



The Norwegian Aquaculture Analysis 2018

The Norwegian aquaculture analysis: an overview

Dear reader,

We are pleased to present the latest issue of our Norwegian aquaculture analysis. This 2018 report, with a dedicated section on the balance of sustainability and growth within the Norwegian aquaculture industry, brings updated financial and quantitative facts and figures for the related sectors of the value chain, together with our analysis on structural shifts and development. The analysis covers companies within the value chain – ranging from technical solutions to production and export of salmon and trout.

EY, as a multidisciplinary provider of professional services to the industry, possesses in-depth insights into the characteristics of each segment of the value chain. The segments are seamlessly tailored with EY's core professional services within Advisory, Corporate Finance, Tax & Legal Services, Audit and Accounting. Specialist seafood sector teams are located in numerous seafood clusters and marketplaces around the world.

When analyzing the developments in the aquaculture industry, global megatrends are of great importance. Underlying forces of disruption are technology, globalization and demographics. Our research has further identified the following key megatrends that will affect the global food industry and salmon, in particular:

- ▶ Growing world population and urbanization
- ▶ Health conscious consumers
- ▶ Resourceful planet

These trends, together with the impact of the future working world, redefined industry and reimagined, greatly impact the global potential and development of this sector. The effects of future working world are broader in scope and occur on a longer time frame than megatrends. Hence, they fundamentally reshape the entire political and economic landscape, including global consumption of seafood.

In order to foresee the future of the Norwegian aquaculture industry, one has to view the sector in a larger global framework with implications greater than those created locally. As a consequence, we observe an increasing consciousness and awareness within the value chain and end-consumers about sustainability and preventive health.

This awareness affects the whole value chain and not just farming. The latter has been experiencing volume constraints

due to biological challenges, regulations and a need for technical development. Growth of the industry is highly dependent on solving the existing challenges on present volumes as well as growing its perspective on the global consumption potential.

We do, however, see a noticeable shift in the attitude and investment that support sustainable value creation in onshore, fjords and offshore. Given the fact that salmon and trout constitute approximately 2% of the global seafood production, the potential to transfer the value of know-how and applied technology to other species and agriculture sectors is considerable.

For the sake of completeness, our qualitative observations are also based on the last available industry-reported quarterly figures in 2018, even though the analysis refers to the 2017 annual financial reporting.

The export value of sea farming has more than doubled since 2006. In 2017 and 2018, Norwegian companies' export of salmon and trout is experiencing a continued value growth, both in terms of turnover and shareholder value.

Throughout 2017-18, the industry has been experiencing record-high export value and revenue levels; but in relative terms, profitability (EBITDA margin) was not at the same level as the most profitable year, 2010. The main reason for the drop in profitability has been the rise in operating costs, which was mainly driven by the increasing challenges with sea lice and diseases. However, in 2017, there was an increase in OPEX as more focus was put on mitigating factors.

The feed and sea farming segments retain their positions as the strongest contributors to value creation. Within these segments, the industry has managed to develop large industrialized business units. However, there are forces reducing the margins and the strategic strength of the traditional feed producers, calling for business repositioning and core product development.

Furthermore, the fish health segment shows a relatively stable profitability over time, whereas there has been a negative and volatile development both in the egg and spawn production and the processing segments. The margins in both subsegments show an upward trend, as opposed to smolt production that is still delivering stable margins on rising revenues as a result of larger smolts being sold.



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Well-boat businesses continue to be very profitable, with an all-time high revenue and EBITDA margin in 2017. Two transactions in this segment so far in 2018 underpin that a consolidation in this segment is in process.

The technical solutions segment is still fragmented, but has, throughout 2017 and 2018, experienced several mergers and acquisitions, giving rise to companies of a more optimal size. We expect to see accelerating innovation and product development in this segment.

The use of experiences and technology from challenging sectors such as subsea, offshore, shipping and pharmaceutical sector continues. We also see investment in pilot installation and existing applications, which in turn will further stimulate production and give rise to market opportunities in the aquaculture subsegment other than salmon production. This gives rise to further positive perceptions regarding the potential of the sector.

Given the positive development of the salmon aquaculture industry in the recent years, we have seen an increased interest for this industry among investors and financial institutions, and players entering the aquaculture value chain. Industry representatives recognize this positive attitude by the way of barometers. However, by nature, such measures are biased and tend to underestimate the efforts needed to manage the challenges and realize the opportunities in an industry exposed to biological risks, consumer disruption and strong competition from a range of products and substitutes. Reputational risks related to sustainable and sound production and fish health may here represent the greatest market risk for the industry.

I hope you find our annual analysis both interesting and enlightening. If you have any comments or questions with regard to the analysis, please don't hesitate to contact us to discuss the aspects of this exciting industry.



Eirik Moe
Sector Leader, Aquaculture and Seafood
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Welcome to the third edition of EY's annual review of the Norwegian aquaculture industry. In this report, among other things, we focus on growth and sustainability, with a special section on land-based farming solutions.



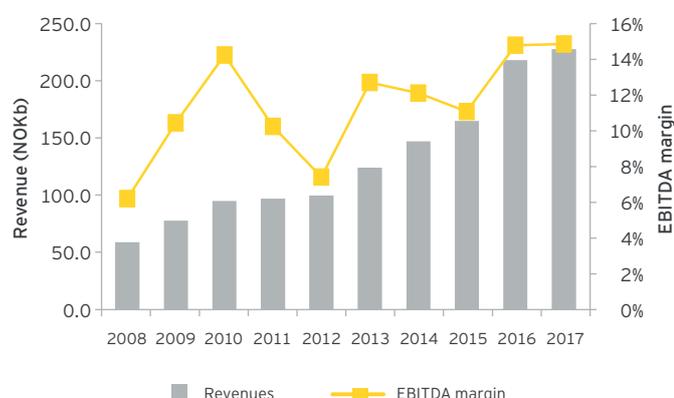
Introduction

The Norwegian aquaculture industry has witnessed a tremendous development through recent years. Since 2008, salmon price has skyrocketed and volume has increased significantly.

The industry as a whole and the different segments of the value chain attract a lot of attention. With this report, EY sets out to give you the big picture and a better understanding of the financial performance of the aquaculture industry.

In this edition, we put extra focus on the growth and sustainability of the sector. We take a deep dive into land-based farming, a development that has received increasing attention in recent years. With technological developments in recirculating aquaculture systems (RAS), more and more companies are arguing that land-based farming of Atlantic salmon is both feasible and profitable. Also, as with earlier editions, we analyze the development of different segments of the value chain. With a database including more than 800 Norwegian companies, we can provide insights based on large amounts of data.

Norwegian aquaculture industry. Aggregated revenues 2008-17



Calculations

EBIT = earnings before interest and taxes

EBITDA = earnings before interest, taxes, depreciation and amortization

Capital employed = total assets - (financial long-term and short-term investments + cash) - (trade creditors + tax payable + public duties payable)

Return on capital employed (ROCE) = $\frac{\text{EBIT}}{\text{capital employed}}$

CAGR = compound annual growth rate

Inclusion criteria

A company is defined as a Norwegian aquaculture company if both of the following criteria are met:

- ▶ At least 50% of its turnover is generated in the aquaculture industry.
- ▶ It is a Norwegian-registered legal entity.

Value chain segments

- ▶ Technical solutions
- ▶ Biotechnology
- ▶ Production
- ▶ Distribution
- ▶ Processing

Each of these categories are further broken down into subsegments to capture the huge diversity within the industry.

Company size definition

- ▶ Large company: revenue above NOK1b
- ▶ Medium-size company: revenue between NOK100m and NOK1b
- ▶ Small company: revenue below NOK100m

Methodology

In order to analyze financial activity across the value chain, we have gathered information from standalone financial statements of individual legal companies. Accounting information is publicly available from the Brønnøysund Register Centre. The number of companies included in the analysis will vary slightly depending on the availability of financial information. For companies operating with divergent financial periods, adjustments have been made to present the data on a calendar-year basis.

Many of the identified companies offer products and services in more than one segment of the value chain. However, in this analysis, each company is linked to only one segment of the value chain based on its main activity. This simplification could result in subsegments being over- or understated compared with the actual total. For larger industrial conglomerates with multiple subsidiaries, each entity is allocated to its respective best-fit segment.

The methodology does not capture or eliminate intercompany transactions or revenues in holding companies registered abroad.

Please note that the analysis is limited to the domestic aquaculture industry. Thus, foreign units owned by Norwegian companies are not reflected in the analysis. This may give a somewhat misrepresentative picture, particularly for the companies noted on the Norwegian Stock Exchange, as many of them have a substantial part of their business outside Norway.

Sustainability in aquaculture

Sustainability in aquaculture

Since its conception, the aquaculture industry has been faced with a wide variety of sustainability issues resulting from being a new and fast-growing, animal-based food production business operating in relatively undeveloped areas. Environmental issues have been particularly at the forefront of stakeholder concerns – whether it be fish escape risks, antibiotic use or the ecological impacts of large densities of fish living in a fixed area for long periods of time. In this section, we touch upon some of the most recent sustainability developments in the industry – from problems that are being tackled to new challenges that are arising.

New lice treatment technologies show promise and reduce chemical treatments

The Norwegian salmon farming industry continues to be challenged by the problem of fish lice. New treatments seem to be yielding results, with the companies reporting to the Global Salmon Initiative (GSI) generally seeing slightly lower lice levels in 2017 than in 2016. Furthermore, the use of active substances such as insecticides has been reduced markedly across GSI-reporting companies. Reductions in the usage was, on average, over 90% year on year from 2016, indicating that the new treatments with freshwater, warm water and other non-chemical measures such as cleaner fish have been widely adopted and are further improving the industry's environmental performance.

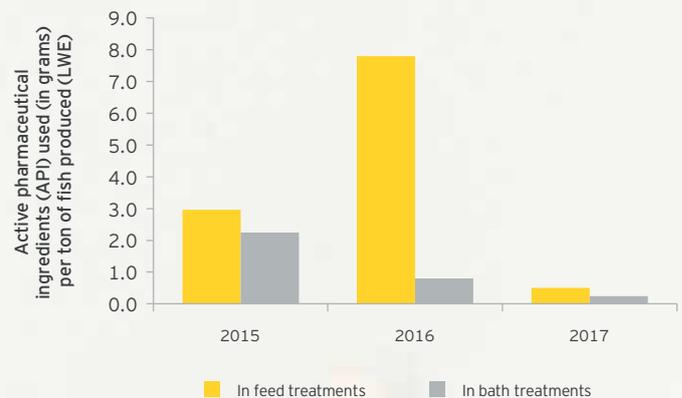
This transition is extremely timely, following the recent research into the effects of hydrogen peroxide, aka bleach, on shrimps in fjord-like environments. Hydrogen peroxide has been one of the most commonly used chemical treatment to kill lice, before the widespread introduction of non-chemical treatments. The study indicated that the industry may have been underestimating the effects of these treatments upon wild crustaceans, as even low concentrations appeared to be very harmful to the organisms.¹ The issue of fish lice, however, is anything but resolved with high levels

continuing to be a major hurdle to the continued growth and cost-cutting within the industry.

Value chain impacts undermine the sustainability of the industry

While progress is being made on farm operations, many questions remain about the overall sustainability of the fish farming industry through its value chain – both up- and downstream. The industry has been working on finding solutions to reduce the levels of wild fish in feeds, but is still challenged with finding sustainable sources of oils and feed, with little change in forage fish dependency in recent years. Furthermore, there is still a general lack of disclosure as to the origins of the majority of feed, though this could be amended if the new fish facial recognition technology and big data are adopted, allowing for per fish traceability from feed to the final consumer.

A GSI-reporting company's unweighted average active substance use



Source: Sustainability Report, <https://globalsalmoninitiative.org/en/sustainability-report/sustainability-indicators/>.

1 NB. Hydrogen peroxide use is not included in the above figures.

Significant increase in greenhouse gas emissions due to long-haul exports of fresh fillets

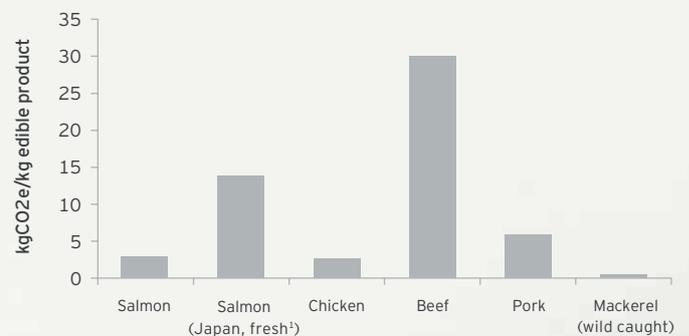
The current industry method of meeting demand from the American and Japanese markets for fresh fillets is increasingly of concern for many observers. Flying fish to Asia, for example, has the effect of more than tripling the greenhouse gas emissions of the product, and is in no way compatible with the demands of a low-carbon society set out in the recent International Panel on Climate Change (IPCC) 1.5C report. Local land-based fish farming may be one solution to reduce air miles. However, this could increasingly pose a threat to Norwegian sea-based production in the coming years, if more sustainable transportation alternatives are not developed. We look more into the status of land-based farming in the following section.

The second year of assured GSI reporting shows the industry's commitment to transparency

The salmon farming industry in Norway has been under a lot of pressure to increase its transparency and has met this head-on with the GSI. The GSI is an industry initiative to disclose annual environmental and social performance in a comparable manner that addresses some key stakeholder environmental and social concerns. Through GSI, a number of large salmon farming companies report comparable key performance indicators including antibiotic use, fish lice levels, and health and safety incidents. For the second

year running, reporting of these figures has been assured, giving more confidence to users about the accuracy of disclosures and highlighting the industry's commitment to good-quality reporting. We consider this to be a positive development within the industry that can be a model for non-financial disclosure in other industries. However, many aquaculture companies do not yet report to GSI, which could pose challenges in years to come for the industry as a whole.

Greenhouse gas emissions for various meat and fish products



Source: "Carbon Footprint," Cermaq, www.cermaq.com/wps/wcm/connect/005476d0-c149-4aab-83a9-9a663bb9e61f/FS_carbon+footprint_2012.10.18.pdf?MOD=AJPERES, 18 October 2012.

1 Figure includes estimate for emissions from flight from Norway to Japan (from Framtiden i våre hender's Den rosa klimabluffen, 2018 report).



Will embracing land-based farming mean replacing open net pens?

Land-based grow-out capacity plans in Norway equaling

10%

of the current Norwegian production volume at sea

Land-based farming: a new era?

Disruptive change or complementary volume enabler?

