



**nuterra™**

**Our sustainability programme**

It's not just what we aspire to do,  
it's what we do

## Nuterra Product Assessment

Salmon feed - March 2017

Skretting Norway





### **Purpose and scope of the Product Assessment Report**

Skretting's commitment to sustainability is expressed through the Nuterra programme, which identifies the key sustainability issues facing the aquaculture industry and the actions Skretting will take to address them.

Our customers, retailers and certification schemes have a need for documentation of the environmental footprint of our products. Our customers can use the information provided in this report to send to their seafood buyers that are requesting specific, documented information relating to compliance towards aquaculture standards or use the information in their own environmental reporting.

The issues addressed under the umbrella "environmental footprint" relate to the areas where we have the most requests for information, and the areas where we at present are able to disclose information of good quality.

This document is an assessment based on multiple products in order to describe the environmental footprint from Skretting feed used to produce salmon. The information provided here is applicable to Skretting Norway fish feed produced in 2016.

*Trygve Berg Lea*

**Trygve Berg Lea**  
Sustainability Manager, Skretting

# Nuterra programme

The Nuterra programme sets out Skretting's sustainability strategy and provides the tools required to implement this throughout our company. The Nuterra programme is made up of three distinct components.

## Nuterra Roadmap

Our Nuterra Roadmap sets clear ambitions regarding people, planet and profit. It is an aspirational vision designed to align our actions and initiatives over a period of several years, as we work to fulfil our mission of 'Feeding the Future'. These objectives are aligned with the long-term goals of our strategy as well as the UN Sustainable Development Goals.

The roadmap is grouped into four areas: Nutritional Solutions, Ingredients, Operations and Commitment.

## Nuterra Standard

Our Nuterra Standard is an internal tool that clearly outlines the actions needed to realise the Nuterra Roadmap and enables us to measure and score progress over time.

Our operations undertake this assessment biannually to ensure that we hold ourselves accountable in our sustainability aspirations and targets.

## Nuterra Product Assessment

The Nuterra Product Assessment is a tool that helps us to measure the environmental impacts and attributes of our nutritional solutions. It uses Life Cycle Assessment methodology to systematically evaluate the environmental aspects of using our products and services.

Important indicators of measured sustainable nutritional solutions include greenhouse gas emissions, acidification, eutrophication and energy use.



## NUTRITIONAL SOLUTIONS

Enabling the animal and farmer to perform better

- Farm and feed performance
- Animal health and welfare
- Young animal feed
- Minimise food safety risks



## INGREDIENTS

Creating a sustainable base for feed

- Responsible sourcing
- Sustainable partnerships



## OPERATIONS

Ensuring our own house is in order

- Reducing environmental impact in our operations
- Improving our own working environment



## COMMITMENT

Involving people in the challenge of 'Feeding the Future'

- Employee engagement
- Stakeholder engagement
- Community development



## Skretting salmon fish feed products

Skretting has a large range of products for many species. The focus here is on the most common products used in salmon farming in sea – which represents the bulk of our product sales.

Regular performance line	Best performance line
<p><b>Spirit</b></p> <ul style="list-style-type: none"><li>• First phase seawater</li><li>• Optimal growth</li><li>• Optimal nutrition</li></ul> <p>Diets for optimal growth in the first phase in seawater until the fish reach 1kg</p> <p>Spirit diets cover all the nutritional needs of fish under normal conditions. Several years of research have given us knowledge to best fulfil the nutritional requirements</p>	<p><b>Spirit Plus</b></p> <p>Spirit Plus is a more advanced Spirit diet. Adding micronutrients and an adjusted production process support feed intake, growth and gut health</p>
<p><b>Optiline</b></p> <ul style="list-style-type: none"><li>• Optimal growth</li><li>• Optimal nutrition</li></ul> <p>Lowest feed cost per kg of fish</p> <p>Grower diets that satisfy all the nutritional needs of fish under normal conditions. Many years of research has given us knowledge to best fulfil the nutritional requirements and best use of different raw materials</p> <p>The diets can be adjusted to different production environments, such as summer and winter</p>	<p><b>Premium</b></p> <ul style="list-style-type: none"><li>• Higher yield</li><li>• Low FCR</li><li>• Better growth</li></ul> <p>More fish with less feed</p> <p>Premium is our high energy feed with metabolic activators which increase the utilisation of digestible energy - which means better growth with less feed. The result is higher slaughter yield, and therefore more edible fish</p> <p>The metabolic activators also changes the way the fish store fat. Less fat is stored around the gut, while more fat is built into the muscles. Therefore the fillets get bigger and contain more healthy fatty acids</p>



Using technology that is based upon our latest understanding of essential micronutrients and how they interact with fish and shrimp, MicroBalance allows us to replace one feed raw material with another without impacting performance, welfare or end-product quality.

