

# Sustainable seafood

The Marine  
Harvest way



marineharvest

*Will there be enough seafood  
for my grandchildren?*

*How will fish be farmed  
in the future?*

*How does Marine Harvest  
reduce environmental  
impacts?*

*How is profitability and  
environmental responsibility  
linked?*



THE GLOBAL MARKET LEADER

**Number 1**  
farmed salmon producer

STRIVING FOR IMPROVEMENT  
IN EVERYTHING WE DO

**21 countries**  
with about 4,800 employees

THE MOST COMPREHENSIVE  
SUPPLY CHAIN IN AQUACULTURE

**4m meals**  
as salmon portions per day

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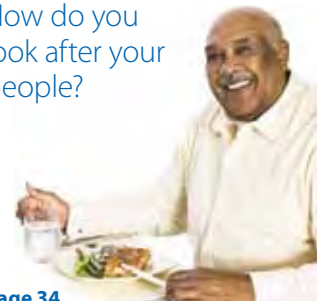
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# Why we care

A strong business case for sustainability

01

The seafood industry must be socially and environmentally sustainable to be profitable over the long term. A deep understanding of this elementary truth and its implications, by all stakeholders, is a prerequisite for environmentally responsible conduct as well as the successful development and profitable growth of our industry.

The world needs more seafood, and aquaculture must grow its production to meet demand. This growth must however be sustainable from all perspectives: environmental, social and economic. History teaches that there are structural and economic traits of fisheries and the fish farming industry that must be addressed to avoid unsustainable business practices. Where fish farming and wild catch industries are fragmented the need for collective action may become manifest. The incentive to achieve short-range, high profitability can override the proper consideration of longer-term consequences. At the same time, competition for open access resources can easily cause conflicts with other stakeholders. The seafood industry has experienced all these consequences, in the form of depletion of wild fish stocks, regional biological collapses in fish farming and entrenched conflicts with stakeholders. The negative consequences not only affect the environment and confidence of local communities, but also reduce profitability and limit growth opportunities over the longer term.

The present Marine Harvest Group is a result of four decades of consolidation in our industry. The management and owners of Marine Harvest have continuously worked to build a larger and more co-ordinated company with the financial strength and resources necessary to take a leading role in the sustainable development of our industry. We believe this strategy will prove to be highly profitable going forward. Our long-term approach is rooted in four guiding principles, implemented through our global quality system and followed up on all management levels through business reviews of key performance indicators.

This governance system drives development and implementation of global best practices, to secure sustainable development.

However, in the seafood industry, no single stakeholder defines sustainability, and regardless of size or resources, one company alone cannot solve all sustainability challenges. This is why communication must play a key role in the sustainable development of our industry. Sustainability communications should take place globally, involve multiple stakeholders and promote open and honest dialogue. At Marine Harvest we seek out healthy exchanges with the scientific community to understand and develop fresh solutions. With politicians and regulatory bodies, close and open dialogue can bring a continuous improvement of regulatory mechanisms. In addition, the involvement of non-governmental organisations can help reach a common understanding of environmentally and socially responsible practices, motivate change and improvements.

Our ambition for this document is that it improves and informs our dialogues, and so can contribute to a sustainable development of the seafood industry, and ensure that we take good care of the environment. There is only one earth, and we have a moral obligation to take care of it. Please read our Update on Progress report for updated data and further details on our progress.

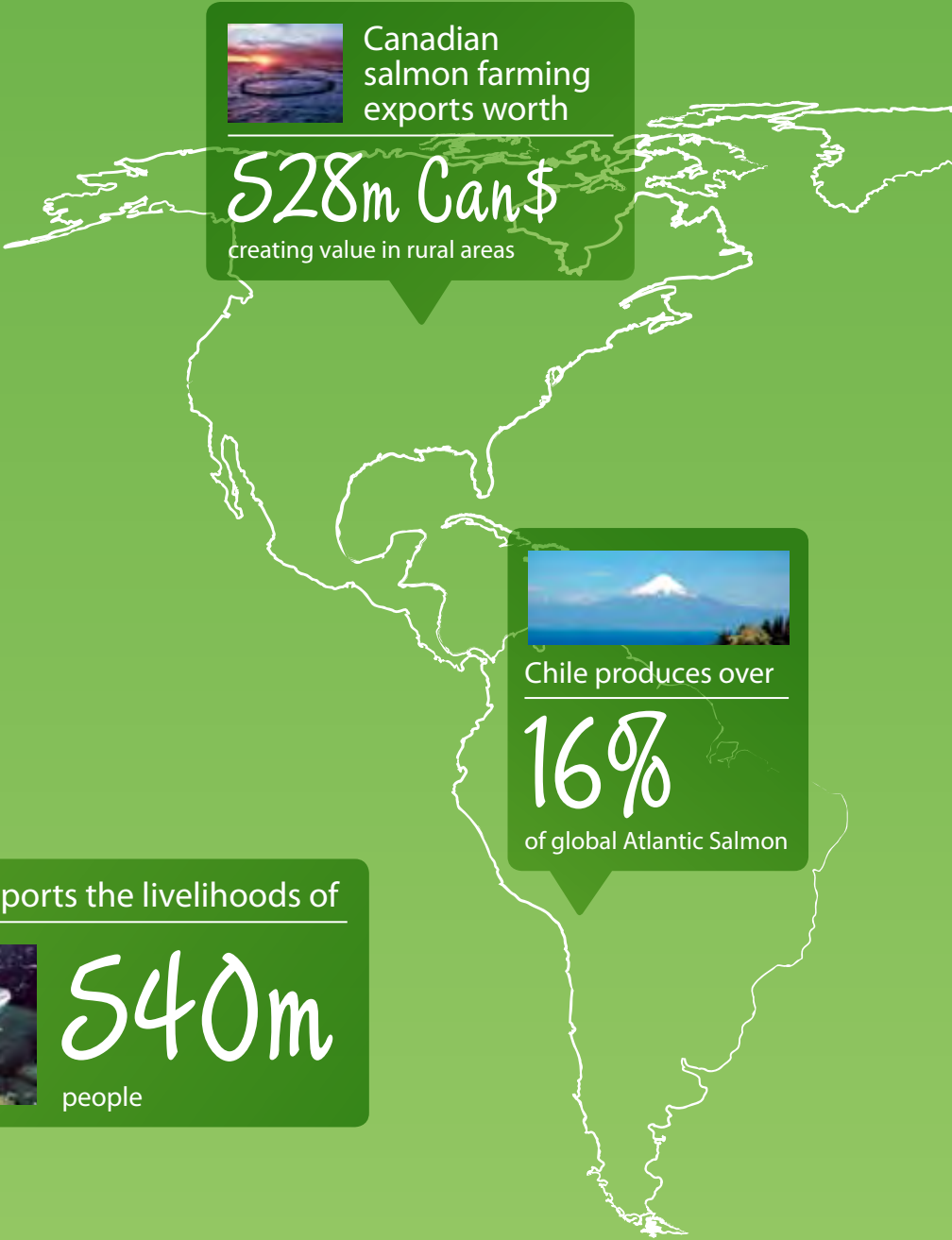
**Alf-Helge Aarskog**



# Our world

02

At Marine Harvest, sustainability principles are embedded in every aspect of our business and are gradually becoming a strong part of our corporate culture. Marine Harvest is the world’s leading seafood company and largest producer of farmed salmon, with a presence in 21 countries and customers in over 50 countries. The company is headquartered in Norway, and is listed on the Oslo Stock Exchange. Around the world we employ about 4,800 employees.



Norway  
produces  
over



36%

of world salmon  
production

Seafood is the most traded food commodity worth



\$102bn

in 2008

03

Europe

51% of EU

salmon production sold  
to retailers



East Asia  
seafood consumption increased by



+170%

1961–2008

UN FAO

An average human eats



17.1kg

of seafood per year

UN FAO expects fish farming  
production to grow by



85%


from 2004 to 2030

Marine Harvest's largest product line is fresh superior salmon, head on, gutted. As consumer demand for high value-added seafood products has increased, filleting and processing capacity has come on-line to deliver the wide range of options now

available, such as ready made meals and appetisers. Retailers are by far the most important channel, but Marine Harvest is primarily a private label supplier, sometimes through secondary distributors and processors.

▶ See page 15 for more information





## Will there be enough seafood for my grandchildren?

According to the UN's Food and Agricultural Organisation (FAO), by 2050 the world's population will grow to 9 billion people. This growth will be accompanied by an increase in standards of living, with more people eating more protein-rich foods such as meat, eggs, milk and seafood. In combination this is likely to result in a doubling of global demand for food by 2050. Fish farming will need to grow to meet the increasing demand in seafood.

Seafood supplies over

3bn

people with at least  
15% of their average  
animal protein

Fish farming accounted  
for over

45%

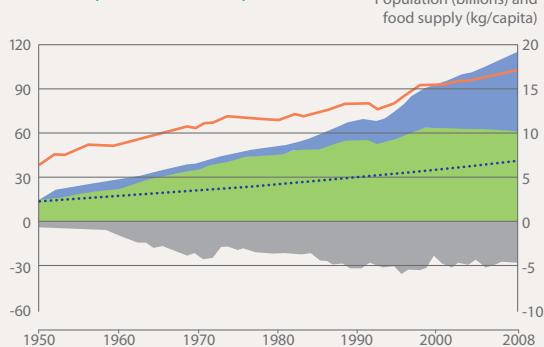
of the world's food fish  
production in 2008

## What are the key challenges in global food production?

The key challenges are the availability of production areas, freshwater and energy. These are all limited resources. The need to increase production of animal proteins, from meat, fish, eggs and milk, brings an additional challenge.

People have a nutritional requirement for protein-rich foods. Therefore, basic foods such as cereals and vegetables, which could be used as human foods, must be diverted along with other resources into secondary food production. There is also an urgent need to reduce the emissions of climate gases associated with food production. The bottom line is not only must we produce more food, we need more nutritious food produced from a limited amount of natural resources. At the same time as this we also need to reduce the emissions of climate gases.

Fish use (million tonnes)



• Food fish supply from aquaculture  
• Food fish supply from capture fisheries  
• Population (billions)  
• Per capita food fish supply (kg)  
• Non food uses  
(source UNFAO)

## How can salmon farming help?

Salmon is an efficient converter of feed, leaves a relatively light carbon footprint and does not put extra strain on limited freshwater resources.

### Efficient food production

Salmon farming is among the most efficient ways of producing meat due to its feed conversion and protein retention ratios, which are significantly better than those found in other animals. To produce 1kg of salmon, it takes around 1.2kg of feed. Although not directly comparable, due to differences between feeds, it takes around two, three and eight kilos of feed to produce a kilo of chicken, pork or beef respectively. This is because salmon are cold-blooded and therefore use hardly any energy to maintain body temperature. Also in an aquatic environment less energy goes into physically supporting the animal than on land.

### A better use of a limited resource

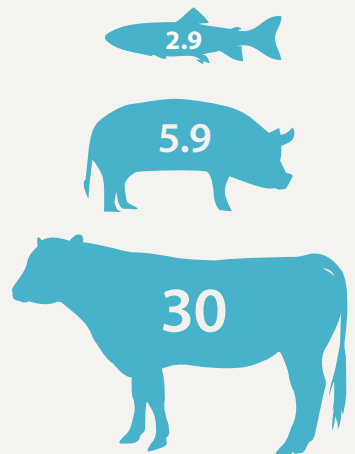
Fishmeal and fish oil from wild industrial fisheries has been an established commercial raw material for decades. Fish oil, which historically has been used for technical purposes like fuel and hardening of margarine, has today been superseded with most fish oil used as feeds in fish farming. Here their richness in protein and omega-3 is rightly prized as part of the human food chain and is a better use of a limited natural resource.

The global production of fishmeal has been stable as salmon farming has grown significantly over the last four decades. Fishmeal, which was previously used in feed for less efficient land animals, is now used in salmon farming and farming of other species.

▶ See page 8 for more information

## Carbon footprint

Measured as kg CO<sub>2</sub>e/kg edible part at slaughter



What do you do to keep fish healthy?