Introduction

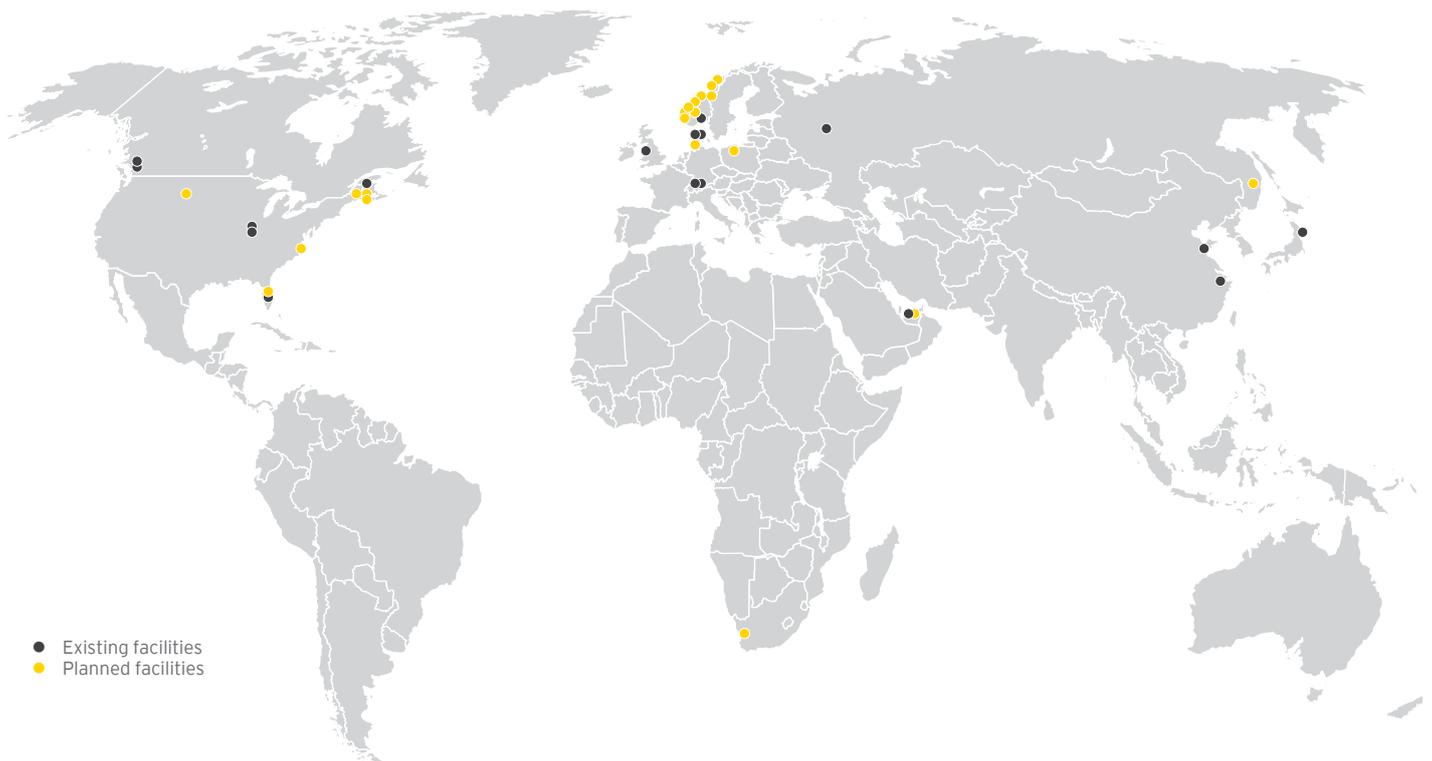
Limited volume growth in traditional salmon farming coupled with demand-driven high salmon prices are leading to industry super profits. Super profits give rise to the willingness to explore and invest in alternative sources of growth such as closed pens in sea, offshore sea farming and land-based farming.

Land-based farming of Atlantic salmon may sound counterintuitive. Still, we note an increasing interest and investments in land-based

opportunities as the production cost per kilogram in open net pens continues to rise and significant advances are seen in land-based technology, reducing the cost gap between the two production alternatives. Adding lower transportation costs and carbon footprint as well as shortened time-to-market in overseas markets, land-based farming may start to make sense. Or does it?

In this section, we take the pulse on the status of land-based farming. Can it contribute to sustainable growth?

Identified existing and planned grow-out facilities for Atlantic salmon



Identified planned capacity per year*

Thousand tons	2018	2019	2020	2021	2022+
Norway-Denmark	7.0	49.5	75.4	106.2	143.7
US-Canada	3.2	33.2	46.2	46.2	179.2
Other	12.0	19.0	21.5	21.5	27.8
Total	22.3	101.8	143.2	174.0	350.8

* Not an exhaustive list, only identified projects included.



Splashy plans or firm fish?

The plans are definitively there ...

Traditional Norwegian salmon farmers' investments in land-based smolt production have contributed to significant technological advances in RAS, gradually reducing risks and costs associated with land-based farming. Inspired by this, certain players and suppliers have started to invest in land-based grow-out facilities for Atlantic salmon. These have been typical pilot projects with limited capacity and located in Norway and Denmark, close to the competency clusters. The next wave of land-based farming also includes larger facilities, some located closer to the consumer market, such as Atlantic Sapphire's planned facility of 90,000 tons in Florida, US.

We have identified existing and planned grow-out facilities for Atlantic salmon that aim to take the capacity from about 22,000 tons (in 2018) to more than 350,000 tons (in 2022 onward) – about 13% of the expected world production in 2020. In aggregate, the identified plans in Norway sum up to around 130,000 tons – about 10% of the current production volume at sea. We have identified 11 planned facilities with a capacity of 10,000 tons or more, six of which are to be located in Norway, including one "part land, part sea" facility.

Although the competency, suppliers and pilot projects, to a large extent, are located in Denmark and Norway, the scale of the current land-based plans in Norway are a bit surprising. We had expected more of the larger projects to be planned closer to the consumer markets that require costly air freight – for example, the US and China – as this increases competitiveness. If we exclude Atlantic Sapphire's 90,000 tons from the equation, about half of the identified land-based volumes are currently planned along the Norwegian coastline. The rationale appears to be a mix of local technological knowledge coupled with a belief in further growth in the European salmon market.

... but what about the implementation capacity?

Entrepreneurs and founders behind the largest identified Norwegian land-based initiatives form a diverse group; however, in general, they have a long experience in the aquaculture industry.

Three out of the six largest planned facilities in Norway received the required permits as of October 2018. The planned 15,000 tons' grow-out facility in Stord Havbrukspark however, received a negative response on its permit application in October 2018 due to adverse experiences with the related smolt facility, and is thus not included in our list. Further, the initiative that seeks to combine land- and sea-based farming received significant fewer development licenses than applied for, putting the entire project at risk.

It is unclear to what extent the required financing is in place; but many projects appear to be still in the very early phase in this respect. With no success stories or "proof of the concept" to date, there is significant risk involved for both banks and equity investors. Several banks have signaled reluctance to provide financing.

The two current front-runners for the two largest planned facilities in the US are the Norwegian companies, Atlantic Sapphire (90,000 tons) and Nordic Aquafarms (33,000 tons). According to Atlantic Sapphire, further equity financing will not be required after the share capital increase of NOK600m in May 2018; but the company still needs further external financing to complete the funding of its phase 1 investment plans. Nordic Aquafarms is in the process of applying for the required permits for its planned land-based salmon farm in Maine. The first phase (13,000 tons) will involve investments of up to USD150m, which will need to be financed once the required permits are in place.

In summary, there are still critical hurdles with regards to permits and financing to be overcome in order to realize all the identified plans for land-based salmon farms. On top of that comes the possibility of some technological and biological child diseases, as land-based farming is still in its early days. These aspects will undoubtedly impact the timing and realization of the identified land-based volumes going forward.

Who will win the cost-cutting game?

The cost gap seems to be closing between land-based and open net pen farming ...

Investment in RAS systems is highly capital-intensive; but with the development of technology, the investment cost related to land-based production has decreased. There are numerous studies and estimates concerning investment cost for land-based facilities. However, as most of the planned land-based facilities are yet to be built, the investment estimates have inherent uncertainties, illustrated by the large span in estimates – from approximately NOK60/kg to NOK150/kg per thousand tons of capacity. DnB estimates the cost for open net pen farming of NOK15/kg in addition to the license cost.¹ After the latest auction of licenses in June 2018, the Directorate of Fisheries reported that the cost of licenses ranged from NOK132/kg to NOK252/kg. This indicates that the current investment cost for land-based production is not necessarily higher than that for open net pens.² However, in the last auction round in 2014, the average cost of licenses was NOK 75/kg, illustrating how the license cost is impacted by the salmon price development.

The chart on the right side, showing the production cost per kilogram (whole fish equivalent or WFE), demonstrates the development in production cost for traditional open net pen farming in Norway for the period of 2008-17. The dotted lines illustrate the estimated production cost range for land-based farming in Norway based on a number of research studies made.³ As for the investments, the estimated costs for land-based production are yet to be proven as there are few fully operative land-based farms today.

As the research studies indicate, the projected land-based production costs per kilogram (WFE) and the actual traditional sea-based costs are converging. Over the last years, the open net pen production cost has increased significantly, reaching NOK31.3/kg in 2017 – almost double the cost level in 2005. The main driver of the increased cost level in traditional farming is the increase in the cost of feed and biological challenges. According to a Nofima study from 2017,⁴ the cost for lice treatment increased from NOK1/kg in 2011 to NOK4.25/kg in 2016.

The supporters of land-based systems argue that they will remove such biological challenges. The transportation need related to well-boats will also be made redundant. On the other hand, land-based facilities will have costs related to energy and water treatment that are not relevant for traditional farming.

An aspect of the production cost for traditional farming, which is important to highlight, is the large variance in production cost between the different salmon farmers, locations and generations. According to the annual profitability study prepared by the Directorate of Fisheries, 35.4% of the produced volume in 2017 (42.4% in 2016) was produced for a cost lower than 30 NOK/kg. Further, 17.1% of the volume in 2017 (10.5% in 2016) had a cost lower than 25 NOK/kg, illustrating the potential to cut costs with traditional farming.

Production cost per kilogram (WFE)

	Land-based production cost			Open net pen (2017)
	Study A (2016)	Study B (2017)	Study C (2017)	
Feed	11.8	13.0	16.0	14.2
Smolt (roe)	0.8	2.0	0.3	3.3
Salaries	3.3	3.0	3.1	2.8
Other operating costs	10.7	6.0	12.7	8.9
Depreciation and interest	7.6	6.0	6.6	2.0
Production cost (WFE)	34.2	30.0	38.7	31.3

Source: "Land-based farming of salmon: economic analysis," Trond Bjørndal et al. (2017) and Directorate of Fisheries (www.fiskdir.no).

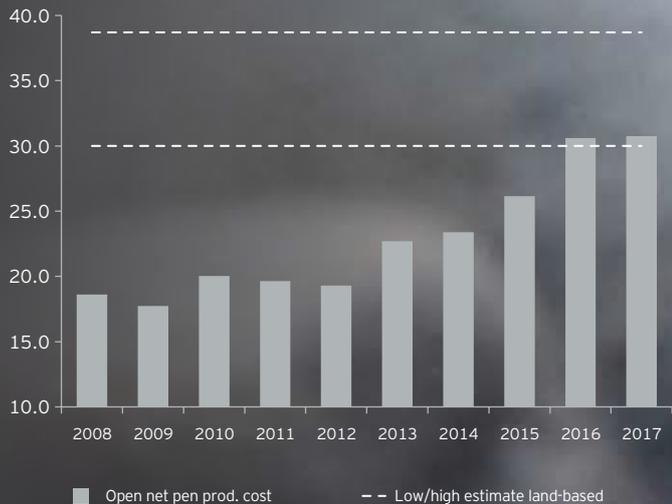
1 "Seafood – Special Report. Deep dive into land-based farming," DnB Markets, 1 February 2017.

2 "Auksjon juni 2018," Directorate of Fisheries website, www.fiskeridir.no/Akvakultur/Tildeling-og-tillatelser/Auksjon-av-produksjonskapasitet/Auksjon-juni-2018, accessed 19 October 2018.

3 "Land-based farming of salmon: economic analysis," NTNU Open website, www.brage.bibsys.no/xmlui/handle/11250/2465608, accessed 16 October 2018.

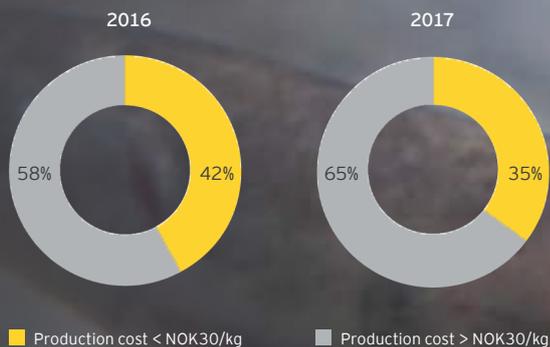
4 "Kostnadsutvikling i lakseoppdrett. Med fokus på fôr og lusekostnader," Nofima website, www.nofimaas.sharepoint.com/sites/public/Cristin/Rapport%2024-2017.pdf?slid=53159c9e-a0fb-7000-160a-804b1dde236a, accessed 16 October 2018.

Production cost per kilogram (WFE), 2008-17



Source: Directorate of Fisheries (www.fiskdir.no).

Share of open net pen volume produced at a production cost lower than NOK30/kg (WFE)



Source: Directorate of Fisheries (www.fiskdir.no).



How long can land-based salmon producers withstand a drop in salmon prices?



Who will win the cost-cutting game? (Continued)

... but who has the potential to stand as the winner in the long-term cost-cutting game?

The actual average production cost for open net pen farming continues to increase. The projected land-based production costs are decreasing with improvement in technology. The gap is getting smaller. The high demand and need for increased production volume coupled with super profits continue to incentivize further research, development and investments into land-based farming. Moreover, as land-based production sites can be placed close to overseas end-markets, the transportation cost will be significantly reduced, creating pockets of interesting opportunities. For example, placing a production site in the US or Asia will entail lower transportation costs in the range of NOK13-18/kg compared with that of salmon produced in Norway (Kontali).

In the end, this is a long-term cost-cutting game. Traditional farming has a big cost-cutting potential related to biological issues. If solved, best practice cost levels for open net pen production indicate that it will be challenging for land-based production to keep up. However, given the potential of transportation advantages in land-based production being placed closer to the end-market, investments in land-based farms may pay off in certain geographical markets.

The future development in the salmon price will determine the relative importance of being cost-competitive going forward. Perhaps the global consumer demand for Atlantic salmon will be so strong that, despite future volume increase from innovative farming solutions such as land-based or offshore, the salmon price will continue to remain high. This will increase the chances for land-based production to gain foothold. But what if the salmon price drops close to, or below, the average land-based production cost for a year? Will the costly land-based facilities with economic lifetimes of 20+ years, higher ongoing replacement capex and probably less cost-cutting potential, be able to keep up with the competition and stay afloat? We only need to go back to 2015 when the salmon price was lower than NOK38.7/kg, and with the recent oil price plunge fresh in mind, it is worth mentioning. It may not happen. But there is certainly a risk.