Crucially, this innovation, which is the result of several decades of research conducted by the Skretting Aquaculture Research Centre (ARC), enables us to produce feeds with much lower fish meal content across several major species.

At a time when raw material prices are highly volatile, the raw material flexibility enabled by MicroBalance presents a major advantage over traditional aquafeeds. It reduces the aquaculture industry's dependence on raw materials that become too expensive by replacing them with less costly alternatives that maintain the same nutritional values. This unprecedented raw material flexibility ensures we supply aquaculture diets that are both more economically viable and sustainable.



Many aquaculture systems are open to the natural environment, which exposes fish and shrimp stocks to stresses such as extreme temperatures, handling and a range of parasites and diseases that can lead to negative health impacts. Skretting is committed to helping farmers secure animal health through continued investment in R&D, which helps to improve the sustainability of production by maintaining a high level of animal welfare as well as increasing the efficiency of production.

The result from more than 20 years of research, our Protec products help protect the skin, intestine and gills of aquaculture species. They support immune systems, add the building blocks for new cells and increase the level of antioxidants.

# Use of wild fish for feed

Under the Nuterra programme, we will regularly update the industry with our use of wild fish used to produce 1kg of feed, based on the average, weighted raw material composition. The use of wild fish will be expressed as the Forage Fish Dependency Ratio (FFDR). It will be calculated based on the use of fish meal and fish oil.

Table 1. Calculation of Forage Fish Dependency Ratio (FFDR) based upon average inclusion of fish meal and fish oil to produce 1 kg of feed (FFDR per kg salmon is calculated by multiplying by economic feed conversion ratio - FCR).

FFDR fish meal	Premium and Spirit Plus product line <sup>1)</sup>	Optiline and Spirit product line <sup>2)</sup>	Skretting all production <sup>3)</sup>	
Marine protein				
Origin from whole wild fish	86	48	103	<i>g per kg feed</i>
FFDR	356	201	428	<i>g per kg feed</i>
FFDR	0,36	0,20	0,43	<i>kg per kg feed</i>
FFDR fish oil	Premium and Spirit Plus product line <sup>1)</sup>	Optiline and Spirit product line <sup>2)</sup>	Skretting all production <sup>3)</sup>	
Marine oil				
Origin from whole wild fish	88	91	85	<i>g per kg feed</i>
FFDR	1766	1815	1708	<i>g per kg feed</i>
FFDR	1,77	1,82	1,71	<i>kg per kg feed</i>
	Fish meal	Fish oil		
Yield in production	24	5		%

1. High performance line (low feed conversion and high growth) from sea water transfer to slaughter  
2. Normal performance line (feed conversion and growth) from sea water transfer to slaughter  
3. Average of all products produced by Skretting

The yield refers to the amount of fish meal and fish oil one in average will get from processing 1 kg of wild fish. Typical figures from the industry refers to that one in average get 240 grams (24%) fish meal from processing 1 kg of wild fish and in average 50 grams of fish oil form processing 1 kg of wild fish. The yield of fish oil will be highly variable – depend on species and season of the year.

## Rationale

The salmon aquaculture industry has significantly reduced the inclusion rates of fish meal and fish oil from forage fish in salmon feeds during the past two decades. The Nuterra programme aims to support the trend toward lower inclusion rates as well as the increasingly efficient use of marine resources. Fish meal and fish oil are both finite resources that are shared across a range of users with increasing demands, from direct human consumption to aquaculture to pig and poultry production. The Nuterra programme promotes the efficient use of these resources, producing increasing amounts of farmed salmon from a given input of fish meal and fish oil.

Our nutritional solution MicroBalance has made it possible to substitute fish meal with other raw materials in diets for a number of aquaculture species. Fish oil is a scarce raw material and our nutritional concept LipoBalance enables us to substitute fish oil with alternative oils.

# Carbon footprint of feed

Under the Nuterra programme, we will regularly update the carbon footprint of 1kg of feed used to produce 1kg of salmon based on the average, weighted raw material composition. The carbon footprint is delivered at factory gate (average numbers).

