Enabling Sustainable Fish Farming

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AQUACULTURE PAINS AND CHALLENGES

The increase in global population will result in a significant increased demand for animal food sources. One of the most sustainable food sources comes from the Atlantic salmon, illustrated in Table 1.

	Cows	Chicken	Pig	Salmon
Feed conversion rate (kg feed/edible meat)	4-10	2,2	3	1,2
Carbon footprint (kg CO2/kg edible meat)	30	4,4	5,9	2,9
Water consumption (l/kg edible meat)	15.400	4.300	6.000	1.400

Table 1 - Environmental impact of food sources

The aquaculture industry is facing several challenges with the current fish farming operations that are hampering expansion:

- Limited sheltered areas for sites cause bad water conditions and no opportunity for expansion
- Sea lice and diseases caused by bad water quality and fish density in the nets
- Contamination of water and sea floor due to stationary water
- Fish escapes cause legal fines of up to 20 mio. NOK

Most of the issues could be overcome by relocating the sites to open sea, which would enable much cleaner, bigger and sustainable farming facilities, but unfortunately the stronger sea currents bring along a series of other issues:

- The load on equipment is significantly increased with greater risk of damage
- Repair of damaged equipment is more expensive in open sea
- Greater risk of more fish escaping due to damaged equipment
- Insurance policy dictates visual inspections of nets

SOLUTION

A novel polymer optical fiber sensor system will help overcome the issues of relocating to offshore fish farms. The novel sensor will be embedded in nets, moorings and top rings and will enable:

- Real time monitoring of stress, temperature and wear on the equipment
- Early warning functionality to prevent fish escape
- Documentation of equipment damages for insurance claims

This solution will have significant climate impact by enabling production expansion of one of the most sustainable sources of animal protein. In addition, enabling relocation of fish farms also results in protection of the natural marine flora and the wild salmon.

STATUS

We are currently in dialogue with two market leading aquaculture equipment manufacturers. Both companies believe that by utilizing these novel sensors they can offer significant value to their customers, fish farm operators, and solve their unaddressed challenges and pains.
At the moment no commercial sensor systems are capable of addressing these critical challenges and pains in the aquaculture industry.