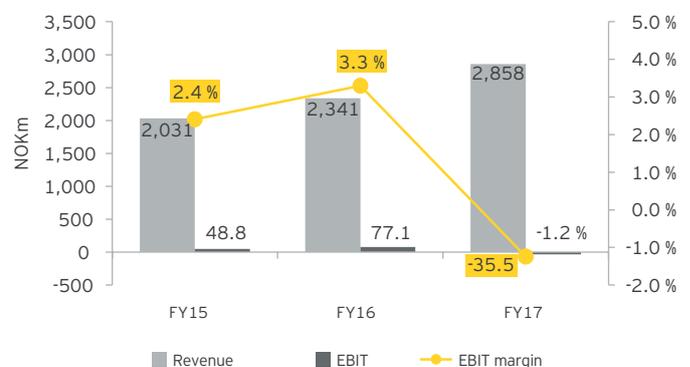
Only a minority of RAS suppliers have achieved significant profitability

Most of the key RAS suppliers identified are Danish and Norwegian companies. Danish companies historically have a reputation for being one of the best in class on water cleaning technology.

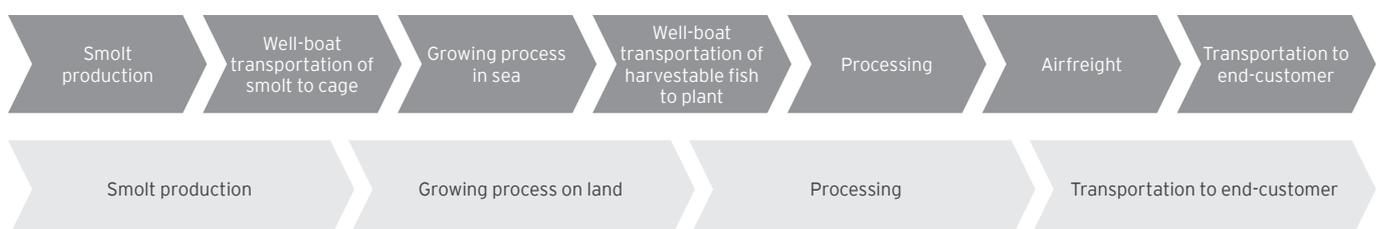
There are a few RAS suppliers that have both a high experience level and a broad offering within the variety in species and fish life cycle. Some of the suppliers are more specialized on Atlantic salmon, but many are species generalists. We do not see a clear connection between project experience and profitability. Even though most suppliers are experiencing growth, only a minority has achieved significant profitability.

Compared with the technical supplier segment that generates an average EBIT of around 8%, the identified RAS suppliers have low EBIT margins as seen in the below graph. The negative EBIT in 2017 is primarily due to one particular supplier.

Aggregate financial performance by identified RAS suppliers



Source: Company webpages, financial statements, Intrafish, expert interviews, Capital IQ.



Will the pros outweigh the cons?

Enablers	Disablers
 <p>Better control with sea lice, diseases and escapes – improving fish welfare</p>	<p>Several remaining biological uncertainties, such as early maturity, risk of other diseases and off-taste</p>
 <p>Improved RAS technology that reduces risks and costs and enables the fish to grow faster</p>	<p>Technological development still in its early days; several incidents with land-based smolt facilities and possibility of more childhood illness with the risk of shutdown and loss of biomass</p>
 <p>Positive environmental image; lower carbon footprint from transportation; no wild salmon impact; less chemical need and waste from production</p>	<p>Higher use of energy and materials; confiscation of land, which is a more scarce resource and may have alternative uses</p>
 <p>Production costs getting closer to current open net pen costs; lower cost of transportation to overseas markets</p>	<p>High long-term investments, vulnerable if salmon prices drop. No actual cost statistics yet, cost estimates remain to be proven; must obtain sufficient financing</p>
 <p>Branding as organic, local, fresh and environmentally healthy food, appealing to conscious consumers; enable consistent year-round supply</p>	<p>Biological concepts remain to be proven; new freezing technology reducing some of the advantages of being local</p>
 <p>Political will and economic incentives to increase local production and processing in certain areas, for example, aquaculture subsidies in the EU</p>	<p>The regulatory frameworks related to permissions, waste disposal etc. are not established and need to be further developed with the inherent uncertainties that entails</p>

What do the traditional salmon farmers think?

To our knowledge, none of the largest traditional salmon farmers are currently investing or planning to invest in land-based grow-out facilities. Instead, they are focusing on growth opportunities that continue to exploit Norway’s comparative coastal advantages, many of them through applications of development licenses. For example, Marine Harvest is testing closed pens at sea through “The Egg” and the “Marine Donut” solutions; Lerøy Seafood (pipefarm) and Cermaq (flexifarm, pending approval) are also looking to develop and test closed sea-based systems through development licenses; With their “iFarm” concept, Cermaq also puts some of their efforts in solving today’s open net pen production challenges through technologically advanced individualized farming; SalMar’s

“Ocean Farm” and, potentially, “Smart Fish Farm” seek to succeed with scalable offshore farming facilities; Grieg Seafood is primarily aiming to reduce open net pen production costs through biological control, increased efficiency and digitalization.

They are all searching for and investing in future innovative concepts for efficient and profitable salmon farming. Although the concepts are different, they have one common denominator. They are all sea-based. None are land-based. This is where their competitive edge is today. But, if land-based farming proves to be a success, we don’t doubt that they have the competency and capacity to enter this playground as well.

“Land-based farming still has a long way to go technologically. Some will succeed in the future, but it must be done close to overseas end-markets. SalMar believes in exploiting the natural resources through offshore farming and that sea farming will have higher chances of success in the long run.”

Olav-Andreas Ervik
CEO, SalMar

Disruptive change or complementary volume enabler?

Based on everything we've seen, heard and discussed around the current status, plans, opportunities and risks of land-based grow-out salmon farming, we summarize our views as follows:

- ▶ Land-based grow-out salmon farming is happening. It is just a matter of how fast, how much and where.
- ▶ The cost gap between open net pens at sea- and land-based production is getting smaller, at least in Excel spreadsheets. As for the majority of new technological concepts, unforeseen events and cost are likely to incur.
- ▶ Not all plans will get realized and they will, on average, take longer to implement than anticipated. Some may not get the required permissions to operate. Others may not get sufficient funding from investors and lending banks. Some may fall short on competency and technological aspects.
- ▶ The volumes will not impact the salmon price in the short term. If and when global land-based volumes approach 10%-15% of the

global production, this may change, pending on the development in the other side of the equation – demand growth.

- ▶ The most compelling business cases appear to be those situated close to overseas end-markets that are of a sufficient scale and where there are favorable locations available.
- ▶ At the end of the day, this will be a cost-cutting game. Land-based production will struggle to compete against best practices in sea-based production. The importance of being cost-competitive will depend on the development of salmon price and the future prevalence of best practices. There might be room for both.

Land-based salmon farming will continue its journey and contribute to the required growth of salmon supply. It will take more time and need to overcome more hurdles than all the current initiatives. We believe that it will complement rather than substitute open net pen production.





Short-term forecast

First, the verdict on last year's forecast ...

Methodology

Revenue has been estimated for 2018 and 2019 based on a quantitative forecasting model. Several approaches have been incorporated into the model, varying between the different subsegments. Among the approaches used are:

- ▶ An analysis of historical correlation between key variables (such as salmon price and volume) and revenue
- ▶ Guidance from public companies
- ▶ Analyst reports for certain subsegments
- ▶ Discussions with industry experts

Introduction

The 2018 edition of the Norwegian Aquaculture Analysis marks the second year where we take a look into the crystal ball and attempt to forecast the development of the companies included in our database.

As with the 2017 edition, we note that in terms of revenue contribution the subsegments of sea farming and trading are, by far, the largest. Their revenue is, to a large extent, the product of volume and price. With this in mind, our focus in this section will be on the main factors impacting these two subsegments.

There is currency exposure in both revenue and cost for the farming companies. Most sales are in euros, and a large part of the fish feed costs are in currencies other than NOK. In theory, the forecasted NOK price of salmon should, therefore, take currency effects into account. Although input factors for feed are purchased primarily in US dollars, the raw materials originate from a broad range of currencies, and are as such more diversified than the trading currencies may imply.

How did we do?

Salmon price

Since we finalized the 2017 edition of our forecast early in 2018, we knew the average salmon price for 2017 when preparing the forecast. However, a key input in our forecast has been not only

the average salmon price, but to what degree the sea farming and trading subsegments actually achieve the spot price. For instance, an average spot market salmon price of NOK61 does not mean that the average salmon price of the sea farming subsegment constitutes 100% of this – historically, we have observed that the combined sea farming subsegment in our database has achieved between 80% and 90% of the average annual spot price. In our 2017 forecast, we had estimated this to be 90%, which ended up being almost spot on with the actuals at 89%. However, we overestimated the EBITDA margin of the sea farming subsegment as the costs ended up being higher than our estimate. In addition, our volume estimates turned out to be too optimistic, as further described below.

Fish volume

While the actual 2017 sales volume of slaughtered fish¹ decreased by approximately 1.4% (salmon and trout (WFE), salmon alone increased by 0.2%), we had calculated a growth of 2%. We based our estimates on observed growth and guidance from some of the publicly traded sea farming companies, as well as estimates from Sjømat Norge – both stipulated year-on-year growth in the 1%-3% range.

The verdict

After several years of double digit revenue growth, the Norwegian aquaculture industry grew only by 4.5% in 2017 – a little over our estimated revenue growth of 2.6% in our 2017 forecast. Our forecast was negatively impacted by the low volume, and our – in retrospect – too pessimistic view on the trading subsegment. Trading significantly over-performed when compared with our forecast, mainly due to the achievement of higher salmon prices than what we had anticipated. This may be impacted by good timing (selling more fish when the price is high) or being able to negotiate more advantageous contracts now that the salmon price has remained high over some time.

1 "Sale of slaughtered fish Weight in metric ton round weight (WFE)" statistics, Directorate of Fisheries.

... followed by our thoughts on 2018 and 2019

Going forward

2018 will most likely mark the third year in a row with an annual average salmon price above NOK60 (as measured by Fish Pool). We note that no significant changes have happened in terms of Norwegian production volume since 2012. In fact, volume of slaughtered fish sold has been in the range of the low 1,200,000s and the high 1,300,000s in the years between 2012 and 2017 – and it is unlikely that 2018 will be the year where the volume finally crosses 1,400,000.

Disease

Biological problems will continue to be a challenge to the industry for the foreseeable future. The year 2018 has seen several cases of both infectious salmon anemia (ISA) and pancreas disease (PD), predominantly in the middle and western parts of Norway. According to the Norwegian Veterinary Institute, as of October 2018, there have been 10 ISA outbursts in the year, of which only one has been in northern Norway. In 2017, 14 ISA outbursts were recorded, of which five were in northern Norway. Also, there have been 128 locations with PD suspicion as of September 2018 vs. 121 for the same period in 2017. In other words, in terms of disease control, there is little to support high-volume growth in 2018.

Lice

Lice is not a new phenomenon and has been a problem in the salmon industry for quite some time. It is considered a high priority to find new ways to both fight the lice and prevent them from showing

up in the first place. Both chemical and mechanical lice removal solutions are in play, but no permanent sustainable solutions have been found. Looking at the lice statistics from barentswatch.no, lice is still a significant issue in 2018.

Can post-smolt strategies save the day?

The combination of both disease and lice issues, with no permanent solutions in sight, supports a low-growth scenario for the upcoming years. However, we note that most of the larger farming companies focus on increasing the size of fish prior to moving it from land to ocean. As most of the larger issues (in monetary terms) occur in the ocean (and not in the smolt phase), keeping the fish longer on land may positively impact the volume going forward. Increasing the size of the fish on land can reduce the time the fish spends in the ocean by several months. Considering that the small post-smolt fish is more susceptible to biological hazards than larger fish, successfully implementing a post-smolt strategy of increasing the fish size prior to moving it to the ocean may yield positive results in terms of volume growth going forward.

As of 2Q 2018, several of the large public sea farming companies provided guidance on the 2018 volumes being higher than the 2017 volumes. In addition, the traffic light system that was introduced by the Norwegian Government in 2017 is expected to provide the industry with a better foundation for healthy growth. There seems to be some consensus among analysts that there will be an overall year-on-year growth in the harvest of salmon in 2018.



We are vaguely optimistic and estimate a small volume growth in both 2018 and 2019, albeit we do not expect the total volume produced to reach all-time highs.

Price

Even though no major changes to volume have taken place in the 2012–17 period, the same cannot be said about the price. In 2016, after three years of average prices as low as NOK40s, the price went up to the low NOK60s. Considering that we estimate only a marginal volume growth, we do not expect a sudden oversupply to challenge the high demand. This supports our view that the salmon price will stay at the same level as seen in the last couple of years.

We are also of the opinion that in the next couple of years, the volume output from land-based farming solutions will not be significant enough to have an overall price effect.

Costs

With no immediate solution to the biological problems, costs related to this will continue to be high in the sea farming subsegment. A weak NOK will keep feed expenses high, albeit it will keep export revenues also high.

Branding and export

Salmon export has become a big business. We think that both China and Russia will be important markets going forward. Also, an increase in salmon interest in the US may yield a higher demand.

We anticipate that more and more of the Norwegian aquaculture companies will focus on branding and finding ways to differentiate their salmon products from those of their competitors'. The battle for market shares will increase and a stronger brand will be the greatest offense and defense.

The conclusion

Gathering our analyses together, the chart below illustrates our revenue and margin forecast for the Norwegian aquaculture industry for 2018 and 2019. We forecast revenues to go marginally up in both 2018 and 2019, driven by stable high prices and a slight volume growth. Continued biological challenges are expected to keep the margins stable. In other words, we presume something that looks remarkable like a steady-state industry in the short-term perspective, which we think will be the case without a solution to the biological problems the industry is facing.

A future technological breakthrough on sustainable growth may impact the situation. Can the industry control biological challenges in open net pens? Will offshore pens provide satisfying solutions? What will be the impact of land-based production? One thing is certain – there are enough interesting aspects in this industry at the moment that it is worth keeping watch on the time to come.

