

Use of zooplankton (new feed resource)



Last update: 2 June 2023

- **Type of challenge:** Environment.
- **Challenge:** Resource management (resource depletion, food-feed competition, reduction of protein deficit).
- **Action:** Realizing blue bioeconomy potential by sustainable sourcing of marine proteins and essential nutrients for aquaculture production.
- **Animal category:** Fish, crustaceans.
- **Technique:** Incorporation in feed formulation of processed feed materials produced from stocks of zooplanktonic species as sources of proteins; omega-3 and vitamin D, i.e. an alternative to vegetable or fish meals and oils.
- **Mode of implementation:** Trawling with minimal by-catch; the catch is processed into different products (frozen, lipids, hydrolysates and meal); the Institute of Marine Research has estimated the annual production of the zooplankton *Calanus finmarchicus* in the Norwegian Sea to be 290 million tons and the standing stock during the winter to be 40 million tons. Modelling of harvesting of 3.3 million tons showed no effect on predators of *Calanus finmarchicus*; several findings give support to the use of lipid from zooplankton from high latitudes as an alternative or as a supplement to fish oil and a provider of long-chain n-3 PUFA in diets for use in salmon aquaculture.
- **Requirements / limitations:** Zooplankton is falling under the scope of the Animal-By-Products legislation; research & development is being performed in the harvesting technology to make it possible to catch the copepod at high seas; increased knowledge is also needed as basis for setting sustainable quotas according to upscaling of the harvesting capacity.
- **Economic consequences:** Zooplankton products is not widely available now and they are not competitive yet compared to other relevant compound fish feed ingredients.
- **Other considerations:** New catching and processing activities will develop as harvesting increases, improving the economic interest in zooplankton products as feed ingredient for aquaculture.
- **References:**
 - A management plan for *Calanus finmarchicus* has been completed by the Institute of Marine Research and the Directorate of Fisheries (2016). <https://imr.brage.unit.no/imr-xmlui/handle/11250/2440945>
 - Olsen et al. (2004). Atlantic salmon, *Salmo salar*, utilizes wax ester-rich oil from *Calanus finmarchicus* effectively. Aquaculture, Vol. 240, (1-2), 433-449. <https://agris.fao.org/agris-search/search.do?recordID=US201300974455>
 - CalaFeed - Enhancing the potential of *Calanus* as raw material for sustainable aquaculture feed ingredients (2021). <https://www.sintef.no/en/projects/2021/calafeed/>
- **Other techniques:** Use of nutrients from other low trophic level resources such as insects, polychaetes, starfish, krill, etc.