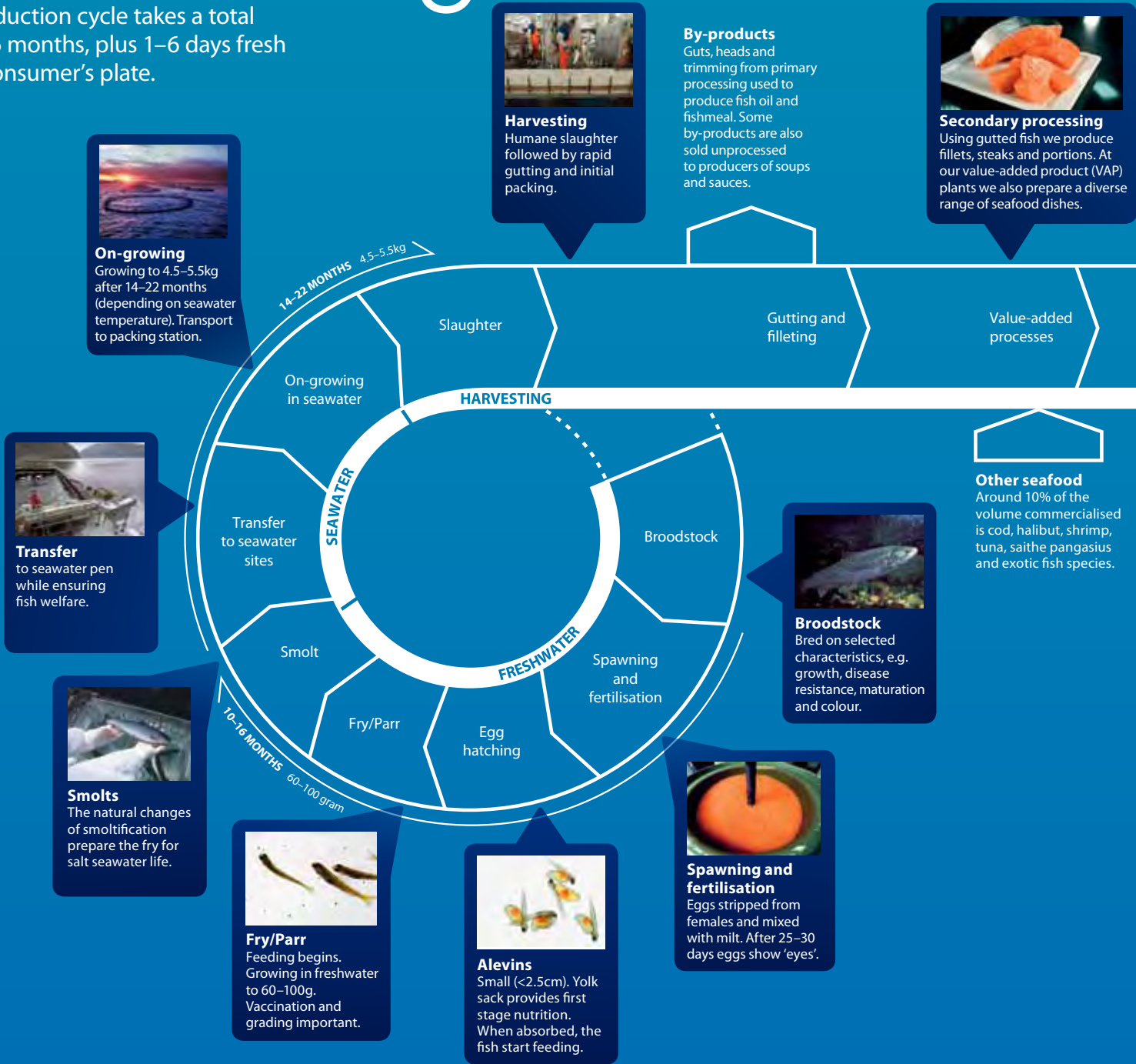
What do your salmon eat?

How do you care for employee safety?

How do you supply seafood around the world?

# The salmon cycle

The production cycle takes a total of 24–36 months, plus 1–6 days fresh to the consumer’s plate.





# What's new in seafood?

Atlantic salmon  
production

1.32m

tonnes in 2009 (HOG)

Marine Harvest Atlantic  
salmon typically contains

1860mg

EPA and DHA per 100g

07



## Packing and transport

Delivering fresh products like seafood around the world in the shortest possible time means robust packaging that protects the physical, nutrient and microbiological characteristics of product in transit.

Packing

Transport

Customer

Our products are sold in over 50 markets from our bases in 21 countries. Our customers are retailers, seafood processors, food service companies and distributors.

Retailers are by far the most important distribution channel for us. We are primarily a private label supplier.



Our largest product line is fresh superior salmon, head on, gutted. We supply Label Rouge salmon from Scotland and Norway, and organic salmon from Ireland.



The size of our operations means we are able to respond quickly to changes in demand and supply. Supply security is also reinforced by our large, global distribution network.



Seafood processors, food service companies and secondary distributors are important channels.



We market locally recognised brands of value-added products including smoked salmon, coated fish, frozen and fresh portions and increasingly, ready meals sold in modified atmosphere packaging.



We have concluded that fish farming is a far more efficient food production method than wild salmon fisheries.

## How much wild fish do you use to produce salmon?

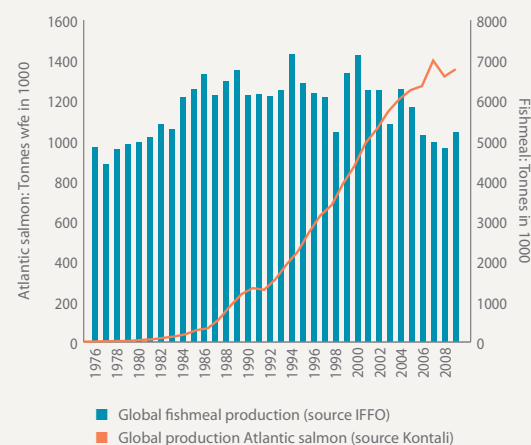
There has been considerable debate about the sustainability of using wild fish to feed farmed fish. In co-operation with our feed suppliers, we have thoroughly investigated this issue and have greatly improved the efficiency of our use of wild fish resources.

Historically, fish oil was a by-product of fishmeal processing that went into industrial products such as fuel and hardenings. Our utilisation of this valuable resource for feed is a huge improvement in resource utilisation, but has resulted in a dependency on fish oil. Our calculations show that to produce 1kg of salmon in our largest business unit in Norway, we depend on around 180g of fish oil. To extract 180g of fish oil, we need 2.5kg of wild industrial fish. Between one-fifth and one-quarter of this raw material comes from cuttings and trimmings from wild fish processing. From this 2.5kg, we also get approximately 560g of fishmeal, of which only 180g goes into the fish feed. To put it simply: we rely on 2.5kg of industrial wild fish to produce 1kg of healthy and nutritious salmon, but we do not use 2.5kg of wild fish. In addition to oil we get around 380g of fishmeal, more than we need for 1kg salmon, from the 2.5kg of wild fish. In comparison, wild salmon need to eat approximately 10kg of wild fish to grow 1kg.

The use of marine raw material in salmon feeds brings additional nutritional efficiencies. As much as 90% of wild fish used in fishmeal is unsuitable for human consumption. Even with human food fish, the edible portion may be as low as 40–60% with the rest going to waste. In salmon farming little goes to waste as cut-offs and trimmings are used, for example for production of salmon meal and salmon oil used in agricultural feeds and as nutritional supplements.

▶ See page 27-28 for more information

Increasing global salmon production without increased fishmeal production



## Would it not be better to eat wild industrial fish?

According to the UN's Food and Agricultural Organisation (FAO), 90% of the wild industrial fish used for fishmeal and oil is presently unmarketable in large quantities as human food.

The reasons for this are that some of the species are unpalatable, too small, bony or turn rancid too quickly for economic storage and subsequent processing. Although the FAO encourages using more fish directly as human food, they believe it is more efficient, in a protein-hungry world, to feed the unmarketable species to animals, subsequently eaten by man, than to not harvest the fish at all. The wild fisheries industry would of course prefer selling fish for human consumption, as the price is higher than for fishmeal production. If this is not possible, using the wild fish for fishmeal is a good alternative.



Wild salmon need to eat approximately

10kg

of wild fish to grow 1kg

According to the UN FAO

90%

of the wild industrial fish used in fishmeal and oil is unmarketable in large quantities to humans



## What can you do to preserve wild fish stocks?

Marine Harvest is engaged in both fish farming and the processing and marketing of wild fish. Our wild fish business depends on the sustainable management of wild fish stocks. As a fish farmer we depend on marine raw materials for feed. If wild fish stocks are depleted we will run out of feed.

Our approach to wild fisheries is broad. On the one hand we are pushing for the improved management of wild fisheries to avoid depletion of fish stocks. On the other hand we are reducing our dependency of marine raw materials in feed. The proportion of fishmeal in the fish feeds in our largest farming region has declined from around 60% in 1990 to 15 to 20% today, without compromising quality or fish health and welfare. Furthermore, due to an increasing proportion of feeds being derived from trimmings from other food fisheries, the volumes of fishmeal in our feed coming from wild fish in industrial fisheries is declining. We are also working with our feed manufacturers, retailers and the International Fishmeal and Fish Oil Organisation (IFFO) to ensure that the fish used in fishmeal and fish oil production is responsibly sourced. Certification to the IFFO standard requires that fisheries used for fishmeal and fish oil comply with the main principles of the FAO Code of Responsible Fishing (1996), which is the only internationally recognised reference for sustainable fishing. We do not use feed with ingredients from illegal, unreported or unregulated fisheries.

## How do you make sure the seafood you buy in is sustainable?

We produce top quality sustainable seafood thanks to our own global fish farming activities and a worldwide sourcing network. Increasingly our products include bought-in seafood and we are investing in the sustainable supply of species such as Icelandic whitefish, flatfish, pangasius, tilapia and tuna.

We have developed different sustainability programmes with our dedicated suppliers to improve sourcing sustainability. These start with an 'SCA sustainability' assessment executed by independent marine scientists which lead on to action plans developed in conjunction with our suppliers. The programmes focus on sustainable fishing methods, installing ecological farming methods, maintaining the marine biodiversity, enhancing social programmes like training and infrastructure improvements. They also feature obtaining various quality certificates such as from the BRC, IFS, ISO, GlobalGAP and MSC. More on our sustainable tuna programme can be found on page 12, while our quality certificates table is on page 21.

Marine Harvest actively contributes to the definition of wild-caught seafood sustainability labels. One way we support these initiatives is through purchasing Marine Stewardship Council (MSC) certified Alaska pollock, hoki and Hastings dover sole. The MSC certification is based on a healthy fish stock level, sustainable fishing methods and a professional fisheries management system. We have also invested in a 'sustainable Iceland concept' for white fish species. The concept assures 'sustainable seafood products' of a superior quality and supports the 'certification approach' of the Icelandic Government.

Our approach to wild fisheries must be broad. In fish farming we work to reduce our dependency of marine raw materials in feed, and push for improved management of wild fisheries.

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## Why are people eating more seafood?

Seafood has for centuries been an important part of most food cultures. In recent years, increases in seafood consumption have followed global population growth, improved living standards and the desire for more healthy food.

Finland  
Salmon consumption  
per person

4.6kg

per year

USA  
Salmon consumption  
per person

0.98kg

per year

## Why are people eating more salmon?

Salmon is the most versatile seafood for the consumer; the combination of its colour, texture, taste and price makes it an affordable and convenient treat both every day and for special occasions.

Off the shelf it's convenient, has few bones, is easy to cook and fits well with local habits, dishes and tastes. The characteristics of salmon also make it an ideal raw material to process into convenient products, supported by its all-year fresh availability. Furthermore, the nutritional profile of Atlantic salmon makes it a perceived staple food among the increasing proportion of consumers in mature economies concerned about healthy eating.

