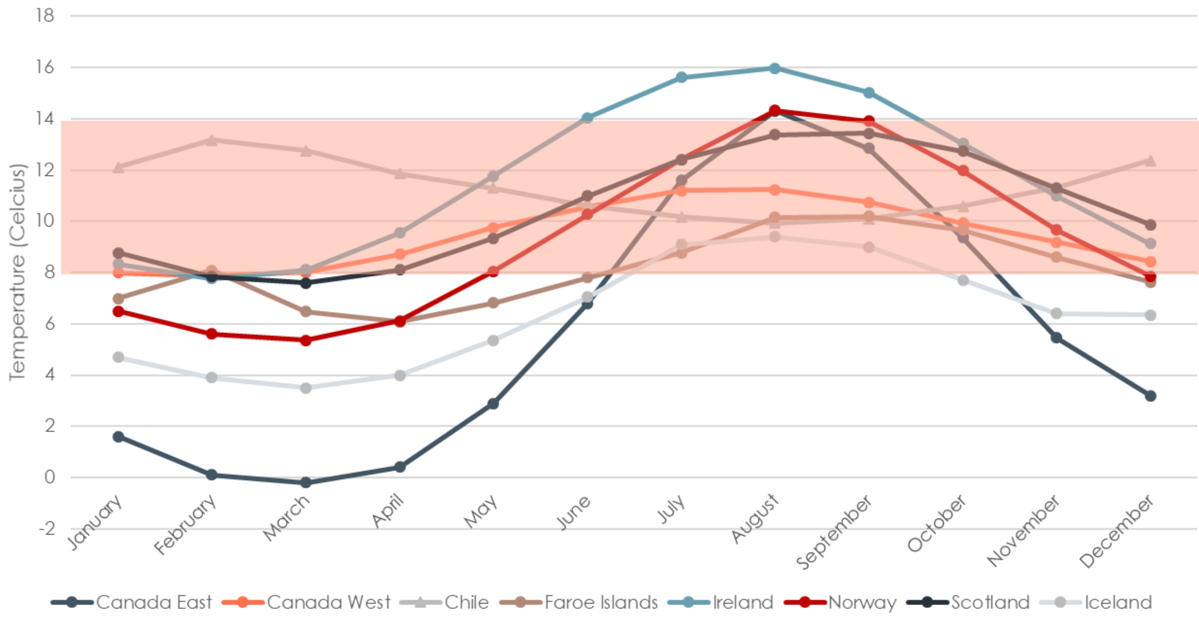
The total freshwater production cycle takes approximately 10-16 months and the seawater production cycle lasts around 12-24 months, giving a total cycle length of on average about 3 years. Post-smolt will normally have a longer production cycle in freshwater and a shorter production cycle in seawater depending on smolt size. In Chile, the cycle is slightly shorter as seawater temperatures are more optimal with fewer fluctuations.

In autumn, broodstock are stripped for eggs, and ova inlay takes place between September and March. The producer can speed up the growth of the juveniles with light manipulation which accelerates the smoltification process by up to 6 months.

Spring and autumn are the two main periods to release smolt in Norway. However, there are smolt being released in all twelve months of the year. Harvesting is spread evenly across the year, although most harvesting takes place in the last half of the year as this is the period of best growth. During summer the harvesting pattern shifts to a new generation, and consequently weight dispersion between large and small harvested salmon is greater at this time than for the rest of the year.

After a site is harvested, the location is fallowed between 2 and 6 months before the next generation is put to sea at the same location. Smolts may be released in the same location with a two year cycle.

8.3 Influence of seawater temperature



Seawater temperatures vary considerably throughout the year in all production regions. While the production countries in the northern hemisphere see low temperatures at the beginning of the year and high temperatures in autumn varying by as much as 10°C, the temperature in Chile is more stable varying between 10°C and 14°C. Chile has the highest average temperature of 12°C, while Ireland has 11°C and the four other regions have an average temperature of about 10°C.

As the salmon is a cold-blooded animal (ectotherm), water temperature plays an important role in its growth rate. The optimal temperature range for Atlantic salmon is 8-14°C, but they thrive well from 4-18°C. Temperature is one of the most important natural competitive advantages that Chile has compared to the other production regions as the production time there historically has been shorter by a few months.

With high seawater temperatures, risk of disease increases, and with temperatures below 0°C, mass mortality becomes more likely, both of which cause the growth rate to fall.

Note: Average sea temperature 2015-2020 for all regions at Mowi's sites except Canada East and Iceland which is obtained from seatemperature.org at respectively St. Johns and Ísafjörður.

Salmon Production and Cost Structure

8.4 Production inputs

Eggs

There are several suppliers of eggs to the industry. AquaGen, Benchmark Genetics and Rauma Stamfisk are some of the most significant by quantity. In addition to these suppliers, Mowi produces its own eggs based on the Mowi strain.

Egg suppliers can tailor their deliveries through use of broodstock with favourable genetics for different traits desired by customers, and several suppliers are able to produce eggs throughout the whole year. The market for salmon eggs is international, although this can be subject to import/export restrictions imposed by different countries.

Smolt

The majority of smolt are produced "in-house" by vertically integrated salmon farmers. This production is generally for a company's own use, although a proportion may also be sold to third parties. A smolt is produced over a period of 6-12 months from fertilisation of an egg to a mature smolt weighing 100-250 grams. Post-smolt production (250-1,000 grams) has become more common in recent years, accounting for 9.1% of the smolt release in 2019 in terms of individuals. The idea behind larger smolt is to shorten the time at sea, thus reducing exposure to sea lice, disease etc.

Salmon Production and Cost Structure

Labour

According to The Directorate of Fisheries the Norwegian aquaculture industry employed 8,340 people in 2018. A Nofima report stated that 15,000 people were employed in businesses involved in activities connected with the aquaculture industry in 2013. In total there are over 22,000 people employed full-time either directly or indirectly by the aquaculture industry in Norway.

According to the Scottish Salmon Producers Organisation (SSPO), almost 2,300 people are employed in salmon production in Scotland. The Scottish Government estimates that over 8,000 jobs are generated directly or indirectly by the aquaculture industry.

Estimates on Canadian employment say that around 14,000 people are employed in aquaculture, where Canada's farmed-salmon industry provides more than 10,000 jobs. Direct employment in Chilean aquaculture (including processing) was estimated at around 30,000 people in 2014.

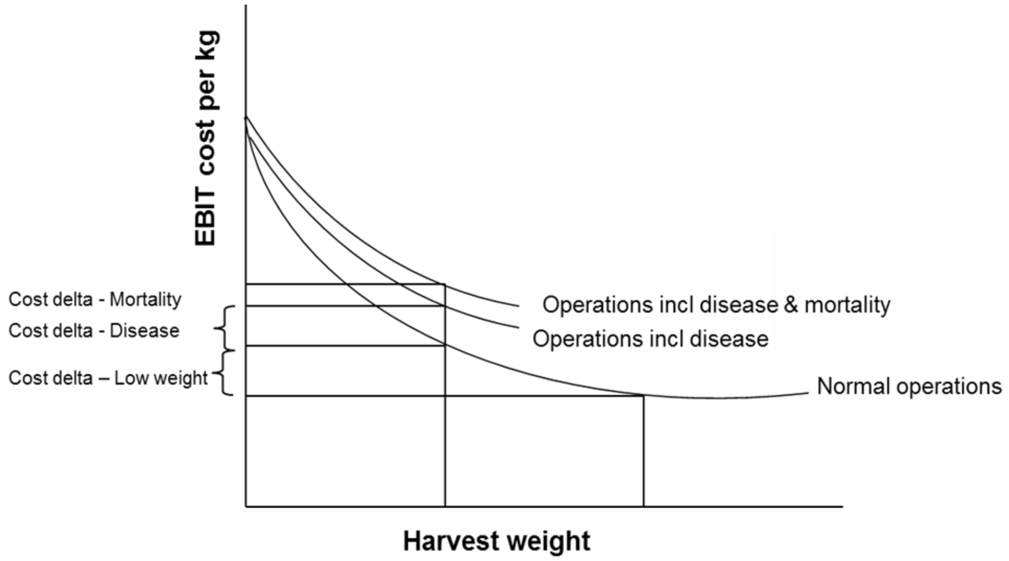
Mowi Group has a total of 14,866 employees in 25 countries worldwide (31 Dec 2019).

Electricity

Electricity is mainly used in the earliest and last stages in the salmon's life cycle. To produce a good quality smolt, production normally takes place in tanks on land where the water temperature is regulated and/or recirculated which requires energy (accounting for 4-5% of smolt cost in Norway). The cost of energy consumption will depend on the price of electricity and the temperature. A cold winter will demand more electricity to heat the water used in the smolt facility. The size of the smolt will also influence electricity consumption as a larger smolt has a longer production cycle in the smolt facility. More energy is consumed when the salmon is processed. However, this depends on the level of automation (2-3% of harvest cost in Norway).

Source: Mowi, Kontali Analyse, Directorate of Fisheries, SSPO, Government of Canada, Estudio Situación Laboral en la Industria del Salmón", Silvia Leiva 2014

8.5 Cost component – disease and mortality



EBIT costs per kg decline with increasing harvest weight. If fish is harvested at a lower weight than optimal (caused by diseases for example), EBIT costs per kg will be higher.

During the production cycle, some mortality will occur. Under normal circumstances, the highest mortality rate will be observed during the first 1-2 months after the smolt is put into seawater, while subsequent stages of the production cycle normally have a lower mortality rate.

Elevated mortality in later months of the cycle is normally related to outbreaks of disease, treatment for sea lice or predator attacks.

There is no strict standard for how to account for mortality in the accounts, and there is no unified industry standard. Three alternative approaches are:

- Charge all mortality to expense when it is observed
- Capitalise all mortality (letting the surviving individuals carry the cost of dead individuals in the balance sheet when harvested)
- Only charge exceptional mortality to expense (mortality, which is higher than what is expected under normal circumstances)

It is not possible to perform biological production without any mortality. By capitalising the mortality cost, the cost of harvested fish will therefore reflect the total cost for the biomass that can be harvested from one production cycle.

8.6 Accounting principles for biological assets

Biological assets are measured at fair value less cost to sell, unless the fair value cannot be measured reliably.

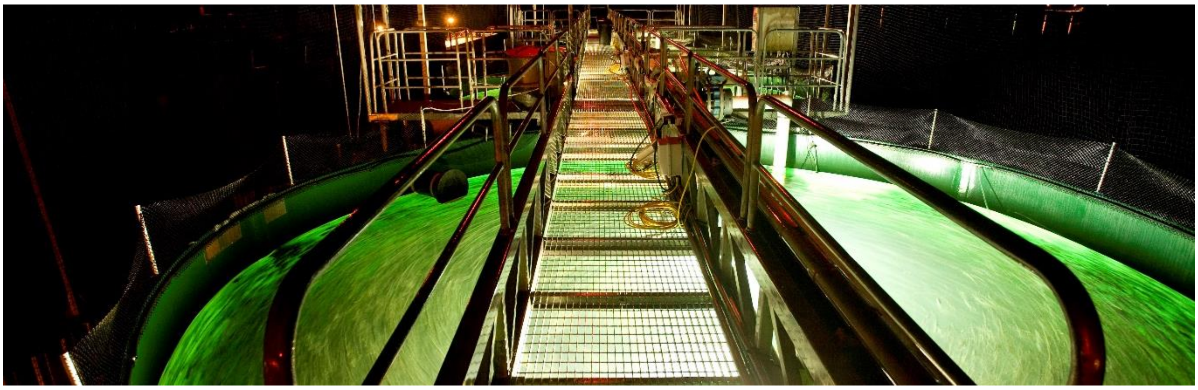
Effective markets for the sale of live fish do not exist so the valuation of live fish implies establishment of an estimated fair value of the fish in a hypothetical market. Fair value is estimated by the use of a calculation model, where cash inflows are functions of estimated volume multiplied by estimated price. Fish ready for harvest (4 kg GWT, which corresponds to 4.8 kg LW) is valued at expected sales price with a deduction of costs related to harvest, transport etc. to arrive at back-to-farm prices. For fish not ready for harvest (i.e. below 4 kg GWT), the model uses an interpolation methodology where the known data points are *i)* the value of the fish when put to sea and *ii)* the estimated value of the fish when it has reached harvest size. The valuation reflects the expected quality grading and size distribution.

Broodstock and smolt are measured at cost less impairment losses, as fair value cannot be measured reliably.

The change in estimated fair value is recognised in profit or loss on a continuous basis and is classified separately (not included in the cost of the harvested biomass). On harvesting, the fair value adjustment is reversed on the same line.

Operational EBIT
Operational EBIT and other operational results are reported based on the realised costs of harvested volume and do not include fair value adjustments on biomass.

8.7 Economics of salmon farming



The salmon farming industry is capital-intensive and volatile. This is a result of a long production cycle, a fragmented industry, market conditions and a biological production process which is affected by many external factors.

Over time, production costs have been reduced and productivity has increased on the back of new technology and improved techniques. In recent years, costs have trended upwards due to several factors including rising feed costs, biological costs and more stringent regulatory compliance procedures.

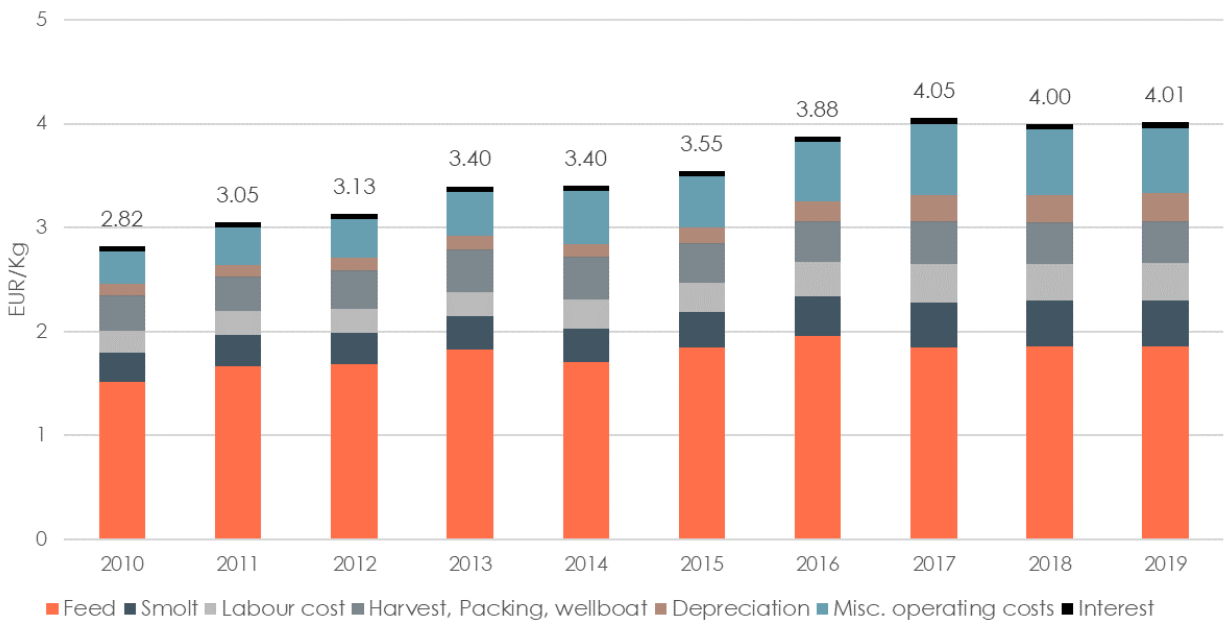
Reported revenues: Revenues are a gross figure; they can include invoiced freight from reference place (e.g. FCA Oslo) to customer, and have discounts, commissions and credits deducted. Reported revenues can also include revenues from trading activity, sales of by-products, insurance compensation, gain/loss on sale of assets etc.

Price: Reported prices are normally stated in the terms of a specific reference price e.g. the Nasdaq price for Norway (FCA Oslo) and UB price for Chile (FOB Miami). Reference prices do not reflect freight, and other sales reducing items mentioned above. Reference prices are for one specific product (Nasdaq price = sales price per kg head on gutted fish packed fresh in a standard box). Sales of other products (frozen products, fresh fillets and portions) will cause deviation in the achieved prices vs. reference price. Reference prices are for superior quality fish, while achieved prices are for a mix of qualities, including downgrades. Reference prices are spot prices, while most companies will have a mix of spot and contract sales in their portfolio.

Quantity: Reported quantity can take many forms. Quantity harvested = Fish harvested in a specific period in a standardized term; e.g. Gutted Weight Equivalent (GWT), which is the same weight measure as Head-on-Gutted (HOG), or Whole Fish Equivalent (WFE), the difference being gutting loss. Quantity sold can be reported using different weight scales:

- Kg sold in product weight.
- Kg sold converted to standard weight unit (GWT or WFE).
- Quantity sold could also include traded quantity.

8.8 Cost structure industry Norway 2010-2019



Feed: As in all animal production, feed makes up the largest share of the total cost. The variation in costs between countries is based on somewhat different inputs to the feed, logistics and the feed conversion ratio.

Smolt: Atlantic salmon smolt is largely produced at land-based hatcheries either in flow-through or RAS systems. Cost per kilo is increasing as farmers increase the size of the smolt in the hatchery before release to sea. The cost is expected to be offset by shorter time in sea, less lice treatment etc.

Labour Cost: Salmon production is a capital-intensive industry and labour cost accounts for a minor part of total costs. However, it has been increasing over the last years, partly because of increased employment in relation to lice issues.

Harvest/ Packing/ Well boat: Costs relating to transportation of live fish, slaughtering, processing and packing are all heavily dependent on quantity, logistics and automation.

Depreciation: The industry is investing heavily in new technology and automation, but also in equipment used to treat lice, which in turn leads to higher depreciation costs.

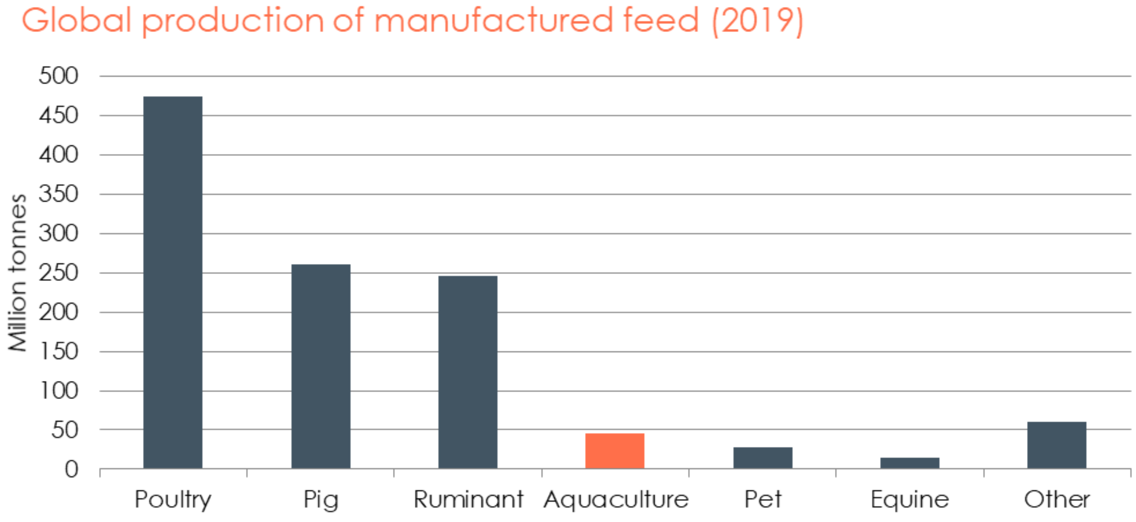
Misc. operating costs: Other costs include direct and indirect costs, administration, insurance, biological costs (excluding mortality), etc.