Table 2. The average carbon footprint of 1kg of feed using the Spirit/Optiline or Spirit Plus/Premium product line (carbon footprint per kg salmon is calculated by multiplying by economic feed conversion ratio - FCR).

	Premium and Spirit Plus product line <sup>1)</sup>	Optiline and Spirit product line <sup>2)</sup>	Skretting all production <sup>3)</sup>	
Marine protein				
Raw materials	2,04	1,97	2,01	CO <sub>2e</sub> /kg
Manufacturing	0,03	0,03	0,03	CO <sub>2e</sub> /kg
Total carbon footprint <sup>4)</sup>	2,07	2,00	2,04	CO <sub>2e</sub> /kg

1. High performance line (low feed conversion and high growth) from sea water transfer to slaughter  
2. Normal performance line (feed conversion and growth) from sea water transfer to slaughter  
3. Average of all products produced by Skretting  
4. Delivered feed factory gate

The calculation of carbon footprint is made by using values for the raw materials that are publically available. The carbon footprints of micro ingredients are not included in the calculation.

## Rationale

Climate change represents perhaps the biggest environmental challenge facing current and future generations. As a result, energy consumption used in food production has become a source of major public concern. SEA Plus recognises the importance of efficient and sustainable energy use. Therefore, we believe that energy consumption in the production of feed should be monitored on a continual basis and that feed manufacturers should develop the means to improve efficiency and reduce consumption of energy sources, particularly those that are limited or carbon-based.

The data identified in this process can also be used by salmon farmers to calculate the carbon footprint of their fish. This information can then be made available in the value chain.

# Nutrient release from products

Under the Nuterra programme, we will regularly update and inform the industry about the nutrient discharge of nitrogen and phosphorus from our standard product lines.

Table 3. Nutrient discharge to the environment when using the Spirit/Optiline/Premium product.

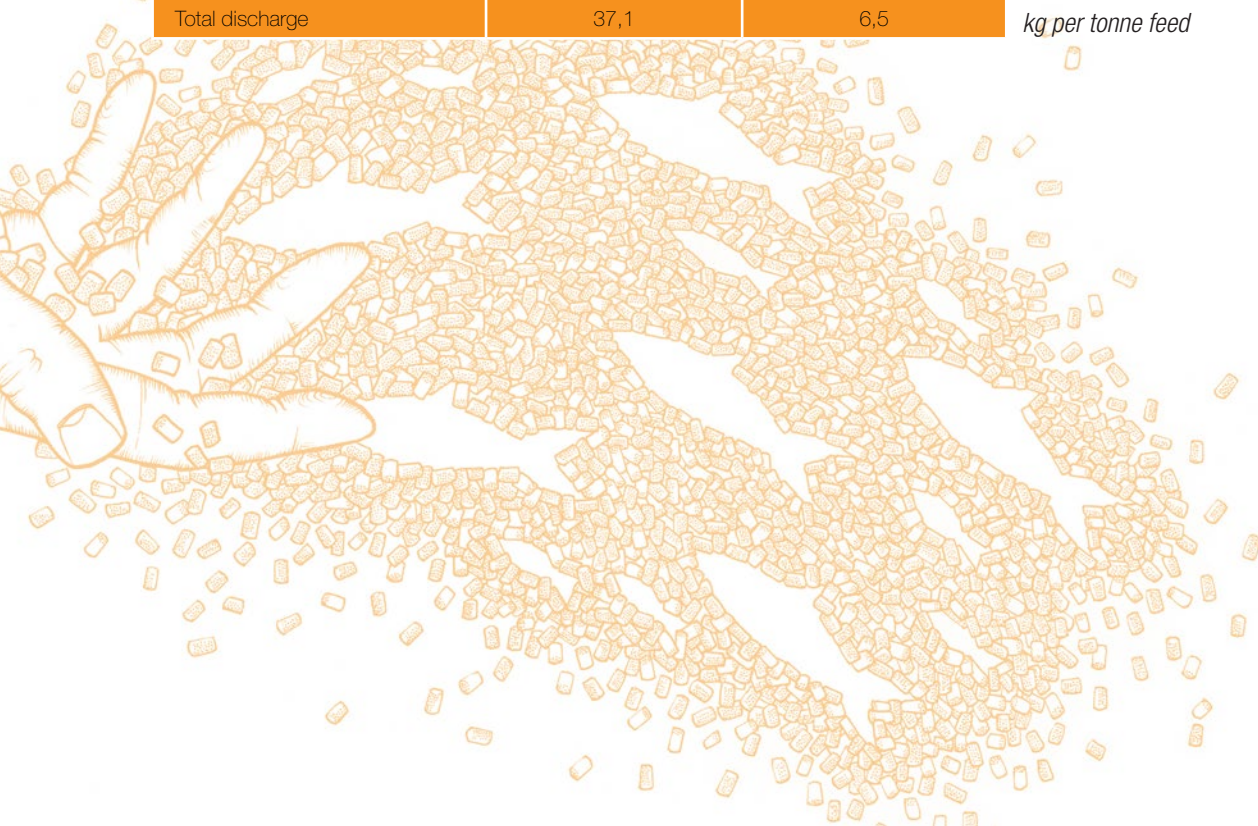
	Nitrogen	Phosphorus	
In faeces	7,6	5,5	kg per tonne feed
Dissolved in water	29,5	1,0	kg per tonne feed
Total discharge	37,1	6,5	kg per tonne feed