### Salmon facts

#### Average nutritional values per 100g:

Energy	183 kcal/766 kJ
Protein	19.9 g
Carbohydrates	0 g
Fat	10.9g
of which:	2.2g
- saturated fat	3.9g
- polyunsaturated fat	2.7g
- of which LC omega-3	0.6g
- EPA	1.3g
- DHA	0 g
Dietary fibre	59 mg
Sodium	

(source USDA)

## What is omega-3?

Omega-3 is a group of nutrients essential for human health. They are unsaturated fatty acids and are found in long- (EPA and DHA) and short-chain (ALA) versions. The long-chain versions have been found to be the most significant for health benefits. However, humans are not able to produce them in the amounts necessary for good health and we need to obtain them from food.

Research into the positive role of omega-3 on human health shows recommended dietary levels can benefit people with circulatory problems such as varicose veins, coronary heart disease, some forms of stroke and cancer (particularly breast, colon and prostate). There's also research suggesting positive effects on depression and anxiety, immune function and infant brain development. Salmon and other oily fish are rich sources of marine omega-3, with a content far above most other food.

▶ See page 28 for more information

### The Organic Salmon Company



Our commitment to providing great organic salmon products to our customers has allowed us to become the world's leading supplier of organic salmon. Our organic salmon farm lies four miles off the west coast of Ireland. The Atlantic waters in this remote location are classed by the European Union as 1A in quality – the best there is. Our salmon are fed special diets that contain only organic, natural ingredients while stocking densities are less than half that of conventional farms. This natural, healthy environment and low population density allows the fish to develop good muscle and body shape. The Organic Salmon Co. fish are raised in line with organic standards certified by the German, Swiss and EU organic authorities.

Our ambition is to be our customers' preferred supplier based on product knowledge and supply chain expertise.

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Sustainable tuna

As a leading seafood supplier we source and supply tuna products to some of our largest customers, although as a proportion of our total volumes this is less than 0.5%. The sustainability of tuna catch fisheries is widely debated. However, we believe we can play a positive role in ensuring our supplies continue to be responsibly sourced. We obtain supplies from a fisheries consultancy (Blueyou) and a WWF-promoted yellow fin tuna project based in the Philippines. The project focuses on the support and development of sustainable and small hand-line fishing. Our role is to indirectly support the project by guaranteeing a volume and a price which helps increase the incomes of the local community. The Marine Stewardship Council (MSC) standard is a guiding principle for the project and MSC status is the final objective of the project.

Isn't omega-3 in other foods too?

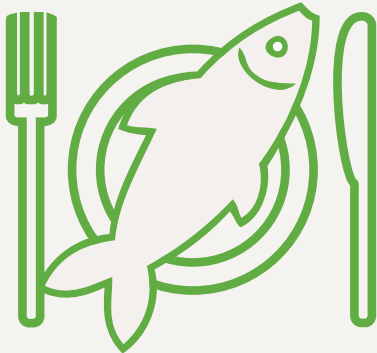
Omega-3 is found in many foods including oily fish, meat, and vegetable oils. However, the health benefits of omega-3 depend on its source and its balance to omega-6.

In vegetable sources, omega-3 is present mainly as ALA, a short chained fatty acid that has inferior health benefits over the long-chain omega-3 fatty acids, EPA and DHA. Beef, lamb and chicken also contain low levels of short-chain omega-3s. However, in these meats the positive effect is outweighed by the higher levels of omega-6, another group of fatty acids. Although omega-6 is also essential to human health, a too high intake relative to omega-3 reduces the body's abilities to convert ALA to the vital EPA and DHA forms of omega-3. Oily fish, like salmon, provide a balanced ratio of omega-3 to omega-6 and contains pre-formed EPA and DHA. From analysis of our farmed Atlantic salmon we know that, on average, eating one salmon meal provides the equivalent of one week's recommended intake of EPA and DHA (European standards). By substituting a meat-based meal, rich in omega-6 fatty acids, with a weekly salmon meal, consumers not only benefit from the omega-3, they obtain a whole range of healthy nutrients.

▶ See page 28 for more information

Salmon RDA

Salmon provides a wide nutrient package  
Percentage of daily values for these essential nutrients provided by one portion (100g) of salmon (source USDA).



59% Selenium	40% Vitamin B3 (Niacin)
25% Phosphorus	23% Vitamin B1 (Thiamin)
8% Magnesium	15% Vitamin B5
11% Potassium	(Panathenic acid)
47% Vitamin B12	8% Vitamin B9 (Folate)
32% Vitamin B6	6% Vitamin C

To protect the nutritional value of our fish we have introduced an omega-3 group operating standard. This means that our salmon will always contain at least 1.4 grams of EPA and DHA per 100 grams. On average our salmon contains well above this figure. This guarantee is backed up by our quality management system, Qmarine and its regular product analysis programmes.

The full nutritional package

There's more to salmon and seafood than omega-3. Salmon is a good source of protein and is low in fat and saturated fatty acids. It contains key micronutrients including iron, magnesium, zinc, iodine and selenium as well as being a healthy source of vitamins A, B and D.





Ducktrap River of Maine offer a range of smoked salmon that includes gravadlax and pastrami style as well as pepper and garlic.



Healthy eating options include our own brand Fish 'n Grains with its wheat and broken-wheat coatings.

## How do you expand the market for seafood?

With a very strong underlying demand for seafood, our focus is on increasing the absolute availability of seafood. We are doing this, not just by broadening the range of ready-made foods we offer, but by strengthening our global logistics operations to increase availability.

### Our products

Our largest product line is fresh superior salmon, head on, gutted. However, we supply a wide variety of seafood types and products. As consumer demand for our high value-added products increases, so does our filleting capacity and range of options now available, such as smoked and cured fish.

The typical options available from our primary and secondary processing plants are:

- Whole gutted salmon, head on or head off, including Label Rouge salmon from Scotland and Norway, and organic salmon from Ireland
- Salmon fillets in trim types A to E.  
See [www.marineharvest.com](http://www.marineharvest.com) for more details
- Salmon steaks, cutlets, portions, loins, kebabs, steak combos (steaks plus tail fillets)
- Other white fish or other seafood
- Other options as agreed with the customer.  
These are available fresh and frozen.

Secondary processed foods such as fillets, portions, steaks and kebabs are available in modified atmosphere packaging (MAP), trays and other retail packaging such as bags, show boxes, vacuum skin pack trays and flow packs.

In addition, we offer a vast range of value-added foods from our specialist plants in Belgium, France, Japan, the Netherlands and the USA.

We can deliver products in the following categories:

- Breaded
- Pre-fried
- Dusted
- Marinated
- Grilled
- Battered
- Topped
- Filled with sauce
- Delicatessen product
- Fresh fish ready meals
- Smoked fish

### Improving logistics

In order to grow the accessible market for salmon, we also work to improve our global logistics operation. In 2009 we opened two new processing facilities in the US (Miami and Los Angeles) where fresh salmon fillets can be processed before local distribution. A similar facility was opened close to the Narita Airport in Japan in 2010. In combination with increases in filleting capacity in Norway, these new facilities have increased the availability of fresh salmon fillets in two important markets.

Our new salmon logistics hub close to the Oslo Airport, has also increased logistics efficiency and flexibility for transport via truck, rail and air freight.

To expand the market in south-eastern Europe, a new terminal was opened in the Czech Republic in 2010. Fully packed trucks use this terminal for efficient transport to this part of Europe, and for increasing the geographical range of our logistics chain.

▶ See page 15 for more information

100g of salmon provides

59%

Selenium RDA

100g of salmon provides

47%

Vitamin B12 RDA

On average we will eat 55% more meat in 2030 than in 1980

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## What's new in seafood?

Our new product development teams work within a structured foods development process that includes inputs from our marketing function and customers. The trend towards pro-actively developed new foods continues with most of our European new products produced in this way.

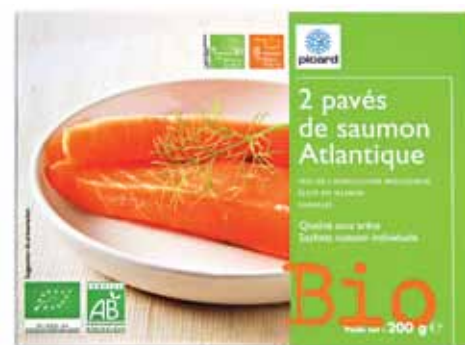
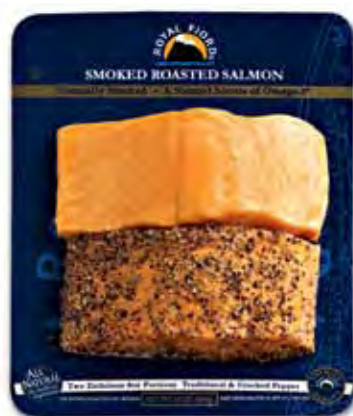
By using co-innovation techniques with our customers we have identified and satisfied market trends in foods. Some important trends we have addressed are:

- Sustainable sourcing from reliable, certified seafood suppliers
- Healthier 'light' products with enhanced pack product information
- Convenience offering such as appetisers and ready meals
- Attractive consumer pricing while retaining an appealing margin
- Great tasting products without sacrificing health and convenience

Our close customer relationship has been the key driver behind many successful consumer-focused launches, such as for the following products which emphasise salmon's convenience:

- Seafood appetisers
- Salmon burgers
- Boneless salmon steaks

As we are primarily a private label supplier much of our output reaches consumers under retailer-branded packaging.



# How do you supply seafood round the world?

Our products are sold in over 50 markets from our bases in 21 countries. Our customers are retailers, seafood processors, food service companies and distributors. Retailers are by far the most important channel to us, but even in this channel we are primarily a private label supplier, sometimes through secondary distributors and processors.

Our ambition is to be our customers' preferred supplier based on product knowledge and supply chain expertise. Our collaborations with customers primarily cover supply chain, product adjustments and innovations, but also include larger collaborations which anticipate future challenges related to quality and sustainability. Our R&D people are involved in projects aimed at improving the quality of our salmon along the entire value chain from salmon hatchery, through to dietary and health benefits of seafood consumption for end consumers.

The size and global spread of our operations allows us to respond to changes in demand and supply, for example by quickly switching supply and processing between countries. Our large global distribution

network based on chilled airfreight, trucking, rail and frozen sea transport reinforces this supply security. With farming in six countries on three continents, and a global sales and logistics organisation, we have the most flexible global supply capability in our industry, ensuring our ability to meet customers' requirements.

The close relationships between our sales and supply chain management allows for more precise forecasts based on harvesting and biology. For customers this means better control of cost related parameters like yield, size stability and reduced production downtime. Put simply, these elements mean a predictable, reliable supply chain for customers.

We are not solely a private label supplier. We market locally recognised brands like Kritsen, Rolmer, Kendall Brook Salmon, Ducktrap, Delifish, the Organic Salmon Co, Donegal Silver Salmon, La Couronne, Pieters, Sterling White Halibut and in Japan, Sterling Salmon. In addition, we also market Xalar salmon oil, a refined salmon oil based on by-products from harvesting and processing, which is produced in our Marine Harvest Ingredients unit.

## Qmarine

We deliver food products with high technical and nutritional quality to meet customer requirements and consumer expectations. For technical quality our products conform to agreed specifications. For nutritional quality we ensure our fish and fish products provide excellent protein with important minerals, vitamins and omega-3 fatty acids. Please see page 40 for more on Qmarine.

Secondary processed products such as fillets, portions, steaks and kebabs are available in modified atmosphere packaging (MAP) trays and other retail packaging such as bags, show boxes, vacuum skin pack trays and flow packs.



We have increased our filleting capacity to meet the growing global demand for fillet in trim types A to E.



We offer a vast range of value-added seafood products from our specialist plants in Belgium, Netherlands, France, Japan and the USA.



Collaboration with customers primarily covers supply chain and product adjustments but also includes joint working which anticipates future challenges.



Due to the size of our operations we are able to respond quickly to changes in demand and supply.



## What does seafood quality mean?

Our objective is to meet customer requirements for seafood with high technical and nutritional quality, that exceeds consumers' expectations.



