

# **Calanus® Oil**

## ***Marine dietary supplement***

**A new natural product from Norway – a unique marine oil from *Calanus finmarchicus*, the crustacean living on phytoplankton in the pristine North Atlantic Ocean.**

### **Favourable effects in research animals:**

- **Reduces deposition of unhealthy visceral (intra-abdominal) fat**
- **Improves glucose tolerance**
- **Strengthens oxygen uptake and stamina**
- **Reduces plaque formation and cholesterol**

### **Rich in valuable lipid compounds:**

- **Essential polyunsaturated omega-3 fatty acids bound to unsaturated fatty alcohols**
- **Fatty alcohols – precursors of long chain monounsaturated fatty acids with possible health benefits**
- **The antioxidant astaxanthin – in natural form**
- **Plant sterols**

### **Naturally balanced, pure and stable:**

- **Lipid compounds as they exist in live *Calanus finmarchicus***
- ***Calanus finmarchicus* constitutes the very first step after phytoplankton of the marine foodweb in some of the cleanest oceans found**
- **The oil is rich in natural antioxidants, compounds which also protect living *Calanus finmarchicus* against strong sunlight in surface waters**

**Recommended use:**

Two capsules per day. Two capsules contain 1000 mg (1 gram) of Calanus® Oil.

**Safety and effects**

Clinical documentation in humans has shown that Calanus® Oil is safe and well tolerated. Moreover, experiments with animals (= preclinical studies) have shown that Calanus® Oil:

- Has positive biomedical effects beside those which can be ascribed to its content of the marine fatty acids EPA and DHA
- Reduces deposition of visceral (intra-abdominal) fat and has positive effects on factors known to be involved in development of diabetes (e.g. glucose tolerance)
- Strengthens exercise capability and oxygen uptake
- Reduces plaque formation in the aorta, and lowers blood cholesterol
- May reduce adverse effects of inflammation
- No negative effects have been observed

Additional clinical testing of Calanus® Oil in humans is now being conducted at the University Hospital North-Norway.

**Calanus® Oil: Complete and balanced**

- A composition reflecting that *Calanus finmarchicus* lives exclusively on marine phytoplankton – the primary producers of the ocean
- The major part of the oil consists of monoesters of fatty acids, where each fatty acid is bound to one long-chained unsaturated alcohol
- Monoesters of fatty acids in *Calanus finmarchicus* represent the most concentrated form of biological energy found in Nature
- High content of essential marine omega-3-fatty acids

- Differs from fish oils and krill oil by having a high content of the essential fatty acid SDA (18:4n-3, stearidonic acid), in addition to EPA and DHA
- Naturally free of environmental contaminants, reflecting that *Calanus finmarchicus* lives exclusively on oceanic phytoplankton
- The oil does not need to be subjected to purification processes often used to remove contaminants from fish oils
- Ruby colour due to high content of the antioxidant astaxanthin in its natural ester-form
- Contains plant sterols from oceanic phytoplankton, as for instance brassicasterol

### Nutritional significance

It is well documented through numerous scientific studies that marine lipids have favourable health benefits, and it is recommended that humans, who do not consume sufficient seafood, take supplements to ensure intake of marine lipids. The essential fatty acids EPA and DHA – which are found in marine lipids – contribute significantly to health benefits of seafood, but do not explain everything. Water soluble compounds, as well as unknown lipid components which may be removed during processing of fish oils for use in dietary supplements, may also contribute. Environmental contaminants normally have to be removed from fish oils by extensive extraction procedures. This is not necessary with oil from *Calanus finmarchicus*, however, since it feeds entirely on phytoplankton – the first level in the oceanic foodweb – and is therefore naturally free of contaminants.

The main components in Calanus® Oil are chemically similar to those found in live *Calanus finmarchicus*. Biomedical tests in animal models have proven that such a balanced and natural oil has positive biomedical effects far beyond those which can be explained by its content of EPA and DHA.

In marine oils most of the essential fatty acids are bound in three chemical forms, triglycerides, phospholipids or fatty-acid monoesters. In oils from fish and sea mammals most of the fatty acids are bound in triglycerides, krill oil is rich in phospholipids, whereas *Calanus finmarchicus* stores fatty acids mainly in monoesters with unsaturated fatty alcohols. Calanus® Oil is therefore rich in fatty acid monoesters, or wax esters, with a low melting point and therefore free-flowing at low temperature, as opposed to plant waxes and bees-wax which are

solid waxy compounds at room-temperature. All these forms of marine lipids are found naturally in seafood, but the content of the different lipid types varies depending on the food source and processing conditions the seafood or oil has been subjected to.

Fatty acid monoesters are the most energy-dense biological "fuels" in nature. Migrating or diapausing animals which experience long periods without access to food, use fatty acid monoesters as energy stores and as a reserve of essential fatty acids. *Calanus finmarchicus* is an example of such a biological adaptation. In the spring and summer it builds up a store of essential lipid components and energy in the form of oil sacs rich in fatty acid monoesters. This energy store is consumed during the following long winter when there is no access to phytoplankton, as well as for reproduction next spring. Similar adaptations are found in certain fish species, as well as in migrating sea-birds and marine mammals.