The nutrient discharge information is given as an average for a production of a 5 kg (live weight) salmon in sea water. The actual emission can vary with body composition and feed waste.

### Rationale

Nutrients such as phosphorus and nitrogen are essential for life and these elements occur naturally in the water column of both fresh and marine environments. In the environment they function as nutrients for algae growth.

The reported nutrient discharge cannot be used to measure the effect of the nutrients in the environment (the farm site). The effect of the nutrient load must be measured in the ecosystem through for example analyses of water and environmental



# Responsible sourcing policy

Our nutritional solutions include a wide variety of ingredients sourced from all over the world. We can only develop sustainable nutritional solutions if we are part of a responsible supply chain.



Our Supplier Code of Conduct (<http://www.nutreco.com/globalassets/from-root/nutreco-supplier-code-of-conduct.pdf>) enables us to engage with our suppliers on material issues relating to their operations and to set minimum criteria relating to environmental, social and legal aspects.

Cooperation between value chain partners (business, government, science and NGOs) is a prerequisite to successfully address the sustainability challenges of our industry. Skretting participates in various sustainable partnerships such as the the ProTerra Network, the Aquaculture Stewardship Council feed dialogue and the International Fish meal and Fish Oil Responsible Supply Standard (IFFO RS).

## Traceability of raw materials

Raw material traceability is fundamental to the Nuterra programme. This requirement makes raw material sourcing more transparent in the value chain. For some feed ingredients this will demand traceability with regard to country of origin, while for marine raw materials we demand more detailed traceability back to the fishery from which the marine raw materials originated.

Table 4. Average raw material composition for the Optimal and High performance product line and average for the total production.

	Premium and Spirit Plus product line <sup>1)</sup>	Optiline and Spirit product line <sup>2)</sup>	Skretting all production <sup>3)</sup>
Marine protein %			
Fish meal from whole fish	8,6	4,8	10,3
Fish meal from trimmings	1,9	1,1	2,3
Vegetable protein %			
Soy protein concentrate	30,4	30,7	27,3
Faba beans	3,7	4,8	4,2
Wheat gluten	10,1	7,8	10,4
Sunflower meal	0,5	8,0	2,0
Other vegetable protein	0,0	0,1	0,1
Marine oils %			
Fish oil from whole fish	8,8	9,7	8,5
Fish oil from trimmings	2,3	2,4	2,2
Fish oil from farmed fish <sup>4)</sup>	0,0	0,0	0,7
Vegetable oils %			
Rapeseed & camelina oil	21,8	18,9	19,6
Carbohydrates %			
Wheat	9,4	9,8	9,4
Other	2,4	2,6	3,1
Total %	100,0	100,0	100,0

1. High performance line (low feed conversion and high growth) from sea water transfer to slaughter

2. Normal performance line (feed conversion and growth) from sea water transfer to slaughter

3. Average of all products produced by Skretting

4. In customer specific diets

# Source of marine raw materials

Under the Nuterra programme, all fish meal and fish oil originates from responsibly managed fisheries as defined by Nutreco Supplier Code of Conduct – requirements for marine raw materials.

Table 5. Certification status of origin of fish meal and fish meal originating from targeted reduction fisheries (whole fish).