Marine Harvest supply

4m

meals as salmon  
portions daily

On average we will eat

55%

more meat in 2030 than  
in 1980

## What are the components of quality?

Technical quality means the food conforms to customer specifications, for instance on grade, trim, fat content, pigment and packaging. It also covers microbiological quality which determines the shelf life, particularly for fresh foods. Nutritional quality relates to the role of our fish and fish products as natural healthy food in consumer diets.

All aspects of quality are covered by our total quality management system, Qmarine and its standard operating procedures (SOPs). Together, these control our production practices and processes, and so ensure we meet our customers' specifications and comply with regulatory requirements.

▶ See page 21 for more information

## In what ways can food be unsafe?

Potential food contaminants such as chemicals, bacteria and viruses are naturally found all around us, all the time. To combat any risk caused by these potential contaminants building up and making food unsafe, everyone from the producer through to the final consumer has a role.

As a producer and processor, we have a pivotal part in this chain of responsibility. We only buy certified feeds from reputable feed suppliers operating under licences and control from competent authorities, and operate our farms and facilities to exacting food safety standards which minimise food risks to below authorised public health levels. Backed up by national and international food safety monitoring, an individual's risk from unsafe food is very small.

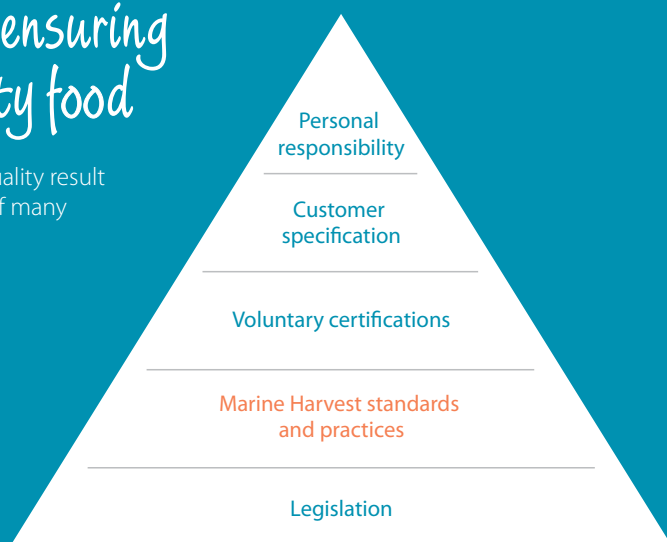
As a producer and processor, we have a pivotal part in this chain of responsibility.

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## Our role in ensuring good quality food

High levels of food quality result from the overlaying of many different factors



We give listeria control special attention, both to assure the safety of our ready-to-eat products and to assure low risk level for customers processing our products for ready-to-eat foods.



## How do you protect seafood safety?

Our undisputed objective is to produce and supply documented safe seafood.

At the core of our quality process lies our Qmarine quality management system, which controls and co-ordinates our three main overlapping product assurance approaches:

1. Control of undesirable substances
2. Control of food-borne pathogens
3. Tracking and tracing

Food safety risks can accumulate from feed and water during farming, from additives or ingredients in value-added products and through contact with operators, equipment and packaging materials during processing.

### Control of undesirable substances

Our feeds are produced in strictly controlled environments regulated by the authorities to assure that potentially harmful contaminants are not transferred from raw materials into feeds. The main risks for feed contamination are environmental pollutants like PCBs, dioxins and heavy metals which can be found as trace amounts in most food and feed. Controlling the safety of feeds is an effective way of ensuring the welfare and health of our fish and minimising any eventual risk for consumers. Legislative requirements, internal controls and monitoring programmes by our feed suppliers all mean our feeds are documented as safe and within the statutory limits before they are transferred to our fish farms.

During our production stages, water quality is regularly monitored to further minimise the risk of chemical contaminants affecting our production. We occasionally use medicines to treat fish diseases under the control of certified fish health professionals. We strictly observe the specified medicine withdrawal periods and fish are checked for any residues before harvest.



North African seafood  
consumption increased by

260%

1961–2008

Marine Harvest is the

No.1

salmon producer in  
the UK

### Microbiology, food-borne pathogens and temperature control

Bacteria and viruses form a natural part of our lives, and are present everywhere, including on fish farms and in processing facilities. Some may be harmful for consumers and may cause product deterioration if uncontrolled. Luckily bacteria that can cause sickness in humans like salmonella, campylobacter, yersinia or E. coli are rarely found in seafood. Contamination can still potentially occur through polluted waters, poor processing hygiene and cross contamination during handling. To combat these we have detailed systems to assure excellent processing hygiene, including good temperature control from harvest through to customer delivery. This first defence is supported by group-wide microbiological monitoring of all classes of fish and products to ensure levels present are below legal limits both in the countries of production and in the markets where we sell our products. The methods of analysis, notification and response are all laid down in our standard operating procedures (SOPs).

Listeria monocytogenes is a potential food-borne bacteria that can grow at low temperatures and potentially cause disease if present in food products that are eaten without heat treatment. Since salmon can be eaten uncooked, we give listeria control special attention, both to assure the safety of our ready-to-eat products and to assure low risk level for customers processing our products for ready-to-eat foods. A group-wide best practice manual for listeria control has been developed and is used in addition to our other monitoring and control programmes.

### Tracking and tracing

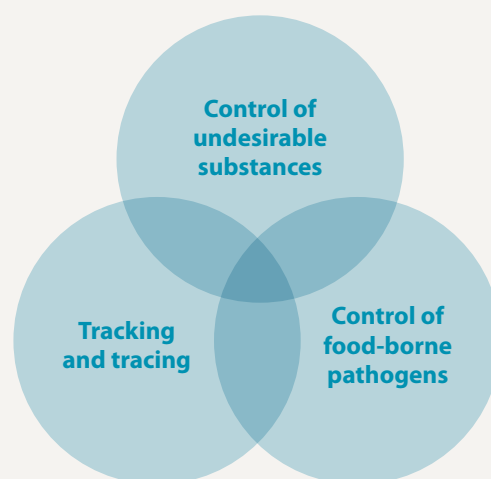
On the rare occasion that an adverse incident occurs, tracking and tracing is an important tool to identify affected products, in order to trace the origin of the problem and to understand how we can avoid the same circumstances in the future. All our production and processing facilities keep records of all deliveries, from fish eggs and feed, to ingredients for value-added processing and packaging material. Every production step is recorded. This means it is possible to trace back any product to its origins. Every box or package of fish delivered from our processing plants has a batch number on the label. This is the key for tracing.



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## Marine Harvest's quality assurance approach

Our Qmarine quality management system controls and co-ordinates our three main overlapping product assurance approaches.



100%

of Marine Harvest's  
Scottish salmon is  
Freedom Food assured

South East Asia seafood  
consumption increased by

134%

1961–2008

20

Our performance against regulatory baselines, international and industry standards, both general and sustainability-related, are the yardsticks that allow us to assure consumers.



## How do external organisations help keep seafood quality high?

A reputation for reliably high-quality seafood is vital to our continuing success. As well as our processes we maintain high quality by responding to and engaging with a range of external organisations. The requirements and specifications our customers ask for is central to this. Beyond these, our performance against regulatory baselines, international and industry standards, both general and sustainability-related, are the yardsticks that allow us to assure consumers and secure our reputation.

Many of our activities, particularly animal welfare, fish health and food safety are controlled by local, national and international regulators. In our largest markets, Europe and the USA, the EFSA and FDA set the basis for food safety and quality, whereas the WHO and UN FAO contribute global scientific advice. While our group-wide standards take all relevant organisations' regulations as a compliance baseline, our company standards frequently exceed their requirements. We monitor and evaluate EFSA and FDA food safety advice and contribute to proposals and hearings either individually or via trade bodies.

In line with customer requirements, we hold a variety of voluntary quality certifications which often emphasise welfare and sustainability concerns. Verification of these quality marques such as Label Rouge, Freedom Food and GlobalGAP is by third party auditors who ensure our processes are in line with the marques' specifications. Conclusions drawn from these audits play a significant part in our improvement processes. The range of voluntary quality certifications attained by our business units is shown on page 21.



## Quality and related certificates held by Marine Harvest operations in 2010.

21

Business Unit	Activity	Certification	% of plants certified to each scheme
Ireland	Broodstock and juveniles	ISO 9001, ISO 14001, OHSAS 18001, GlobalGAP, Naturland Organic, BioSuisse Organic, EU Organic Aquaculture	100%
	On-growing	ISO 9001, ISO 14001, OHSAS 18001, Naturland Organic, BioSuisse Organic, EU Organic Aquaculture	ISO 9001 = 100%; ISO 14001 = 100%; IOHSAS 18001 = 100%; EU Organic Aquaculture = 60%; Naturland Organic = 60%; IOFGA Organic = 60%; BioSuisse Organic = 60%.
	Primary processing	ISO 9001, ISO 14001, OHSAS 18001, BRC, Naturland Organic, BioSuisse Organic, EU Organic Aquaculture	100%
Sterling White Halibut	Broodstock and juveniles	ISO 9001, ISO 14001	100%
	On-growing	ISO 9001, ISO 14001	100%
	Primary processing	ISO 9001, ISO 14001	100%
Chile		SalmonGAP/GlobalGAP pending.	100%
Norway	Broodstock and juveniles	ISO 22000, ISO 9001, ISO14001 and GlobalGAP	100% Label Rouge, one site in south
	On-growing	ISO 22000, ISO 9001, ISO 14001, GlobalGAP	100% Label Rouge, few sites
	Primary processing	ISO 22000, ISO 9001, ISO 14001, GlobalGAP	100% Label Rouge, one site in south
Canada	Broodstock and juveniles	ISO 14001	100%
	On-growing	ISO 14001	100%
Scotland	Juveniles	Label Rouge, ISO 9001, ISO14001, GlobalGAP, Product Certification Scheme for salmon smolt, PGI, Freedom Food, COGP	100%
	On-growing	Label Rouge, ISO 9001, ISO 14001, GlobalGAP, PGI, Freedom Food, COGP	100%
	Primary processing	BRC, ISO 9001, ISO 14001, GlobalGAP, PGI, Freedom Food, Label Rouge, COGP	100%
Faroes	Broodstock and juveniles	GlobalGAP	100%
	On-growing	GlobalGAP	100%
	Primary processing	GlobalGAP	100%
VAP Europe	Secondary processing	IFS, BRC, BIO, GlobalGAP, ISO 22000, ETI	Pieters: BRC, GlobalGAP, BIO, MSC -100%
			Boulogne: IFS, GlobalGAP, BIO
			Kritsen: IFS, ISO 19001, Label Rouge, MSC -100%
			Boulogne: IFS, GlobalGAP, BIO
			Sterk: BRC Grade A, IFS High level, MSC, ETI
			Rolmer: IFS -100%
			Rennes: IFS, BIO, Label Rouge -100%
			Lorient: IFS -100%
			Poland: IFS, BRC, GlobalGAP

## Qmarine

We are committed to providing safe and documented food products. Our farming, processing and logistics operations are organised to create and protect safe food and we continuously monitor the safety of our products. We update our practices, based on the latest science and best practices and ensure we are in line with current legislation in our markets. Please see page 40 for more on Qmarine.





## What are conditions like for farmed fish?

Fish produced using good, stress-free farming practices are healthier and show better growth. This sustainable approach means our fish are kept under conditions that, as much as possible, naturally satisfy their needs for food, clean water, space and habitat. By providing good conditions we aim to minimise distress, injury and disease and lessen the need to intervene.

At maximum stocking densities our fish have

97%

of pen space to move around freely

In the EU

61%

of salmon is sold fresh

## Can fish become sick?

Just like other animals, wild and farmed fish occasionally suffer from disease. In these circumstances, our co-ordinated fish health management and veterinary health plans come into play. These have been designed with an emphasis on disease prevention and reducing the exposure of healthy fish to infections so we can limit any potential spread. Frequent health monitoring by health professionals is also an important line of disease defence.

Our experience tells us to pay particular attention to the occurrence and treatment of pancreas disease and infectious salmon anaemia, two diseases found naturally in salmon in several geographical regions. Occasionally individual fish die without suffering from a disease, for instance from natural causes. We check for and remove fish remains on a frequent basis and all mortalities are handled in a way that minimises the risk of any disease spreading.