The energy of the oil sacs of *Calanus finmarchicus* may amount to as much as half of the energy found in all fish, sea mammals and seabirds in the Nordic seas. Most of this energy is fatty acid monoesters – similar to those found in Calanus® Oil – which are the main source of energy and of all the essential marine fatty acids found in fish and sea mammals. Surprisingly, despite the fact that fatty acid monoesters are the main source of energy and lipid compounds of crucial importance for the health of the entire marine ecosystem of the Nordic seas, little attention has been paid to this lipid class as a dietary supplement.

In the descriptions of marine oils as supplements or foods, it is rarely pointed to the fact that most of the essential fatty acids EPA and DHA found in the marine environment, are fatty acid monoesters, and that also lipid from food fishes such as herring and capelin naturally contain such monoesters in the same forms as in *Calanus finmarchicus*. It is also rarely informed of the fact that fatty acid monoesters both from plants and animals have at all times been important constituents of human diet, and that modern diet and processing methods may have led to reduced availability of these important compounds which we have been evolutionary adapted to.

Fatty acid monoesters are found in noticeable amounts in plants, both in the form of the protective wax-layer on the surface of green leaves and in energy-dense lipid stores in seeds. But plant oils do not contain the essential fatty acids EPA and DHA, and can therefore not fully replace marine lipids. However,

some plant oils contain the essential fatty acid SDA, which nutritionally may replace EPA.

The oil from *Calanus finmarchicus* – the vegetarian of the Nordic seas – combines the positive nutritional properties and health benefits of both plant oils and marine oils: It is by far the largest source in the animal kingdom of plant sterols and the essential “plant“ omega-3 fatty acid SDA, and at the same time the most important source of EPA and DHA at the base of the foodweb. Plant sterols reduce total blood cholesterol and the “bad” cholesterol, without affecting the “good” cholesterol. This comes in addition to the well known effects of EPA and DHA, which the oil also has a high content of. At the same time, the oil is a very rich source of SDA, the counterpart to the marine essential omega-3 fatty acids EPA and DHA in plants.

### **About *Calanus finmarchicus***

- A tiny (3-4 mm) ”shellfish” living on phytoplankton in the sea
- Annual biomass production of 200-400 million metric tons in the Norwegian Sea, nearby waters and along the Norwegian coast during 3-4 months in spring and early summer
- Norway’s largest renewable and harvestable marine resource
- The annual biomass production exceeds more than 20 times the entire biomass of fish, seabirds, and sea mammals in the North Atlantic and the Norwegian Sea
- Key source of energy, proteins, vitamins, minerals, lipids and antioxidants for the wildlife in the area
- Main source of marine omega-3-fatty acids deposited in all fish and sea mammals in the North Atlantic
- Is very different from krill when it comes to biology, energy content and chemical composition
- Only a small part of the annual biomass production is being utilized by fish, birds and sea mammals

## Harvesting

- Not previously harvested commercially to any extent, since no harvesting technology has been available
- Environmentally friendly harvesting of *Calanus finmarchicus* along the Norwegian coast is now possible, thanks to new technology
- The current catches constitute less than 0.001 % of estimated annual biomass production and takes place in harmony with regulations set by the governmental authorities
- Can be harvested in spring and early summer by fishing vessels which have limited fishing alternatives during that time of the year
- Harvesting of *Calanus finmarchicus* is possible in areas where the presence of fish larvae is very low
- The catch is being gently pumped onboard and frozen for further processing ashore.

## Recovery of Calanus Oil

- Frozen *Calanus finmarchicus* is handled in a process which ensures that the oil is released, collected and processed in a gentle way
- The oil contains the important metabolites which are found in the lipid deposits of live *Calanus finmarchicus*, in their natural forms
- No organic solvents are being used in the production
- After the oil has been recovered, a nutritious extract with excellent shellfish taste is left

## Composition of Calanus® Oil

Content in recommended daily dose (2 capsules):

100 % pure Calanus® Oil	1000	mg
Whereof		
Marine unsaturated fatty acid esters:	850-900	mg
Other natural lipid components:	100-150	mg
Sterols (brassicasterol and others):	5-10	mg
Astaxanthin (-ester)	1	mg

The content of monounsaturated fatty alcohols (predominantly C20:1n-9 and C22:1n-11) is approximately 35% of the oil. The n-3 fatty acids, predominantly the essential omega-3 (n-3) fatty acids SDA, EPA and DHA typically constitute approximately 20 % of the oil.

### **About the producer Calanus AS**

Calanus AS is a research based company which develops the entire value chain from harvest of *Calanus finmarchicus* to production and documentation of human health and nutrition products based on this highly valuable natural resource. The company cooperates with medical research laboratories on developing documentation of the positive health effects of Calanus® Oil, and has good contact with Norwegian authorities to develop sustainable harvesting and management of *Calanus finmarchicus* – our largest renewable and harvestable marine resource. For more information and contact please refer to [www.calanus.no](http://www.calanus.no).

### **Literature**

#### **A. Health aspects and nutritional significance of lipid components in Calanus® Oil**

##### The marine fatty acids EPA og DHA

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**B. *Calanus finmarchicus* in the marine ecosystem**

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**D. Marine fatty acid monoesters in food**

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