Reduction fisheries	Certified <sup>1)</sup>	Approved under the ASC salmon standard <sup>2)</sup>	Benthic impact
Species & fishery			
Anchoveta - Peru	IFFO RS		No impact on the benthic habitat
Anchoveta - Chile	IFFO RS		No impact on the benthic habitat
Anchoveta - Ecuador			No impact on the benthic habitat
Common sardine - Chile	IFFO RS		No impact on the benthic habitat
Capelin - Iceland	IFFO RS		No impact on the benthic habitat
Capelin - Barents Sea	IFFO RS		No impact on the benthic habitat
European sprat - North Sea	IFFO RS	Yes	No impact on the benthic habitat
Baltic sprat	IFFO RS		No impact on the benthic habitat
Lesser sand-eel - North Sea	IFFO RS	Partly	Bottom trawl
Atlantic herring - Icelandic summer-spawning	IFFO RS	Yes	No impact on the benthic habitat
Atlantic herring - Norwegian spring-spawning	MSC	Yes	No impact on the benthic habitat
Blue whiting - Northeast Atlantic	IFFO RS		No impact on the benthic habitat
Gulf menhaden - Gulf of Mexico	IFFO RS	Yes	No impact on the benthic habitat
Mackerel - North Atlantic	MSC	Yes	No impact on the benthic habitat
Horse mackerel - North Atlantic			No impact on the benthic habitat
Norway pout - North Sea	IFFO RS		No impact on the benthic habitat
Boarfish	IFFO RS		No impact on the benthic habitat

1. IFFO RS refers to whole fish raw material approved under the standard

2. Based on Fishsource scores applicable for 2016

Under the Nuterra programme, all fish meal and fish oil from trimmings (fish by-product) must not come from a species listed under the categories on the IUCN Red list ([www.IUCN.ORG](http://www.IUCN.ORG)) as 'endangered' or worse. Species that are listed as 'vulnerable' are not eligible for use. An exception exists for fisheries from a discrete sub-population if they have a fishery management plan that continually evaluates the stock relative to fishing and adjusts/controls harvests according to changes in the status of the stock.

*Table 6. Certification status of origin of fish meal and fish meal originating from by-products (trimmings).*

Trimmings and by-products	Certified <sup>1)</sup>	Approved under the ASC salmon standard <sup>2)</sup>
Species & fishery		
Atlantic herring - Icelandic summer-spawning	IFFO RS	Yes
Atlantic herring - Norwegian spring-spawning	MSC	Yes
Mackerel - North Atlantic	MSC	Yes
Trimmings and by-products		
Salmon oil (farmed) <sup>3)</sup>		Yes

1. IFFO RS refers to by-product fish raw material approved under the standard

2. Based on Fishsource scores applicable for 2016

3. Used in specific customer diets

*Table 7. Relative share of certification status of origin of fish meal and fish meal.*

Origin	Fish meal	Fish oil
Whole fish	%	%
Certified (IFFO RS and MSC)	81	69
MSC certified	1	1
ASC compliant material	16	36
Trimming and by-products	%	%
Certified (IFFO RS and MSC)	9	12
MSC certified	6	5
ASC compliant material	9	16
Total material	%	%
Certified (IFFO RS and MSC)	90	81
MSC certified	6	6
ASC compliant material	25	51

*Table 8. Origin of fish meal and fish meal originating from targeted reduction fisheries (whole fish).*

Reduction fisheries	Fish meal	Fish oil
Species and fishery	%	%
Anchoveta - Peru	19,7	5,2
Anchoveta - Chile		2,4
Anchoveta - Ecuador		3,0
Common sardine - Chile		2,4
Capelin - Iceland	3,6	3,0
Capelin - Barents Sea		0,1
European sprat - North Sea	14,5	20,2
Baltic sprat	3,5	3,3
Lesser sand-eel - North Sea	6,1	3,3
Atlantic herring - Icelandic summer-spawning	0,7	0,7
Atlantic herring - Norwegian spring-spawning	0,6	0,4
Blue whiting - Northeast Atlantic	30,0	12,4
Gulf menhaden - Gulf of Mexico		14,2
Mackerel - North Atlantic	0,0	0,2
Horse mackerel - North Atlantic	0,2	2,5
Norway pout - North Sea	2,4	1,4
Boarfish	0,0	
Unidentified	0,4	0,9
Total	81,9	75,7

Table 9. Origin of fish meal and fish meal originating from by products (trimmings).