## What do you do to keep them healthy?

We use sound farming practices, proven policy principles and keep our fish in good conditions that satisfy their biological needs for food, clean water, space and habitat. Our fish health management focus is on disease prevention and builds on control approaches, supervisions by our fish health professionals and a continuous quest for new knowledge and in-depth understanding.

### Feed and environment

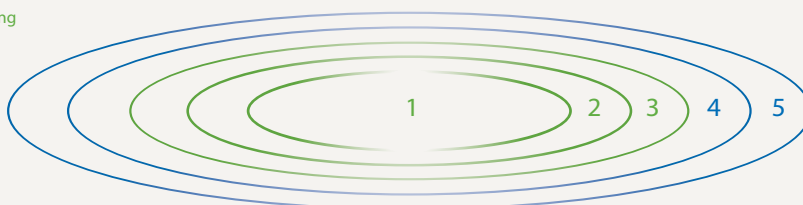
Our feeds are carefully balanced to provide the necessary nutrients. They are delivered through efficient feed management technologies which feed the fish when they need it, without overfeeding. We strive to ensure a good living environment for our fish to thrive. We continually check water quality, temperature, salinity and oxygen content to support optimal rearing conditions, including during transport.

We continually check water quality, temperature, salinity and oxygen content to support optimal rearing conditions, including during transport.

23

## Fish health management at Marine Harvest

- 1 Monitoring surveillance and reporting
- 2 Local fish health plans
- 3 Marine Harvest standards
- 4 National legislation
- 5 International legislation



Our fish occupy less than

3%

of the available pen volume

Our salmon will always contain at least

1.4g

of marine EPA and DHA per 100 grams

24

### Ballan wrasse farming



The ballan wrasse is a small fish which naturally grazes on the parasites of other fish. The wrasse has proven to be an efficient tool to reduce the number of lice on farmed salmon. However, it is uncertain how many wrasse can be caught from the wild without negatively affecting their populations. In addition, the access to ballan wrasse varies depending on the time of the year and location. An obvious solution to allow wider use of wrasse on farms was to start up the ballan wrasse farming project in 2009. The plan is to continue to invest in the project in the coming years.

### Stocking densities

Our fish are kept at densities that reduce the risk of diseases spreading and balance welfare with performance. Even at maximum stocking densities our fish occupy less than 3% of the available pen volume. This means they have more than 97% of the space to move around freely and express normal behaviour.

### Fallowing and co-ordinated approaches

Leaving a site empty between production cycles – known as fallowing – is an important component of good farming practice. It allows for the resting or restoration of the local environment and reduces the risk of diseases. We work within the industry to co-ordinate fallowing areas to allow the natural environment to rest on a larger scale.

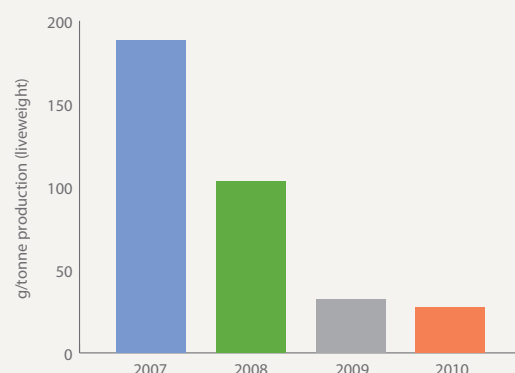
### Vaccination

The vaccination of young fish is now widely available for the majority of bacterial diseases of the salmon family. The use of vaccines has reduced the need for antibiotics to a minimal level in most salmon farming regions. In our largest farming unit, we only needed 0.003 grams of antibiotics per tonne produced in 2010.

### Monitoring

All our fish farms receive both routine and unscheduled monitoring visits by fish health professionals who consider fish behaviour, appetite, site hygiene controls and mortality. In the event of suspected disease or increased mortality, a health professional will keep a close eye on the fish until restored, decide on mitigation and, if appropriate, prescribe relevant medicines.

Antibiotics grams per tonne (liveweight) production 2007-2010



How do you treat fish if they become sick?

If our fish become sick we use effective infection control methods that are safe for the fish and the environment.

We only ever use approved veterinary medicines prescribed and supervised by authorised veterinarians or officially certified fish health professionals, under the strict control of relevant authorities. To guarantee there is no negative impact on the quality of our products we make sure that appropriate medicine withdrawal periods and verification procedures are in place, so that pharmaceutical residue levels are below the statutory safety limits both in the production country and the markets for the fish. We never use antibiotics preventively or to promote growth.



To control sea lice our current standards include both medicinal and non-medicinal routes, whereas our strategy is to further develop biological and non-medical tools.



## Do fish get lice?

As with humans and animals, fish also get lice. Sea lice are marine parasites, which feed on the mucus and skin of farmed and wild salmon, as well as related species. They are harmless to humans, however they can damage the skin of the host fish, which can then become vulnerable to other infections. Sea lice can also stress the fish, affect growth and generally reduce the fish quality. We regularly monitor the occurrence of sea lice on our fish, checking that numbers are below the statutory level that triggers mandatory control. Trigger levels vary depending on the type of lice, time of year and local differences in lice species as well as wild fish species.

To control sea lice we have tried and tested operational standards in place. Experience tells us that the most effective approaches integrate both medicinal and non-medicinal routes. Non-medicinal methods include use of wrasse and food supplements, as well as good production management such as synchronised fallowing, attention to clean nets and adjusting stocking densities.

Medicines are an important tool against sea lice and even the best managed farms may have to use licensed medicines following veterinarian advice. The structured and systematic use of various veterinary medicines is fundamental to avoid treatment resistance. By synchronised delousing in all farms in the same area, we minimise sea lice levels during the out-migration of wild salmon in the spring. As well as our use of delousing medicines, prior checking of drug sensitivity and thorough evaluation of drug efficacy post-treatment, form a fundamental part of our sea lice management.

We are also looking to decrease the amount of delousing medicines by diversifying the methods we use. First and foremost this strategy is supported by the use of wild caught wrasse which graze harmlessly on the salmon. We have successfully collaborated in increasing the use of hydrogen peroxide treatments. Hydrogen peroxide converts into simple water and oxygen which is natural to the environment. In addition to this we support a range of R&D projects targeting improved sea lice management. We also put great effort into the farming of cleaner-fish (different types of wrasse), in order to ensure stable supply and avoid depleting local wild stocks (see page 24).

Aquaculture's experience with sea lice in Chile during 2006 to 2008 and in Norway from 2008 onwards, implies that sea lice mitigation efforts in the industry have been too weak. Starting in 2009, we significantly increased our effort through a series of broad-ranging and long-lasting initiatives. These include: a call for stricter regulations with zone management, closer industry co-operation, development of new non-medical approaches and far-reaching research efforts in addition to farming of cleaner fish. Our long-term goal is to ensure that sea lice from salmon farms do not have a significant negative impact on wild salmon stocks.

▶ See page 33 for more information

## Qmarine

Fish welfare is based on good health management and sound farming practices. We rear fish under conditions that suit their biological needs and minimise stress, aggression and injury. We monitor frequently the health status of our fish and act rapidly if it is compromised. Please see page 40 for more on Qmarine.



## How does Marine Harvest reduce environmental impacts?

As with most other human activity, and all other food production, fish farming affects the environment. Our focus is on environmental responsibility, ensuring an acceptable level of environmental impacts. Salmon farming depends on a sound ocean environment and viable coastal communities to be profitable in the long run.

Milligrams of EPA and DHA guaranteed in 100g of salmon by Marine Harvest

1400mg

Around

24%

of the marine raw materials in feed derived from processing cut-offs and trimmings

## What do your salmon eat?

In the early days of salmon farming, the fish were fed almost entirely on marine raw materials like off-cuts, trimmings and wild fish. With the introduction of feed pellets technology, focus shifted from the raw material in feed to nutritional requirements which can be met by a range of raw materials. We now feed our fish scientifically formulated pellets that provide all the necessary nutrients for growth and good fish health, as well as ensuring high nutritional content in our products. Our fish feeds comprise a combination of marine raw materials, like fishmeal, fish oil, and vegetable meal and oil, made mainly from sunflower, soy and rapeseed.

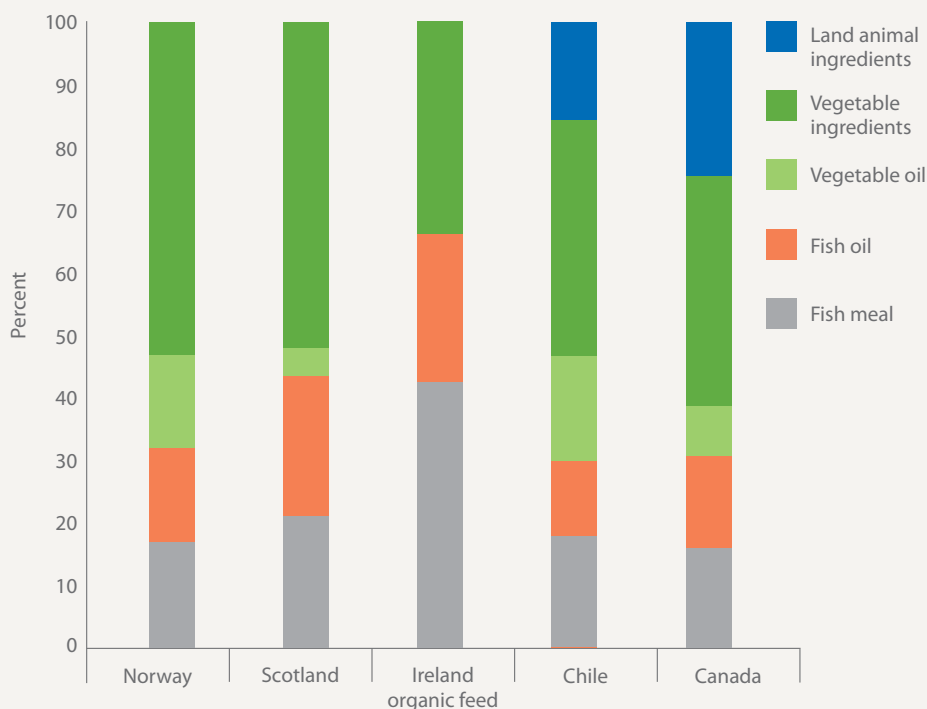
### Reduced use of wild fish

By 1990, around 60% of feeds were composed of fishmeal made from wild fish. Today, following extensive research into nutrition, our feeds still provide all that a fish needs but often contain as little as 15% fishmeal. Further research conducted with our suppliers confirms that additional reductions in fishmeal content is possible, meaning that farmed salmon can become net producers of marine protein. Levels of fish oil in feeds have also declined – replaced by vegetable oils. The move away from marine raw materials has not negatively affected fish growth, fish health or product quality.

### Better utilisation of a scarce resource

The decreasing level of marine-sourced ingredients in feeds has added to the efficiency of wild fish use. Since 2004, salmon farming has grown while at the same time reduced its use of fishmeal in absolute terms. In addition, about 24% of the marine raw materials in feed is derived from processing cut-offs and trimmings, so reducing the proportion of fishmeal from wild sources. This trend is expected to continue.

Raw materials in typical salmon feeds



These efficiencies come from several directions. Compared to the agricultural animals that previously ate this resource, salmon are cold blooded and live in water. This means they do not use energy to maintain body temperature or stand upright and so are better at converting fishmeal to meat. Salmon also have far better protein retention than land animals. These advantages mean salmon farming companies are prepared to pay higher prices for fishmeal than agriculture. As a result fishmeal resources have switched to the more lucrative fish farm market.

▶ See page 9 for more information

Since 2004, salmon farming has grown while at the same time reduced its use of fishmeal in absolute terms.



We depend on wild industrial fish for our feed. This is why we work actively to ensure that wild fish stocks used for fishmeal production are sustainably managed.