Source: Kontali Analyse. Nofirma (2018) Kostnadsdrivere i lakseoppdrett 2018

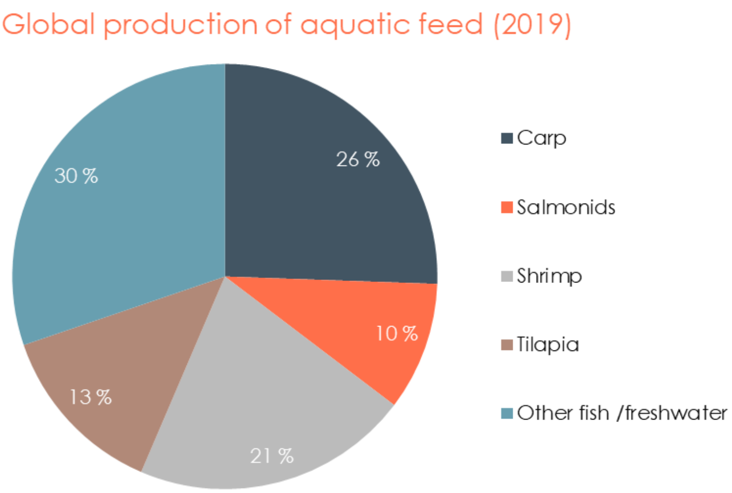
9 Feed Production

Feed Production

9.1 Overview of feed market



Global production of manufactured feed was around 1,127 million tonnes in 2019. The majority was used for land-dwelling animals, where 87% was used in the farming of poultry, pig and ruminants. Only 4%, or 45 million tonnes, of global production of manufactured feed was used in aquatic farming.

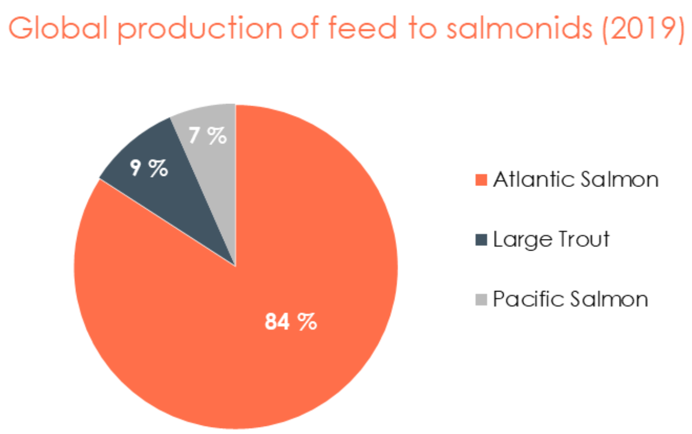


Most aquatic feed produced globally is used for carp as this is the predominant farmed fish species. Feed for salmonids only accounts for 10% of the total production of aquatic feed.

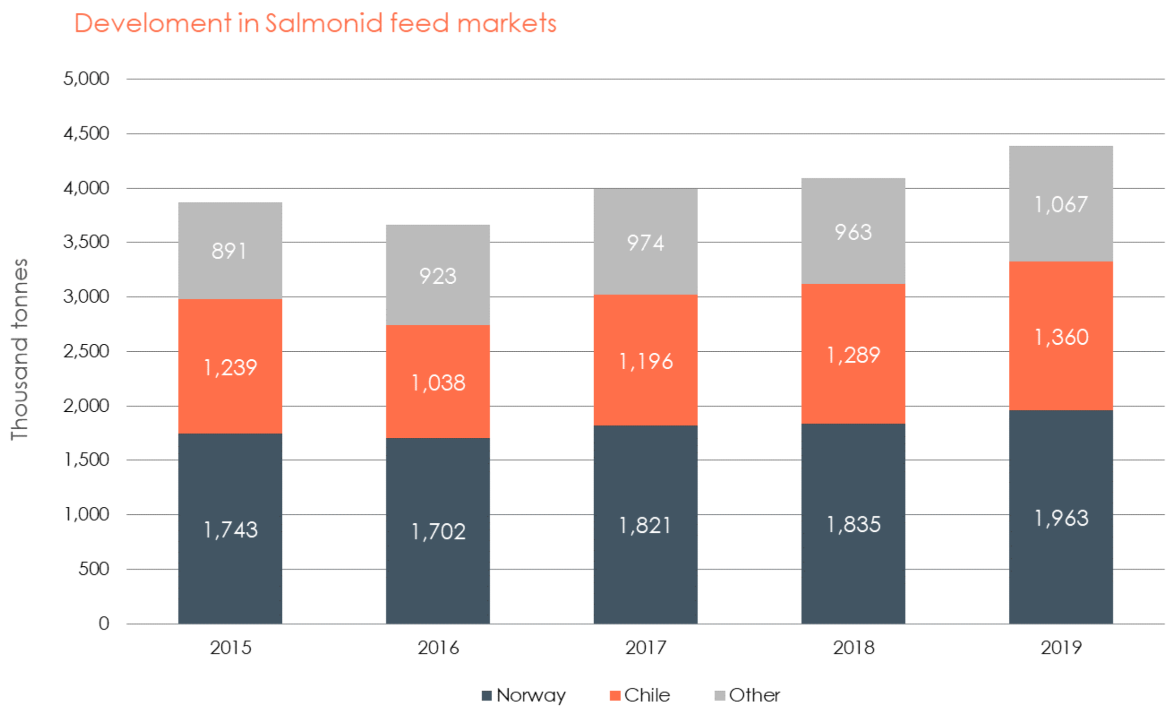
Source: Kontali Analyse

MOWI

Feed Production



Atlantic salmon is the most farmed species of salmonids and is therefore the largest consumer of salmonid feed.

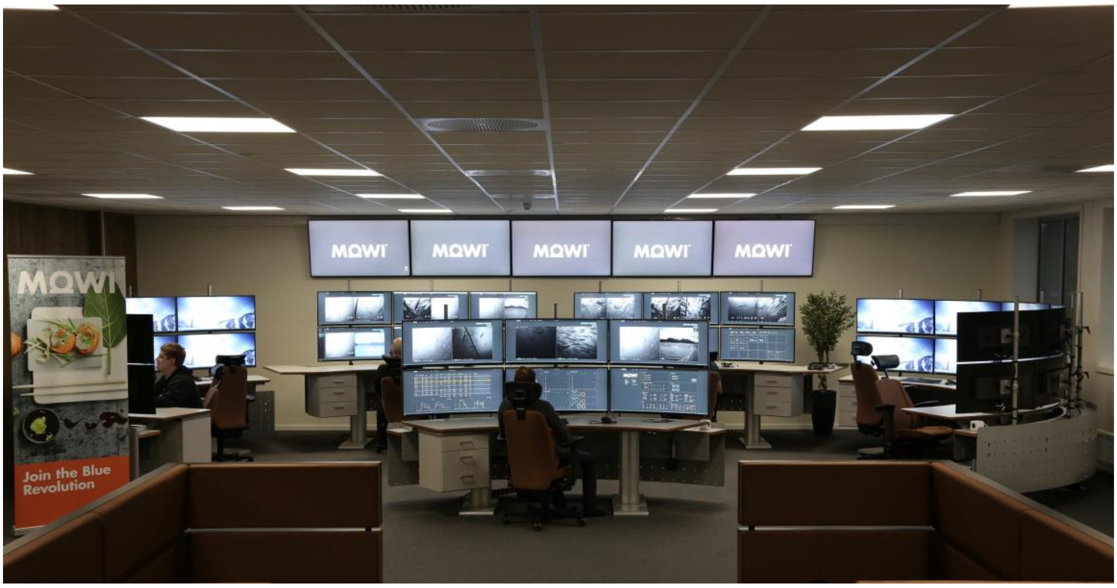


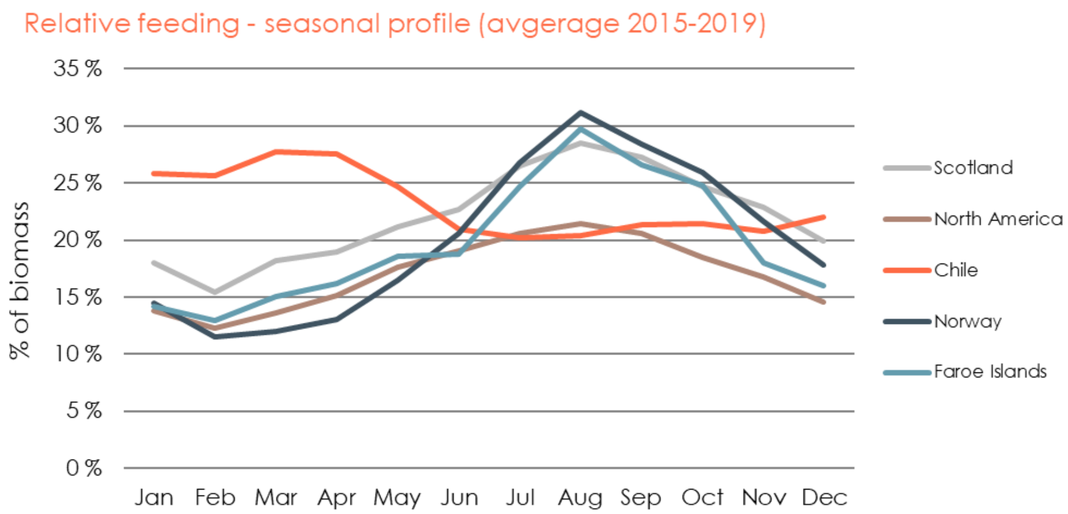
Most of the feed used in farming of salmonids is produced close to where it is farmed. Norway used 45% of the global feed directed towards the salmonid segment in 2019 and Chile used 31%.

Source: Kontali Analyse

Feed Production

9.2 Relative feeding (*)





The production of feed around the world varies as there are large deviations in sea temperature. Norway has the greatest seasonality in production. The low season is from February to April and the high season is from July to October, with the mid-season in between. Production in the low season can be as low as only 30% of the high season's production. Over a year, Chile has the highest relative feeding. Feed is considered a perishable product with limited opportunities to store.

*Relative feeding: (Feed sold or fed during a month) / (Biomass per primo in month)
Source: Kontali Analyse

MOWI

Feed Production

9.3 Salmon feed producers

During the last decade, the salmonid feed industry has become increasingly consolidated. Together with Mowi, three producers now control the majority of salmon feed output; Skretting (subsidiary of Nutreco which has been acquired by SHV), EWOS (Cargill), and BioMar (subsidiary of Schouw). These companies all operate globally.

In mid-2014, Mowi began production of feed from its first new feed plant. In 2019, Mowi completed its second feed plant located in Kyleakin, Scotland. Mowi has a total production capacity of 600,000 tonnes. In 2019 Mowi produced 405,193 tonnes compared with total global salmonid feed production of around 4.4 million tonnes.

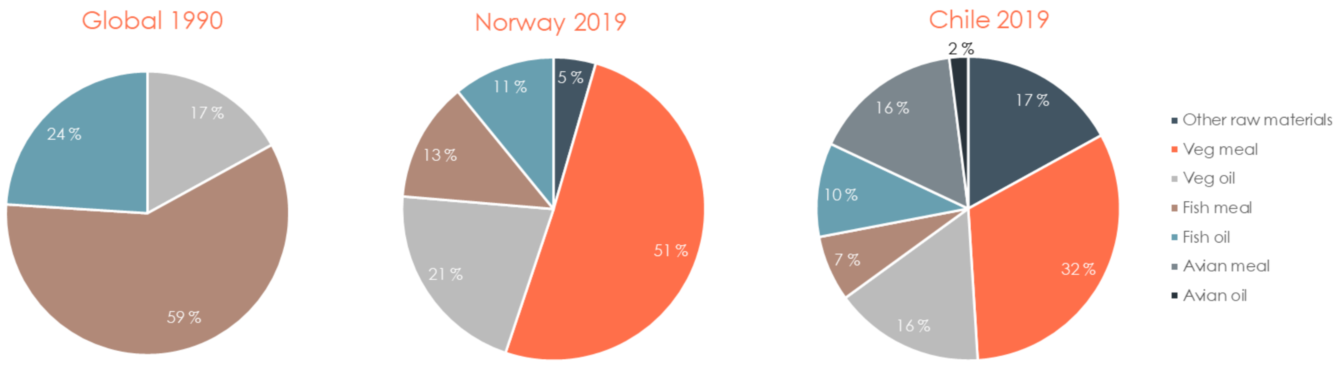
The major cost elements when producing salmonid feed are the raw materials required and production costs.

The feed producers have historically operated on cost-plus contracts, leaving the exposure to raw material prices with the aquaculture companies.

MOWI

Feed Production

9.4 Salmon feed ingredients



Growth intervals	0.1 - 0.2 kg	0.2 - 1 kg	1 - 2 kg	2 - 3 kg	3 - 4 kg	4 - 5 kg
Feed consumption (Norway)	0.08 kg	0.75 kg	1.00 kg	1.05 kg	1.10 kg	1.20 kg
Time, months	2	4	4	3	2	2

Atlantic salmon feed should provide proteins, energy and essential nutrients to ensure high muscle growth, energy metabolism and good health. Historically, the two most important ingredients in fish feed have been fish meal and fish oil. The use of these two marine raw materials in feed production has been reduced in favour of ingredients such as soy, sunflower, wheat, corn, beans, peas, poultry by-products (in Chile and Canada) and rapeseed oil. This substitution is mainly due to heavy constraints on the availability of fish meal and fish oil.

Atlantic salmon have specific nutrient requirements for amino acids, fatty acids, vitamins, minerals and other lipid- and water-soluble components. These essential nutrients can in principle be provided by the range of different raw materials listed above. Fish meal and other raw materials of animal origin have a more complete amino acid profile and generally have a higher protein concentration compared to proteins of vegetable origin. As long as a fish receives the amino acid it needs it will grow and be healthy and the composition of its muscle protein is the same irrespective of feed protein source. Consequently, feeding salmon with non-marine protein sources results in a net production of marine fish protein.

During the industry's early phases, salmon feed was moist (high water content) with high levels of marine protein (60%) and low levels of fat/oil (10%). In the 1990s, feed typically consisted of 45% protein, made up mostly of marine protein. Today, the marine protein level is lower due to cost optimisation and the availability of fish meal. However, the most interesting development has been the increasingly higher inclusion of fat. This has been made possible through technological development and extruded feeds.

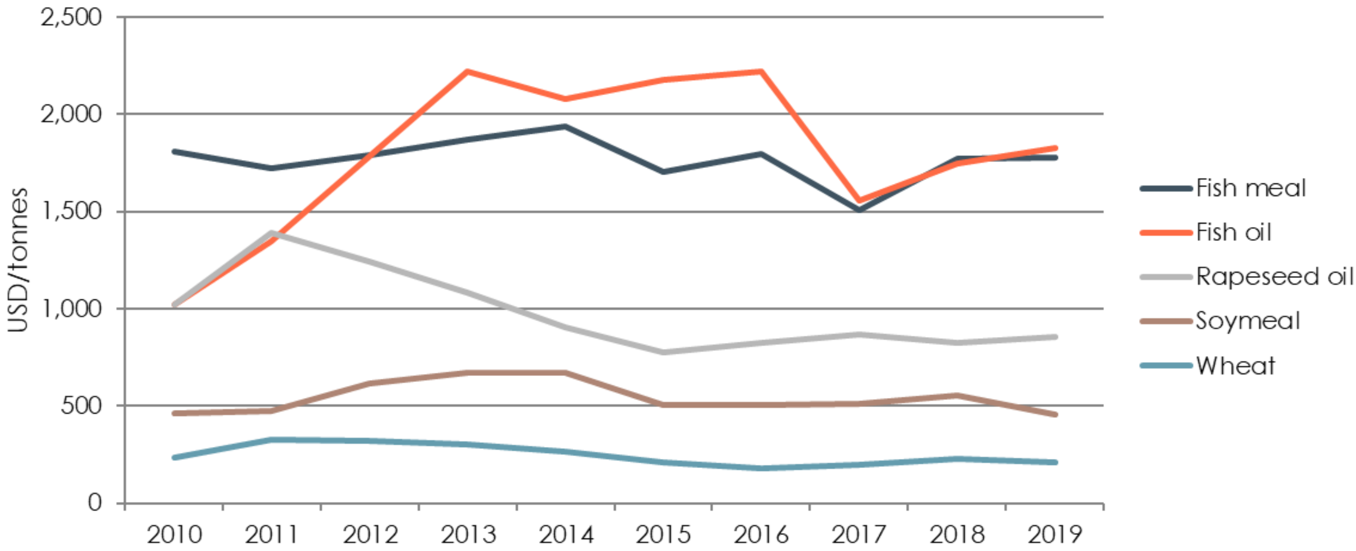
Source: www.nifes.no, Holtermann, Mowi

Feed Production

Feed and feeding strategies aim to grow a healthy fish fast at the lowest possible cost. Standard feeds are designed to give the lowest possible production cost rather than maximised growth. Premium diets formulated for giving amongst other things better growth rate and higher survival.

Feeding control systems are used at all farms to control and optimise feeding. Feeding is monitored for each net pen to ensure that fish are fed to maximise growth (measured by the Relative Growth Index - RGI). At the same time systems ensure that feeding is stopped immediately when the maximum feed intake has been provided to prevent feed waste. The fastest growing fish typically also have the best (i.e. lowest) feed conversion ratio (FCR).

9.5 Feed raw material market



Fish oil: In general, fish oil prices are more volatile than vegetable sources mainly due to volatile supply as result of the quota systems for fisheries. The average price of fish oil was about USD 1,827 per tonne in 2019.

Fish meal: Fish meal has seen stable price development over the past ten years. Although prices have been stable based on a yearly average, there are large variations within the years. The market for fishmeal is small compared to that for vegetable proteins.

Rapeseed oil: Up until 2011, rapeseed oil and fish oil had correlated price development. However, in the last few years there has been a downward trend in the price of rapeseed oil.

