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2018 AIW

December 4 2018

EcoSalmon: Fishfarming in Closed Cages at Sea

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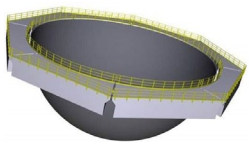
History

- Big scale R&D since 2010
- Excellent results – pioneers in closed seacage technology
- Big investments and risk in developing the technology
- Investment so far: ca 35 million USD
- The company has no permanent fish-farming licenses

From Idea to Reality



1997

2007

2011

2012

2013

Environmental Price from the Norwegian Fisheriesminister

March 2016

August 2017

December 2017

Personnel

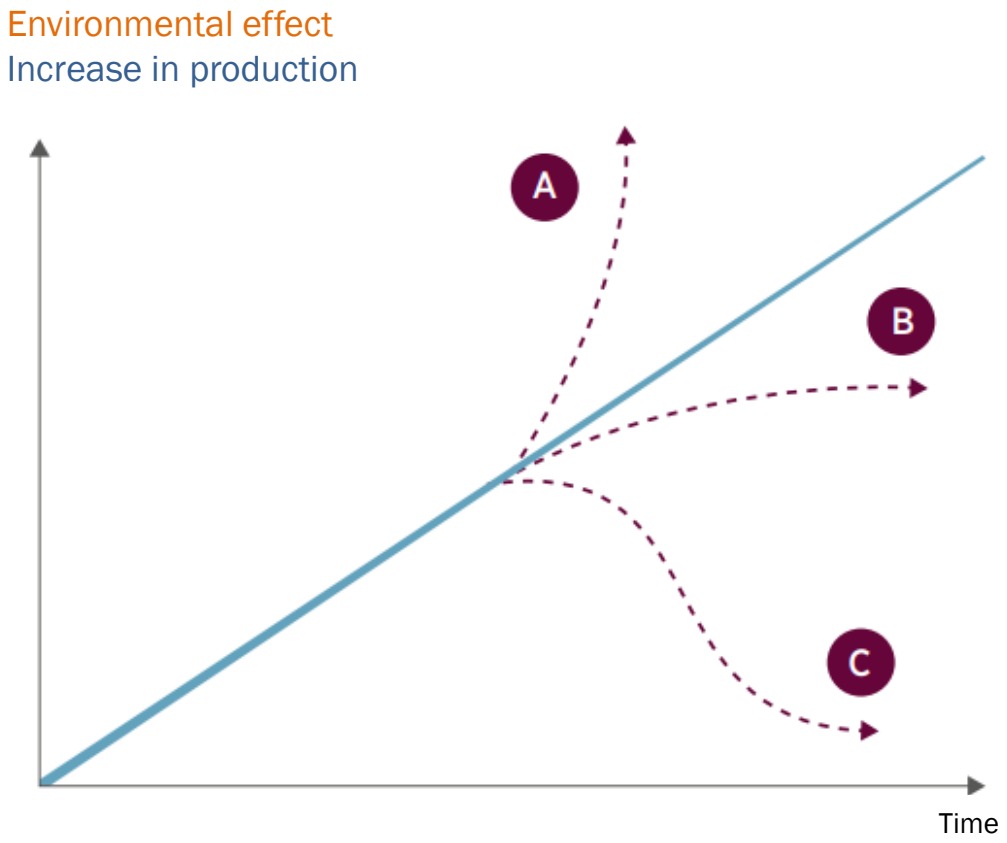
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

- Negative effect on the environment hinder growth in fishfarming in the world
- We need to encourage reconsiliation between stakeholders
- Authorities must regulate the industry to encurage fishfarmers to develop new, sustanable and environment friendly thecnology

„Roadmap for Norwegian Fishfarming“

The Federation of Norwegian Industries

By 2030, fishfarming must posess technology to prevent salmon lice, escapes, and significantly reduces biological waste into the ocean



A: Negative environmental effect increase with increased farming with current technology