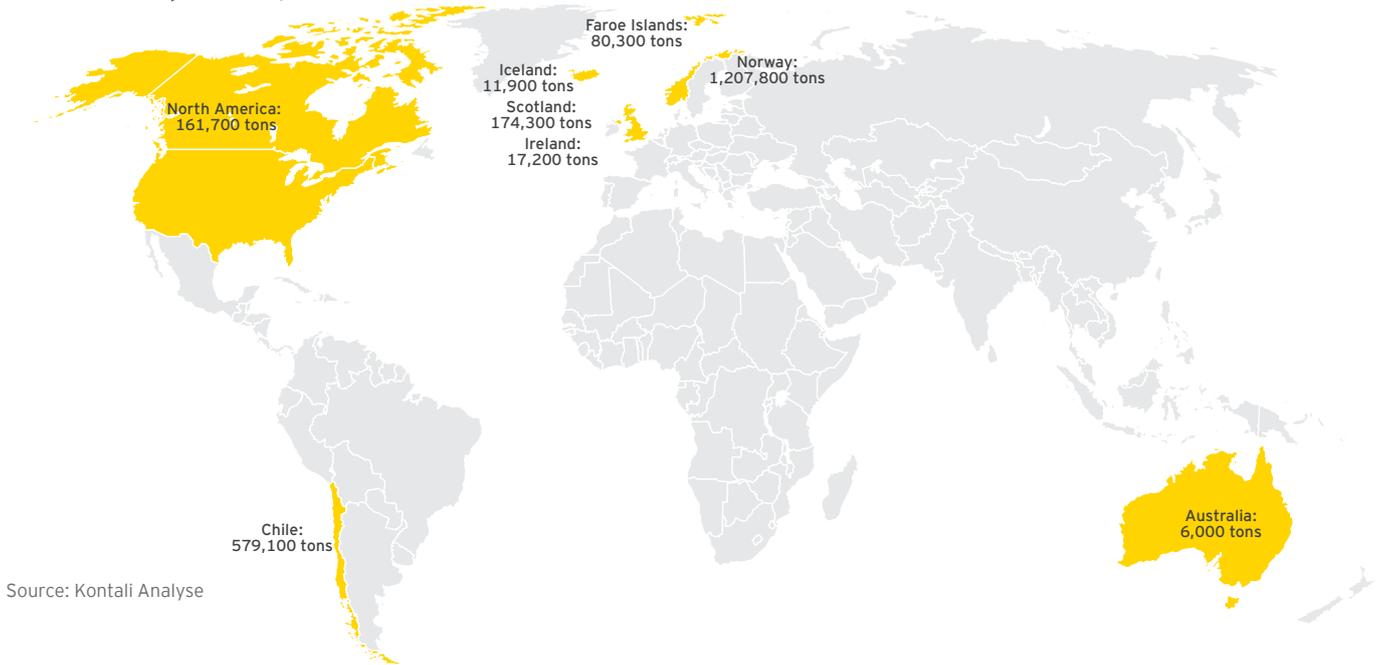
The Norwegian aquaculture short-term forecast



Global perspective

A peak in the aquaculture industry in a global perspective

Atlantic salmon production, 2017



Source: Kontali Analyse

Market trends supporting the continued growth of the aquaculture industry



Globally, the market value of marine and coastal resources and industries is estimated at 5% of global GDP. (Source: UN).



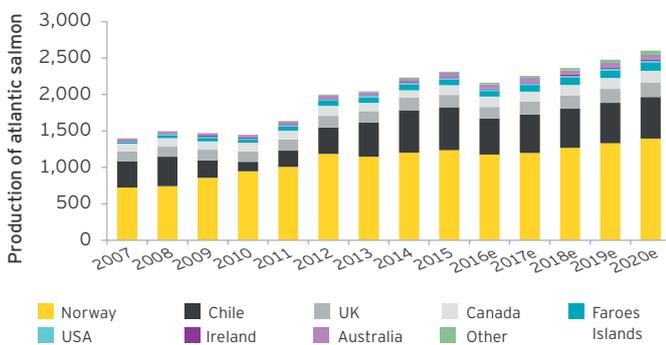
Aquaculture's share of direct human consumption is now more than 50%. (Source: FAO).

Is ocean the limit?

As the population increases, fish farming “holds a tremendous promise in responding to the surging demand for food,” according

to the Food and Agriculture Organization’s (FAO) The State of World Fisheries and Aquaculture report.

World production of Atlantic salmon (rw 1,000)



Source: Pareto, Kontali 2017.

In 2017, Atlantic salmon harvests reached 2.3 million tons, 6% higher than that in 2016. Chile contributed with a 15% growth (+74,700 tons), representing more than 50% of the total volume increase in FY17. Kontali Analyse expects an additional growth of 5% in FY18, primarily driven by a 6% expected growth in Norway. However, FAO expects a steady increase in production volumes over the next 2-3 years, and an 8% growth in 2018.

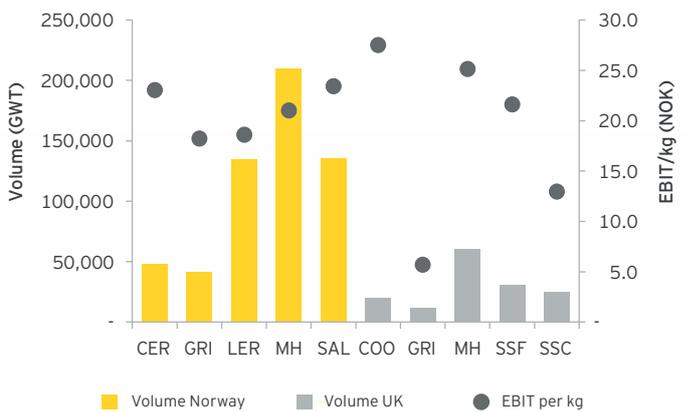
Although biological issues are still highly relevant in the production of Atlantic salmon, improvements are seen across different farming areas in the world. Production is again on the rise, but the pace of growth is slow. There are no immediate signs of a drop in the underlying demand for salmon; consequently, prices are still expected to be high world wide.

A micro perspective on Norway and the UK

Salmon prices have increased from NOK26/kg in 2008 to an average of NOK61/kg in 2017. Farming companies report record-breaking results almost every quarter, as demand is high and supply limited. However, the highly volatile salmon price and increasing health costs related to fish farming contribute to significant differences in profitability between the various players.

When comparing the largest farming entities in Norway and the UK – two countries in the eastern part of the Atlantic Ocean – we observe that profitability varies from NOK5 EBIT/kg to NOK27 EBIT/kg. The large variations are mainly explained by biological challenges – an issue on both sides of the North Sea.

Top 10 key industry players in the North Sea



Key findings from the segment analysis

After four years with double digit growth, the Norwegian aquaculture industry as a whole had to settle for a 4.5% year-on-year growth from 2016 to 2017. Knowing that there were no drastic changes with either salmon price or the harvested volume when compared to those of 2016, this is not surprising considering that these are key revenue drivers for the industry.

Technical solutions

The segment continued its growth in 2017, but had to let go of some of its record-high EBITDA margin from the previous year. Continual high M&A activity characterizes the subsegment, especially with financial investors showing high interest.

Biotechnology

Both the fish health and feed subsegments have continued their increase in revenue and EBITDA margin. Continued biological problems increase the need for research into sustainable solutions, lifting the fish health subsegment. For feed, the increase may in parts be explained by their bargaining power coming from being a fairly consolidated subsegment.

Production

Both the egg and smolt production subsegments experienced some reductions in EBITDA margins in 2017. Going forward, it will be interesting to see how the post-smolt strategies will impact the smolt production subsegment.

The sea farming companies still struggle with biological challenges. Although their problems positively impact revenue in some of the other subsegments, the overall effect on the industry is negative. Once again the cost per kilogram has peaked for the production companies. Knowing that the cost per kilogram was in the mid-20s five years ago (with roughly the same volume harvested), we can only imagine the margins the industry could have enjoyed if the development in cost level had not been so extreme.

Distribution

After a rough last year in terms of margins – mostly due to unfavorable fixed-price contracts – the trading subsegment yielded positive margins in 2017. With salmon prices on a higher level in the 2016-17 period than in the 2015-16 period, we reckon that more favorable fixed-price contracts played its role in this development.

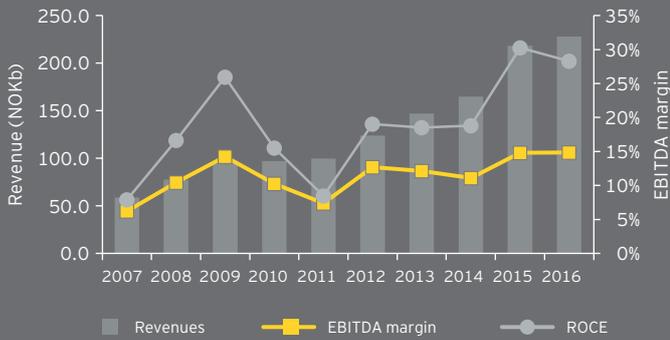
Slaughtering continued its double digit revenue growth, despite harvested volume going down. We observe that several new facilities are being built; at the same time, we keep an eye out for how the new processing vessels may impact the subsegment going forward.

Transportation on sea continues its super profit existence, which the increased M&A activity in this segment may have picked up on. With the current development of new types of vessels, such as harvesting vessels, for fish transportation, it will be interesting to follow this subsegment in the years to come.

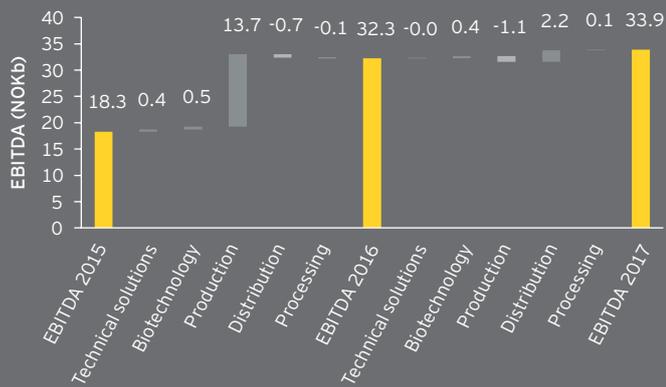
Processing

General growth in the processing segment is higher than the 4.5% growth in the industry as a whole. Processing is demanding and costly in Norway due to its labor-intensiveness. The Norwegian Government looked into a potential fee on export on unprocessed fish, but decided against it for now.

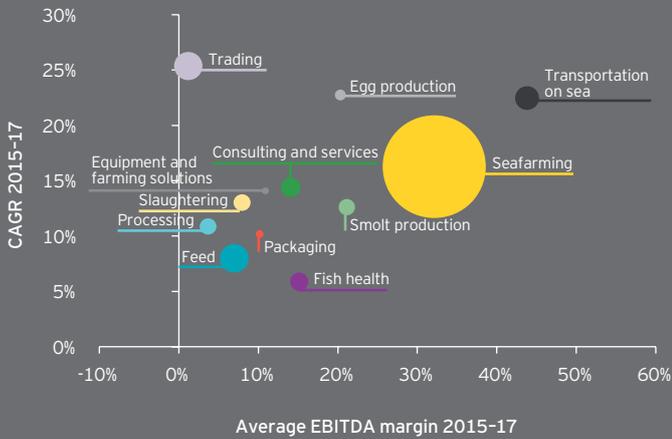
The Norwegian aquaculture industry, 2008-17



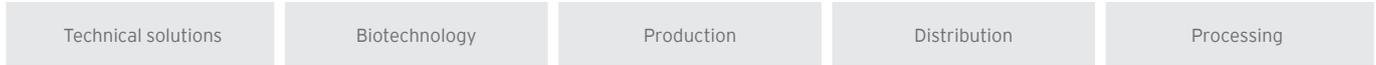
EBITDA bridge 2015-17



Bubble chart of the Norwegian aquaculture industry (bubble size by 2017 EBITDA)



Segment analysis



The value chain

When discussing the aquaculture industry, we primarily talk about the end product – salmon and trout. But there are many other stages and actors in the industry. The aquaculture value chain includes broodstock (egg and spawn), smolt, edible fish, fish processing (based on farmed fish), export and trade, and suppliers of goods and services.

For analytical purposes, the value chain and the value creation can be presented in different ways.

In particular, there are three groups of suppliers – namely technical solutions suppliers, biotechnology suppliers and distributors – which can be challenging to present in a common value chain. These three can also be perceived as diverted or parallel activities.

It is apparent that technical solutions suppliers are needed at every stage of the value chain (as we can see in the illustration on the right side). Hence, presenting them as just one segment can be misleading.

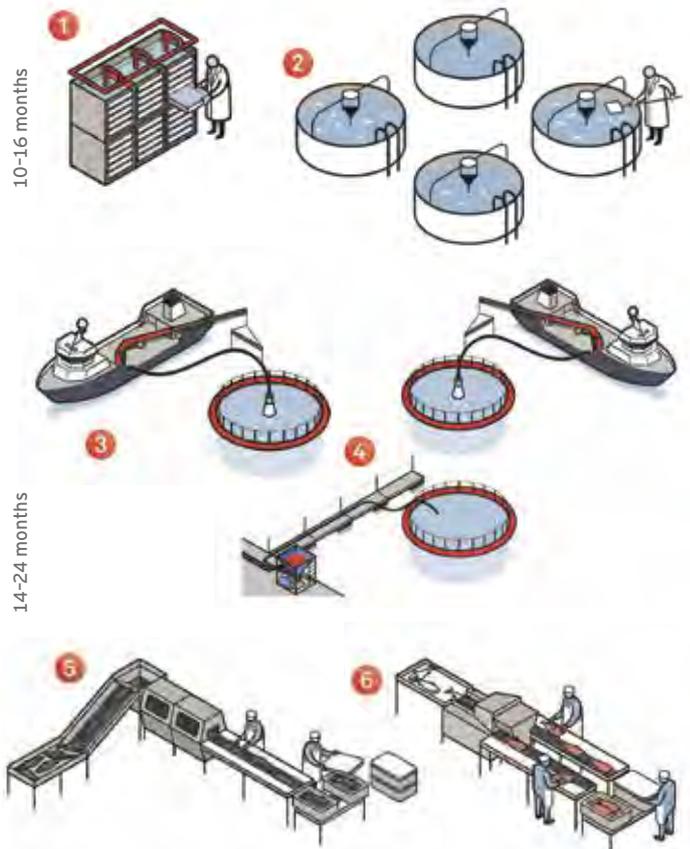
The abovementioned challenge is almost the same as that for the biotechnology suppliers, who deliver a wide range of products including feed, vaccines, medicines and cleaner fish. The common denominator for these products are the biological or pharmaceutical raw materials. The biotechnology manufacturers supply both egg and spawn producers, smolt producers and sea farmers.

The distribution phase is also complex. Sea transportation is needed for both transporting smolt from freshwater to cages in seawater, and transporting harvestable fish to processing plants. In addition, we have traders and exporters who purchase fish from sea farmers and provide it to the end-consumers, either slaughtered or processed.

The primary value-creating activity in the industry is production. The production cycle is about three years. During the first year, eggs are fertilized and the fish are grown to 100 grams in controlled freshwater environments. Subsequently, the fish are transported into seawater cages where they are grown to about four to five kilos. This growing process takes 14-24 months, depending on the seawater temperature.

Despite the methodological challenges, we have decided to present technical solutions, biotechnology and distribution together with production and processing in one single value chain. This is to make the analysis easier to follow and interpret.