## How much omega-3 should salmon contain?

Salmon is an excellent vehicle for increasing omega-3 in the human diet. Our group-wide omega-3 minimum standard guarantees that one dinner portion provides the daily requirement of marine omega-3 (EPA and DHA) for one week (European standards). In addition the standard surpasses current European Union and United States dietary advice.

The primary source of omega-3 in our fish is fish oil in feed. Fish oil is a valuable and limited resource. During the last few years the high availability and depressed price of fish oil means feed oil content, and correspondingly omega-3 levels, have been far above our minimum standard. Going forward we expect a reduction in fish oil availability and consequently an increase in fish oil prices.

It is possible to reduce the content of fish oil, and as a result the level of marine omega-3 in salmon, to well below our minimum standard. These levels will, in the long term, be decided by consumer preferences. For our part, we are committed to meeting the demands set by the market for omega-3 in our salmon.

Current European food labelling regulations requires that foods labelled 'Source of Omega-3 fatty acids' must contain 40mg EPA and DHA per 100 grams. Those labelled 'High Omega-3 fatty acids' must contain 80mg per 100 grams. The current omega-3 content (EPA and DHA) of Marine Harvest farmed salmon from Norway is 2,000mg per 100 grams.

▶ [See pages 11–12 for more information](#)



## Can you grow your production?

We depend on wild industrial fish for our feed. This is why we work actively to ensure that wild fish stocks used for fishmeal production are sustainably managed. Sustainable management of wild fish stocks implies that fishmeal and fish oil are limited resources.

To be able to grow over the long term, salmon farming and other aquaculture industries need to reduce the inclusion of fishmeal and fish oil in feed, and continue to increase the use of cut-offs and trimmings from the wild fish industry. Our experience in these areas so far indicates a good potential for growth. It is still possible to significantly reduce the use of fish oil and fishmeal in salmon feed, without compromising fish health, food quality or nutritional requirements for our products.

In addition to this, we are researching the potential for using marine omega-3 from sources other than wild fish and the potential for our salmon to convert short-chain omega-3 (ALA) from vegetable sources into long-chain marine omega-3 fatty acids (EPA and DHA).

Percentage of global soy  
crop GM 1997

7%

Percentage of global soy  
crop GM 2009

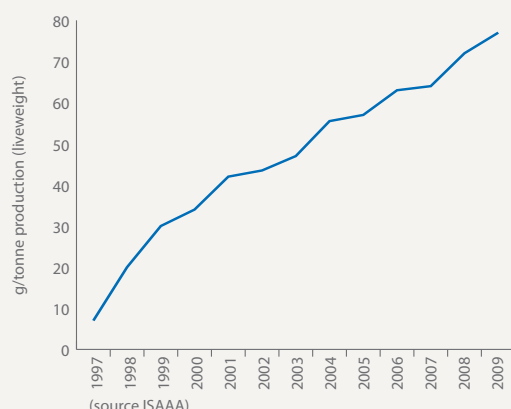
77%

## What will farmed fish eat in the future?

We take great care to ensure that the high-quality fish feeds we use meet customer requirements, for example by meeting organic criteria and, in Europe only, excluding genetically modified (GM) crops. It is becoming increasingly difficult to source non-GM raw material (especially soy meal) and it may only continue to be possible for a limited period of time. After all, around 80% of land animal feeds in Europe contain GM crops so excluding them from salmon feeds can be hard to justify in the longer term.

Land animal by-products are highly nutritious, safe and well-balanced alternatives to marine and vegetable feed raw materials. They are valuable both from a sustainability point of view and a marine raw material dependency point of view, as well as from a fish nutrition perspective. Land animal by-products such as blood meal and oil have been used in salmon diets in North and South America for several years, although they are not currently used in Europe. We believe limiting the use of land animal by-products will curb

Percentage of global soy crop that  
is genetically modified



the long-term development of fish farming and increase the pressure to use marine raw materials. Some of the fish oil and fishmeal used in Europe is transported from South America. Substituting some of this raw material with land animal protein could potentially reduce the emissions of climate gases in our value chain. Marine Harvest will always work in close co-operation with our customers and respect customer requirements and opinions relating to the selection of feed ingredients. We are keen to establish close dialogues with European customers on the acceptability of including GM-sourced ingredients and land animal by-products in European salmon feeds.

## How can you produce food and protect the environment?

We are determined to ensure acceptable  
environmental impacts of our activities.

The most significant impacts from global food production come from the composition of feeds, the carbon dioxide released through operations and the freshwater used. In addition to these common global challenges, all types of food production have their own specific challenges which need consideration. Through being aware of the environmental risks of our activities, we have incorporated specific environmental management and monitoring requirements in our Qmarine global quality programme.

To better understand our operations' potential effects on the environment we have produced the overview shown on the next page. This materiality tool is based on our experience, existing regulations, available science and dialogues with a range of stakeholders. It is an essential element of our work to improve our operations and address sustainability issues.

### Reducing carbon by better processes



One way we are reducing our environmental impacts is by redesigning our production processes. At our Sterk processing plant in the Netherlands we produce coated frozen fillets and similar products. To do this we rapidly defrost the fillet surface, coat it and then immediately refreeze it. Our engineers have developed a more efficient, rapid defrost process based on warm water. With no reduction in food safety, the new process has improved production output, increased quality as well as cutting our energy costs and carbon footprint.

For us, climate change management is not just about the amount of non-renewable energy we use but also the choices we make, for example in our packaging.

The potential environmental impacts of fish farming

Activity	Potential environmental impact	How we manage these issues is shown on page...
Fish farming	Use of fishmeal and fish oil in feed produced from fisheries classified as non-sustainable	5, 8
	Impact on the seabed from waste feed, faeces, medicines and anti-foulant treatment of nets	31, 32, 35
	Interaction with marine mammals and birds	32–33
	Reduction in biodiversity around fish farms	32, 35
	Spread of diseases and parasites from farmed to wild fish	33
	Possible genetic impact on wild fish from escaped farmed fish	33
	Contamination of seabed and water from oral and bath therapeutics	24, 25
	Use of non-renewable fuel sources for heat, light, power and oxygenation	UoP
	Potential lowering of lake and water table levels in freshwater farming	UoP
	Contamination of coastline/beaches by waste products (plastic, polystyrene, ropes, etc)	UoP
	Pollution from accidental fuel spills	UoP
Fish processing	Pollution from water discharged into municipal sewage system or into land drainage, or into surface and sea waters	UoP
	Consumption of energy derived from fossil fuels, with associated generation of greenhouse gases	29, 31, UoP
	Pollution of ground water from landfill of organic and inorganic wastes	UoP
	Use of fossil fuels in packaging – EPS	31
	Noise and vibration from processing activities	UoP
	Air emissions from rendering of solid organic waste	UoP
	Depletion of freshwater aquifer	UoP
Distribution	Odour pollution from waste treatment	UoP
	Consumption of fossil fuels and generation of greenhouse gases by transport and in production of packaging	13
	Pollution of the environment by waste packaging	UoP

Further information on our environmental performance is included in our annual Update on Progress (UoP).

How are fishing, fish farming and climate linked?

Farming fish in unspoilt coastal water makes us particularly aware of the importance of treading lightly on the earth. For us, climate change management is not just about the amount of non-renewable energy we use but also about the choices we make, for example in our packaging.

To better understand our carbon footprint, we have investigated how much energy is used in different stages of salmon farming. The study concluded that by far the most energy (90%) is used in the production of our fish feeds. With our suppliers we are looking at how this stage can become more energy efficient. One challenge here is to balance the different amount of energy required to produce the vegetables, cereals, oils and wild fish in our feeds. Fishing for wild fish has the lowest energy inputs of our ingredients, while arable crops tilled by tractors and industrially processed for their oils are more energy intensive. The dilemma for us is that the proportion of feed coming from wild fish is decreasing compared to the more energy intensive vegetables and oils. Overall this means our feeds are requiring more energy to produce.



Despite the energy used in our feed, salmon is still an energy efficient form of animal protein with a relatively light carbon footprint. This is due to the individual salmon needing less energy to maintain itself, as its body temperature is always similar to its surroundings, normally between 6-16C. Fish processing stages do require important energy inputs especially for automation, transport, cooking, freezing and super-chilling of our products to create product varieties and maintain shelf life.

As a global supplier of seafood, reliable and energy efficient transport is vital in ensuring our products reach customers well within their shelf life. We are looking at improving the efficiency of our transport in four ways:

- Reducing the distances we transport low value products like by-products, by increasing the share of fish which is filleted at the harvest station
- Ensuring transport capacity is used efficiently
- Transporting less water and ice, for example by using super-chilled approaches rather than transportation of fish on ice, and transporting fillets instead of whole fish
- Using more efficient transport methods and packaging, eg EPS boxes

▶ [See page 5 for more information](#)

## Does fish farming affect water quality?

**Clean, fresh and well oxygenated water is an essential element in successful fish farming, and we constantly monitor water quality around our sites to ensure the health and welfare of our fish and the marine environment.**

We are especially interested in understanding the health of the seabed underneath our farms where fish faeces and uneaten food can accumulate, causing problems for bottom dwelling animals. We are aware of this potential problem and have acted to better control feeding systems so that less food goes uneaten. To increase the dispersal of faeces we have moved several fish farms into stronger water currents where the faeces are flushed away and quickly dispersed. We regularly test seafloor conditions and report the results to the authorities. Our sites are fallowed in between production cycles to ensure the seafloor can return to normal conditions before new production is started. In some areas we have started larger monitoring programmes to evaluate the ecological carrying capacity in the area.

▶ [See page 35 for more information](#)

### Improving packaging



Moulded polystyrene (EPS) boxes provide a lightweight, water-resistant and hygienic solution for the transportation of fillets and harvested fish. We have been working on a simplified uniform box that reduces our energy use. The new EPS box is stronger with a plastic film that has replaced the lid. This allows for higher stacking and its uniform size allows more efficient pallet and lorry loading, which will cut the number of journeys and the fuel needed while at the same time improving product integrity.



We are also collaborating with equipment suppliers in new technologies and improved specifications in netting material.

32

Group salmon harvest  
2010

296,000

tonnes HOG

Return on Capital –  
ROACE – 2010

19.9%



## What happens if farmed fish escape?

Many of our farms are located in areas that are well known for their wildlife. Farming in these areas presents several sustainability challenges. We believe that any stock losses – for instance by being eaten by sea mammals and birds or escaping from our pens – means an unnecessary cost and a waste of resources. For these reasons, in addition to wanting to avoid potential damage to wild salmon stocks, we have a zero escapes target. This is backed up by a rigorous programme to develop methods and equipment to minimise or eliminate escapes, which is having results.

We ensure nets are always in good condition and are tagged showing net maker and year of manufacture. Nets are usually replaced after four to five years of use. In a rolling programme pen moorings are renewed on a regular basis and pens are regularly inspected for wear and tear. We are also collaborating with equipment suppliers in new technologies and improved specifications in netting material and pen, net and mooring design.

The potential impacts of escaped fish on wild salmon are still not sufficiently understood, and vary between different countries and regions. Crucial to the debate is the understanding that farmed Atlantic salmon and wild Atlantic salmon are virtually identical genetically; however, their behaviours are different. Wild salmon are predatory animals while the farmed fish are used to being fed. This is a disadvantage for escaped farmed fish that often stay around the pens looking for food. They are also susceptible to seals that are attracted to our farms. However, some farmed salmon do adapt to the wild spending time at sea before migrating to the rivers to spawn. If an escaped salmon succeeds in spawning and its offspring survive to complete another spawning cycle (the only way in which their genes can be introduced into the population) then, effectively, the fish are fit to survive in the wild.

Farmed salmon may nonetheless have a negative impact on local salmon stocks, as their behaviour in breeding grounds may potentially impact wild salmon breeding, and local stocks have special local traits (size, colour etc) which may be diluted through interbreeding. This is why we have chosen a zero tolerance for escapes.

Marine Harvest is participating in an EU project looking at farming sterile fish through triploidy (non-transgenic method). This method would eliminate any issues related to possible genetic mixing of farmed and wild stock.