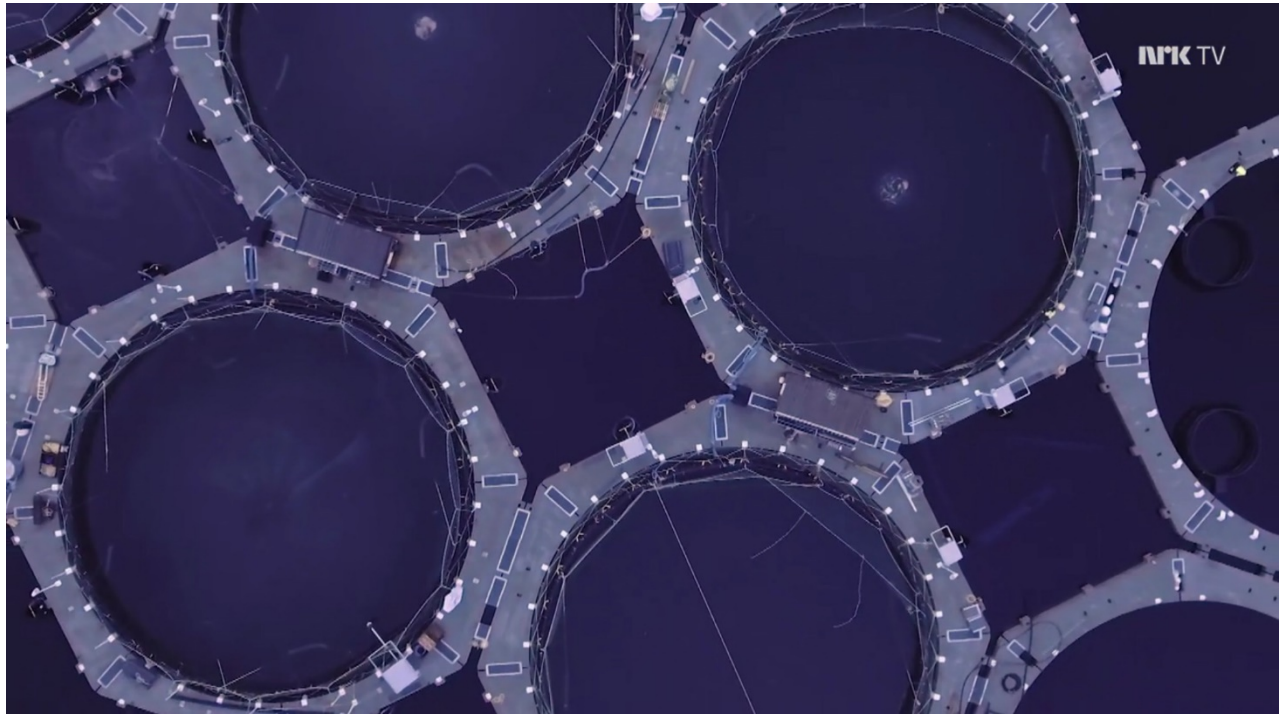
B: Mitigation reduce negative enivironmental effect

C: New Thinking – new equipment will minimize negative enviromental effect!