The Atlantic salmon life or production cycle



Source: "Fig 6.2 The Atlantic salmon life and production cycle," *Salmon Farming Industry Handbook 2016*, Marine Harvest, www.hugin.info/209/R/2023118/751659.pdf, 23 June 2016, © 2016 Marine Harvest ASA.

Technical solutions



Exciting growth prospects

About the segment

The technical solutions segment includes companies with approximately 50% or more of its business linked to the aquaculture industry, but which are not directly linked to any of the other segments. Hence, there is a large variety of products and services provided by the companies in this segment.

The largest companies within this segment are producers of technical solutions and services specifically developed for the aquaculture industry, e.g., barges, well-boats, feeding systems, cages, mooring systems, sea lice treatments and software.

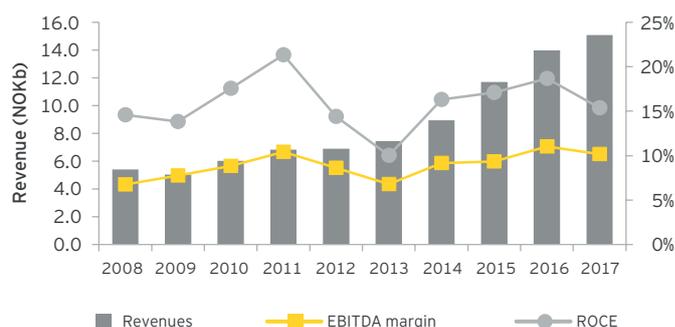
We have divided the segment into two subsegments:

1. Consulting and services
2. Equipment and farming solutions

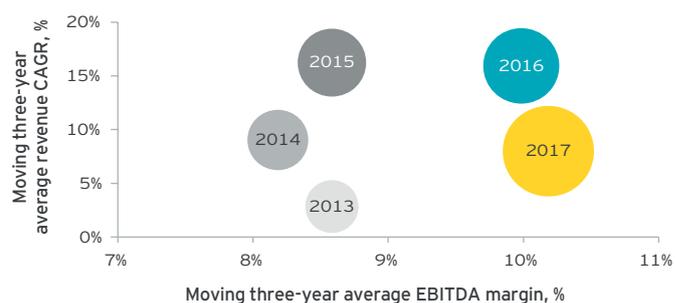
Segment highlights

- ▶ Revenue from technology solutions grew by 8% in 2017, which was less than that in the previous periods. In 2016 and 2015, the annual growth rates were 19% and 31%, respectively. Looking at the average over the last three years, 2015 represented a shift from revenue growth to profitability focus.
- ▶ M&A activity in the segment continues, with more than 20 registered transactions from 2016 and onward. The segment has the highest interest from financial investors, and offers the highest level of synergy to other industries when considering mergers.
- ▶ The segment has the highest churn rate and number of new companies emerging, implying relative low barriers of entry. Some companies are built on one idea that aims to improve niche parts of the industry.
- ▶ The medium-sized companies have had a stable share of total revenue in the range of 70%-75%, but a declining share of EBITDA. These companies have the advantages of a broader spectrum of products, enabling them to participate in the increasingly competitive broader market. However, as more niche solutions offer higher profitability, the apparent trend is conducting long-term research projects through the creation of close alliances with competitors. This provides top players with the opportunity to diversify their product lines in order to maintain strong market positions.
- ▶ In 2017, the Norwegian state fisheries closed the applications for development licenses, in which a total of 104 innovative new concepts were applied for, representing growth opportunities for this segment. Among them were proven technology solutions for post-smolt production by facilitating land-based recycling water treatment systems. In 2017, there were 17 finished plants, 10 ongoing and 12 planned for. We anticipate further growth in the segment going forward.

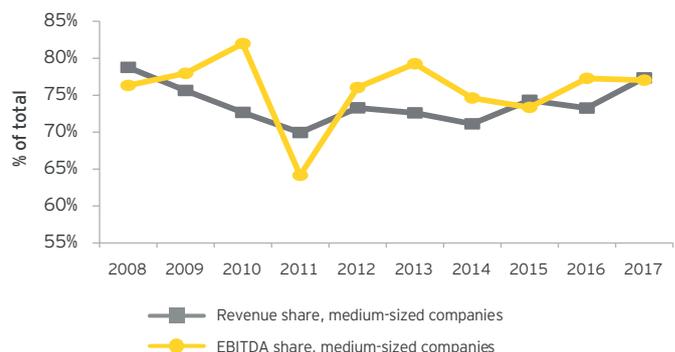
Key financials



Revenue and EBITDA development



Revenue and EBITDA shares per company size



Consulting and services

Equipment and farming solutions

High investments to facilitate growth

Consulting and services

The companies in this subsegment offer competency on various specializations across the whole value chain (asset light), and ongoing maintenance and services on production facilities with vessels and machinery.

The top five players

In 2017, the top five players made up over 45% of the total revenues, with an average EBITDA margin of 16%. Due to the high level of mergers (such as SINTEF Ocean), the number of companies in the subsegment decreased by two.

Premium valuations in M&A

Intangible assets, a proxy measurement of R&D and other capital, increased by 53% from 2016 to 2017 (CAGR 2013-17 21%), where goodwill constitutes approximately 35%. This implies premium valuation in M&A.

High annual growth to capital employed

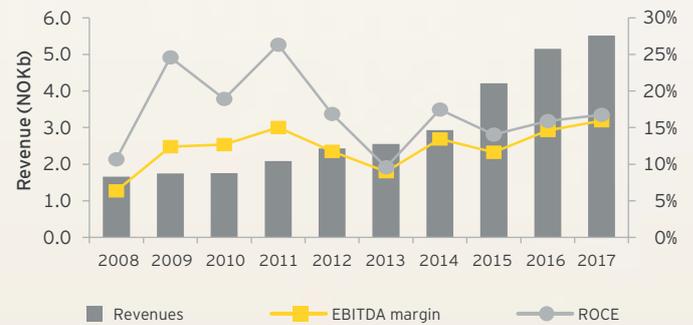
In regards to capital employed (CAPEM), this subsegment has seen an annual growth rate of 19% from 2013 to 2017, with the greatest growth spurt happening from 2015 to 2016 (41%). However,

CAPEM increased by only 5% in 2017, implying that the more asset-heavy companies are nearing market equilibrium.

Top five companies (2017 revenues)

1. SINTEF Ocean AS
2. Gildeskål Forskningsstasjon AS
3. MMC First Process AS
4. Moen Marin AS
5. Aas Mek Verksted AS

Key financials



Consulting and services

Equipment and farming solutions

Equipment and farming solutions

The companies in this subsegment offer a variety of equipment and solutions – from the largest players, such as AKVA Group offering nearly all kinds of equipment, to more niche smaller players.

High investments

Reduced revenue growth rates coupled with high investments in 2016 and 2017 resulted in a lower ROIC. The 2017 year on year increase of 20% in CAPEM is due to the increasing technology- and capital-intensiveness in the aquaculture industry, requiring the subsegment to invest in R&D and equipment to solve biological challenges, increase production and facilitate growth.

New business areas

New business areas are being explored, with a focus on post-smolt production, various forms of cage-based production, offshore and near-shore production, as well as land-based full cycle production. Various solutions are being tested, some more profitable and sustainable than others.

Popular M&A subsegment

The subsegment is popular within M&A, where the largest player Optimar was acquired by German Haniel in 2017. Seen from an

EV/EBITDA multiple perspective, valuation is increasing, and companies with high market share (measured in revenue) are rewarded with higher multiples.

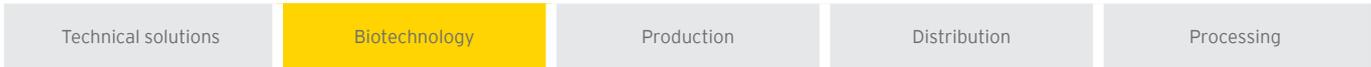
Top five companies (2017 revenues)

1. Optimar AS
2. AKVA Group ASA
3. Steinsvik AS
4. Aqualine AS
5. Egersund Net AS

Key financials



Biotechnology



Substantial growth on increased demand for sustainable expansion

About the segment

Biotechnology refers to the application of biological technologies in product research and development. Modern biotechnology has been used in aquaculture with regards to cases such as reproduction control, disease control, environmental management, feed production and biodiversity conservation. We have divided the segment into two subsegments:

- ▶ Fish health
- ▶ Feed

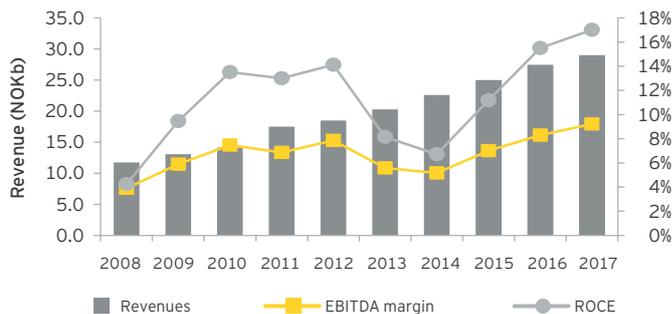
Segment highlights

Biotechnology not only enhances production to meet demand, but also ensures sustainability and response to environmental threats. Use of technology makes it possible to maintain healthy fish stocks at low prices by contributing to nutritious feed and effective disease prevention.

The application of biotechnology in the aquaculture industry is a relatively recent practice. However, the segment has seen a substantial growth both in terms of margins and revenues in the past decade. This could be explained by the following:

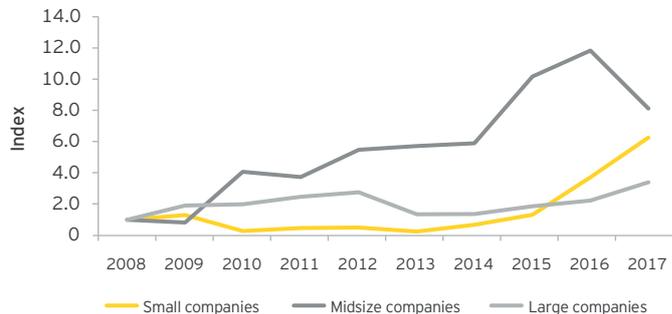
- ▶ Rapid growth in sea farming comes with challenges related to sustainability and limited resources.
- ▶ Shortage in marine raw materials as ingredients in fish feed calls for new solutions.
- ▶ Increased focus on animal and fish welfare sets focus on both nutritious feed and effective vaccinations.
- ▶ Fish lice and diseases set boundaries for further growth and the issue is closely followed by regulators. Significant investments have been made in past years to prevent and monitor fish diseases.

Key financials*

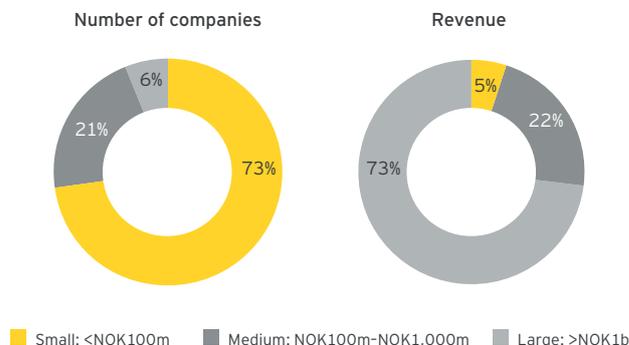


* Due to a change in reporting period, we have estimated both historical and current data for EWOS AS. Hence segment data for revenues, EBITDA margin and ROCE would not be comparable with last year's analysis.

Index-regulated EBITDA (per company) per category



Segment composition (2017)



“Solving our biological challenges is what will trigger the extremely great potential we have along our coast.”

Ole-Erik Lerøy
Chairman of Marine Harvest

Increased focus on fish health drives higher revenues and margins

Fish health

According to Ole-Erik Lerøy, Chairman of Marine Harvest, "Solving our biological challenges is what will trigger the extremely great potential we have along our coast."¹ Fish health is still a key risk factor affecting the fish farming industry, which has led to several universities now offering dedicated study programs on the topic.

However, the motives are not solely growth-driven. Most researchers consider that fish have the ability to sense fear, pain and discomfort. Farmed fish are included in the standard animal welfare legislation in Norway. Animal welfare could be defined as:

- ▶ The animals' biological function, health and development
- ▶ The animals' own experience, fear and pain
- ▶ A most natural life

Sea lice represents the biggest threat to Norwegian fish health, but there are also risks of diseases such as PD, heart and skeletal muscle inflammation (HSMI) and infectious salmon anemia (ISA). As of 14 October 2018,² 23 Norwegian localities report of currently having sea lice quantity above the limit, compared with a weekly average of about 31 over the past six years. The sea lice limit is normally defined as 0.5 mature female sea lice per fish. About 131 localities are currently affected or suspected to be affected by PD (compared with a weekly average of about 116 in the past six years), while four localities report to be affected by ISA (compared with a weekly average of about eight in the past six years).

Sea lice could lead to suboptimal salt balance and bacterial and fungi infections. The health problem in the sea farming phase and the development of drug resistance, call for new solutions, which partly led to the introduction of the Norwegian research and development licenses. These licenses have built-in incentives for different solutions for managing sea lice and disease challenges.

To conquer the battles of sea lice and diseases, a number of different concepts are under planning and testing, such as:

- ▶ Offshore open cage constructions
- ▶ Enclosed or semi-enclosed sheltered cages
- ▶ Antibacterial treatments

Not surprisingly, continued focus on fish health has led to further growth in revenues, ROCE and EBITDA margins, despite flattening harvested volumes and decreasing salmon prices. The segment is dominated by mid-sized and small companies, with no entities reporting >NOK1b in revenues for 2017. This could mean lower bargaining power relative to other segments. However, the EBITDA growth is driven by the smallest entities in 2017.

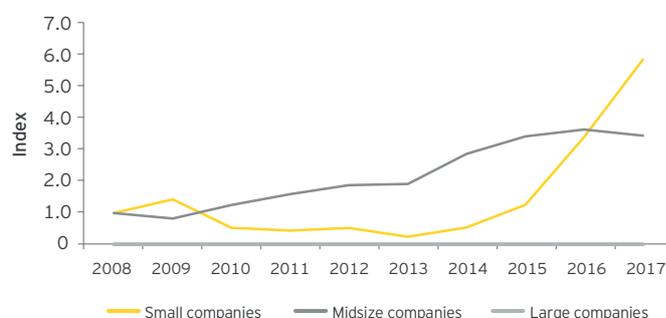
Top five companies (2017 revenues)

1. PHARMAQ AS
2. Europharma AS
3. Nofima AS
4. Veterinærmedisinsk Oppdragscenter AS
5. MSD Animal Health Norge AS

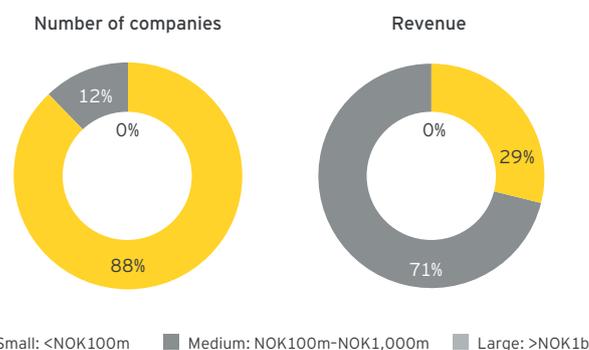
Key financials



Index-regulated EBITDA (per company) per category



Segment composition (2017)



1 "Fiskehelse er den nye jobbvinneren," Univeristy of Bergen website, www.uib.no/en/node/112190, accessed 23 October 2018.