Trimmings and by-products		
Species & fishery	%	%
Atlantic herring - Icelandic summer-spawning	5,6	4,0
Atlantic herring - Norwegian spring-spawning	3,5	6,9
Mackerel - North Atlantic		1,1
Trimmings and by-products	9,1	8,7
Salmon oil (farmed) <sup>3)</sup>		3,6
Total	18,1	24,3

Rationale

Wild fish harvested from the ocean and reduced into fish meal and fish oil are a component of salmon feeds. Small pelagic fisheries typically feed the fish meal and fish oil industry but in some regions are also important for direct human consumption. Also known as forage species, these are small, short-lived species that occupy a low trophic level (LTL) in the ecosystem. Due to their specific population biology and dynamics, these species are frequently resilient to fishing pressure if catches are well managed, but overfishing is always a possibility without effective controls.

Through the Nuterra programme, we strive to ensure that marine-based feed ingredients come from sustainable sources in the short- and long-term. The requirements aim to align industry incentives to support processes that will lead to improved fisheries management.

# Use of soy raw materials in feed in relation to deforestation and loss of biodiversity

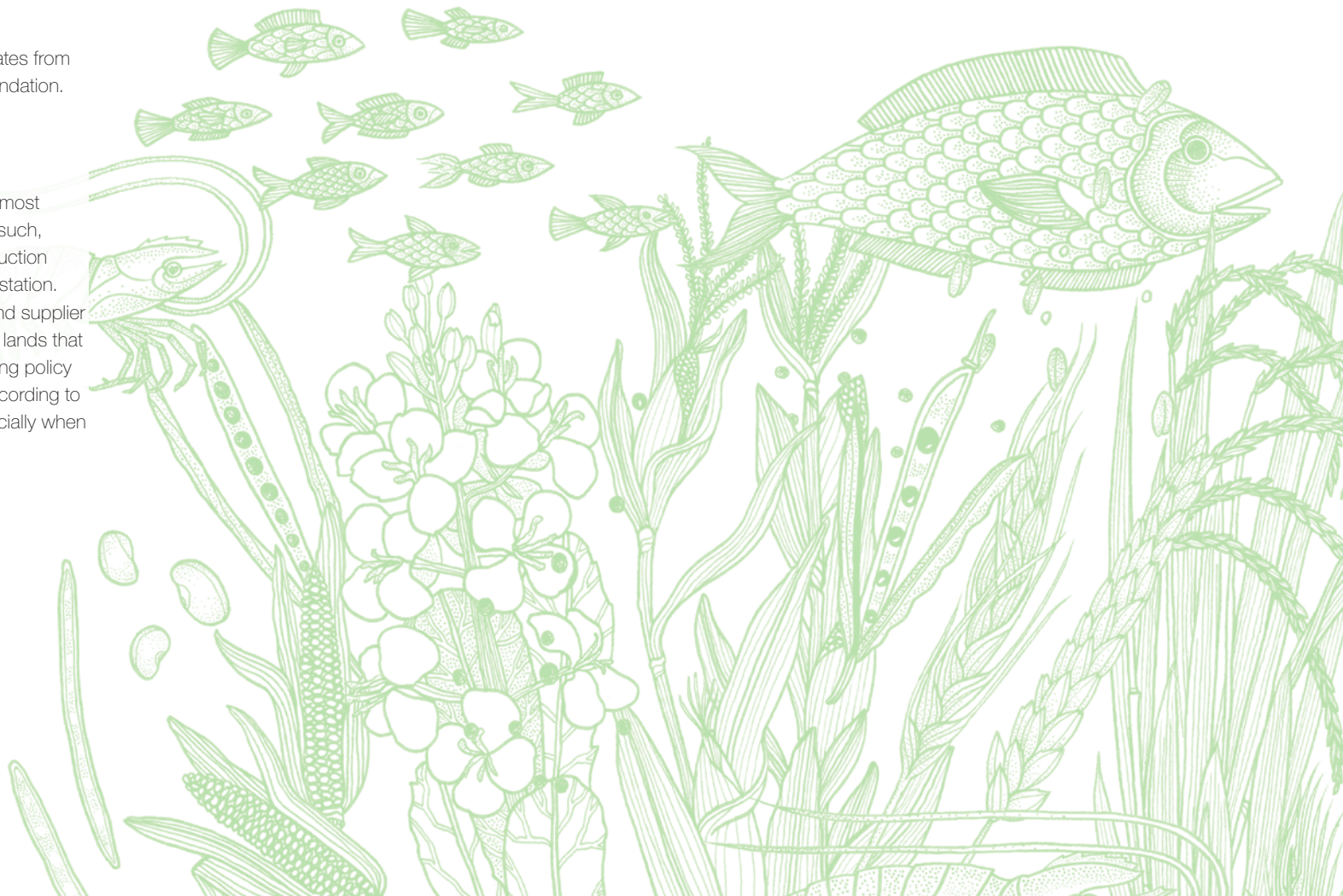
**Under the Nuterra programme, soy raw materials originating from Brazil must come from responsible producers. They must not originate from areas of deforestation. Furthermore, soy producers must also ensure legal use of land and water, and respect of the needs and rights of smallholders and indigenous people as well as protection of workers' health and rights.**