## How do you stop predators eating the farmed fish?

There is an abundance of wildlife in and around fish farms, including seals and birds such as heron, shags and cormorants, which naturally try to prey on our fish. We avoid predation as far as possible, by using a range of accepted and approved preventative measures, such as anti-predator tensioned nets, which achieve a high rate of success with minimal damage to wildlife.

Seal predation remains a serious problem. When seals attack they not only consume salmon, they injure others and stress the whole pen, while their damage to the net allows fish to escape into the wild. It is therefore our duty to protect the welfare of the animals in our care as much as we can while respecting wildlife. On rare occasions a particularly aggressive and persistent seal may penetrate our nets and will be undaunted by our electronic seal scarers, where they are used, which emit a noise deterrent. In these circumstances shooting may be the only option, although this is only ever carried out as a last resort and in accordance with relevant local regulations, where necessary obtaining a specific permit.

## Do sea lice from farmed fish harm wild fish?

Sea lice are naturally occurring external parasites that feed on the mucus, skin and blood of marine fish. A large number of different species exist, some of which feed on salmon in particular.

They were first scientifically identified on salmon in 1910 and they are common on wild salmon in all indigenous salmon regions. Severe sea lice infections and mass mortalities have been documented on wild fish since 1940. A moderate number of sea lice on wild caught salmon used to be welcomed by anglers as being synonymous with good quality and freshly run fish.

Farmed salmon smolts are lice-free when they are introduced to seawater but lice larvae from wild or other farmed fish then attach themselves. If unmanaged the lice will grow, mature, produce new larvae and increase in number which can potentially lead to a sea lice infestation on wild fish. The potential impacts on wild fish are still not sufficiently understood, and differ with region, type of sea lice, fish species, salinity levels in local water, water temperature and hydrological characteristics.

In our view there is sufficient scientific evidence of potential negative impacts of sea lice from fish farms, if not properly managed, on the wild salmon, to take a precautionary stance on this issue. We know that too many mature egg-producing female sea lice on our farms, in the wrong geographical area at the wrong time of the year, can potentially lead to an increase in sea lice levels on some types of wild fish, even if the number of sea lice per farmed fish is low.

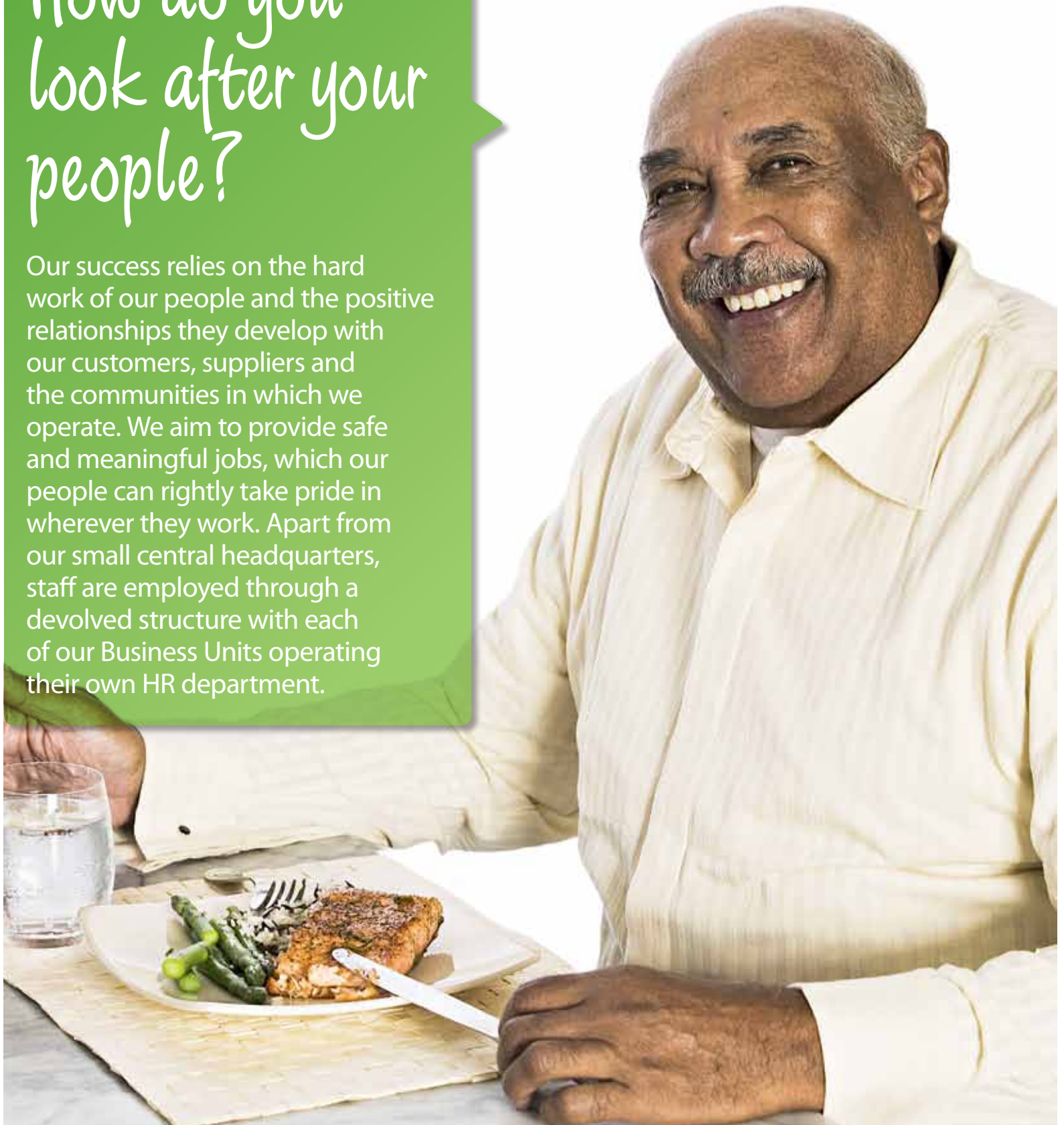
Limiting the number of lice on farmed fish reduces the potential for sea lice spreading from farmed fish to wild fish. These limits, which are based on local conditions, are set by fish farmers and authorities and are well below the limit necessary to maintain good fish health. Our sea lice monitoring and control system combines biological, medicinal and husbandry practices. More on these can be found in the section on fish management on page 25.

### Qmarine

We will minimise the environmental impact of our activities and operate in harmony with the environment, neither depleting resources beyond their capacity, nor introducing materials or substances that cause lasting harm. See page 40 for more on Qmarine.

# How do you look after your people?

Our success relies on the hard work of our people and the positive relationships they develop with our customers, suppliers and the communities in which we operate. We aim to provide safe and meaningful jobs, which our people can rightly take pride in wherever they work. Apart from our small central headquarters, staff are employed through a devolved structure with each of our Business Units operating their own HR department.





Seafood supports the livelihood of 540m people worldwide.

## How do you work with local communities?

Our success depends on viable local communities and the support of the communities where we operate. Very often, our facilities are located near towns, villages or scattered settlements where many of our employees and their families live.

By working together with the community to support what matters most to them, we are able to strengthen our already close ties. If concerns regarding our operations are expressed, we encourage dialogue. This may include site tours, presentations or stakeholder meetings to try to find mutually acceptable solutions. We engage with communities by sponsoring, or participating in, various local initiatives, such as infrastructure projects, fish enhancement societies, environmental stewardship programmes, sporting events or charitable organisations.

### First Nations in Canada



In Canada our fish farms operate within the traditional territories of many First Nation peoples. For more than ten years we have been working together with the Kitasoo/Xai'xais bands of Klemtu, British Columbia, growing and processing high-quality farm-raised salmon. More than 50 band members are employed on farm sites and at the processing plant sending 5,000 tonnes of fresh salmon to the market every year. Similar agreements bring benefits to the Kwakiutl, Quatsino and Gwa'sala 'Nakwaxda'xw First Nations. In addition we use local First Nation owned businesses, such as Qwe'Qwa'Sot'Em Faith Aquaculture Ltd and James Walkus Fishing Company for many support functions.

### Protecting and strengthening wild salmon stocks

Wild salmon stocks are important to us. Not only are they the basis for the market for our fish; our employees live and work in areas where the wild salmon has long been a part of society. Our farmed salmon are also bred from the careful selection of wild salmon stocks. It is natural and important for us to support enhancement projects and co-operate with local communities to protect wild salmon stocks. In areas where the stocks have been weakened or where local communities are concerned about the potential negative impacts of salmon farming on already weakened stocks, we work with local communities to improve breeding grounds and river conditions and offer our skills to assist in restocking wild smolt. In areas where local communities are concerned about the negative impacts of fish farming on wild salmon, we open up for dialogue, enter into area management plans and co-operate on measuring our impacts.

### Measuring ecological carrying capacity

Fish farming increases the nutrient load in fjords and coastal areas and some local communities may be concerned about local impacts. As explained on page 31, the environmental carrying capacity normally far exceeds the nutrient load from farms. We have found that an effective means of ensuring that we do not exceed the area's ecological carrying capacity is to co-operate with other stakeholders to collect data on the nutrient load from fish farming. Our first large scale project on this theme started in Rogaland, western Norway in 2010. We intend to use Rogaland as a template for how we approach these issues in other areas.

▶ See page 31 for more information



Farmed Atlantic salmon  
accounted for

46%

total global supply of  
all salmon species 2009  
– Kontali

32%

of the world's fish stocks  
may be **over-exploited,  
depleted or recovering**  
– UN FAO

## How do you care for employee safety?

We aim to provide a safe working environment for all employees at all times. Safety management at Marine Harvest is a shared responsibility between individual employees, specialist professionals in all business units and the group's health services. All three are dedicated to continuously enhancing the working environment, improving safety management and developing safety competences.

### Our objectives

To achieve this we operate an integrated safety management system where each business unit has health and safety targets, goals and improvement plans. To remain up-to-date with legislation and new workplace challenges, Business Units regularly review their safety management system, follow up on incidents and revise procedures as needed. Regular employee safety training emphasises a safe operating environment and the understanding of good management procedures. We are reinvigorating training by our commitment to undertake a major new initiative, focusing on individual attitude and responsibility for safety. To help motivate our people to develop safer attitudes we are increasing the links between good safety performance and personal incentives.

Our safety network is an important way for the Business Units to work together on safety issues, for instance communicating and making real our 12-point safety management principles. This offers straightforward ways to safer working.

Marine Harvest's 12 Safety Management Principles:

1. All sites shall establish annual safety targets with action plans (what, who, when).
2. All sites shall have high standards of housekeeping.
3. All managers shall carry out safety walks.
4. All employees shall participate in safety meetings on a regular basis.
5. The use of personal protective equipment and lifejackets shall be specified for employees, contractors and visitors.
6. A risk assessment with respect to safety shall be made for all jobs, equipment, and potentially hazardous materials, with an annual review made of those considered most critical.
7. A work permit system shall be in place, to include lock-out, tag-out procedures and to safeguard work in confined spaces.
8. An approval system for contractors shall be in place.
9. All accidents and near misses shall be reported and investigated, to include root-cause analysis, and with the subsequent implementation of corrective actions within the planned time.
10. An emergency response plan shall be in place and tested at least once every year.
11. All Business Units shall have a safety committee, to include site managers and other members so as to reflect a safety focus throughout the organisation.
12. A programme for systematic and regular safety training shall be in place.

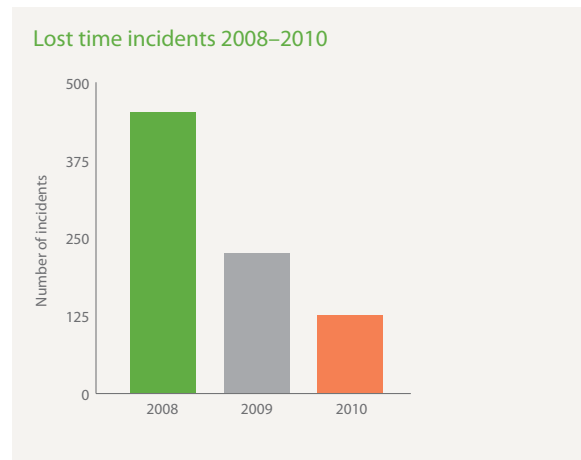
To help motivate our people to develop safer attitudes we are increasing the links between good safety performance and personal incentives.