Soy meal: Soy and corn have traditionally been very important vegetable protein sources in fish feed. Prices have been under pressure in the last few years as a result of increased supply, especially from expanded production in Brazil. The average price in 2019 was USD 455 per tonne.

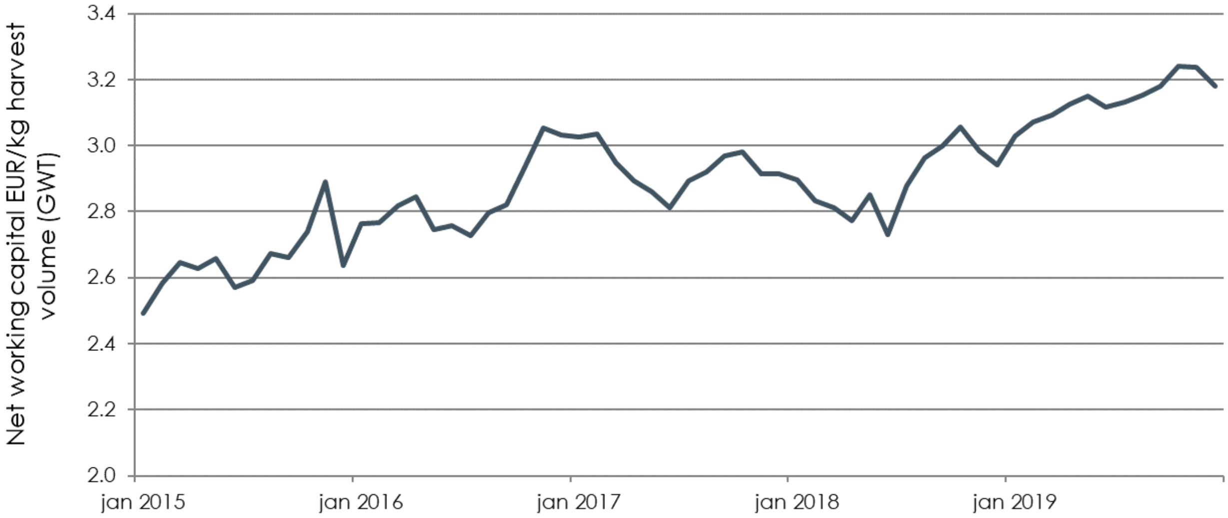
Wheat: Prices for wheat have remained stable over the years with generally good production and balanced supply/demand.

Source: Holtermann

10 Financial Considerations

Financial Considerations

10.1 Working capital



The long production cycle of salmon requires significant working capital in the form of biomass.

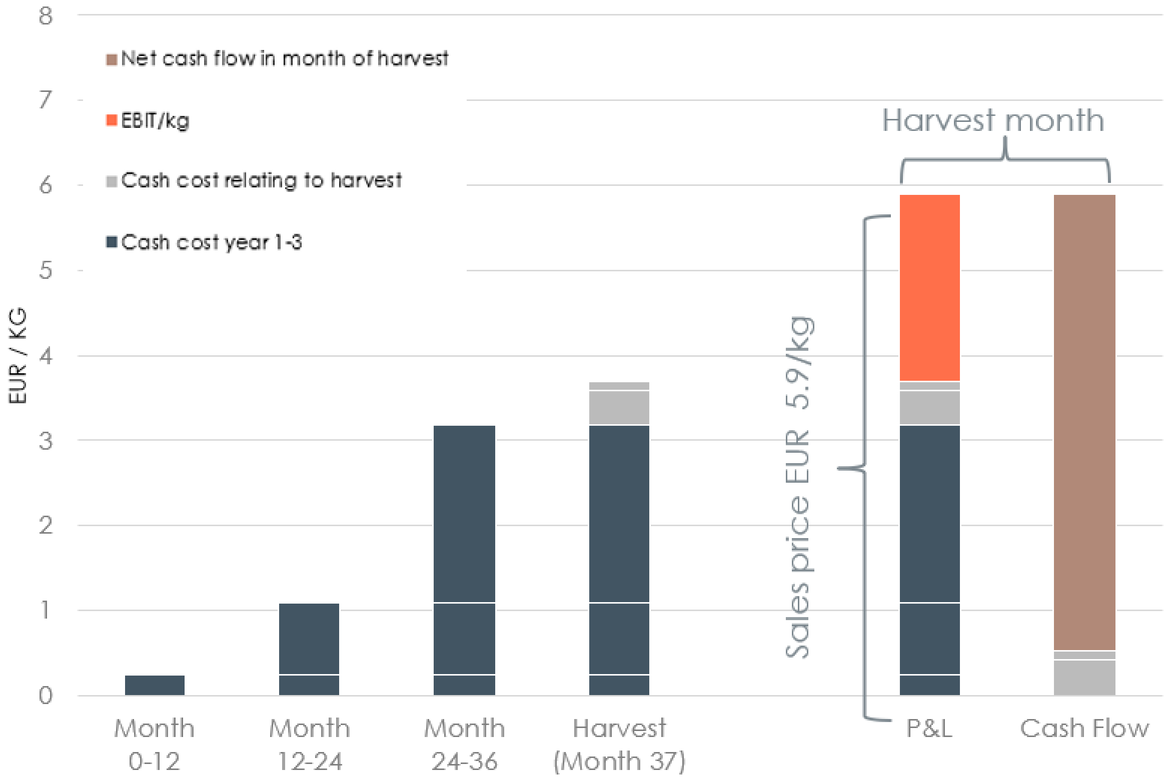
Working capital investments are required for organic growth, as a larger "pipeline" of fish is needed to facilitate larger harvest volumes. On average, a net working capital investment of approximately EUR 3.2/kg is required, split between the year of harvest and the year immediately preceding harvest, in order to obtain an increase in harvest volume of 1 kg. The working capital requirement has increased over time and fluctuates with variations in currency exchange rates.

Net working capital varies during the year. Growth of salmon is heavily impacted by changing seawater temperatures. Salmon grows at a higher pace during summer/autumn and more slowly during winter/spring when the water is colder. As the harvest pattern is relatively constant during the year, this leads to large seasonal variations in net working capital. For a global operator, net working capital normally peaks around year-end and bottoms out around mid-summer.

Source: Mowi

Financial Considerations

Cost of building biomass



For illustration purposes, the farming process has been divided into three stages of 12 months. The first 12-month period is from production from egg to finished smolt. 24 months of on-growing in the sea follows this. When the on-growing phase ends, harvest takes place immediately (illustrated as "Month 37"). In a steady state there will always be three different generations at different stages in their life cycle. Capital expenditure is assumed equal to depreciation for illustration purposes. The working capital effects are shown above on a net basis excluding effects from accounts receivable and accounts payable.

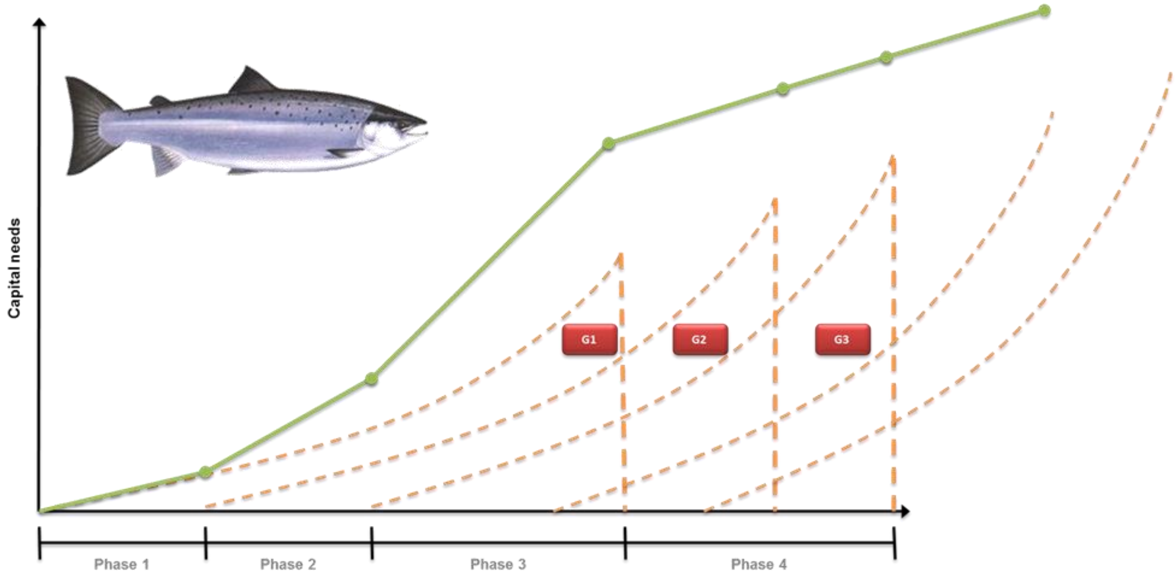
By the point of harvest there have been up to 36 months of costs to produce the fish, comprising the cost of producing the smolt two years ago, further costs incurred to grow the fish in seawater, and some costs related to harvest ("Month 37"). Sales price covers these costs and provides a profit margin (represented by the green rectangle).

Cash cost for the period in which the fish are harvested is not large compared to sales income, creating a high net cash flow. If production going forward (next generations) follows the same pattern, most of the cash flow will be reinvested into salmon at various growth stages. If the company wishes to grow its future output, the following generations need to be larger requiring even more of the cash flow to be reinvested in working capital.

This is a rolling process and requires substantial amounts of working capital to be tied up, both when in a steady state and especially when increasing production.

Source: Mowi

Financial Considerations



The illustration above shows how capital requirements develop when production/biomass is being built "from scratch". In phase 1, there is only one generation (G) of fish produced and the capital requirement is the production cost of the fish. In phase 2, the next generation is also put into production, while the on-growing of G1 continues, rapidly increasing the capital invested. In phase 3, G1 has reached its last stage, G2 is in its on-growing phase and G3 has begun to increase its cost base.

At the end of phase 3, the harvest starts for G1, reducing the capital tied-up, but the next generations are building up their cost base. If each generation is equally large and everything else is in a steady state, the capital requirement will peak at the end of phase 3. With growing production, the capital requirement will also increase after phase 3 as long as the next generation is larger than the previous (if not, the capital base is reduced). We see that salmon farming is a capital-intensive industry.

To equip a grow-out facility you need cages (steel or plastic), moorings, nets, cameras, feed barge/automats and workboats.

Source: Mowi

10.2 Capital return analysis

Investments and payback time (Norway) - assumptions

- Normal site consisting of 4 licenses

- Equipment investment: MEUR 3.5 - 4.5
- Number of licenses: 4
- License cost (second hand market) MEUR: 60 (~MEUR 15 per license)
- Output per generation: ~4,200 tonnes GWT
- Number of smolt released: 1,100,000

- Smolt cost per unit: EUR 1.7
- Feed price per kg: EUR 1.3 (LW)
- Economic feed conversion ratio (FCR): 1.2 (to Live Weight)
- Conversion rate from Live Weight to GWT: 0.84
- Harvest and processing incl. well boat cost per kg (GWT): EUR 0.4

- Average harvest weight (GWT): 4.5kg
- Mortality in sea: 15%

- Sales price: EUR 5.9/kg

To increase capacity there are many regulations to fulfil.

In this model we focus on a new company entering the industry and have used only one site, for simplicity's sake. Most companies use several sites concurrently, which enables economies of scale and makes the production more flexible and often less costly.

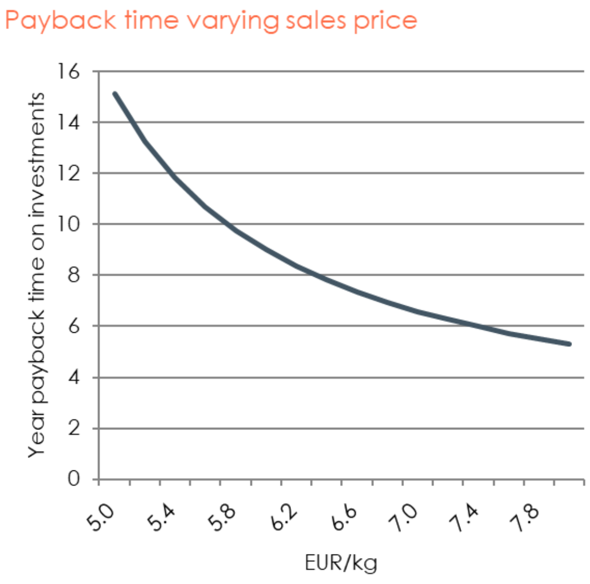
In this model smolts are bought externally, also in the interests of simplicity. Smolts are usually less costly to produce internally, but this depends on production quantity.

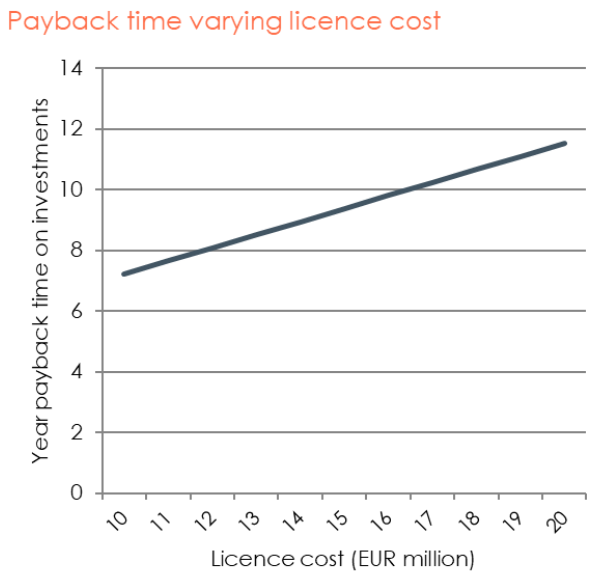
The performance of the fish is affected by numerous factors including feeding regime, seawater temperature, disease, oxygen level in water, smolt quality, etc.

The sales price reflects the average sales price from Norway over the last five years.

Source: Mowi, Kontali Analyse

Financial Considerations





Results
Because of the simplifications in the model and the low, non-optimal production regime, production costs are higher than the industry average. Due to high entry barriers in terms of capital needs, and falling production costs with increasing quantity, new companies in salmon production will experience higher average production costs. During the production of each generation the working capital needed at this farm, given the assumptions, would be peaking at around MEUR 13 (given that the whole of each generation is harvested at the same time).

With a sales price of EUR 5.9/kg the payback time for the original investments would be around 9 years. This result is very sensitive to sales price, licence cost and economic feed conversion ratio (FCR).

The sales price of EUR 5.9/kg is based on the average price in Norway in the 5-year period 2015-2019.

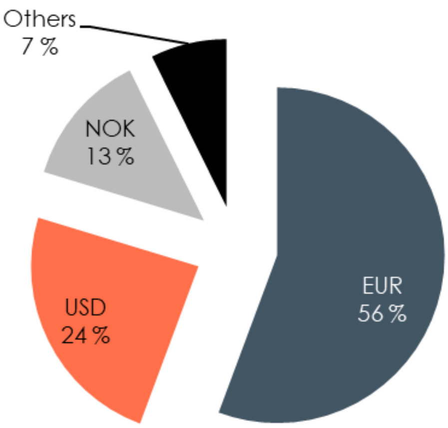
Source: Mowi

Financial Considerations

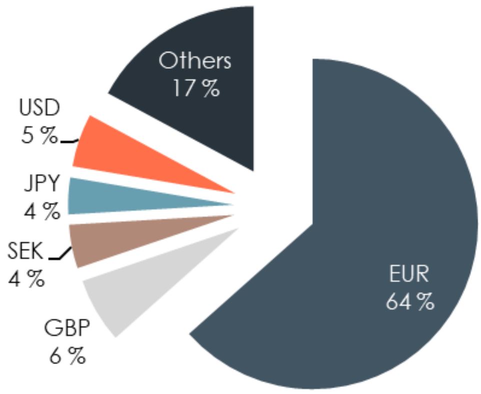
10.3 Currency overview

Norwegian exposure vs foreign currency(1)

Traded currency



Local currency



Exporters deal in the traded currency, while the customer has an exposure to both traded and local currencies. For example, a Russian processor trades salmon in USD, but sells its products in the local currency, roubles (RUB).

Most Norwegian producers are exposed to currency fluctuations as most of the salmon they produce is exported. Most of the salmon is exported to countries within the EU and is traded in EUR. The second largest traded currency is USD. Some players in countries in Eastern Europe, the Middle East and some Asian countries prefer to trade salmon in USD rather than in local currency.

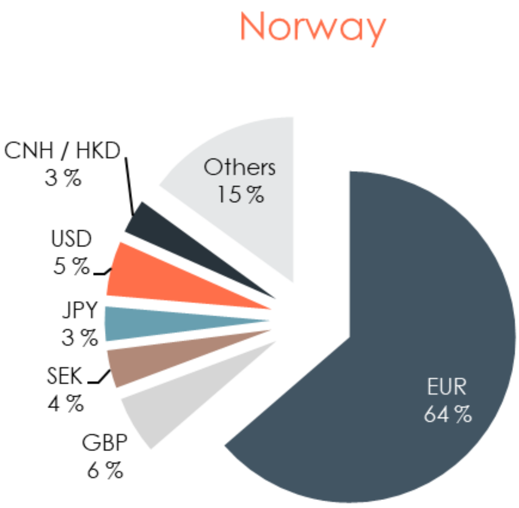
The price of salmon quoted in traded currency will compete with other imported goods, while the price of salmon quoted in local currency will compete with the price to consumers of domestically produced products.

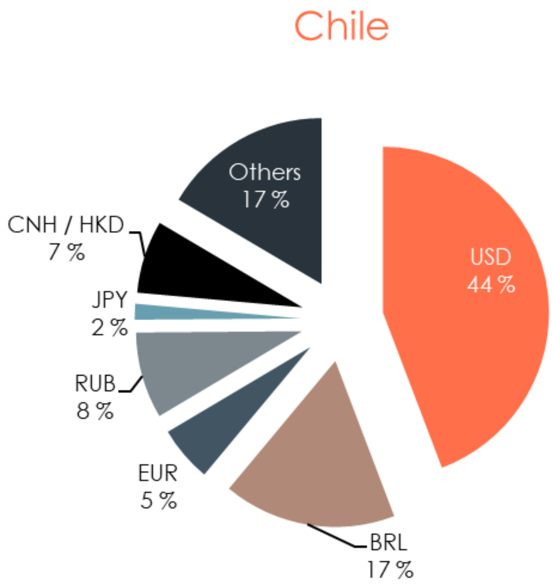
There is a currency risk involved in operating in different currencies, and therefore many of the largest industry players hedge currencies often with back-to-back contracts. The currency risk arising from salmon sales denominated in the traded currency is usually absorbed by the exporter, while the currency risk in local currency is absorbed by the customer.