All soy protein concentrate in Skretting products originates from soya which is ProTerra certified (<http://www.proterrafoundation.org/>).

## Rationale

Tropical deforestation is widely regarded as one of the most serious global environmental problems of our time. As such, Skretting is committed to supporting raw material production initiatives that do not occur in regions subject to deforestation.

We have also built long-term sustainable purchasing and supplier policies that prohibit the sourcing of soy products from lands that are illegally deforested. In addition, part of our purchasing policy is to encourage our suppliers to pursue certification according to recognised schemes for responsible production, especially when it comes to soy.



# Use of transgenic plant material in feed

**Skretting Norway has as a mandatory requirement to disclose the use of transgenic\* plant raw material to the customer.**

Currently, Norwegian food and feed law has not approved any transgenic plants for use in food or feeds. Under the principle of legal compliance Skretting does not use any transgenic plant raw material in its products.

## Rationale

Processed genetically modified foods must be approved by Food Act general regulations for production and marketing of food and feedstuffs. These regulations contain the key elements of EU legislation on the approval of genetically modified products.

Those who want to sell genetically modified feeds in Norway must first apply to the Food Safety Authorities for approval of products, even in cases where the same transgenic feed raw material has already been approved in the EU. Approval is based on thorough health risk assessments.

When genetically modified feeds have been approved, they shall comply with the labelling regulations and labelled accordingly in order that customers can make an informed choice. In addition, Norway has distinct regulations prohibiting genetically modified products that contain genes coding for antibiotic resistance.

\*Defined as containing >0,9% transgenic materials in the plant raw material used. When less than 0,9% transgenic material is found, it must be the result of technical random and unavoidable pollution in the supply chain.





## Certification to other standards

**Skretting Norway is certified to a number of recognised standards within the area of food safety and environmental compliance.**

Standard	
NS-EN ISO 9001-2008	Quality management systems
NS-EN ISO 140001-2004	Environmental management systems
ISO 22000	Food management systems
Global GAP - GGN: 4050373823641	Compound feed manufacturing (Norway)
Global GAP - GGN4052852471015	Compound feed manufacturing (France) - imported starter feeds
Hazard Analysis and Critical Control Points (HACCP)	All Norwegian factories
ASC responsible salmon standard	Compliance statement feed related requirements

# Operating in compliance with all applicable national laws and local regulations

**Skretting operates in accordance with the Norwegian laws governing feed production.**

These laws are:

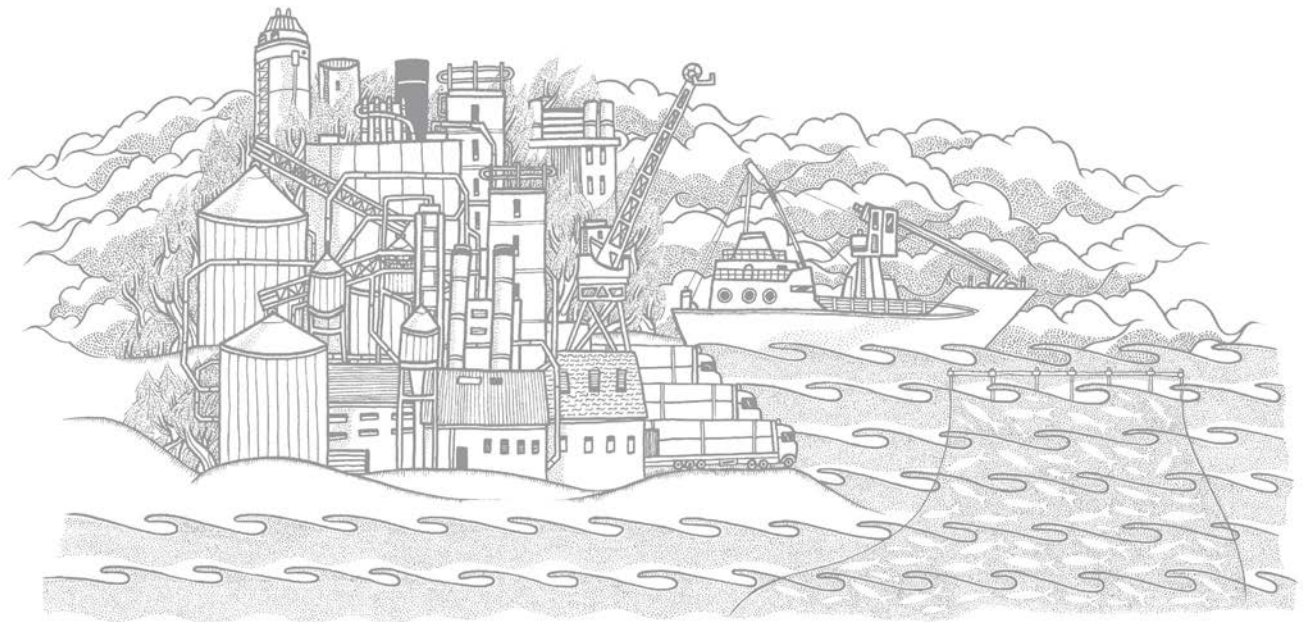
- The food law
- Regulation on the use of feed raw materials
- Regulation on feed hygiene
- Regulation on labelling and trade of feed stuffs