2 "Uke 41," Barentswatch website, <https://www.barentswatch.no/fiskehelse/2018/41>, accessed 16th October 2018.

Continued revenue growth despite shortage of feed materials and more stable salmon prices

Feed

Feed represents about half of the total production cost for salmonids. The correct ingredients are vital for both the health and quality of farmed fish.

Conventional marine materials are, to a declining extent, used as ingredients in fish feed, and constitutes currently about 30% of the average Norwegian fish feed, with the remaining ingredients being mainly vegetable derivatives.¹

There have been a significant price increase and shortage of marine ingredients over the past years, leading the industry to shift toward vegetable materials. As a consequence, the long chain omega-3 fatty acid content in farmed salmon has declined. This is an issue both in regards to the end-customer's demand and the salmon's healthy growth.

Shortage of conventional marine materials and environmental issues constitute a threat to the further growth of the aquaculture industry. The industry is working to develop new sources of fish feed, which has led to multiple initiatives across the globe, as given below:

- ▶ Nord University in Norway has three ongoing science projects, aimed at utilizing algae in fish feed. Some companies have already started to offer algae-based omega-3 ingredients in their feed.
- ▶ Several institutions are trying to utilize insects as an alternative protein source.

Despite the shortage of feed materials, flattening harvested volumes and more stable salmon prices, we still see a continual growth in revenues, ROCE and EBITDA margin in the fish feed industry. This could partly be explained by the bargaining power:

- ▶ The segment is still largely consolidated with a composition mainly unchanged from last year.
- ▶ On the other hand, the index-regulated EBITDA shows growth for both small, mid-sized and large companies. Another explanation could thus be higher efficiency due to increased biological insight and knowledge in the industry.

Top five companies (2017 revenues)

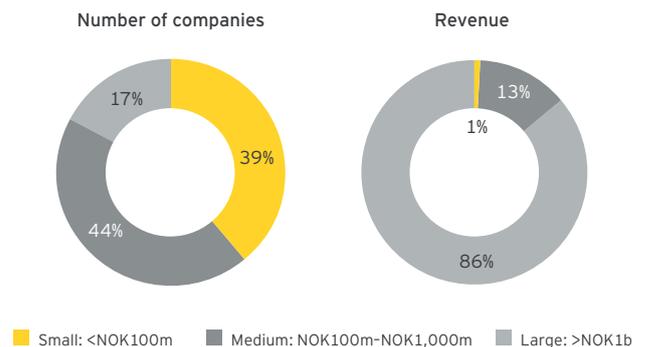
1. EWOS AS
2. Skretting AS
3. BioMar AS
4. Marine Harvest Fish Feed AS
5. Aker BioMarine Antarctic AS

Key financials*



* Due to a change in reporting period, we have estimated both historical and current data for EWOS AS. Hence segment data for revenues, EBITDA margin and ROCE would not be comparable with last year's analysis.

Segment composition (2017)



1 "Hva er i fôret til laksen?" Norwegian Seafood Council website, www.laksefakta.no/hva-spiser-laksen/hva-er-i-foret-til-laksen/, accessed 16 October 2018.

Conventional marine materials comprise 29% of the average Norwegian fish feed. A shortage of marine ingredients and increased prices have led to a shift toward vegetable materials. This leads to declined omega-3 content in farmed salmon, which has motivated the industry to explore new sources for fish feed, such as algae.





Production

Technical solutions

Biotechnology

Production

Distribution

Processing

With no major salmon price changes, the continued increase in operating expenses takes its toll on the segment's margins

About the segment

The production segment consists of the full chain of handlers of live fish. The cycle starts with the breeding and fertilization of eggs, through nurturing of fry to smoltification, and finally putting to sea and growing to harvest size.

To capture the various stages of the production cycle, we divide this segment into three subsegments:

- ▶ Egg and spawn production
- ▶ Smolt production
- ▶ Sea farming

As quality in the first stages of the cycle is crucial to successful sea farming, there has been a large degree of vertical integration in this segment; the sea farming companies expand into upstream activities to facilitate access and high quality both in the broodstock or eggs and in the handling and vaccination of fry during the freshwater stage.

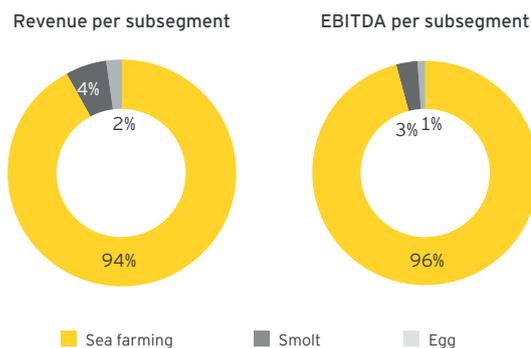
The segment in total consists of about 200 companies.* However, relatively small number of companies account for the majority of the value creation. In 2017, the 10 largest companies had a market share of about 50%, both in terms of revenue and EBITDA.

Segment highlights

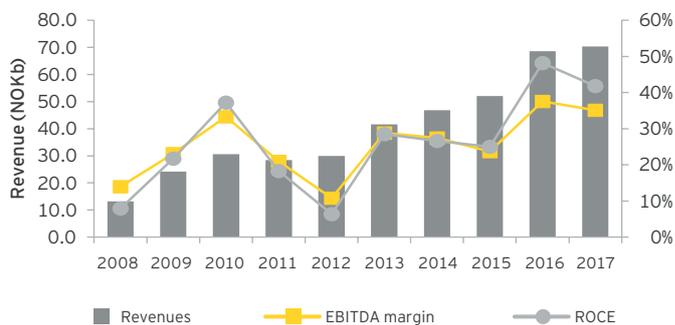
- ▶ The segment has experienced a substantial growth from 2008 to 2017, with a notable acceleration from 2013, driven by a significant increase in prices and favorable currency exchange rates for exports.
- ▶ Aggregated revenue in the segment increased by 3% from 2016 to 2017 as the volume remained relatively stable and the prices continued to be on an all-time high level in a historical perspective.
- ▶ The sea farming subsegment is the main contributor to the segment with a share of over 94%, both in terms of revenue and EBITDA.
- ▶ While the segment has been highly profitable in the last years, previous periods fall short compared with the all-time high prices and profits of 2016 and 2017.
- ▶ The increased profitability and increasing demand for various supporting services have made the sector a major contributor to value and job creation along the Norwegian coast.

- ▶ There is an underlying concern with the sector's increasing challenges related to sea lice and other environmental issues. These challenges materialize in higher cost, and are the main reasons for the small decline we see in EBITDA from 2016 to 2017. These challenges have plateaued the growth in production volumes in the past few years, paradoxically driving up prices and profits in the short term. In the long term, however, there is a need for a sustainable growth in volume and how to achieve this. Facing biological challenges and diseases is one of the major concerns the industry faces going forward.

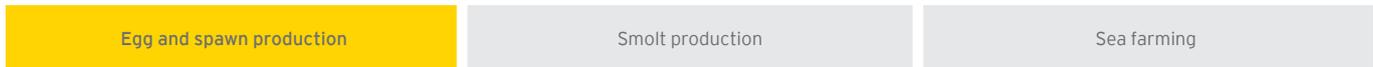
Segment composition (2017)



Key financials







Egg and spawn production

The companies in this subsegment are specialized in spawning and egg production. Their primary product is fertilized fry. In addition, these companies often sell other products, such as fry, smolt and broodstock, as a result of the breeding business.

Many of these companies also cross over into smolt production and even sea farming on a smaller scale. Some of the companies operate on a stand-alone basis, while others are owned fully or partially by sea farmers or other industry players.

Research and development

As the industry faces increasing production challenges related to sea lice and diseases, a lot of effort is put into research and development (R&D) in this subsegment. These companies work extensively to develop knowledge in areas such as breeding, spawn production and disease control. They aim to strengthen the breeding material and also utilize genetic technology to improve resistance to diseases and enhance growth rate.

Revenue growth

The subsegment has experienced a strong revenue growth over the last 10 years. Much of the revenue growth in 2016 is attributed to a sharp increase in revenue from the sale of mature salmon grown on the egg producers' own licenses, as opposed to egg and spawn. In 2017, we see stable revenues when compared with 2016.

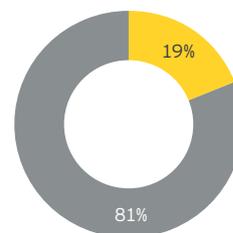
Margin development

The EBITDA margin has a 10-year average of 20.7%. Primarily driven by increased prices, the EBITDA margin surged to a peak of 26.7% in 2016. In 2017, however, the margin fell to 21.0% due to increased costs, while revenues plateaued.

Top five companies (2017 revenues)

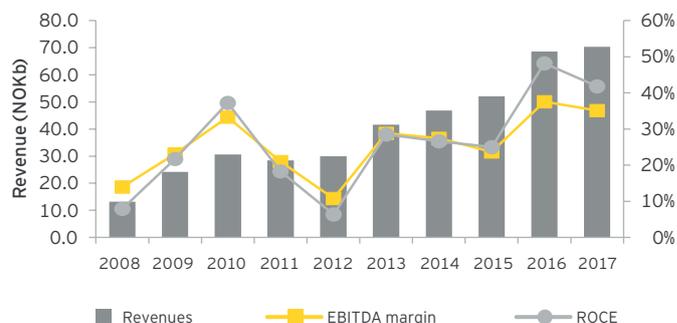
1. AquaGen AS
2. Salmobreed AS
3. Nordnorsk Stamfisk AS
4. Salten Stamfisk AS
5. Svanøy Havbruk AS

Top five companies: share of subsegment revenue



■ Rest ■ 5 largest companies

Key financials







Smolt production

The smolt producers operate in the middle of the production cycle. They cover the process from fertilization of eggs to when mature fish are ready to be put to sea. The biological process that makes young fish ready for the transition from freshwater to seawater is called smoltification, and fish that has undergone this process is called a smolt. This is the primary product of this subsegment.

By nature, where feed and temperature are limited, this process usually takes two to four years. In specialized fish farm where conditions are optimized, the process is shortened and typically takes about 6-12 months.

The smolt-producing companies have experienced a continual revenue growth over the last years. At the same time, the EBITDA margin has remained relatively stable.

Owned by sea farming companies

All the top five companies by revenue in this subsegment are fully or partially owned by sea farming companies. There is a reason to believe that the high degree of cross-ownership and intergroup trade, along with other long-term business relations, contribute to the stable revenue growth and EBITDA margin observed. Without direct insight into bilateral purchases and contracts, however, this is difficult to verify.

Post-smolt production

Recently, the production of larger smolts (100-200 grams) and even plans to produce smolts of up to 1kg have become more common. Such larger smolts are called post-smolt and the main goal is to shorten the time in sea, which is where the fish are exposed to the highest risk in the production cycle.

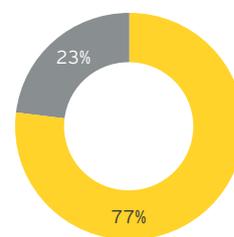
RAS technology

As a result of the technological development in this industry, we see an increase in land-based smolt facilities based on the RAS technology. This technology is a way of recirculating water in the fish tanks, making it possible to produce large quanta of fish with a relatively low water consumption. Most of the land-based facilities that are built today apply this technology.

Top five companies (2017 revenues)

1. SalMar Settefisk AS
2. Nordlaks Smolt AS
3. Laksefjord AS
4. Helgeland Smolt AS
5. AS Sævareid Fiskeanlegg

Top five companies: share of subsegment revenue



■ Rest ■ 5 largest companies

Key financials



■ Revenues ■ EBITDA margin ● ROCE

Egg and spawn production

Smolt production

Sea farming

Sea farming

Sea farming is the last part of the production process where the fish are put into seawater and grown until harvest size (about 4-5kg). This process takes about 14-24 months. This is, by far, the largest subsegment in the aquaculture sector.

Favorable salmon price yields high EBITDA margins

With an EBITDA margin of over 35% in the last two years, this subsegment has been experiencing record-high profitability. The minor reduction in EBITDA per kg from 2016 to 2017 is due to slightly reduced average price and increasing costs.

The large profits in this subsegment in recent years have been driven by increased demand combined with a slight increase in harvest volumes. As such, we have seen an increase in the annual average price for farmed Atlantic salmon by over 50% from 2013 to 2017. The increase is also partly driven by the weakening of NOK vs. EUR in the period.

Cost per kilogram increase

The implied cost per kilogram has increased significantly over the last years due to several factors such as diseases, extreme weather, illnesses and other operational challenges. These challenges have also led to stagnating volumes. In the period of 2013-17, the increase in cost per kilogram was about 50%, while the corresponding increase in harvested volume was only 4%. In the bottom right graph, we have illustrated the development using our overall database numbers for the segment.

Two major contributions to the rise in costs in recent years are increase in the price of feed and costs related to health issues, primarily sea lice. Sea lice contributes to the rise in cost through increased use of lice treatments, specialized feed, cleaner fish, increased use of service boats as well as investments in R&D. There is also less-visible costs related to starvation, delayed growth and forced early harvest, curtailing production plans and harvest volumes. The cost in relation to the mitigation and treatment of lice has increased from about NOK1/kg in 2011 to NOK4.25/kg in 2016.² This is the major reason for the increase in OPEX we see over the past years.

Stagnating fish volume

The stagnating volumes over the last few years, together with increased demand, have led to a surge in price and profits. However, stagnating volumes, together with increasing costs, are unfavorable developments in the long run. High prices can turn away consumers, reversing the trend of increased demand. On the other hand, high prices spike investments, both in alternative sea farming solutions and new geographic regions with the possibility of increased long-term supply. Land-based facilities as well as closed facilities at sea are examples of such innovative farming solutions. Refer to the land-based section for a closer look into this development.

Top five companies (2017 revenues)

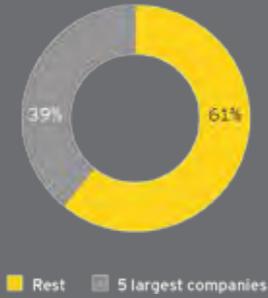
1. Marine Harvest Norway AS
2. SalMar Farming AS
3. Lerøy Midt AS
4. Cermaq Norway AS
5. Salmar Nord AS

1 Directorate of Fisheries (www.fiskedir.no). Volume equals sale of slaughtered fish, weight in metric ton round weight (WFE).