Note: (1) The table shows exposure against local currency weighted against total export volumes
Source: Kontali Analyse

Financial Considerations

Exposure against local currency – 2019[1]





Europe is the largest market for Norwegian produced salmon, so EUR is the predominant currency for Norwegian salmon producers.

Key markets for Chilean produced salmon are the USA and Brazil, so exposure to USD and BRL (Brazilian real) in local currency terms is followed closely. Exposure to RUB has increased over the years as the Russian market has become more important for Chilean exporters.

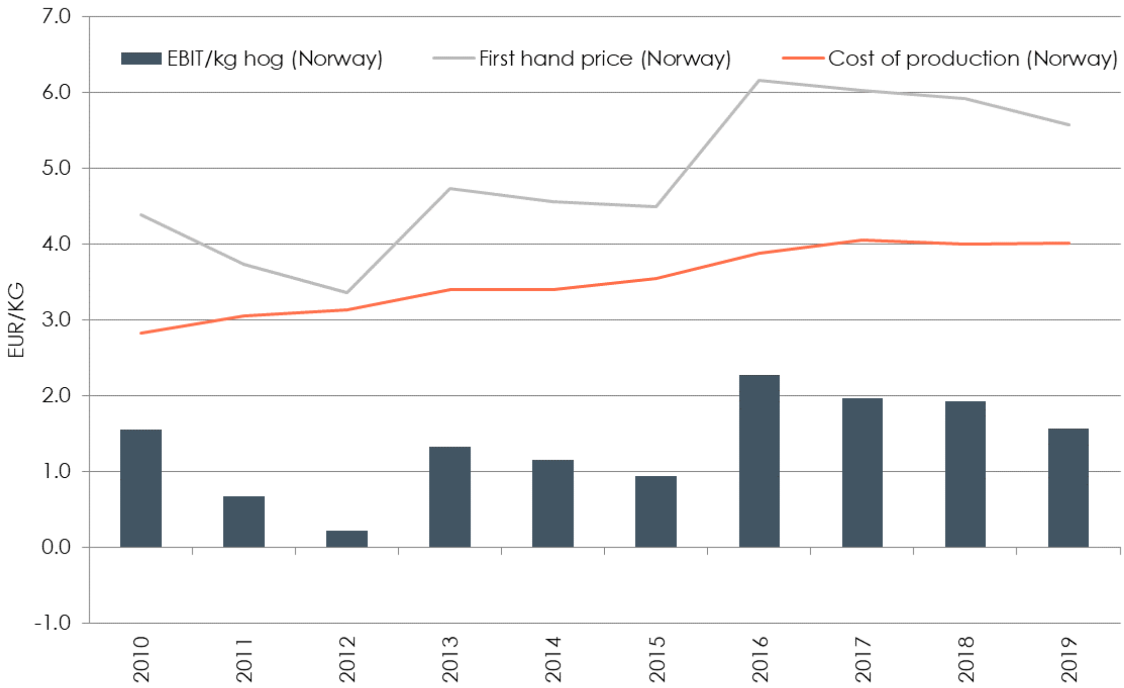
Feed production: Currency exposure
The raw materials required to produce feed are as a rule of thumb quoted in USD (approx. 70%) and EUR (approx. 30%), based on long term average exchange rates. Raw materials generally account for 85% of the cost of producing feed. The remaining costs, including margin for the feed producer, are quoted in local currency.

Secondary Processing: Currency exposure
The biggest market for value added products is Europe, hence the vast majority of currency flows are EUR-denominated, both on the revenue and cost side. In the US and Asian processing markets currency flows are denominated largely in USD and EUR on the revenue side whilst costs are denominated in USD, EUR and local currency.

Note (1): The table shows exposure against local currency weighted against total export volumes
Source: Kontali Analyse

10.4 Price, cost and EBIT development in Norway

Norwegian profitability over time



Price adjusted for e.g. contract sales.

The upward trending salmon price from 2010-2019 was caused by supply growth being lower than the structural growth in demand.

Atlantic salmon is seen as a healthy, resource-efficient, and climate friendly product. On the back of a growing global middle class, an aging population, a global trend towards healthy living, and a focus on carbon footprint, demand has been estimated to grow by 6-7% per annum. Product innovation, category management, long-term supply contracts, effective logistics and transportation have stimulated strong demand growth for salmon.

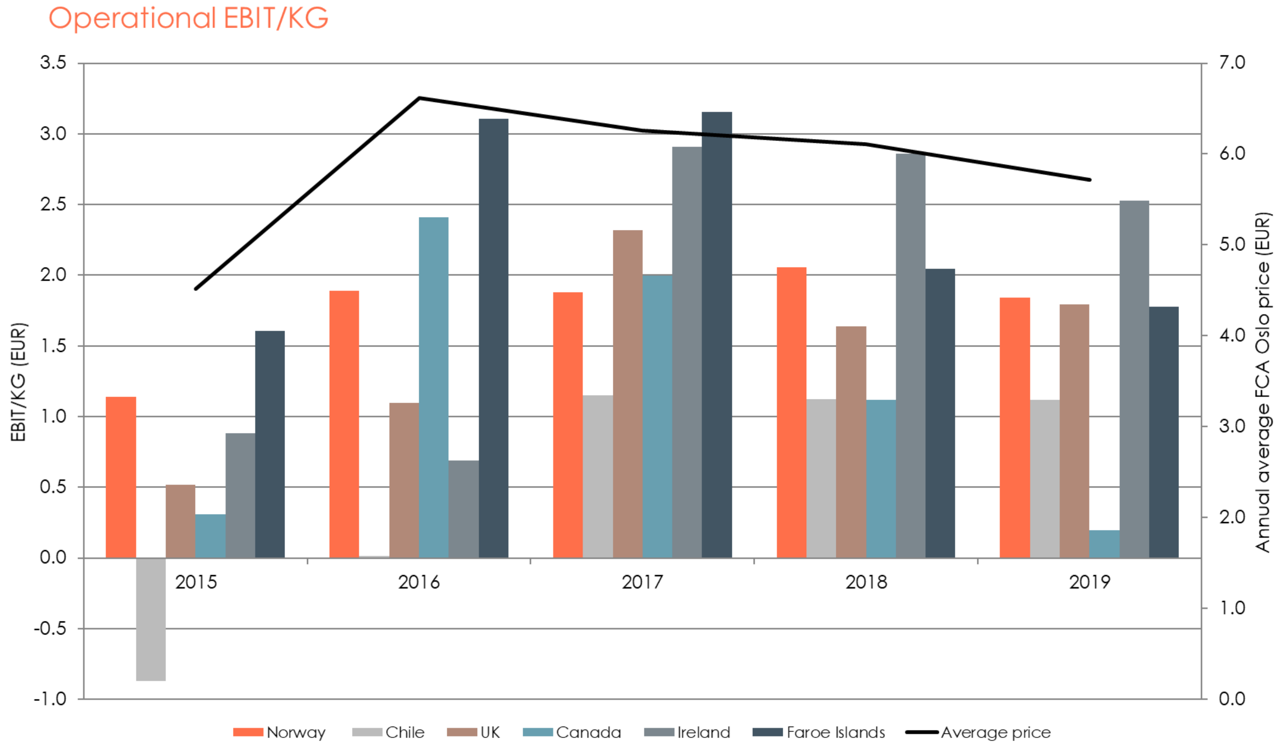
An essential characteristic of the salmon market is that supply is limited due to regulations and biological conditions. However, over the course of the years there have been several supply shocks. In Chile, the ISA virus outbreak which lasted until 2010 and the algae bloom in 2016 caused negative supply shocks which in isolation caused positive price movements.

In recent years, costs have trended upwards due to several factors including rising feed costs, biological costs and more stringent regulatory compliance procedures. The average EBIT per kg for the Norwegian industry has been positive with the exception of a few shorter periods. In the last 10 years it has been EUR 1.4 per kg in nominal terms (EUR 1.7 per kg the last 5 years).

Source: Kontali Analyse, Norges Bank

Financial Considerations

10.5 Effects of geographical diversification



The illustration above depicts Mowi's performance across different countries over the last 5 years. In all regions, the biological risk is high, and this impacts cost significantly from period to period. The variance in EBIT per kg is high, however, the geographic specific risk can be diversified with production across regions.

Source: Mowi

11 Barriers to Entry – Licences

Barriers to Entry – Licences

Due to biological constraints, seawater temperature requirements and other natural constraints, farmed salmon is only produced in Norway, Chile, Scotland, the Faroe Islands, Ireland, Iceland, Canada, USA, Tasmania and New Zealand.

Atlantic salmon farming began on an experimental level in the 1960s and evolved into an industry in Norway in the 1980s and in Chile in the 1990s.

In all salmon-producing regions, the relevant authorities have a licensing regime in place. In order to operate a salmon farm, a licence is the key prerequisite. Such licences restrict the maximum production for each company and the industry as a whole. The licence regime varies across jurisdictions.

Barriers to Entry – Licences

11.1 Regulation of fish farming in Norway

Licence and location
Fish farming companies in Norway are subject to a large number of regulations. The Aquaculture Act (17 June 2005) and the Food Safety Act (19 December 2003) are the two most important laws, and there are detailed provisions set out in the various regulations which emanated from them.

In Norway, a salmon-farming licence allows salmon farming either in freshwater (smolt/fingerling production) or in the sea. The number of licences for Atlantic salmon and trout in seawater was limited to 1,051 in 2019. Such limitations do not apply for freshwater licences (smolt production), which can be applied for at any time. Seawater licences in can use up to four farming sites (six sites are allowed when all sites are connected with the same licences). This increases the capacity and efficiency of the sites.

New seawater licences are awarded by the Norwegian Ministry of Trade, Industry and Fisheries and are administered by the Directorate of Fisheries. Licences can be sold and pledged, and legal security is registered in the Aquaculture Register. Since 1982, new licences have been awarded only in certain years.

Production limitations in Norway are regulated as "maximum allowed biomass" (MAB), which is the defined maximum volume of fish a company can hold at sea at all times. In general, one licence sets a MAB of 780 tonnes (945 tonnes in the counties of Troms and Finnmark). The sum of the MAB permitted by all the licences held in each region is the farming company's total allowed biomass in this region. In addition, each production site has its own MAB and the total amount of fish at each site must be less than this set limit. Generally, sites have a MAB of between 2,340 and 4,680 tonnes.

The Norwegian coast is divided into 13 geographical areas of production. The level of sea lice in these areas decide if the MAB can increase (6%), stay the same or decrease (6%) in these areas. Every second year the government announces the conditions for growth on existing and new licences.

Sites complying with very strict environmental standards are offered additional growth. The conditions for this growth are A) below 0.1 lice per fish at every counting for the past two years in the period April 1st to September 30th and B) a maximum of one treatment during the last cycle of production. For sites meeting this standard a maximum of 6% growth is offered, regardless of the general situation in the different production areas.

In “red” areas, companies will need to reduce production by 6%.

A decision on these conditions was announced in February 2020. Nine areas were defined as “green”, two areas as “yellow” and two areas were defined as “red”.

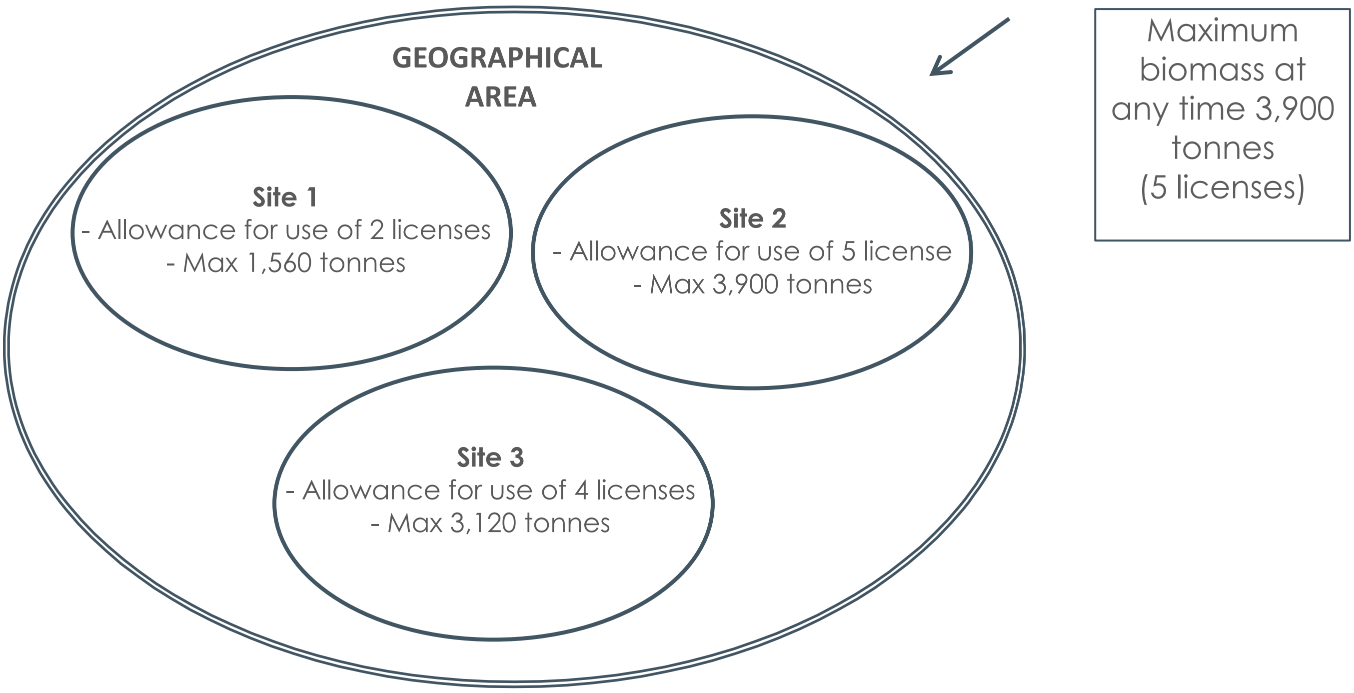
There is an ongoing debate in Norway regarding new taxes aimed at the salmon farming industry. In 2018, the Ministry of Finance decided to establish a committee to consider imposing a resource rent tax for the industry. Their recommendation was to impose a resource rent tax for the industry. On 12 May 2020, the Norwegian government presented their proposal for the Revised National Budget. As part of the proposal, the Norwegian government discarded the recommendation from the committee to introduce a 40% resource tax in Norway and instead proposed a production fee of NOK 0.4/kg of salmon produced with effect from 2021. The details of this proposal is yet not ready, but it is likely that a new fee will be imposed when the Parliament passes the budget for 2020.

Barriers to Entry – Licences

Access to Licences

The figure below depicts an example of the regulatory framework in Norway for one company:

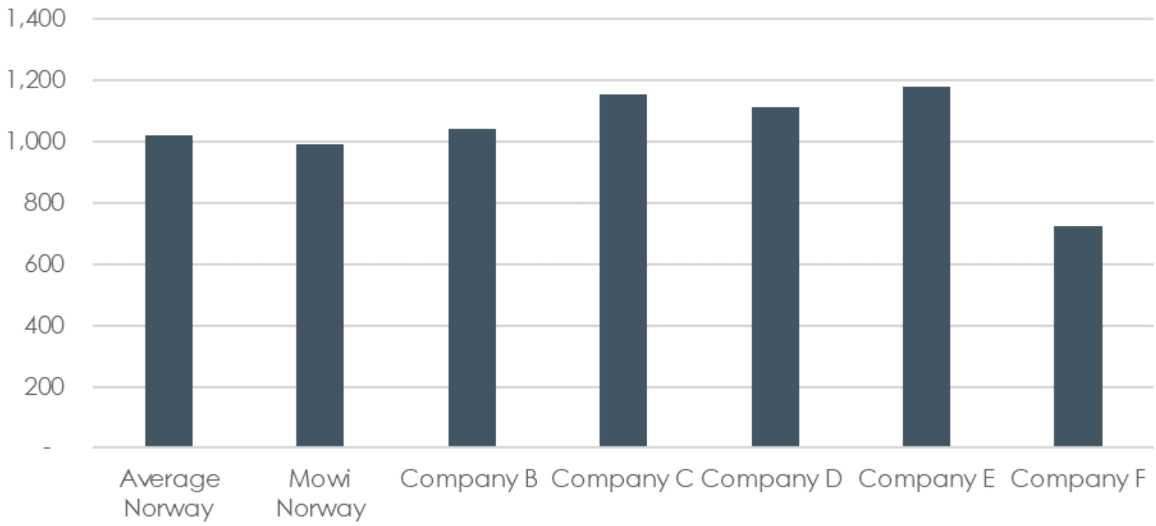
- Number of licences for a defined area: 5
    - Biomass threshold per licence: 780 tonnes live weight (LW)
    - Maximum biomass at any time: 3,900 tonnes (LW)
- Number of sites allocated is 3 (each with a specific biomass cap). In order to optimise production and harvest quantity over the generations of salmon, the licence holder can operate within the threshold of the three sites as long as the total biomass in sea never exceeds 3,900 tonnes (LW).
- There are also biomass limitations on the individual production sites. The biomass limitation varies from site to site and is determined by the carrying capacity of each site.



MOWI

Barriers to Entry – Licences

Average harvest per standard license 2019



The graph above shows the harvest per licence in 2019 for the Norwegian industry as a whole and for the largest listed companies.

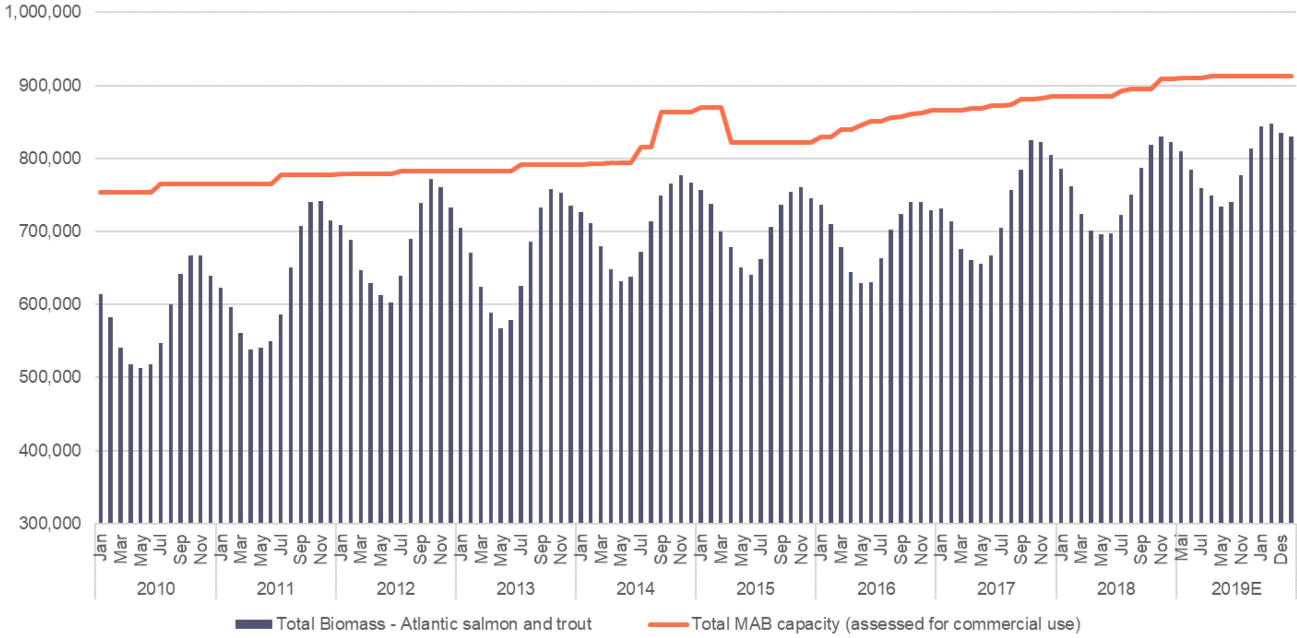
Please note that one standard licence equates to 780 tonnes in the comparison above. A standard licence of 945 tonnes in the counties of Troms and Finnmark has therefore been recalculated to 780 tonnes to make the overview comparable. In addition, a broodstock license is adjusted to 65% of a standard license for all companies.