## How do you ensure you treat people fairly?

At Marine Harvest we aim to be an open, positive working community which shows respect and support for individuals and the diverse cultures where we operate and from where our employees are drawn.

Our Code of Conduct is our principal guide for how we treat each other. We believe all our workers have the right to freely form and join groups for the promotion and defence of their occupational interests, including the right to engage in collective bargaining by joining a trade union. We support and comply with all applicable laws and the Universal Declaration of Human Rights and require a similar commitment from participants in our supply chain. An important prerequisite of compliance is the awareness of the potential risk of human rights violations – whether due to local conditions, custom, practices or otherwise. As with any potential contravention of our Code of Conduct, risky situations or allegations of human rights violations are investigated and followed up. Our operations in Ireland, Scotland, Asia, Norway, VAP Europe and Canada have local whistleblower protection programmes in place.

We provide a working environment free from harassment where employees are respected as individuals and feel proud of their work. This is the basis of our belief that all employees have a right to work without discrimination, whether on the basis of race, ethnicity, national or other origin, disability, age, gender, sexual orientation, language, religion, or any other characteristic where a person is not treated as an individual. All our operations have local equal opportunity policies in place according to local laws and regulations. On the rare occasions when these issues come to prominence we will treat them with discretion, care and support as many of these issues have a highly personal aspect. All our employees contribute to our success. The diversity of our employees is an asset to the company. Details on the composition of our workforce, senior management team and Board are available in our Update on Progress and Annual Report and Accounts.



## Qmarine

Protecting the safety, health and human rights of our employees is a core value for us. We operate in a responsible manner towards society at local, national and international levels. As a world leading aquaculture and seafood company we accept a responsibility to lead aquaculture towards increasing sustainability. Please see page 40 for more on Qmarine.



## How is profitability and environmental responsibility linked?

We believe healthy profits come from providing customer value from healthy, tasty and nutritious seafood, farmed both cost-effectively and in an environmentally responsible way that maintains a good aquatic environment and respects the needs of wider society. This is a view we share with many of our investors who welcome this long-term approach to delivering solid returns.

Marine Harvest  
is the world's

No. 1

salmon farmer

Salmon accounts for

12%

of global seafood  
by value

# What principles do you follow to ensure sustainable development?

In the seafood business and specifically in aquaculture, there are no real long-term conflicts between environmental and social responsibility and economic profitability. To ensure the sustainable development of our company, we have developed four guiding principles (our 4-Ps).

## Our guiding principles

### Profit

#### Attractive financial results

Our profits depend on our ability to provide customer value from healthy, tasty and nutritious seafood, farmed both cost-effectively and in an environmentally sustainable way that maintains a good aquatic environment and respects the needs of wider society. Attractive financial results are, in turn, necessary to provide the financial resources that facilitate our investment in sustainability. These investments include: employee competences, R&D efforts to improve environmental performance, equipment we need to operate with good employee safety, good fish health and acceptable environmental impacts.

### Product

#### Tasty and healthy seafood providing customer value

We will not compromise on our ability to continually deliver assuredly healthy, tasty and responsibly produced seafood to our customers. Attractive financial results are a precondition for product and market development. We need the best available talents to ensure good food quality and product development.

### People

#### Safe and meaningful jobs

Neither employee safety, nor our employees' self-respect and personal pride in their work can be compromised if we are to succeed as a company with good relationships with our communities. Taking a leading role in the area of sustainability improves our attractiveness for potential employees, and we need the best available talent to continue to develop sustainably.

### Planet

#### Sustainable and environmentally responsible development

All our operations and our long-term profitability ultimately depend on sustainable and environmentally responsible interactions with the natural environment. To maintain fish health, avoid escapes and minimise the environmental impact of our operations, we need financial strength and the best skilled people.



Profit



People

Seafood for a better life



Product



Planet



South East Asia seafood  
consumption increased by

134%

1961–2008

Marine Harvest supply

4m

meal portions of  
salmon daily

## What systems do you use to oversee your business?

For each of our guiding principles we have a set of ambitions and key performance indicators (KPIs). The principles and ambitions are used in our planning and budgeting process. All business units report on the KPIs at monthly and quarterly business review meetings with group management. This structure is important, but not sufficient alone to control and develop our business. We have supplemented our guiding principles with a Code of Conduct and a global quality system called Qmarine.

Our 44-page Code of Conduct was launched in 2010. Printed in seven languages and available via our intranet, the Code sets out and builds on seven basic rules. For each rule it explains what all employees should do, and what everyone should take extra care to watch out for. Marine Harvest employees must make a personal commitment to follow the Code and to raise questions and concerns about possible violations. We have followed up on the launch with e-learning, workshops, presentations and discussions at a local level.

For employees involved in sales, marketing, purchasing, customer relations and head office functions we have several supplementary ethical documents. These offer advice and dos and don'ts on competition, compliance, site investigations and communications with business partners.

Marine Harvest Group is listed on the Oslo stock exchange and follows the regulations established by the Norwegian Corporate Governance Board (NUES). Open dialogue with investors and the stock market is important to us. An overview of important dates, latest quarterly financial presentations, webcasts by our CEO and CFO and our investor relations contacts can be found on our website.

Our group management team consists of four people. The CEO has overall responsibility for the day-to-day operations and is also responsible for ensuring good corporate governance. The CEO reports to the Board of Directors.

## What other management processes do you use?

At the core of management is our total quality system called Qmarine.

Qmarine holds our global, standard operating procedures (SOPs) which enable us to apply the same high standards wherever we operate. In many instances the standards required by Qmarine exceed, and are never less than, individual national requirements. It guides our actions and decisions in the strategic areas of food safety, food quality, fish welfare, environmental responsibility and social responsibility. All SOPs are held in a central database, or MQM, which controls individual local quality management systems and their procedure implementation. Qmarine is very much a living system and is continually updated from developing best practice. It is used on the one hand for compliance, for instance with regulatory requirements and, on the other hand, driving knowledge, from identifying and sharing best practices and outcome of internal or external R&D, throughout the company.

# Qmarine

Our global quality management programme, aligned to the Group’s guiding principles (see page 39).



Food Safety



Food Quality



Fish Welfare



Environmental  
Responsibility



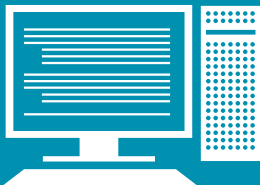
Social Responsibility



Quality Assurance



Standard Operating Procedures developed, implemented and maintained through a specific global database.



Marine Harvest operations thereafter implement these procedures in their local quality management systems.



Norway



Scotland



Ireland



VAP



Canada



Chile

# How will fish be farmed in the future?

Our research and development teams work with academics, suppliers, NGOs and other players in the industry to improve the way we manage our fish, fish health and welfare, and product quality as well as reducing our environmental impacts.

Meeting the challenge of fish health will continue in the future with an emphasis on tackling viral diseases and parasites. Our diverse toolbox of promising alternatives to sea lice chemical treatment includes biological, mechanical and physical tools, sea lice gene sequencing, breeding and potentially a vaccine. We are also gaining a better understanding of natural processes, such as harnessing wrasse and other cleaner fish.

## Past, present, future?

The proportion of the salmon life-cycle in closed containment is likely to increase, requiring new facilities to be built.



Modern wellboats allow greater ease and better fish welfare when transferring fish.



The size of farms and individual pens has increased considerably in the last 40 years.



134%

Estimated global  
aquaculture growth  
2000–2050 – UN FAO

Fish farming is over

45%

of the world's fish food  
production

## How has salmon farming changed?

In its early days – in the 1970s – salmon farming was an unco-ordinated cottage industry. Today, salmon farming has matured into an efficient business sector with high standards and a sustainable outlook. Early fish farms reared comparatively small numbers of salmon that were densely packed into small 30m circumference cages constructed of wood. Hand feeding allowed spillage of feed pellets resulting in unacceptable impacts to the seabed. Early pen design was also less resilient. Fewer secondary safety features meant that during bad weather stock could escape and working conditions were risky.

Today, following industry consolidation, more professional fish farming approaches and better technology have reduced the time to fish maturity from 30 to 18 months. Modern pens can have a circumference of up to 160m. They have remotely controlled automatic feeding systems linked directly to feed barges, so that overfeeding, feed spills and the associated seafloor build-ups are minimised. Pen materials and structures are now substantially more robust and are easier to clean, reducing the need for chemical defoulers. Feed composition has moved on from fish trimmings to high-technology feed pellets with significantly reduced marine ingredients. Parasite control has moved on from putting onions in the water to a complex combination of biological, medical, technical and husbandry techniques. Fish health interventions have advanced from a reliance of antibiotics to widely used vaccines for the most common diseases.

## How will your industry change in the next decade?

With the tremendous changes seen in salmon farming and the seafood industry over the last decades, caution in predicting future development is wise. However, some development trends are clear enough to give an indication of what to expect.

We expect farming technology to change, but exactly how it will change remains to be seen. The trend towards larger farms, located further off the coast, will continue. One potential development is the use of submersible net-pens, which reduce exposure to parasites and harsh weather conditions. The proportion of the salmon life cycle spent in closed containment is also likely to increase. Several business units are already planning new sites for rearing post smolts (up to 1kg fish) in closed tanks on land, and are looking into technology for floating closed containment for fish up to 1kg. Full cycle to harvest in closed containment appears impractical at present as the required energy input to currently available recirculating technology would be in conflict with our corporate sustainability objectives. We will continue to monitor and evaluate this and all new advances in rearing technology.

The trend towards reduced dependency on wild fish material for feed is also expected to continue, and we will see debates on the use of genetically modified feeds, and land animal protein for feeds in fish farming, in the same way as we have seen in agriculture. With new genetic technology, breeding towards specific traits is made possible. Salmon will be bred not only for growth and general health conditions but also for disease resistance. New vaccine technology is expected to lead to effective vaccines against viral diseases. Fish welfare is also an area where improvements are expected. Harvest methods are already undergoing changes, to avoid stress and enhance welfare.

In its early days – in the 1970s – salmon farming was an unco-ordinated cottage industry.



Our ambition is to enable our industry to increase the supply of nutritious seafood to the world's population while improving our technology and reducing our environmental footprint.

## How will these improvements affect me?

In the early years of salmon farming, the R&D focus was on making it possible to farm salmon. In the next development phase, reducing costs, improving fish health while ensuring growth capacity was the main focus.

Over the last few years, risk reduction and environmental impacts took centre stage, following an acknowledgment that biological and environmental risks are closely linked to long-term value creation, and that we have an obligation for environmental responsibility. The decade to come should bring further industrialisation and professionalisation in our industry to reduce environmental impacts, minimise associated risks and then implicitly to improve quality while reducing costs. In summary, our ambition is to enable our industry to increase the supply of nutritious seafood to the world's population while reducing our environmental footprint.

### Genetic modification

Genetic modification and transgenic organisms are now not uncommon in crops, vegetables and micro-organisms, for the production of feed, feed ingredients, food, food ingredients and pharmaceutical products. Advances in the development of a genetically modified, transgenic salmon in the USA have seen an Atlantic salmon put forward to FDA approval for production and sale in the USA. Genetic material from chinook salmon and ocean pout has been introduced into it to promote – it is claimed – more rapid growth.

For Marine Harvest, our yardstick for the fish's acceptability is first whether it satisfies our Qmarine quality management system. Specifically:

- Whether the fish is documented safe to eat.
- Is the fish reared in conditions that are well suited to their needs, minimising diseases and disorders, ensuring appropriate nutrition and with the freedom to express their natural behaviour?
- Does the fish fulfil agreed customer specifications and consumers' expectations?
- Environmental impacts should be minimised with no lasting effects.

Before transgenic salmon can be of interest to Marine Harvest, all these requirements would have to be satisfied. In addition to this, the use of GM salmon must be legally authorised, evaluated as ethically acceptable, and lastly the food must be in demand.



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