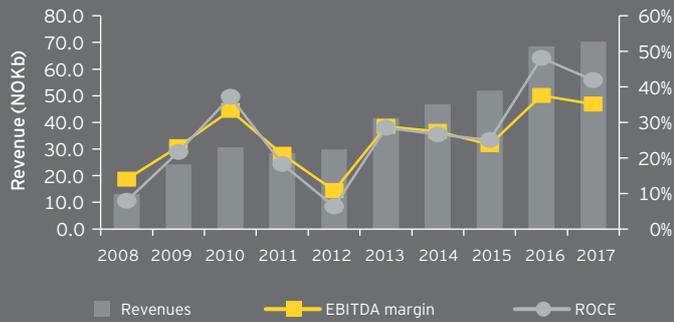
NOK per kilogram is calculated as
$$\frac{\text{Value of slaughtered fish}}{\text{Volume WFE}}$$

2 Source: "Kostnadsutvikling i lakseoppdrett," Nofima AS, <https://nofimaas.sharepoint.com/sites/public/Cristin/Rapport%2024-2017.pdf?slid=40fc9f9e-b008-7000-12b2-44d6264d5792>, accessed 7. November 2018

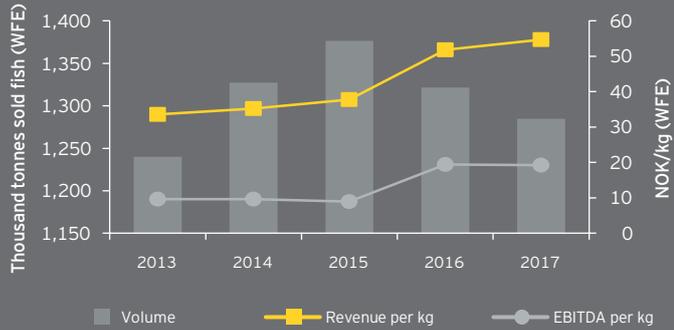
Top five companies: share of subsegment revenue



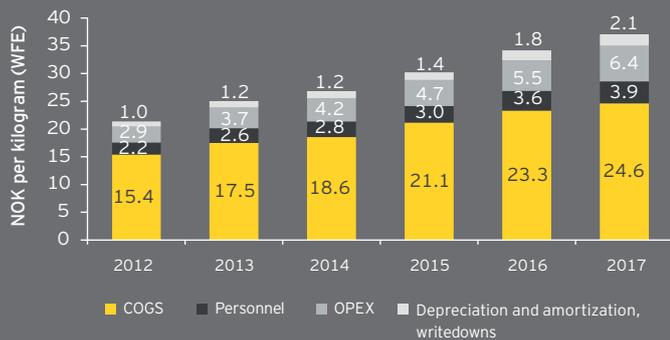
Key financials



Key financials



Cost components per kilogram fish sold (WFE)





Distribution

Technical solutions

Biotechnology

Production

Distribution

Processing

Yet another record year in terms of revenue, with increased margins and ROCE

Segment highlights

Increased revenues

- ▶ The combined revenue for the distribution segment was NOK90.7b in 2017, up by 4.7% from 2016. The trading subsegment has been the biggest contributor to the combined revenue – 95% of the revenue – in 2017.
- ▶ The revenue grew despite a 3.9% decrease in average salmon price (Fish Pool Index) from 2016 to 2017, and a 1.4% decrease in the volume of sold slaughtered fish.¹ This indicates that the trading companies have managed to achieve higher prices on their fixed-price customer contacts compared with 2016.

Norwegian exports: all-time high

- ▶ The year 2017 was another record year for Norwegian salmon exports, which saw an increase in monetary value by 5.3% from 2016 to NOK64.6b and an increase in volume sold by 2.4% from 2016 to 1.2 million tons of salmon.² In 2017, 73% of the Norwegian salmon (measured in product weight) were exported to the EU market, which is equivalent to a decline of 2% from the previous year.¹ This decline in salmon consumption in the EU markets can be explained by the increased salmon prices.² However, exports to other markets are booming; for instance, the US and Japan increased their import of Norwegian salmon by 26% and 31%, respectively, in 2017, when compared with those of 2016.

Positive development in EBITDA margin and ROCE

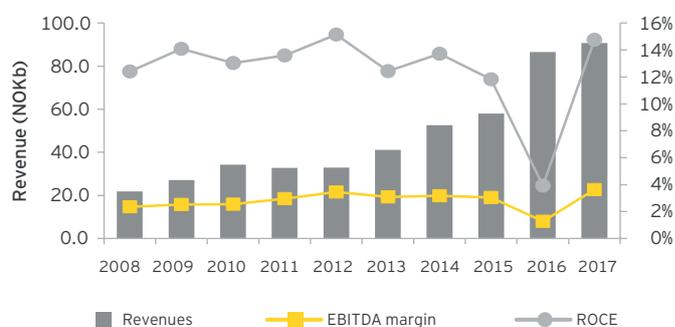
- ▶ The EBITDA margin in the distribution segment reached an all-time high of 3.6% in 2017, up from 1.3% in 2016. The positive development was driven by the 2.2% increase in EBITDA margin in the trading subsegment. The slaughtering subsegment had a stable EBITDA margin from 2016 to 2017 (-0.1%), while the transportation on sea subsegment experienced a negative EBITDA development, from 11.7% in 2016 down to 10.2% in 2017.
- ▶ ROCE increased from 3.9% in 2016 to 14.8% in 2017, primarily due to the improved EBIT in trading following higher contract prices. The improved EBIT in trading in 2017, when compared with 2016, is influenced by some of the largest players in the trading segment suffering under long-term contracts in 2016. They achieved significantly lower prices under these contracts than spot prices in the market.

About the segment

The distribution segment includes companies offering services within the subsegments:

- ▶ Trading
- ▶ Slaughtering
- ▶ Transportation on sea

Key financials



Norwegian salmon exports



Source: Directorate of Fisheries.

¹ "Key figures from aquaculture industry 2017," Directorate of Fisheries, 2018.

² "Seafood exports worth record-high NOK94.5 billion in 2017," Norwegian Seafood Council, 8 January 2018.

Trading

Slaughtering

Transportation on sea

Trading companies

Norwegian-registered trading companies for farmed salmon and trout include both independent trading companies and trading companies owned by salmon producers that have organized this activity in separate companies. Salmon producers that include trading as an integrated part of their production companies are not included in the analysis, with the exception of Norway Royal Salmon ASA.

Revenue growth

The combined revenue in this subsegment increased by 3.9% from 2016 to 2017. Factors contributing to the revenue growth was the decrease in sold volume by 1.4% coupled with the strong increase in demand worldwide. As a result, the trading companies achieved higher prices in the end-market. However, the revenue growth in 2017 was far below the 21.6% growth experienced from 2015 to 2016 (disregarding Marine Harvest Markets Norway AS since it was established as a separate company by Marine Harvest in 2016), primarily driven by the 3.9% decrease in average salmon price (Fish Pool Index) in 2017, when compared with that of 2016.

Increased EBITDA margin and ROCE

The trading subsegment is a low-margin business; the EBITDA margin fluctuated between 1.4% and 2.0% in the period from 2008 to 2015; and in 2016, it sank to -0.02%, the first time the margin was negative. In 2017, however, the EBITDA margin rose to 2.1%, making it the highest margin achieved in the past 10 years. The main driver for the increase in EBITDA margin was the increase in gross margin from 4.1% in 2016 to 8.2% in 2017. The margin increased despite an increase in both personnel expense and other operating expenses.

ROCE increased from -1.6% in 2016 to 19.4% in 2017, mainly due to the significant increase in EBIT. As explained in the last section of the previous page, an important reason for the fluctuations in the EBITDA margin and ROCE was that some of the largest players in the trading segment were hampered by long-term fixed price contracts in 2016.

Norwegian exports

Poland and France remain the largest markets for Norwegian salmon in 2017, measured in value. However, these two markets are among the EU markets that are experiencing declining consumption due to the increased salmon prices. Conversely, other markets are booming; exports of Norwegian salmon to the US and Japan increased by 26% and 31%, respectively, in 2017, when compared with that of 2016.¹

Another fast-growing market is China. In 2017, China lifted the restrictions on Norwegian salmon imports, except for exports from the provinces Sør-Trøndelag, Troms and Nordland due to the presence of the salmon disease, ILA. As a result, exports to China increased by 595% in the first half of 2018, compared with that in the same period in 2017.² China eventually lifted the restrictions on Norwegian salmon imports from the remaining three provinces in the middle of 2018.³

Top five companies (2017 revenues)

1. Lerøy Seafood AS
2. Marine Harvest Markets Norway AS⁴
3. SalMar AS
4. Ocean Quality AS
5. Norway Royal Salmon ASA

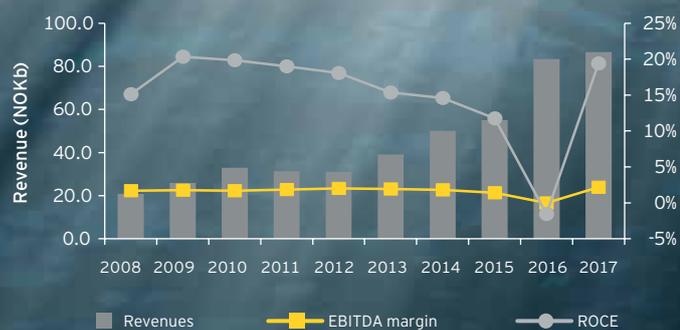
1 "Key figures from aquaculture industry 2017," Directorate of Fisheries, 2018.

2 "Stor muligheter for norsk sjømat i Kina," Norwegian Seafood Council, 28 September 2018.

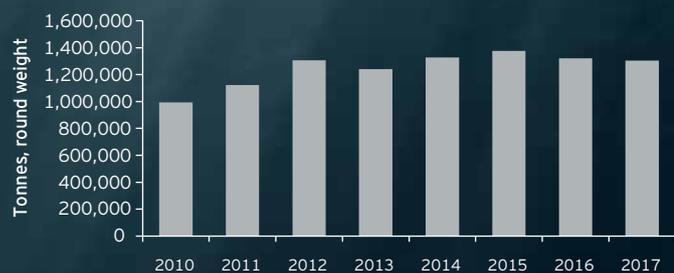
3 Berglihn, H., "Sjømatrådet venter milliardeffekt av Kina-åpning," Dagens Næringsliv, 5 July 2018.

4 Recalculated from EUR to NOK

Key financials

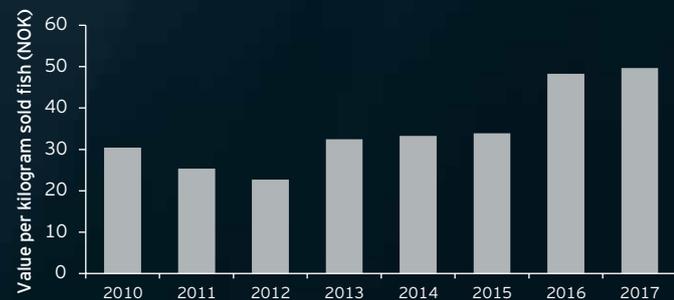


Sold volumes of slaughtered fish



Source: Directorate of Fisheries.

Value per kilogram of sold volumes of slaughtered fish



Source: Directorate of Fisheries.



Trading

Slaughtering

Transportation on sea

Slaughtering companies

The companies in this subsegment offer slaughtering services. Similar to trading, slaughtering is offered by both independent suppliers and salmon producers as an integrated part of their value chain. This analysis includes only slaughtering businesses that are organized in separate legal entities, and it will, therefore, underestimate the total size of the subsegment.

Increased revenues and decline in slaughtered volume

Despite a 1.4% decrease in slaughtered volume, the revenues in the subsegment reached an all-time high of NOK1.07b in 2017 – an increase of 11% from that of 2016. This implies either that the segment has increased its prices or that the volume for slaughtering businesses organized in separate legal entities has increased on the expense of slaughtering plants owned and run by salmon producers.

The reduction in slaughtered volume, coupled with the increase in the number of approved slaughtering plants from 58 to 59, resulted in a 9.3% reduction in the average volume slaughtered per slaughtering plant.

A key driver of revenues in the slaughtering segment is fresh farmed fish, a product whose supply and timing of supply is very vulnerable to sea lice, diseases and other environmental factors.

Despite the lowest overall levels of sea lice in 2017 in the past six years, the mortality rate of fresh farmed fish remains high. In 2017, the estimated loss of salmon in production stood at 54 million (14.2% of average inventory of live salmon),¹ and sea lice is still considered to be a major health issue at salmon farms.

Decrease in EBITDA margin and ROCE

The EBITDA margin dropped from 11.7% in 2016 to 10.2% in 2017. This drop can be explained by the decline in gross margin from 58.1% in 2016 to 55.6% in 2017. ROCE decreased from 11.2% in 2016 to 9.6% in 2017, due to a 8.1% decline in EBIT and a 6.9% increase in capital employed.

Large investments

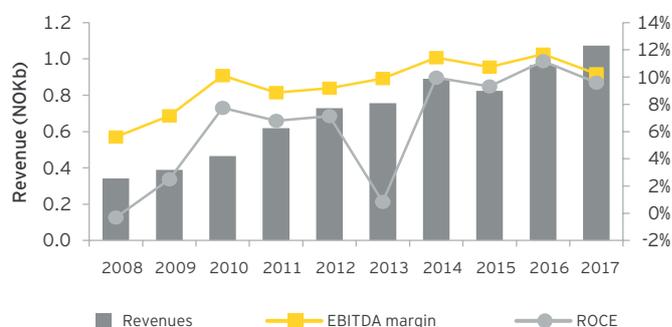
In 2018, Hav Line Vessels AS launched the world's first floating slaughtering facility. The entrance of slaughtering vessels would likely influence the slaughtering segment as well as the well-boat industry.

Many new slaughtering and processing plants have been built or are in the process of being built. For example, SalMar is planning to build a new plant in Lenvik municipality.² Furthermore, Cermaq opened a new plant in Steigen in September 2018³ and Nils Williksen AS is opening their new plant in Rørvik in the beginning of 2019⁴. The high activity level may indicate that the industry is optimistic with regards to volume growth; but also mirrors the trend whereby companies shut down old slaughtering facilities and replace them with larger, more efficient facilities.