Because of the regulation of standing biomass (maximum allowed biomass - MAB) per licence (780 tonnes LW), the production capacity per licence is limited. Annual harvest quantity per licence in Norway is currently at 1,021 tonnes GWT. Larger companies typically have better flexibility to maximise output per licence which means that the average harvest figure for the industry as a whole is normally lower than the figure for the largest companies.

Number of grow-out seawater licences for salmon and trout in Norway:
2007: 929
2008: 916
2009: 988
2010: 991
2011: 990
2012: 963
2013: 959
2014: 973
2015: 974
2016: 990
2017: 1,015
2018: 1,041
2019: 1,051

Barriers to Entry – Licences

Estimated MAB-utilisation in Norway 2010-2019E



Maximum allowed biomass by the end of 2019 was 913,018 tonnes of Atlantic salmon and trout. MAB-utilization is normally at its highest in October-November, because rate of growth is higher than rate of harvest during the summer. It is at its lowest in April-May due to low growth during the cold winter months. Average utilization of the MAB was 87% in 2019E, up from 85% in 2018.

February 2020 the Norwegian Government announced the conditions for growth on existing licenses. Mowi purchased 1 % growth on every possible license in "green" areas of production. This growth represents 1,149 extra tonnes for Mowi.

In addition to growth granted for existing licenses, the Government has decided that the auction of new biomass will take place in August 2020. A total of 33,000 tonnes will be available for purchase, based on forecasts from the Government. The total growth will represent 6% in the "green" areas.

Two production areas are defined as "red", which means production should be reduced by 6% by August 2020. The total reduction for these areas represents about 9000 tonnes.

Barriers to Entry – Licences

11.2 Regulation of fish farming in Scotland

Licences and location

In Scotland, instead of a formal licence, permissions are required from four organisations before setting up a fish farming site; Planning Permission from the local Planning Authority, a Marine licence from Marine Scotland; an environmental licence from the Scottish Environment Protection Agency (SEPA) and an Aquaculture Production Business authorisation, also from Marine Scotland. The Maximum Allowed Biomass (MAB) for individual sites is determined based on an assessment of environmental concerns, including the carrying capacity of the local marine environment to be able to accommodate the fish farm. During 2019 SEPA introduced a new regulatory framework for the licensing of marine fish farms in Scotland. This included new limits on the spatial extent of the impact mixing zone around farms, the use of more accurate modelling tools and more enhanced environmental monitoring. MAB is not uniform and varies depending on the site characteristics and location. The combination of the new standard, the more accurate model and enhanced monitoring may allow for the approval of larger farms than would have been traditionally approved previously (i.e. >2,500 tonnes) provided they are appropriately sited in sustainable locations.

The Crown Estate owns and manages most of the seabed around the UK out to a distance of 12 nautical miles. Anyone who develops or operates in UK territorial waters is doing so on Crown Estate property. Because of this, you have to apply for a lease from The Crown Estate and pay rent to install and operate your farm on the seabed. Most existing licences are automatically renewed at the end of their lease period. A Crown Estate lease is generally granted for a period of 25-year period and is dependent on securing Planning Permission.

The environmental licence from SEPA can be reviewed and MAB reduced in the event of non-compliance with environmental standards and potentially revoked in cases of significant and long-term non-compliance.

New site applications can take 6 months for planning permission to be granted with the determination period for applications for the environmental licence being 4 months however both can take significantly longer. Expansion of existing facilities, subject to environmental suitability is the most efficient route in terms of cost and time; new sites will take a greater amount of time and will be subject to an Environmental Impact Assessment (EIA) in order to secure planning permission.

The environmental licence is charged annually, calculated according to 3 elements; activity and environmental components, and a compliance factor. The annual charge can in some cases be >15,000 GBP. Standing rent is levied by the Crown Estate on the basis of production levels: GBP 27.50 per tonne harvested for Mainland sites; GBP 24.75 per tonne for Western Isles sites; GBP 1,000 annual charge if a site is not in production for 4 consecutive years followed by a GBP 2,000 annual charge if the site is dormant for a further 2 years. A 100% increase to the dormancy charge then applies every second year a site remains inactive to encourage the use of dormant sites. Planning permission applications are also charged at GBP 183 per 0.1 hectare of farm surface area and GBP 63 per 0.1 hectare of sea bed while the SEPA licence application fee is GBP 4,202 for a new site.

11.3 Regulation of fish farming in Ireland

Aquaculture in Ireland is licenced by The Minister for Agriculture, Food and the Marine, (MAFM) under the Fisheries (Amendment) Act, 1997 and its associated Regulations which have been amended to give effect to various EU environment protection Directives. The licensing process is complex.

The Aquaculture and Foreshore Management Division, (AFMD) of the Department manages the processing of aquaculture licences on behalf of the Minister. The Marine Engineering Division (MED) of the Department undertakes site mapping and provides certain technical advice on applications as well as undertaking certain post-licensing inspection duties. The Marine Institute (MI) provides scientific advice on a range of marine environment and aquaculture matters and in the case of applications which require Appropriate Assessment (AA) under EU Birds and Habitats Directives. Advice is also provided by Bord Iascaigh Mhara (BIM) and the Sea Fisheries Protection Authority (SFPA). The National Parks and Wildlife Services (NPWS) are consulted in relation to habitat protection. Inland Fisheries Ireland (IFI), An Taisce and the Commissioners of Irish Lights (CIL) are also consulted. Where relevant, the Local Authority and/or Harbour Authority are consulted. Land based fin fish units also require planning consent from the local authority. All applications are released for public consultation and comment.

An Environmental Impact Assessment (EIA) is mandatory for marine finfish applications and applicants are required to submit an EIS with their initial applications. The obligation to carry out an Appropriate Assessment (AA) applies if the application is within a Natura 2000 site or likely to impact on a Natura 2000 site. Decisions of the Minister in respect of aquaculture licence applications, including licence conditions, may be appealed to the Aquaculture Licences Appeals Board (ALAB). ALAB can confirm, refuse or vary a decision made by the Minister or issue licences itself under its own authority.

Licences are typically issued for 10 years. The 1997 Act provides for licence duration of up to 20 years. Foreshore (seabed) leases and licences are companion consents to Aquaculture Licences. Foreshore Acts allow for leases and licences to be granted for terms not exceeding ninety-nine years, respectively. Terms of current licences vary between harvest output (tons) per annum, smolt number input, maximum number of fish on site or a combination of these. Prior to expiry of a licence, an application for renewal of the licence must be made.

Currently the processing of a marine fin fish licence takes between 87 and 260 weeks. Most licences will be appealed to ALAB which can take at least a further 220 weeks to determine. The process of renewing expired fin fish licences takes as long as a new application.

In 2017, the Minister for Agriculture, Food and Marine initiated an independent review of the Aquaculture licencing system in Ireland. The report of this review was published in May 2017 with the overarching conclusion, that a root-and-branch reform of the aquaculture licence application processes is necessary which encompasses a further 30 recommendations.

Annual fin fish culture licence fees for a marine based fin fish site are €6.35 per tonne for the first 100 tonnes plus €6.35 for each additional tonne. Foreshore rental fees are charged at €63.49 for up to and including 5 hectares of foreshore with each additional hectare up to 10 ha at €31.74 and each additional hectare >10 and up to 20 at €63.49. Annual culture licence fee for a land-based site is €127.97 per annum.

11.4 Regulation of fish farming in Chile

Licence and location
In Chile licensing is based on two authorisations. The first authorisation is required to operate an aquaculture facility and specifies certain technical requirements. It is issued by the Undersecretaries of Fisheries and Aquaculture (under the Ministry of Economy). The second authorisation relates to the physical area which may be operated (or permission to use national sea areas for aquaculture production). This is issued by the Undersecretaries for Armed Forces (Ministry of Defence). The use of the licence is restricted to a specific geographic area, to defined species, and to a specified limit of production or stocking density. The production and stocking density limits are specified in Environmental and Sanitary Resolutions for the issued licence. Under certain conditions, owners can choose to reduce their whole stocking, producing at maximum density (17kg/m3 for Atlantic salmon), or to maintain or increase their stocking, using a limited density (from 4 to 17 kg/m3 for Atlantic salmon) determined by productive, sanitary and environmental conditions of each neighbourhood, any increase over previous stocking numbers means going to 4 kg/m3. Owners can choose only one alternative to stock each semester. From January 2021, all producers will have the option to increase the smolt stocking based on a combined score of fish health parameters, related to losses, sea lice treatments and antibiotic use. The individual company's performance on the parameters in the previous period will determine the size of the potential increase in the next smolt stocking. A positive assessment will result in an increase of 9%, 6% or 3%, while a negative assessment will result in a decrease of -3%, -6% or -9%. For example, if the antibiotic consumption is below 300 g / tonnes, the mortality is less than 10% and the indicator related to baths treatments against Caligus is below 50%, the model will allow farmer the option to grow by 6% in the next stocking.

Access to Licences
The trading of licences in Chile is regulated by the General Law of Fisheries and Aquaculture (LGPA) and controlled by the Undersecretaries of Fisheries and Aquaculture of the Ministry of Economy. Aquaculture activities are subject to different governmental authorisations depending on whether they are developed in private fresh water inland facilities (i.e. hatcheries) or in facilities built on public assets such as lakes or rivers (freshwater licences) or at sea (seawater licences).

To operate a private freshwater aquaculture facility requires ownership of the water-use rights and holding of environmental permits. Environmental permits are issued when operators demonstrate that their facilities comply with the applicable environmental regulations.

Licences for aquaculture activities in public assets are granted based on an application, which must contain a description of the proposed operations, including a plan for complying with environmental and other applicable regulations. Licences granted after April 2010 are granted for 25 years and are renewable for additional 25-year terms. Licences granted before April 2010 were granted for indefinite periods. Licence holders must begin operation within one year of receiving a licence and once the operation has started, the licence holder cannot stop or suspend production for a period exceeding two consecutive years. Subject to certain exceptions, licence holders must maintain minimum operational levels of not less than 5% of the yearly production specified in the RCA (Environmental Qualification Resolution). Until August 2016, all licences not used could be kept by the holder if they prepared an official Sanitary Management Plan.

Licence holders must pay annual licence fees to the Chilean government and may sell or rent their licences. For the moment, no new licences will be granted in the most concentrated regions, Regions X, XI, and XII (Chile is made up of 16 administrative regions).

Barriers to Entry – Licences

11.5 Regulation of fish farming in Canada

Licence and location
Fish farming companies in Canada are subject to different regulations depending on the geographical area they operate in. The Federal Fisheries Act, Navigation Protection Act, Health of Animals Act and the National Aquaculture Activities Regulation (AAR) are some of them. The three geographical areas with fish farming are British Columbia, Newfoundland, and New Brunswick.

To operate a marine fish farm site, provincial and/or federal authorisations are required. In Newfoundland and New Brunswick, the Provincial government is the primary regulator and leasing authority. The Province regulates the activity and operations of aquaculture and issues the Aquaculture Licence and Crown Land lease where fish farms are located. In British Columbia both Federal and Provincial authorisations are required. The Federal Government regulates the activity and operations of aquaculture while the Provincial Government administers the Crown lands where fish farms are located. Individual site tenures have a specific timeline, varying between the different geographical areas and the provincial policy. In British Columbia, the timeline typically ranges from five to twenty years. In Newfoundland, the Crown Land Lease for the site is issued for 50 years and the aquaculture Licence is issued for 6 years. In New Brunswick, individual sites are typically granted for 20 years. All Commercial Aquaculture Licences are renewable but may be lost or suspended for non-compliance issues and non-payment of fees.

The production limitations in Canada are regulated as either a "Maximum Allowable Biomass" or a fixed number of smolt per cycle. "MAB" is specific to each Aquaculture licenced facility in British Columbia. Smaller farms are typically licenced for 2,200mt. with larger capacity facilities licenced to produce 5,000 mt. per cycle. In Newfoundland and New Brunswick, a maximum number of smolt per cycle is given to a farm. Farms are typically licenced for 600,000 to 1,000,000 smolt per cycle in Newfoundland, and 270,000 to 350,000 smolt per cycle in New Brunswick.

Access to Licences
In British Columbia, all permits and licences require consultation with First Nations and local stakeholders. The time taken to acquire licences for a new farm can vary from one to several years. Recently the Provincial government instituted a moratorium on new site applications. However, they have allowed existing sites to amend their tenure size and infrastructure if specific conditions apply. Companies can still obtain new tenures by relocating existing tenures to locations "more suitable for safety or matters of public interest."

In Newfoundland, proponents must submit a sea cage licence application to the Newfoundland Department of Fisheries and Land Resources for each new or acquired marine site. In New Brunswick, companies must submit an Aquaculture licence Application for Marine Sites to the Department of Agriculture, Aquaculture and Fisheries (New Brunswick). It takes about nine months to transition an existing site to a new owner, and approximately one year for a new application in both places. This includes obtaining all necessary approvals and licences, and a review from The Department of Fisheries and Oceans (Federal). Consultation with residents, towns, development groups and commercial/recreational fishermen is required. In Newfoundland, all new sites of the same company must be 1 km apart, 5 km if sites are operated by different companies. Consultations with First nations is now required in both New Brunswick and Newfoundland prior to submission of the application.

In Newfoundland, Provincial approvals can be assigned to a different operator through a government sub-lease assignment process, however, licences are not transferable. A company may transfer licences to another company providing the rationales for the assignment are supported by the government processes in New Brunswick.

11.6 Regulation of fish farming in the Faroe Islands

Licence and location

Fish farming companies in the Faroe Islands are subject to extensive regulation. The most important legislative instruments are the Aquaculture Act (Act No. 83 from 25 May 2009 with latest amendments from 2018), the Environmental Act (Act No. 134 from 29 October 1988 with latest amendments from 2008) and the Food Safety Act (Act No. 58 from 26 May 2010 with latest amendments from 2017).

In addition to the above-mentioned acts, several Executive Orders with more detailed provisions covering fish farming have been issued under the provisions of the acts.

The right according to a specific licence is provided for a specific geographic area and with a limit of production specified in the individual licence. Production and stocking density limit is specified in an Environmental and Sanitary Resolution issued for each specific licence. The density limit may depend on production conditions as well as sanitary and environmental conditions.

The size of the area and density limits etc. for each of the 20 sea licences vary greatly. Production limitations in the Faroes are not regulated through limits on "maximum allowed biomass", MAB. As a consequence, MAB for salmon farms varies between 1,200 tonnes and 5,800 tonnes a year per licence, depending on site characteristics and the geographic location of the individual farm.

In 2012 and 2018 the Government of the Faroe Islands announced revised aquaculture regulations with the aim of securing sustainable growth in the industry and in order to implement anti-trust regulations.

Mowi Faroes is first and foremost affected by the anti-trust regulations in the Aquaculture Act. These rules set a cap of 20% for either direct or indirect foreign ownership in Faroese fish farming companies. If the limit is exceeded with regard to a fish farming company, the company must adjust its ownership to be within the limit within a short deadline set by the authorities or face possible loss of the right to conduct fish farming activities.

Mowi Faroes is 100% owned by Mowi ASA (NO). This ownership is protected by transitional provisions in the Aquaculture Act, securing that the company can remain owned by a foreign company and nonetheless keep its licences. The consequence for Mowi Faroes of the Anti-trust regulations is that the company cannot expand its business with additional commercial licences to farm fish in the sea. Mowi Faroes can however apply for development licences and licences on land.

It is stipulated in the Aquaculture Act that a fish farming company cannot hold more than 50% of the total sea licences. The new restrictions do not apply to licences held by each individual company today, but the new regulations specify that Mowi Faroes can keep its 3 seawater licences and 1 smolt licence, even though the company does not comply with the new cap on foreign-held capital.

Barriers to Entry – Licences

Access to Licences
In order to conduct fish farming activities in the Faroe Islands, the fish farming company must obtain authorisation from Heilsufrøðiliga Starvsstovan (The Faroese Food and Veterinary Authority) to operate an aquaculture facility. The authorisation specifies certain technical requirements with regard to conducting fish farming activities.

Fish farming companies with the above mentioned authorisation can apply for licences to conduct fish farming activities from the Ministry of Foreign Affairs and Trade. New sea licences can be awarded by the Ministry of Foreign Affairs and Trade. There is today a limit of 20 commercial seawater licences and no limit for licences on land. If new licences are to be awarded, they may be awarded through auction.

An application for a seawater licence must contain a description of the proposed operations, including a plan for complying with environmental and other applicable regulations.

The government of the Faroe Islands in April 2018 announced a new category of licences, i.e. development licences. Development licences are intended to motivate investment in new fish farming technologies. Due to the anti-trust regulations, Mowi Faroes can only obtain development licences, as the limits regarding foreign ownership do not apply to such licences.

Licences are granted for 12 years and are renewable for additional 12-year term. Licence holders must pay an annual fee of DKK 12,000 for each individual licence. Fish farming companies must also pay a harvesting fee based on the harvesting of farmed fish. The fee is based on the weight of gutted fish harvested in a month, multiplied by the average international market price in the same month.

Licences can be sold and pledged, and legal security is perfected by registration with the Land Registry. Licences may be withdrawn in cases of material breach of conditions set out in the individual licence or in the aquaculture or environmental legislation.

12 Risk Factors

Risk Factors

12.1 Salmon health and welfare

Maximising survival and maintaining healthy fish stocks are primarily achieved through good husbandry and health management practices and policies, which reduce exposure to pathogens and the risk of health challenges. The success of good health management practices has been demonstrated on many occasions and has contributed to an overall improvement in the survival of farmed salmonids.