Skretting's operations are registered with the Norwegian Feed Authorities.

Registration number	Operation
NO10050187	Skretting Stavanger
NO10050270	Skretting Averøy
NO10050269	Skretting Stokmarknes

Skretting also operates in accordance with the Pollution Control Act (Act of 13 March 1981 No.6 Concerning Protection Against Pollution and Concerning Waste).

Each operating plant has permits related to emissions to air, effluents to water and ground and handling of waste. Detailed description of permits for each operating plant together with historical records of emissions can be found here <http://www.norskeutslipp.no/>





## Engagement in the value chain

**Skretting is of the opinion that we can only progress if we communicate to and enter into dialogues with stakeholders, in particular with our own employees, but also with society in general. Together with our parent company Nutreco we are involved in several initiatives to improve the sustainability of fisheries.**

### **Seafood Business for Ocean Stewardship initiative**

In December 2016, Skretting and Nutreco were one of eight influential seafood companies that came together to form the Seafood Business for Ocean Stewardship initiative. Amongst the many important industry issues being addressed by this group is the need to reduce the global extent of illegal, unregulated and unreported (IUU) fishing and the elimination of any products in the companies' supply chains that may have been obtained through modern slavery, including forced, bonded and child labour.

### **IFFO Responsible Supply standard (IFFO RS)**

Skretting is a member of the IFFO RS standard board. We support IFFO RS in their vision that all marine ingredients produced globally will be sourced from responsibly sourced fisheries products and produced in a safe manner.

### **Peruvian anchoveta fishery improvement project**

In a proactive move towards securing our supply of ASC compliant marine ingredients, Skretting and Cargill Aqua Nutrition joined together and approached members of the Peruvian fish meal and fish oil industry to discuss the implementation of a fishery improvement project (FIP). In cooperation with the Peruvian National Fishery Organisation (Sociedad Nacional De Pesquería), there is now agreement to establish the FIP in Peru, with final action plans currently being established.

This FIP aims to strengthen research, management and sustainability of the Central and Northern Peruvian anchovy fishery. The project will include a benchmark against the Marine Stewardship Council (MSC) fisheries standard. The project will follow the guidelines for a comprehensive FIP set out by the Conservation Alliance for Sustainable Solutions to ensure its credibility and seek maximum collaboration with all stakeholders.

### **European sustainable fish meal roundtable**

Skretting is a member of the European sustainable fish meal roundtable chaired by the Sustainable Fishery Partnership. Participants in the European Sustainable Fish meal Roundtable are principally companies based in the European Union and Norway that use fish meal or fish oil in their businesses and are committed to continuous improvement in fishery management.

### **Ocean Disclosure Project**

The Ocean Disclosure Project is intended to provide a valuable information resource for responsible investors, seafood consumers and others interested in sustainable seafood and corporate responsibility. Skretting has reported the fisheries from which they bought fish along with information about the management of each fishery, environmental impacts and the presence of third party certifications and improvement projects. The Ocean Disclosure project is led by the Sustainable Fishery Partnership.