Top five companies (2017 revenues)

1. Pure Norwegian Seafood AS
2. Slakteriet AS
3. Viking Fjord AS
4. Salten N950 AS
5. Viking Øksnes AS

Key financials



Development in slaughtered volume and number of plants



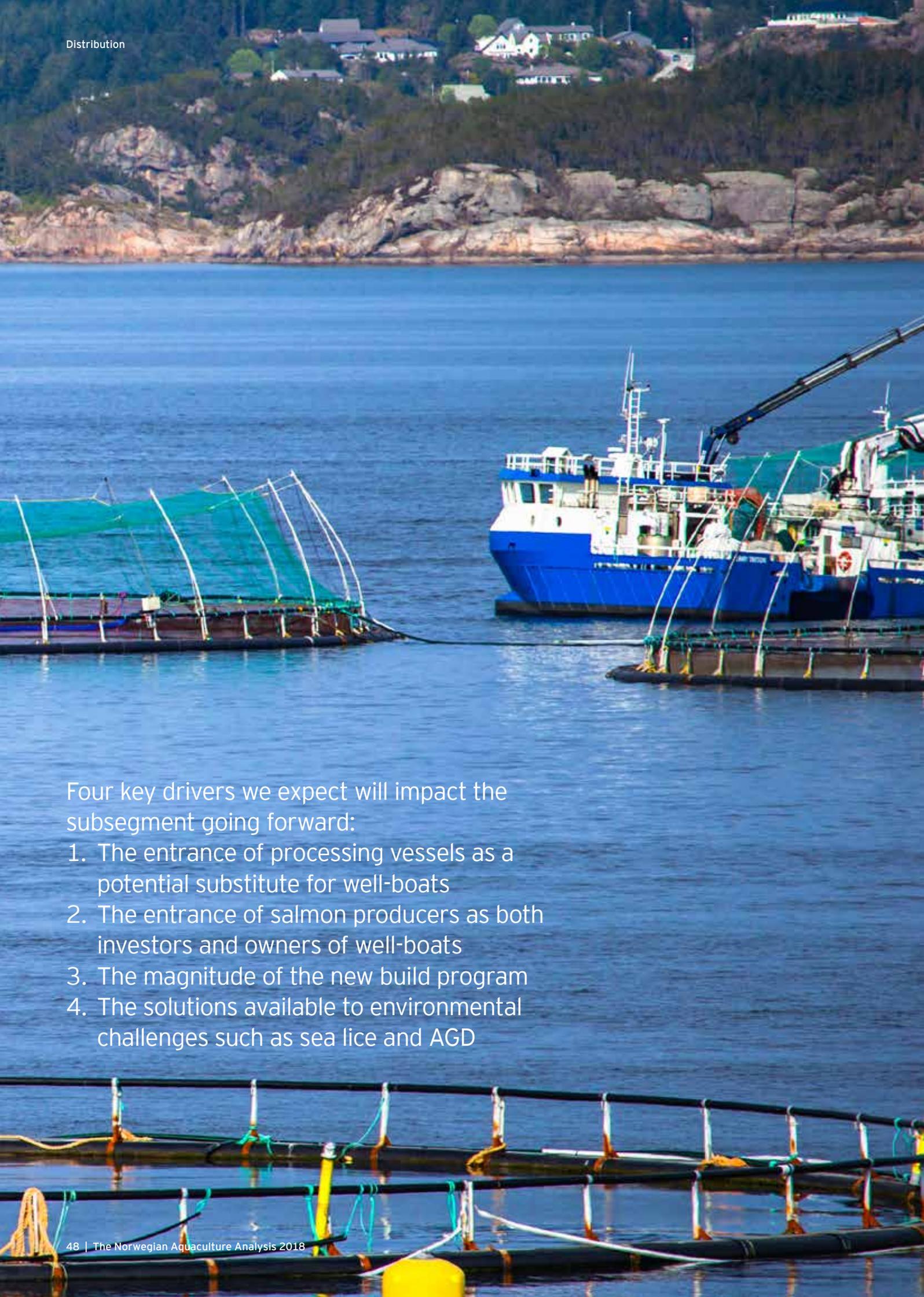
Source: The Norwegian Food Safety Authority.

1 "Key figures from aquaculture industry 2017," Directorate of Fisheries, 2018.

2 Strømøy, T., "SalMar bygger stort slakteri på Senja," Froya.no, 25 August 2018.

3 Berge, A., "I dag åpnet Cermaq sitt nye slakteri i Steigen: Kan spore hver enkelt fisk," iLaks.no, 4 September 2018.

4 "Williksen øker kapasiteten med nytt slakteri," iLaks.no, 6 March 2018.



Four key drivers we expect will impact the subsegment going forward:

1. The entrance of processing vessels as a potential substitute for well-boats
2. The entrance of salmon producers as both investors and owners of well-boats
3. The magnitude of the new build program
4. The solutions available to environmental challenges such as sea lice and AGD

Trading

Slaughtering

Transportation on sea

Transportation on sea

The subsegment consists of well-boat companies transporting smolt to sea farms, and live salmon and trout from farming cages to harvesting and processing plants. The segment also includes companies that focus on freight of feed. Most of these companies also offer sea lice and amoebic gill disease (AGD) treatment onboard well-boats, as well as services such as sorting and counting of fish.

Substantial growth in revenues

Aligned with the growth of the Norwegian salmon farming industry, the well-boat industry has developed and is becoming an increasingly important part of the industry. Due to continued high activity, the well-boat industry had a substantial growth of 31% in revenue from 2016 to 2017, reaching an all-time high of NOK3.04b. This growth is mainly driven by the increased treatment of AGD and sea lice. In 2017, the five largest players in the industry accounted for 79.5% of the subsegment's revenue.

EBITDA margin and ROCE

The EBITDA margin remained the same in 2017 as in 2016 at 43.6% – meaning that the costs have developed at the same pace as revenues. Despite a 29.3% increase in EBIT from 2016 to 2017, ROCE decreased by 4.4% in 2017 and ended at 10.4%. The slight reduction was due to the increase in capital employed, up by 35.3% from 2016 due to investments in new vessels.

The industry keeps investing heavily

The industry is an attractive and high-margin business, and is investing rapidly in larger and more technologically advanced vessels. Between the years 2000 and 2017, 51 boats were built. In 2017 alone, six new well-boats were launched.¹ The new build program continues in 2018, including for Sølvrans that are receiving four new well-boats in 2019.² DESS Aquaculture Shipping has ordered four new vessels; two that will be delivered in 2019 and two in 2020.³ In total, we have identified 15 well-boats and six harvesting vessels planned for delivery in the 2018-20 period. The increased capacity will put more pressure on the industry margin going forward. Due to the high levels of activity, the number of employees rose by 17% in 2017 from 2016, with 822 employees working in the industry by end of the year.

Several large acquisitions

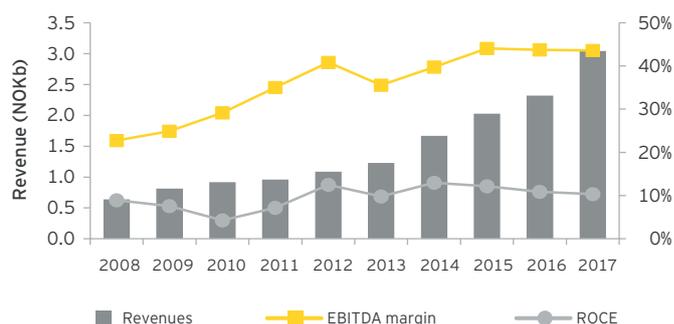
The transportation on sea subsegment has experienced several large acquisitions in 2018. In September, Antin Infrastructure

Partners, a private equity firm, announced the acquisition of Sølvrans. Another acquisition that was announced in October 2018 was AquaShip's acquisition of the feed transporting company Artic Shipping. We expect more consolidations in this subsegment going forward.

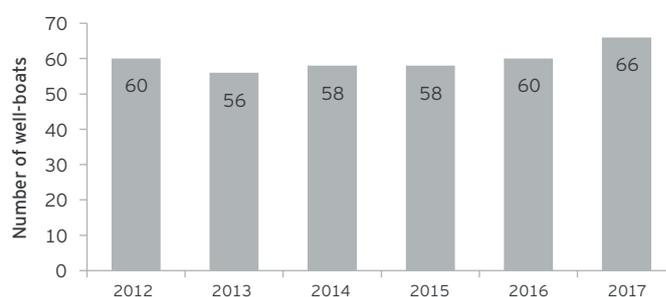
Top five companies (2017 revenues)

1. Rostein AS
2. Sølvrans Rederi AS⁴
3. Norsk Fisketransport AS
4. Frøy Rederi AS
5. Oppdretternes Miljøservice AS

Key financials



Number of well-boats*



* Based on the number of members in Fraktestartøyenes Rederiforening.

1 "Key figures from aquaculture industry 2017," Directorate of Fisheries, 2018. Based on numbers in Association of cargo freighters.

2 Soltveit, T., "Sølvrans revenue jumps £30.8m," Fishfarmingexperts.com, 13 August 2018.

3 "DESS Aquaculture Shipping Chooses Optimarin for Newbuild Wellboats," The Maritime Executive, 10 July 2018.

4 After the merge of Bømlo Brønnbåtsservice and Sølvrans in 2017, Sølvrans climbed from being the third largest player in 2016 to the second largest player in 2017.

Processing

Technical solutions | Biotechnology | Production | Distribution | **Processing**

In the National Budget of 2018, the Norwegian Government concluded to not propose a fee per kilogram for exported unprocessed fish

About the segment

The processing segment includes companies offering services primarily related to secondary processing and companies producing different types of packaging.

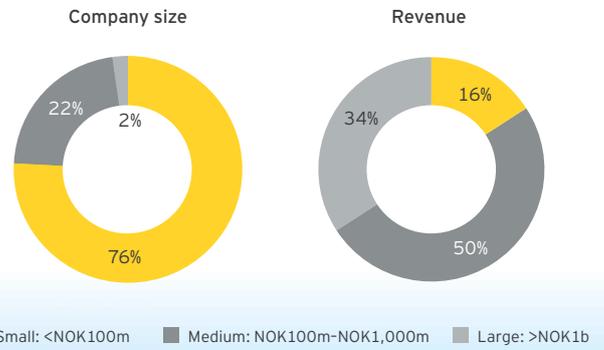
We have divided the segment into two subsegments:

- Processing
- Packaging

Key financials



Segment composition (2017)



Processing

Packaging

Processing

For the purpose of this report, we distinguish between primary and secondary processing. Primary processing is defined as slaughtering and gutting, while secondary processing is filleting, filet trimming, portioning, smoking and the like. In this section, we will take a closer look at the secondary processing, as primary processing is mainly covered under the presentation of the slaughtering subsegment. Secondary processing leads to products normally referred to as value-added products (VAP).

Processing is offered both by individual entities and salmon producers as a part of their value chain. However, our analysis includes only separate legal entities and the analysis, therefore, underestimates the total size of the subsegment.

Labor-intensive and costly

Secondary processing is demanding and costly in Norway. The processes are relatively labor-intensive. It is also demanding to automate the processes sufficiently to ensure that the high labor costs are offset. There has been a decline in the number of companies in the segment from 121 in 2016 to 115 in 2017. The five largest entities represented only 47% of total revenue.

Top five companies (2017 revenues)

1. Sekkingstad AS
2. Hofseth AS
3. Nils Williksen AS
4. North Sea Seafood AS
5. Sjømathuset AS

Key financials





Only 10% of the Norwegian salmon were processed in Norway in 2017. The subsegment is, to an increasing extent, being affected by “new” ways of processing fish. The industry is closely following how the competition from the new slaughtering vessel “Norwegian Gannet” from Hav Line might impact the market in the longer term. Slaughtering and gutting will be done on the vessel and the salmon will be delivered directly to Hirtshals for further processing there, potentially impacting the market for well-boats, slaughterhouses and carriers in Norway.

Fee per kilogram on exported unprocessed fish

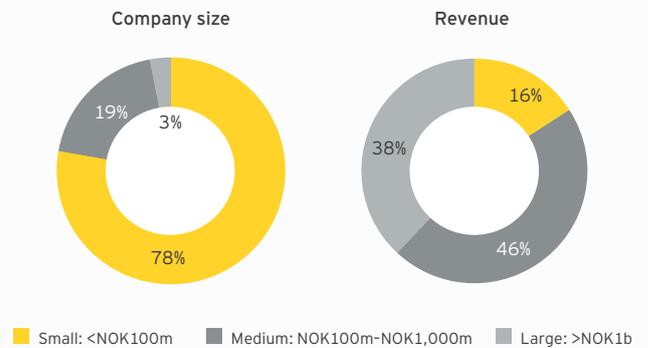
In the National Budget 2018, the Norwegian Government was asked to investigate if there should be a fee per kilogram of exported unprocessed fish. A fee for unprocessed fish would benefit the companies who choose to process the fish in Norway, thus claiming that the fee will support the Norwegian fish processing industry. However, the Government’s conclusion was not to suggest such a fee for the aquaculture segment.

Reduced revenue growth

The segment had a revenue growth from 2016 to 2017 of NOK882m (+5.6%). The revenue growth has not been this low since 2012,

when there was a decline in revenue. The lower revenue growth might be due to more stable salmon prices during the period 2016–17. However, there has been an increase in EBITDA margin of 0.7ppt. The gross margin has been stable, while both personnel expenses and operating expenses in percentage of revenues have decreased.

Segment composition (2017)





Packaging

The packaging subsegment consists of small- to medium-sized companies producing and providing all sorts of packaging and wrappings for fish and feed. While the companies generally produce for the aquaculture industry, a vast share also delivers products to other industries. Due to this, the subsegment is partly overstated in absolute terms.

Revenue growth but small hit to EBITDA margin

The subsegment has an increase in revenue of NOK107m (+7.1%) compared with 2016. The EBITDA margin has, however, decreased by 1.4ppt. to 8.9%.

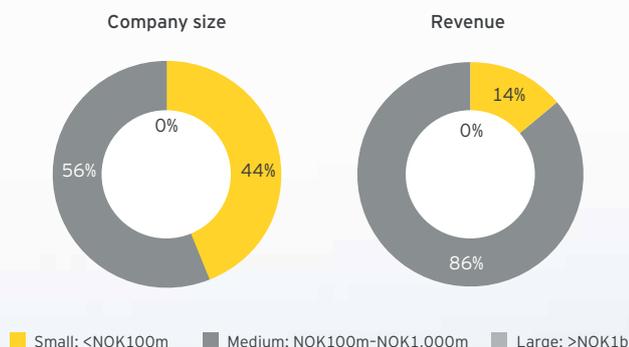
Low bargaining power

For the longest possible shelf life of the fish, packaging is important. However, as the segment is quite small and with no large companies dominating the segment, the bargaining power is probably limited for the segment. Further, growth and profitability in this segment are first and foremost driven by volume and not higher salmon prices.

Top five companies (2017 revenues)

1. Vartdal Plastindustri AS
2. Bewi Produkter AS
3. A/S Nesseplast
4. Accon AS
5. Strømbergs Plast AS

Segment composition (2017)



Key financials



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EYG no. 012660-18GbI
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