Fish health management plans, veterinary health plans, biosecurity plans, risk mitigation plans, contingency plans, disinfection procedures, surveillance schemes, as well as coordinated and synchronised zone/area management approaches, all support healthy stocks with emphasis on disease prevention.

Prevention of many diseases is achieved through vaccination at an early stage and while the salmon are in freshwater. Vaccines are widely used commercially to reduce the risk of health challenges. With the introduction of vaccines a considerable number of bacterial and viral health issues have been effectively controlled, with the additional benefit that the quantity of medicine prescribed in the industry has been reduced.

In some instances medicinal treatment is still required to avoid mortality and for the well-being and welfare of the fish. Even the best managed farms may have to use medicines from time to time. For several viral diseases, no effective vaccines are currently available.

Risk Factors

12.2 Most important health risks to salmon

Sea lice: There are several species of sea lice, which are naturally occurring seawater parasites. They can infect the salmon skin and if not controlled they can cause lesions and secondary infection. Sea lice are controlled through good husbandry and management practices, the use of lice prevention barriers (e.g. skirts), by submerging the salmon using tubenet, cleaner fish (different wrasse species and lumpsuckers, which eat the lice off the salmon), mechanical removal systems and when necessary licenced medicines.

Cardiomyopathy syndrome (CMS): CMS is a chronic disease that can develop over several months and is caused by the piscine myocarditis virus (PMCV). Mortality typically occurs in large seawater fish. A typical clinical outbreak can last one to six months. Control is achieved mainly by good husbandry and management practices and keeping the fish in conditions that satisfy their biological needs for food, clean water, space and habitat.

Pancreas Disease (PD): PD is caused by the Salmonid Alphavirus and is present in Europe. It is a contagious virus that can cause reduced appetite, muscle and pancreas lesions, lethargy, and if not appropriately managed, elevated mortality. PD affects Atlantic salmon and rainbow trout in seawater and is controlled mainly by management and mitigation practices. Vaccination is also used in combination with these measures where PD represents a risk, providing some additional level of protection. In addition, selective breeding for PD-resistant fish has also contributed to reducing the incidence of PD.

Salmonid Rickettsial Septicaemia (SRS): SRS is caused by intracellular bacteria. It occurs mainly in Chile but has also been observed, albeit to a much lesser extent, in Norway, Ireland, Canada and the UK. It causes lethargy and appetite loss, and can result in elevated mortality. SRS is to some extent controlled by vaccination, but medicinal intervention may also be required.

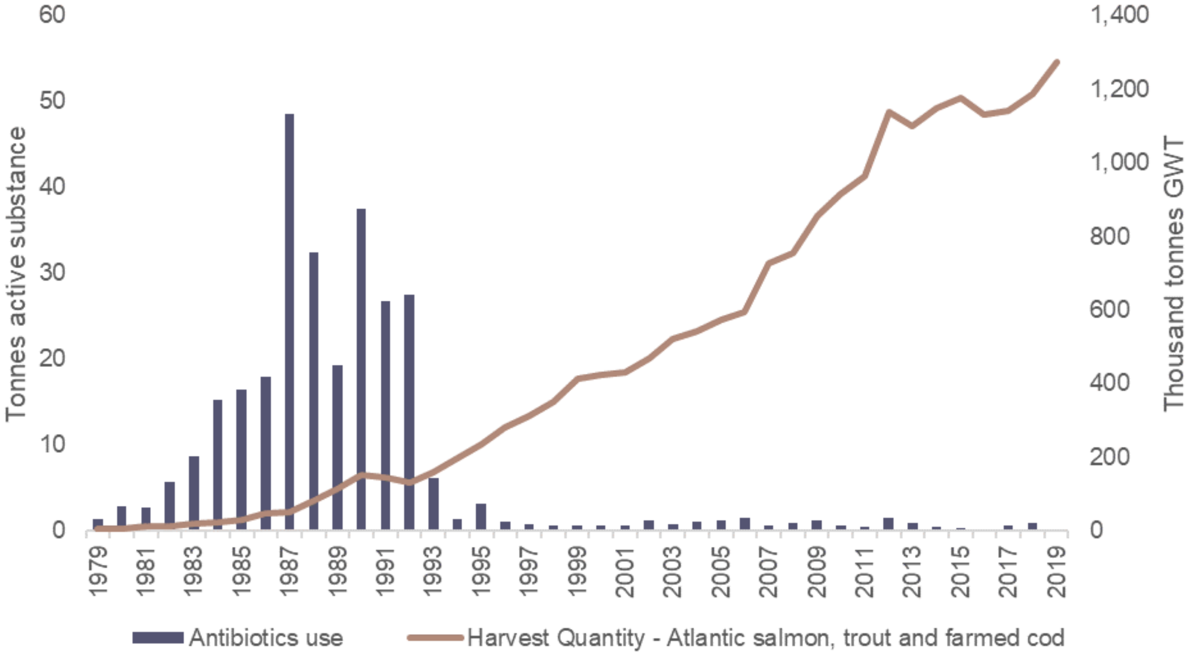
Heart and Skeletal Muscle Inflammation (HSMI): HSMI is currently reported in Norway and to a lesser extent Scotland. Symptoms of HSMI are reduced appetite, abnormal behaviour and in most cases low mortality. HSMI generally affects fish in their first year in sea and control is achieved mainly by good husbandry and management practices.

Infectious Salmon Anaemia (ISA): ISA is caused by the ISA virus and is widely reported. It is a contagious disease that causes lethargy and anaemia and may lead to significant mortality in seawater if not appropriately managed. Control of an ISA outbreak is achieved through culling or harvesting of affected fish and the application of stringent biosecurity and mitigation measures. Vaccines are available and are in use in areas where ISA is considered to represent a risk.

Gill Disease (GD): GD is a general term used to describe gill conditions occurring in sea. The changes may be caused by different infectious agents; amoeba, virus or bacteria, as well as environmental factors including algae or jellyfish blooms. Little is known about the cause of many of the gill conditions and to what extent infectious or environmental factors are primary or secondary causes of disease.

12.3 Fish health and vaccination (Norway)

Production and use of antibiotics in Norway



The incidence of bacterial disease outbreaks increased in the 1980s. In the absence of effective vaccines, the use of antibiotics reached a maximum of almost 50 tonnes in 1987. Following the introduction of effective vaccines against the main bacterial challenges of the time, the quantity of antibiotics used in the industry declined significantly to less than 1.4 tonnes by 1994 and has since then continued to be very low. These developments, along with the introduction of more strict biosecurity and health management strategies, allowed for further expansion of the industry and an increase in production.

During the last two decades there has been a general stabilisation of mortality in Norway, Scotland and Canada, which has been achieved principally through good husbandry, good management practices and vaccination. The trend in the Chilean industry stems from infection pressure from SRS, which has declined in recent years.

Source: Kontali Analyse, Norsk medisinaldepot, Norwegian Institute of Public Health

12.4 Research and development focus

Fish Welfare and Robustness

- Development of better solutions for prevention and control of infectious diseases
- Minimization of production-related disorders
- Optimisation of smolt quality

Product Quality and Safety

- Continuously develop better technological solutions for optimised processing, packaging and storage of products, while maintaining consistently high quality.

New Growth

- Development of methods to reduce production time at sea
- Production in exposed areas
- Production in closed sea-going units

Production Efficiency

- Development of cost effective, sustainable and healthy salmon diets which ensure production of robust fish
- Identify the best harvesting methods, fillet yield optimisation and the most efficient transport and packaging solutions
- Net solutions and antifouling strategies
- Development of AI-based tools for value chain optimization and boosting seawater-phase production efficiency

Footprint

- Develop, validate and implement novel methods for sea lice control
- Reduce dependency on medicines and limit the discharge of medicinal residues
- Escape management and control
- ASC implementation; R&D projects that will facilitate and make ASC implementation more efficient

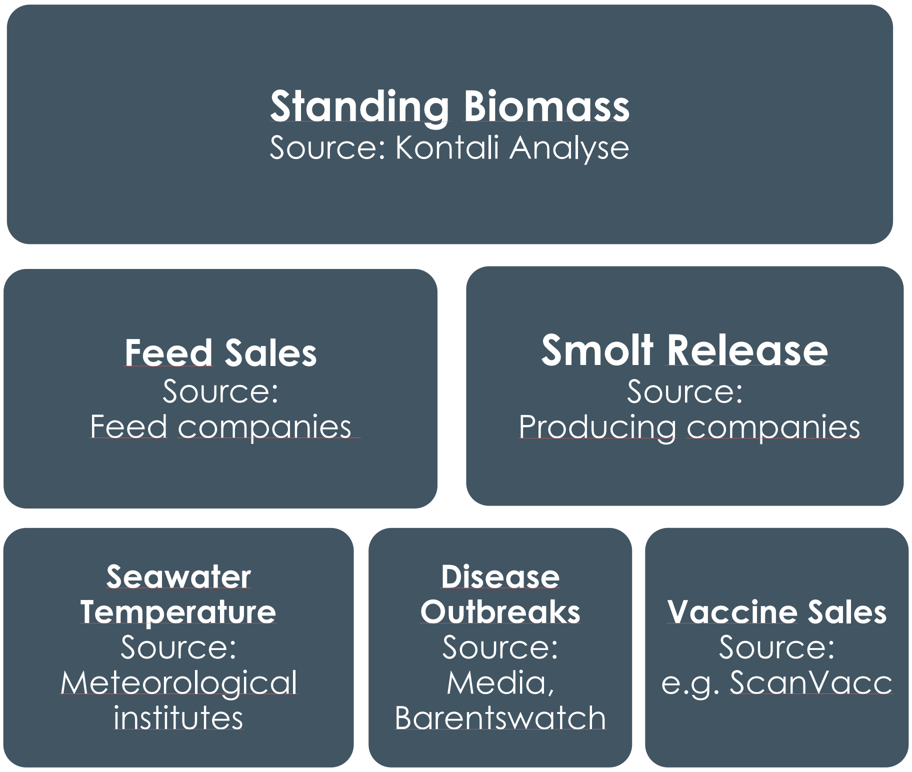
According to Zacco (Norwegian patenting office), the rate of patenting in the salmon farming industry has grown rapidly in the last two decades. Considerable R&D is being undertaken in several areas and the most important developments have been seen in the feed, sea lice control and vaccine sectors, carried out by large global players. In this industry most producers are small and do not have the capital to undertake and supervise major R&D activities. This is expected to change as consolidation of the industry continues.

Smolt, on-growing production and processing
The technology used in these phases can be bought "off-the-shelf" and very few patents are granted. Technology and producers are becoming increasingly more advanced and skilled.

13 Indicators Determining Harvest volumes

Indicators Determining Harvest volumes

13.1 Projecting future harvest volumes



The three most important indicators for future harvest volumes are standing biomass, feed sales and smolt release. These are good indicators for medium- and long-term harvest, while the best short-term indicator is standing biomass categorized by size. As harvested size is normally above 4 kg, the available biomass of this size class is therefore the best estimate of short-term supply.

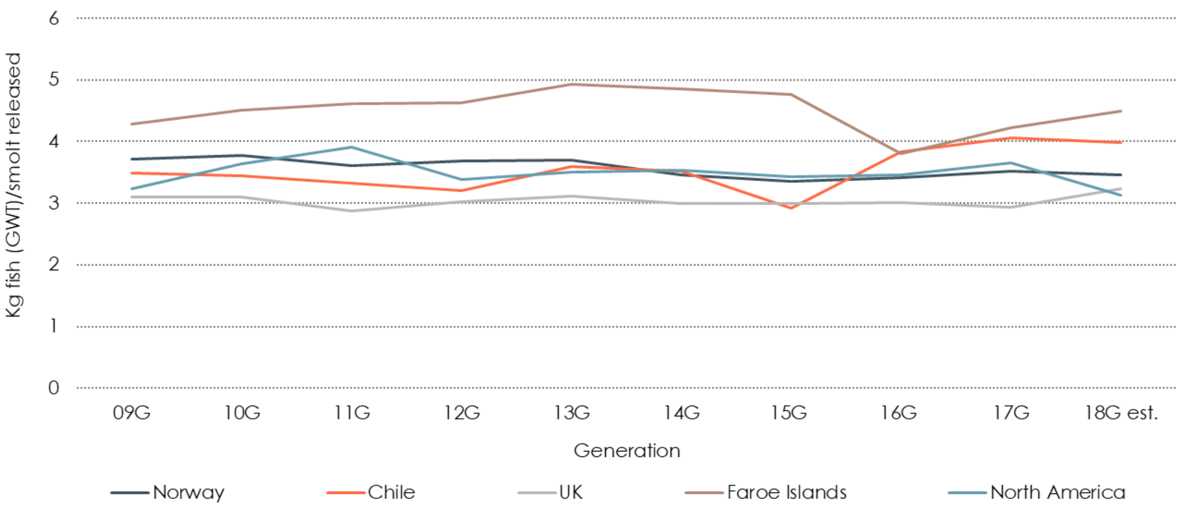
If no actual numbers on smolt releases are available, vaccine sales could be a good indicator of number of smolt releases and when the smolt is put to sea. This is a good indicator of long-term harvest volumes as it takes up to 2 years smolt release to harvest.

Variation in seawater temperature can materially impact the length of the production cycle. A warmer winter can for example increase harvest volumes for the relevant year, partly at the expense of the subsequent year.

Disease outbreaks can also impact harvest volume due to mortality and growth slowdown.

MOWI

13.2 Yield per smolt



Yield per smolt is an important indicator of production efficiency. Due to the falling cost curve and the discounted price of small fish, the economic optimal harvest weight is in the area of 4-5 kg (GWT). The number of harvested kilograms yielded from each smolt is impacted by disease, mortality, temperatures, growth attributes and commercial decisions.

The average yield per smolt in Norway is estimated at 3.46 kg (GWT) for the 18 Generation.

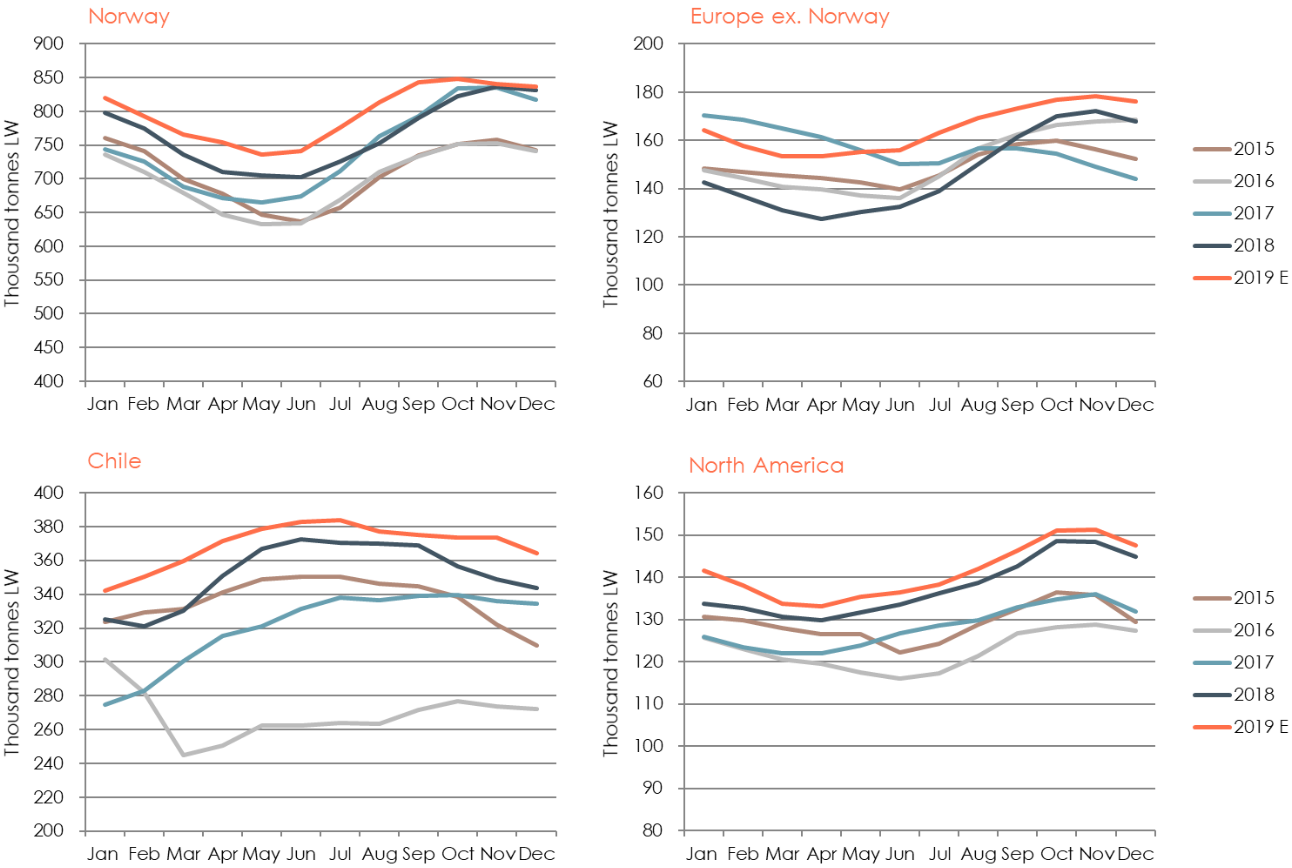
Since 2010, the Chilean salmon industry has been rebuilding its biomass after the depletion caused by the ISA crisis which began in 2007. In 2010/11, the Chilean salmon industry performed well on fish harvested, due to the low density of production (improved yield per smolt). In line with increased density in subsequent years, biological indicators deteriorated. In 2016, an algae bloom caused high mortality, and the Chilean salmon industry started to rebuild its biomass once again. Recently, the yield per smolt has improved in Chile, and the average for 18G is estimated at 3.98 kg (GWT).

Average yield in the UK, North America and Faroe Islands for 18G is estimated at 2.98kg, 3.13kg and 4.50kg, respectively.

Source: Kontali Analyse, Mowi

Indicators Determining Harvest volumes

13.3 Development in biomass during the year



Due to variations in seawater temperature during the year, the total standing biomass in Europe has a S-curve, which is at its lowest in May and at its peak in October. The Norwegian industry is focused on minimising natural fluctuations as licence constraints put a limit on how much biomass can be in sea at the peak of the year.

In Chile the situation is different due to its more stable seawater temperature and opposite seasons (being in the Southern hemisphere). A more consistent water temperature allows for smolt release throughout the year and enables more uniform utilisation of facilities. The relatively low standing biomass in Chile from March 2016 is due to the impact of an algae bloom.

Source: Kontali Analyse

MOWI

14 Secondary Processing (VAP)

Secondary Processing (VAP)

In processing we distinguish between primary and secondary processing.

Primary processing is slaughtering and gutting. This is the point in the value chain at which standard price indexes for farmed salmon are set.

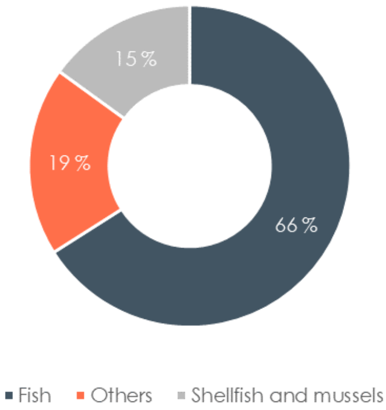
Secondary processing is filleting, fillet trimming, portioning, producing different fresh cuts, smoking, marinating or breading. Depending on the setup of the processing plant, products are fresh packed with Modified Atmosphere (MAP), vacuum packed or frozen and stored for distribution.

Products that have been secondary processed are called value-added products (VAP), as they represent an additional value to the retailer and foodservice operator but most of all to the final consumer.

Secondary Processing (VAP)

14.1 European value-added processing (VAP) industry

- A total value of > EUR 25 billion
- Employees > 135,000
- Extremely fragmented – more than 4,000 companies
- About 50% of all companies have fewer than 20 employees
- Traditionally EBIT-margins have been between 2% and 5%
- The average company employs 33 people and has a turnover of EUR 4.2 million



The seafood industry in Europe is fragmented with more than 4,000 players. Most of the companies are fairly small, but there are also several companies of significant size involved in the secondary processing industry: Mowi, Icelandic Group, Deutsche See, Caladero, Royal Greenland, Labeyrie, Parlevliet & van der Plas and Lerøy Seafood. Some of these companies are integrated into fish farming or wild catch, others are buying external and processing.

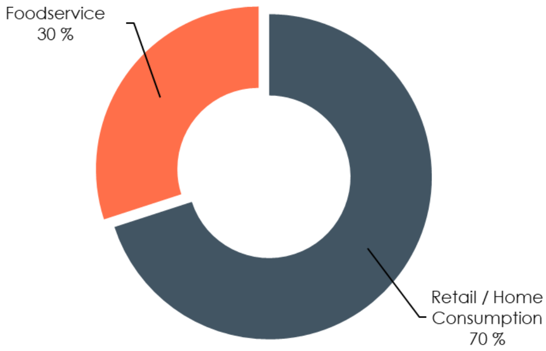
Most of the largest players base their processing on Atlantic salmon, producing smoked salmon, salmon portions or ready meals with different packing techniques. Others are into white fish processing.

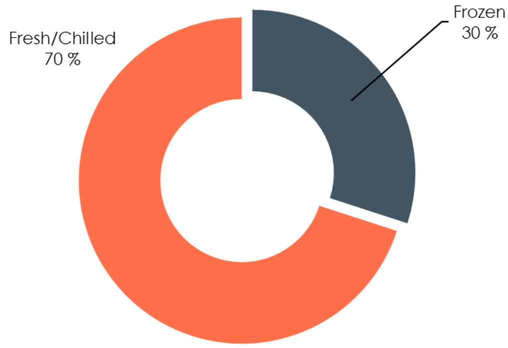
Consumers are willing to pay for quality and added value. This means that we expect to see an increase in demand for healthy convenience products such as ready-to-cook fish, together with a packing trend towards MAP as this maintains the freshness of the product longer for than fish sold in bulk.

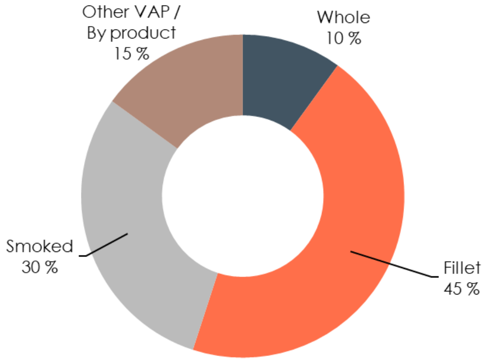
Secondary Processing (VAP)

14.2 Market segment

Market segment in the EU (2019E)

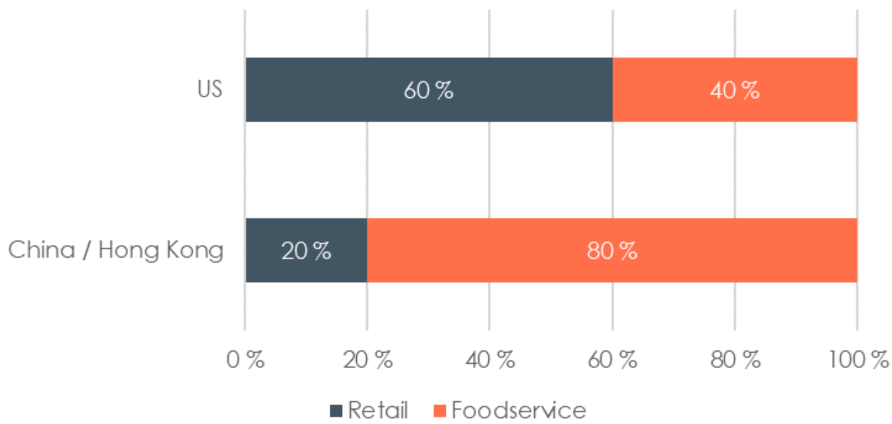






In the EU, around 70% of Atlantic salmon supply went to retailers while the remainder was sold to foodservice establishments. Approximately 70% was sold fresh. Of the different products, fillets had the largest market share of 45% followed by smoked. "Other VAP" consists of all value-added processed products, except smoked salmon.

Market segment other regions (2019E)

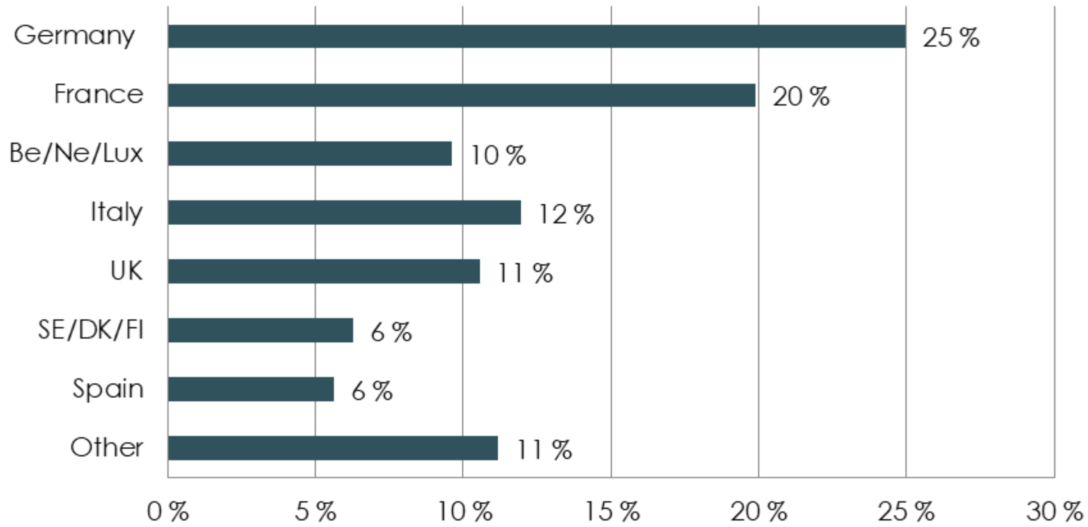


Source: Kontali Analyse

MOWI

14.3 The European market for smoked salmon

Est. % share of smoked salmon market - EU 2019E



Smoked salmon is the most common secondary-processed product based on Atlantic salmon. The European market for smoked salmon was estimated to be 256,500 tonnes GWT in 2019, with Germany and France the largest markets. Assuming 50% yield from gutted weight to product weight, the European market consumed 128,250 tonnes product weight of smoked salmon in 2019.

European smoked salmon producers (2019E)
The ten largest producers of smoked salmon in Europe are estimated to have a joint market share of more than 60%. The production is mainly carried out in Poland, France, the UK, the Baltic states and the Netherlands.

Mowi produces its smoked salmon in Poland (Ustka), UK (Rosyth), France (Kritsen) Belgium (Oostende) and Turkey (Istanbul), and its main markets are Germany, France, Italy and Benelux. After the acquisition of Morpol in 2013, Mowi became the largest producer of smoked salmon. Labeyrie is the second largest and sells most of its products to France, and has also significant sales to the UK, Spain, Italy and Belgium.

Estimated Annual Raw Material - Tonnes HOG			
70 - 90 000	20 - 40 000	10 - 20 000	5 - 10 000
Mowi Consumer Products (PL-FR-UK)	Labeyrie (FR-UK) Lerøy (NL-SE-NO)	Norvelita (LT) Mer Alliance (FR) Suempol (PL) Delpeyrat (FR) Young's Seafood (UK)	Martiko (ES) Friedrichs (DE) Milarex (PL) Intermarché (FR) Foppen (NL) Ubago (ES)

Source: Kontali Analyse

14.4 Branding and product innovation

As the world around us is changing, and consumer needs and behaviours are changing with it, we see an increased interest in seafood and salmon. As consumers, we want to buy products and support companies which provide something good for me, my family and the planet – it's about taking greater responsibility through our product choices.

Salmon farming overcomes many of the key barriers our planet faces in terms of climate and biodiversity when it comes to increased food production. This provides an opportunity for farmed salmon as it can be supplied steadily year-round to markets which in the past had less access to seafood.

Mowi's brand strategy is a great example of putting the final consumer at the centre of our innovation strategies. Based on trends in the market and evolving consumer habits, Mowi is developing products ranging from fresh cuts, coated, smoked and specialty products all the way to ready-meals and on-the-go products to suit customer needs. Mowi sees a huge opportunity in driving the creation of new occasions and new uses for salmon, for example by integrating the product into the local cuisine and thus driving higher and more frequent salmon consumption, especially in those markets where salmon is not a "native" ingredient.

Product innovation is key to achieving Mowi's objective of de-commoditizing the salmon market.

Appendix

Appendix

	Atlantic salmon
Live fish	100%
Loss of blood/starving	7%
Harvest weight / Round bled fish (wfe)	93%
Offal	9%
Gutted fish, approx. (HOG)	84%
Head, approx.	7%
Head off, gutted	77%
Fillet (skin on)	56 - 64%
C-trim (skin on)	60%
Fillet (skin off)	47 - 56%

Net weight
Weight of a product at any stage (GWT, fillet, portions). Only the weight of the fish part of the product (excl. ice or packaging), but including other ingredients in VAP

Primary processing
Gutted Weight Equivalent (GWT) / Head on Gutted (HOG)

Secondary processing
Any value added processing beyond GWT

Biomass
The total weight of live fish, where number of fish is multiplied by an average weight

Ensilage
Salmon waste from processing with added acid

BFCR
IB feed stock + feed purchase – UB feed stock
Kg produced – weight on smolt release

EFCR
IB feed stock + feed purchase – UB feed stock
Kg produced – mortality in Kg – weight on smolt release

Price Notifications
Nasdaq (FCA Oslo) - Head on gutted from Norway (weighted average superior quality)
FOB Miami - fillets from Chile (3-4 lb)
FOB Seattle - whole fish from Canada (10-12 lb)

Source: Kontali Analyse

Appendix

Price indices vs. FOB packing plant

Norwegian NASDAQ-Index - Selling price for superior gutted, fresh salmon iced and packed in boxes - FCA Oslo

NASDAQ Index
- General sales and administration expences ~ 0.75 NOK
= Former NOS/FHL-index
- Freight to Oslo
- Terminal Cost ~ 0.90 NOK
= Selling price farmers FOB packing plant

Norwegian SSB custom statistics - all sizes, all qualities and included contract sales

SSB
- Freight to border
- Duty and taxes
- Adjusted to sizes and quality
- Freight to Oslo
- Terminal cost ~ 1.70 NOK*
= Selling price farmers FOB packing plant

Urner Barry FOB Miami - Chilean atlantic salmon fillets, PBO, d-trim delivered FOB Miami

UB
- See text below
= Selling price farmers FOB packing plant

Urner Barry FOB Seattle - West Coast atlantic salmon - whole - fresh delivered FOB Seattle

FOB Seattle
- Freight (~5-10 cent/lb)
= Selling price farmers FOB packing plant

Several price indices for salmon are publicly available. The two most important providers of such statistics for Norwegian salmon are Nasdaq/Fish Pool and Statistics Norway (SSB). Urner Barry in the US provides a reference price for Chilean salmon in Miami and Canadian salmon in Seattle.

In Norway the farmer's FOB packing plant price is found by deducting freight costs from the farm to Oslo and the terminal cost (~0.90 NOK) and general sales and administration expenses (~0.75 NOK) from the NASDAQ Index. If using the SSB custom statistics, you need to adjust for freight to border, duty and taxes, and for quality and contract sales to get the achieved spot price back to producer. The average difference between SSB price and FOB packing plant is ~1.70 NOK.

Calculating Urner Barry – Chilean fillets, back to GWT plant is more extensive. It is necessary to use UB prices for both 2/3lb and 3/4lb and adjust for quantity share, market handling (5.5 cent), and market commission (3.5%). In addition there are some adjustments which vary over time; premium fish share (~92%), reduced price on downgraded fish (~30%), airfreight (~USD 1.50/kg) and GWT to fillet yield (~70%). Airfreight to USA is currently increased due to COVID-19.

* Average difference between SSB and return to packing plant
Source: Fishpool, Nasdaq, SSB, Norwegian Seafood Council, Urner Barry, Kontali Analyse

Appendix

Historic acquisitions and divestments

In Norway there have been 'countless' mergers between companies over the last decade. The list below shows only some of the larger ones in transaction value. In Scotland consolidation has also been very frequent. In Chile, there have been several acquisitions over the last two years. Canada's industry has been extensively consolidated with a few large players and some small companies.

See table on the next page.

Appendix

Year	Norway
1999	Hydro Seafoods - Sold from Norsk Hydro to Nutreco Aquaculture
2001	Gjølaks - Sold to PanFish
2001	Vest Laks - Sold to Austevoll Havfiske
2001	Torris Products - Sold from Torris to Seafarm Invest
2001	Gjølanger Havbruk - Sold to Aqua Farms
2001	Alf Lone - Sold to Sjøtroll
2001	Sandvoll Havbruk - Sold to Nutreco Aquaculture
2001	Fosen Edelfisk - Sold to Salmar
2001	Langsteinfisk - Sold to Salmar
2001	Tveit Gård - Sold to Alsaker Fjordbruk
2001	Petter Laks - Sold to Senja Sjøfarm
2001	Kråkøyfisk - Sold to Salmar
2002	Amulaks - Sold to Follalaks
2002	Kvamsdal Fiskeoppdrett - Sold to Rong Laks
2002	Matland Fisk - Sold to Bolaks
2002	Sanden Fiskeoppdrett - Sold to Aqua Farms
2002	Ørsnes Fiskeoppdrett - Sold to Aqua Farms
2002	Toftøysund Laks - Sold to Alsaker Fjordbruk
2003	Nye Midnor - Sold from Sparebank1 MidtNorge to Lerøy Seafood Group
2003	Ishavslaks - Sold to Aurora to Volden Group
2003	Loden Laks - Sold to Grieg Seafood
2003	Finnmark Seafood - Sold to Follalaks
2003	Ullsfjord Fisk - Sold to Nordlaks
2003	Henningsværfisk - Sold to Nordlaks
2004	Flatanger Akva - Sold to Salmar
2004	Naustdal Fiskefarm/Bremanger Fiskefarm - Sold to Firda Sjøfarm
2004	Fjordfisk - Sold to Firda Sjøfarm
2004	Snekvik Salmon - Sold to Lerøy Seafood Group
2004	Aure Havbruk / M. Ulfsnes - Sold from Sjøfor to Salmar
2005	Follalaks - Sold to Cermaq
2005	Aqua Farms - Sold to PanFish
2005	Aurora Salmon (Part of company) - Sold from DNB Nor to Lerøy Seafood Group
2005	Marine Harvest Bolga - Sold to Seafarm Invest
2005	Aurora Salmon (Part of company) - Sold from DNB Nor to Polarlaks
2005	Sjølaks - Sold from Marine Farms to Northern Lights Salmon
2005	Bolstad Fjordbruk - Sold to Haugland Group
2005	Skjervøyfisk - Sold to Nordlaks
2006	Fossen AS - Sold to Lerøy Seafood Group
2006	Marine Harvest N.V. - Acquired by Pan Fish ASA
2006	Fjord Seafood ASA. - Acquired by Pan Fish ASA
2006	Marine Harvest Finnmark - Sold from Marine Harvest to Volden Group
2006	Troika Seafarms/North Salmon - Sold to Villa Gruppen
2006	Aakvik - Sold to Hydrotech
2006	Hydrotech - Sold to Lerøy Seafood Group
2006	Senja Sjøfarm - Sold to Salmar ASA
2006	Halsa Fiskeoppdrett - Sold to Salmar ASA
2006	Langfjordlaks - Sold to Mainstream
2006	Polarlaks - Sold to Mainstream
2007	Veststar - Sold to Lerøy Seafood Group
2007	Volden Group - Sold to Grieg Seafood
2007	Artic Seafood Troms - Sold to Salmar ASA
2007	Arctic Seafood - Sold to Mainstream
2007	Fiskekultur - Sold to Haugland Group
2007	UFO Laks - Sold to Haugland Group
2007	Anton Misund - Sold to Rauma Gruppen
2007	Mico Fiskeoppdrett - Sold to Rauma Gruppen
2008	Hamneidet - Sold to Eidsfjord Sjøfarm
2008	Misundfisk - Sold to Lerøy Seafood Group
2008	Henden Fiskeoppdrett - Sold to Salmar ASA
2008	AS Tri - Sold to Norway Royal Salmon (NRS)
2008	Feøy Fiskeopprett - Sold to Norway Royal Salmon
2008	Salmo Arctica - Sold to Norway Royal Salmon
2008	Åmøy Fiskeoppdrett - Sold to Norway Royal Salmon
2008	Nor Seafood - Sold to Norway Royal Salmon
2008	Altafjord Laks - Sold to Norway Royal Salmon
2008	Lerøy Seafood Group - Purchased by Austevoll Seafood
2009	Skjærgårdsfisk - Sold to Lingalaks
2009	Brilliant Fiskeoppdrett - Sold to Norway Royal Salmon
2009	Polarlaks II - Sold to Nova Sea
2009	Fjordfarm - Sold to Blom Fiskeoppdrett
2009	Fyllingsnes Fisk - Sold to Eide Fjordbruk
2009	Salaks merged with Rølaks
2009	65 new licenses granted
2010	Espevær Fiskeoppdrett - Sold to Bremnes Fryseri
2010	AL Nordsjø - Sold to Alsaker Fjordbruk
2010	Nord Senja Fiskeindustri - Sold to Norway Royal Salmon
2010	Marøy Salmon - Sold to Blom Fiskeoppdrett
2010	Fjord Drift - Sold to Tombre Fiskeanlegg
2010	Hennco Laks - Sold to Haugland Group
2010	Raumagruppen - Sold to Salmar
2010	Stettefisk / Marius Eikremsvik - Sold to Salmar
2010	Lund Fiskeoppdrett - Sold to Vikna Sjøfarm (Salmonor)
2010	Sjøtroll Havbruk AS - 50.71% of the shares sold to Lerøy Seafood Group
2011	R. Lernes - Sold to Måsøval Fiskeoppdrett
2011	Erfjord Stamfisk - Sold to Grieg Seafood
2011	Jøkelfjord Laks - Sold to Morpol
2011	Krifo Havbruk - Sold to Salmar
2011	Straume Fiskeoppdrett - Sold to Marine Harvest Norway
2011	Bringsvor Laks - Sold to Salmar
2011	Nordfjord Havbruk - Changed name to Nordfjord Laks
2011	Villa Miljølaks - Sold to Salmar
2011	Karma Havbruk - Sold to E. Karstensen Fiskeoppdrett and Marø Havbruk
2012	Skottneslaks - Sold to Eidsfjord Laks
2012	Villa Arctic - 10 licenses, etc. sold to Salmar
2012	Pundslett Laks - Sold to Nordlaks Holding
2012	Strømsnes Akvakultur – Sold to Blom Fiskeoppdrett
2012	Ilsvåg Matfisk – Sold to Bremnes Seashore
2013	Morpol – sold to Marine Harvest
2013	Villa Organic – 47.8% of shares sold to Lerøy Seafood Group
2013	Villa Organic – 50.4% of shares sold to SalMar
2013	Salmus Akva - Sold to Nova Sea
2014	Skarven (Sømna Fiskeoppdrett and Vik Fiskeoppdrett) - Sold to Nova Sea
2014	Cermaq – sold to Mitsubishi
2015	EWOS - 2 licenses, sold to Bolaks
2015	Senja Akvakultursenter - Sold to Lerøy Aurora
2016	Fjordlaks Aqua - Sold to Hofseth International and Yokohama Reito
2017	NTS acquired Midt Norsk Havbruk
2019	Mowi acquired K.Strømmen Lakseoppdrett
2019	Tombre Fiskeanlegg, Lingalaks and Eidesvik Laks acquired NRS Region South

Appendix

Year	UK
1996	Shetland Salmon products - Sold to HSF GSP
1996	Straithaird Salmon to MH
1996	Gigha, Mainland, Tayinlaoan, Mull Salmon - All sold to Aquascot
1997	Summer Isles Salmon - Sold to HSF GSP
1997	Atlantic West - Sold to West Minch
1998	Marine Harvest Scotland - Sold from BP Nutrition to Nutreco
1998	Gaelic Seafood UK - Sold to Stolt Seafarms
1998	Mainland Salmon - Sold to Aquascot
1999	Hydro Seafood GSP - Initially sold to Nutreco as part of Hydro Seafood deal
199	Joseph Johnston & Sons - Sold to Loch Duart
2000	Aquascot Farming - Sold from Aquascot to Cermaq
2000	Shetland Norse - Sold to EWOS
2000	Hydro Seafood GSP - Sold to Norskott Havbruk (Salmar & Lerøy Seafood Group) from Nutreco
2001	Laschinger UK - Sold to Hjaltland
2001	Wisco - Sold to Fjord Seafood
2002	Wester Sound / Hoganess - Sold to Lakeland Marine
2004	Ardvar Salmon - Sold to Loch Duart
2004	Hennover Salmon - Sold to Johnson Seafarms Ltd.
2004	Bressay Salmon - Sold to Foraness Fish (from adm. Receivership)
2004	Johnson Seafarms sold to city investors
2005	Unst Salmon Company - Sold from Biomar to Marine Farms
2005	Kinloch Damph - Sold to Scottish Seafarms
2005	Murray Seafood Ltd. - Sold from Austevoll Havfiske to PanFish
2005	Corrie Mohr - Sold to PanFish
2006	Wester Ross Salmon - MBO
2006	Hjaltland Seafarm - Sold to Grieg Seafood ASA
2006	Orkney Seafarms - Sold to Scottish Seafarms
2007	Lighthouse Caledonia - Spin-off from Marine Harvest
2010	Northern Aquaculture Ltd - Sold to Grieg Seafood
2010	Lighthouse Caledonia - changed name to Scottish Salmon Company
2010	Meridian Salmon Group - Sold to Morpol
2011	Skelda Salmon Farms Limited - Sold to Grieg Seafood
2011	Duncan Salmon Limited - Sold to Grieg Seafood
2012	Uyesound Salmon Comp – Sold to Lakeland Unst (Morpol)
2013	Lewis Salmon – Sold to Marine Harvest Scotland
2013	Morpol sold to Marine Harvest
2014	Part of Morpol/Meridian sold to Cooke Aquaculture
2015	Thompson Bros Salmon - Sold to Cooke Aquaculture
2016	Balta Island Seafare - Sold to Cooke Aquaculture
2019	The Scottish Salmon Company acquired by Bakkafrost

Year	Chile
1999	Chisal - Sold to Salmones Multiexport
2000	Salmo America - Sold to Fjord Seafood
2000	Salmones Tecmar - Sold to Fjord Seafood
2000	Salmones Mainstream - Sold to Cermaq
2001	Pesquera Eicosal - Sold to Stolt Nielsen
2003	Marine Farms - Sold to Salmones Mainstream
2004	Salmones Andes - Sold to Salmones Mainstream
2004	Stolt Seafarm - Merged with Marine Harvest
2004	Pesquera Chillehue - Sold to GM Tornegaleones
2005	Aguas Claras - Sold to Acua Chile
2005	Salmones Chiloè - Sold to Aqua Chile
2005	Robinson Crusoe - Sold to Aqua Chile
2006	GM Tornegaleones - change name to Marine Farm GMT
2006	Merger Pan Fish - Marine Harvest - Fjord Seafood
2007	Pacific Star - Sold to Andrè Navarro
2007	Salmones Cupquelan - Sold to Cooke Aqua
2009	Patagonia Salmon Farm - Sold to Marine Farm GMT
2010	Camanchaca (salmon division) - Sold to Luksic Group
2011	Salmones Humboldt - Sold to Mitsubishi
2011	Pesquera Itata+Pesquero El Golfo - merged into Blumar
2011	Landcatch Chile - Sold to Australis Mar
2012	Salmones Frioaysen & Pesquera Landes' freshwater fish cultivation sold to Salmones Friosur
2012	Cultivos Marinos Chilé – Sold to Cermaq
2013	Pacific Seafood Aquaculture – Prod rights&permits for 20 licenses sold to Salmone Friosur
2013	Salmones Multiexport divest parts of coho and trout prod. Into joint venture with Mitsui
2013	Trusal sold to/merged with Salmones Pacific Star, with new name Salmones Austral
2013	Congelados Pacifico sold to Ventisqueros
2014	Nova Austral sold to EWOS
2014	Acuinova sold to Marine Harvest Chile
2014	Cermaq – sold to Mitsubishi
2014	Comercial Mirasol – sold to Salmones Humboldt (Mitsubishi)
2015	Landcatch Chile - Sold from Australis Mar to AquaGen
2018	Salmones Magallanes & Pesquera Eden aquired by AquaChile
2018	Salmones Friosur, Salmones Frioaysen & Piscicola Hornopiren aquired by Los Fiordos (Agrosuper)
2018	AquaChile aquired by Agrosuper
2018	Australis Seafood aquired by Joyvio Group Co. Ltd
2019	Salmones Ice-Val aquired by Blumar
2019	Cabo Pilar aquired by Nova Austral (4 licenses)

Year	North America
1989	Cale Bay Hatchery - Sold to Kelly Cove Salmon
1994	Anchor Seafarms Ltd., Saga Seafarms Ltd., 387106 British Columbia Ltd., and United hatcheries merged into Omega Salmon Group (PanFish)
1997	ScanAm / NorAm - Sold to Pan Fish
2001	Scandic - Sold to Grieg Seafoods
2004	Stolt Sea Farm - merged with Marine Harvest
2004	Atlantic salmon of Maine (Fjord Seafood)- Sold to Cooke Aquaculture
2004	Golden Sea Products (Pan Fish) - Sold to Smokey Foods
2005	Heritage (East) - Sold to Cooke Aqua
2005	Heritage (West) - Sold to EWOS/Mainstream
2006	Marine Harvest - Sold to Pan Fish
2007	Target Marine - Sold to Grieg Seafoods
2007	Shur-Gain (feed plant in Truro)- Sold to Cooke Aquaculture
2008	Smokey Foods - Sold to Icicle Seafoods
2011	Vernon Watkins' Salmon Farming (NFL - Canada East) - Sold to Cooke Aquaculture
2012	Ocean Legacy/Atlantic Sea Smolt (NS - Canada East) - Sold to Loch Duart
2014	Cermaq – sold to Mitsubishi
2016	Icicle Seafoods sold to Cooke Aquaculture
2016	Gray Aqua sold to Marine Harvest
2018	Northern Harvest sold to Marine Harvest
2020	Grieg Newfoundland sold to Grieg Seafood

Appendix

Breeding

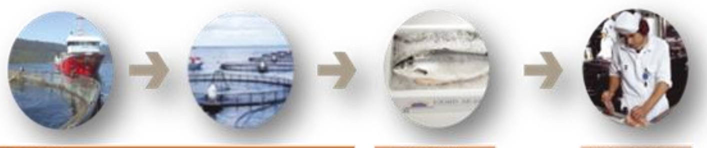
Broodstock Bred on selected characteristics eg. growth, disease resistance, maturation, colour

Spawning and fertilisation: Eggs stripped from females and mixed with milt

Eyed eggs: After 25-30 days fertilized eggs show "eyes". The development is depending on temp. 5000 eggs/ litre

Alevins: Small (<2.5 cm). Yolk sack providing first stage nutrition. When absorbed the fish start feeding

Fry/Parr: Start feeding of small fish. Temp 12-14 ºC. Fish is growing in FW sites to around 60-100g. Vaccination and grading important. Adaptation to life in seawater (smoltification)



Growing

Transfer to seawater sites by wellboat or trucks

On-growing in sea-water sites to around 4.5-5,5 kg (ca 16-22 months depending on temperature). Transport to packing station.

Harvesting

Slaughter, gutting and packing

Processing

The total production cycle takes approx. 10-16 months in freshwater plus 14-22 months in seawater = In sum 24-36 months (in Norway)

MOWI

Appendix

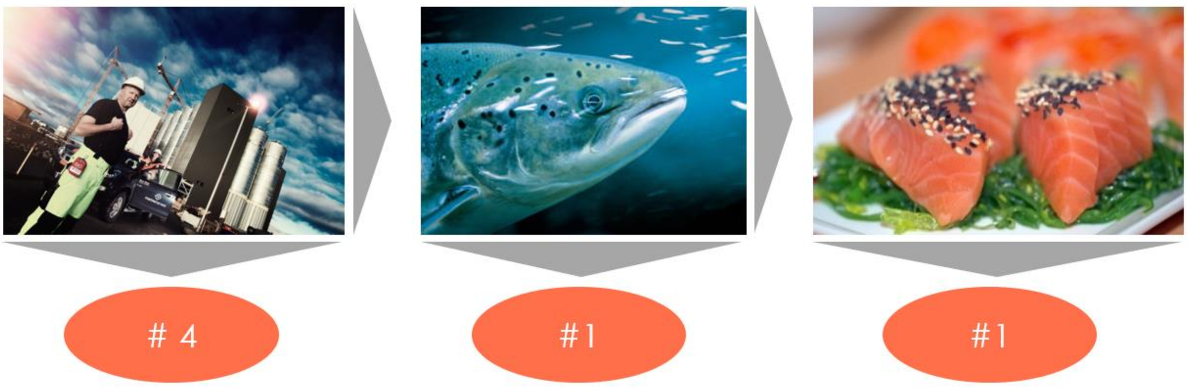
	The history of Mowi
2020	Entered into collaboration with X, Alphabet's innovation engine.
2019	MOWI brand launch
2018	The company once again becomes Mowi
2017-18	Acquisition of Gray Aqua Group and Northern Harvest, and establishes Mowi Canada East
2016	Entered into joint venture with Deep Sea Supply to build, own and operate aquaculture vessels
2013	Acquisition of Morpol
2012	Feed division established
2006	PanFish acquires Marine Harvest
2005	Marine Harvest and Stolt Sea Farm merge
	PanFish acquires Fjord Seafood
	John Fredriksen acquires PanFish
2000	Nutreco acquires Hydro Seafood. New company name: Marine Harvest
1999	Nutreco acquires the Scottish farming operations started by Unilever
1998	Mowi is discontinued as a company name
	Hydro Seafood has sites in Norway, Scotland and Ireland
1996	Hydro Seafood acquires Frøya holding
1990	Hydro Seafood registered 25 June
	Restructuring and consolidation of the industry starts
1985	Hydro increases its holding to 100%
1983	Mowi buys GSP in Scotland and Fanad in Ireland
1975	Mowi becomes a recognised brand
1969	Hydro increases its holding to 50%
1965	Mowi starts working with salmon in Norway
1964	The adventure of Mowi begins

Appendix

Mowi
Mowi is the world's largest producer of farmed salmon, both by volume and revenue, offering seafood products to approximately 70 countries world-wide. The company is represented in 25 countries, employing 14 866 people.

Total revenue for Mowi in 2019 was MEUR 4,135.6 and the harvest quantity of Atlantic salmon was 435,904 tonnes (GWT), which was 19% of the total industry output.

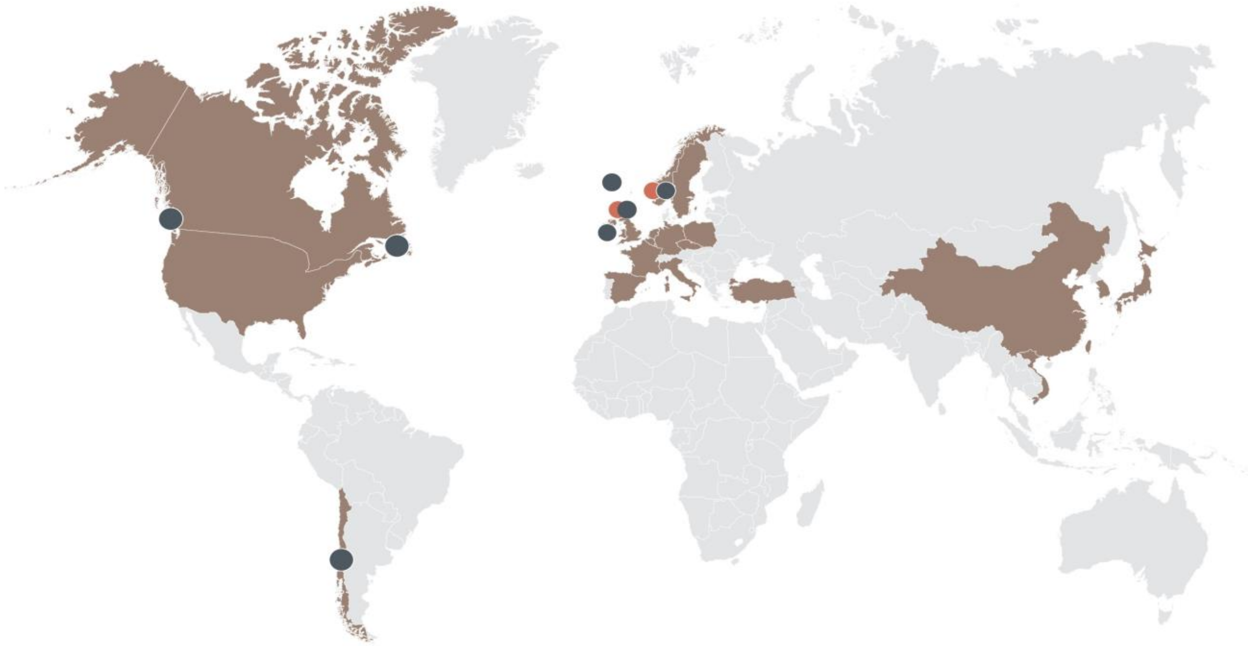
Business areas



	Feed	**Farming**	**Sales and Marketing**
Position	405,193 tonnes vs. global salmonid feed production of ~4.4 m tonnes	435,904 tonnes vs. global production of ~2.32m tonnes (19%)	Leading position in Consumer products Global sales network
Operations	Started in Norway in 2014 and Scotland in 2019	Norway, Chile, Scotland, Canada, Ireland, Faroe Islands	Operations in 25 countries
Volumes	600,000 tonnes capacity	435,904 tonnes in 2019	
Op EBIT 2019	EUR 22.4m	EUR 602.2m	EUR 113.8m

MOWI

Appendix



Feed	Production Capacity	Production 2019	2018	2017	2016	2015	FTE
Norway	360 000	353 310	348 402	305 174	310 242	281 655	92
Scotland	240 000	51 883					80
Total	600 000	405 193					172

Farming	Guidance 2020	GWT 2019	2018	2017	2016	2015	FTE
Norway	260 000	236 880	230 427	210 152	235 962	254 751	1 734
Chile	64 000	65 688	53 165	44 894	45 046	50 144	1 283
Canada	44 000	54 408	39 267	39 389	36 931	62 482	987
Scotland	67 000	65 365	38 444	60 186	43 349	40 112	812
Ireland	6 000	6 650	6 238	9 745	8 441	9 736	264
Faroes	9 000	6 913	7 697	5 980	10 893	2 923	77
Total	**450 000**	**435 904**	**375 237**	**370 346**	**380 622**	**420 148**	**5 156**

Sales & Marketing	FTE
Europe	7 358
Asia	1 260
Americas	848
Total	9 466

MOWI

Appendix

Sources of industry and market information

Mowi:	www.mowi.com
Other	
Kontali Analyse:	www.kontali.no
Intrafish:	www.intrafish.no
Norwegian Directorate of Fisheries:	www.fiskeridirektoratet.no
Norwegian Ministry of Trade, Industry and Fisheries:	www.fkd.dep.no
Norwegian Seafood Council:	www.seafood.no
Norwegian Seafood Federation:	www.norsksjomat.no
Chilean Fish Directorate:	www.sernapersca.cl
FAO:	www.fao.org
International fishmeal and fish oil org.:	www.iffo.net
Laks er viktig for Norge:	www.laks.no
Price statistics	
Fish Pool Index:	www.fishpool.eu
Kontali Analyse (subscription based):	www.kontali.no
Urner Barry (subscription based):	www.urnerbarry.com
Statistics Norway (SSB):	www.ssb.no/laks_en/
NASDAQ:	www.salmonprice.nasdaqomxtrader.com

Appendix