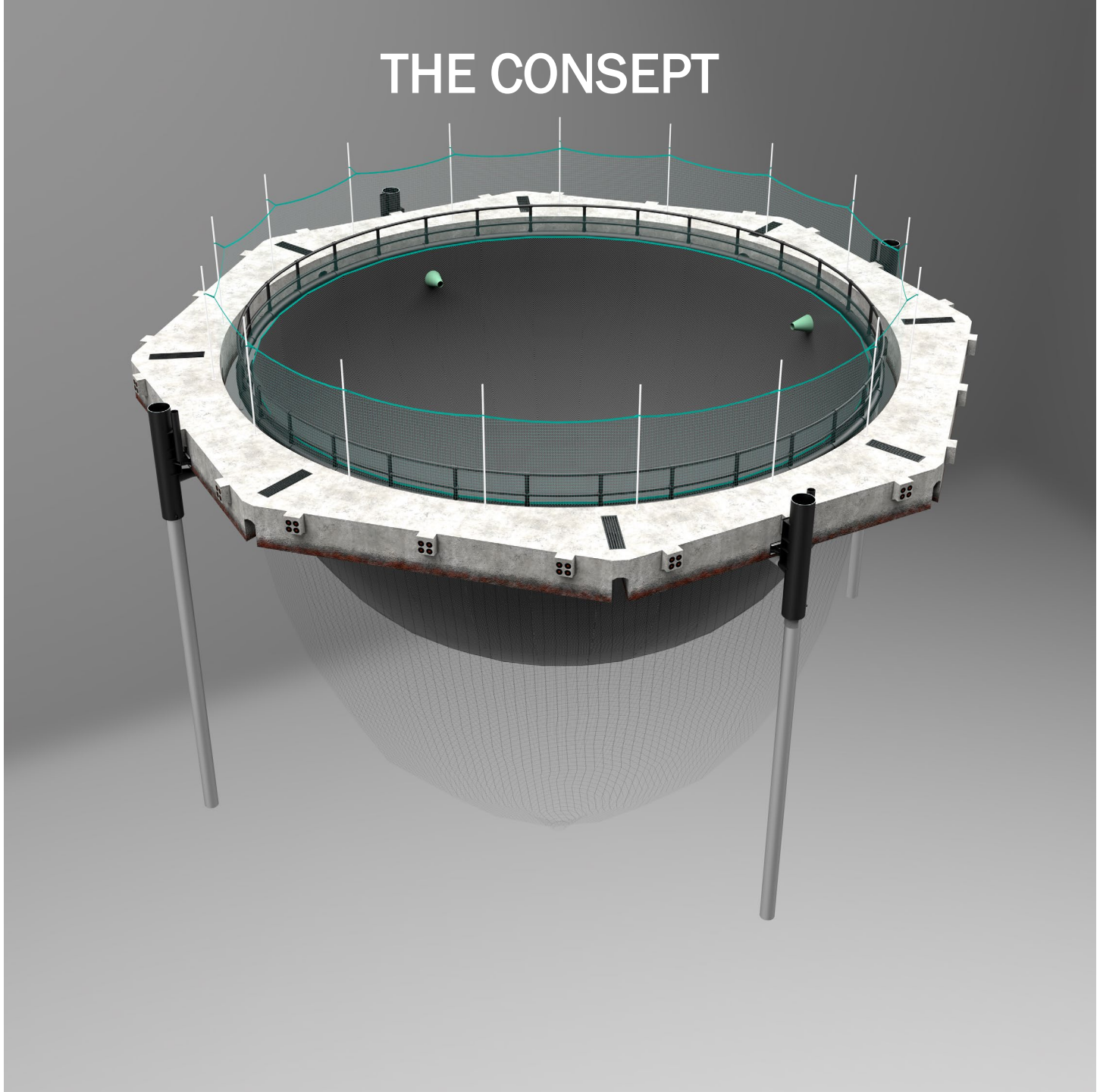
Fishfarming in Closed Cages – Enviromnentalli friendly and sustainable

- *No Salmon Lice*
- *Significantly Reduced Risk of Escapes*
- *Higher Yield of Feed*

- *Significantly Reduced Risk for Loss of Fish*
- *Superior Quality of the Product – Less Fat – Fit Fish!*
- *Reduced Discharge of Organic Waste in the Sea – Up to 70% of Waste Pumped Ashore*



THE CONSEPT



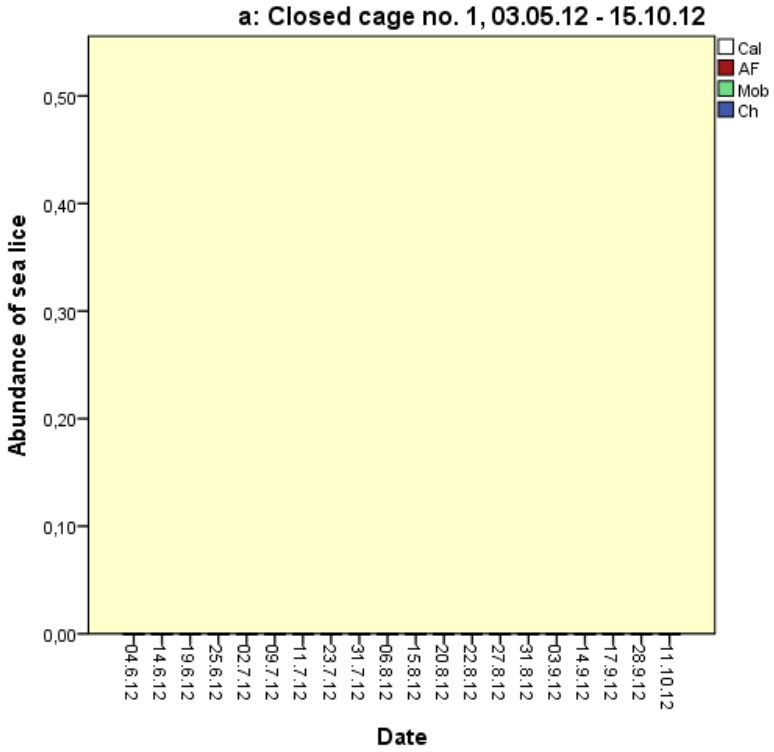
Continuous circulation of the sea in the cage – the salmon lives in best available condition

The water intake is at 25 meters to avoid the salmon lice

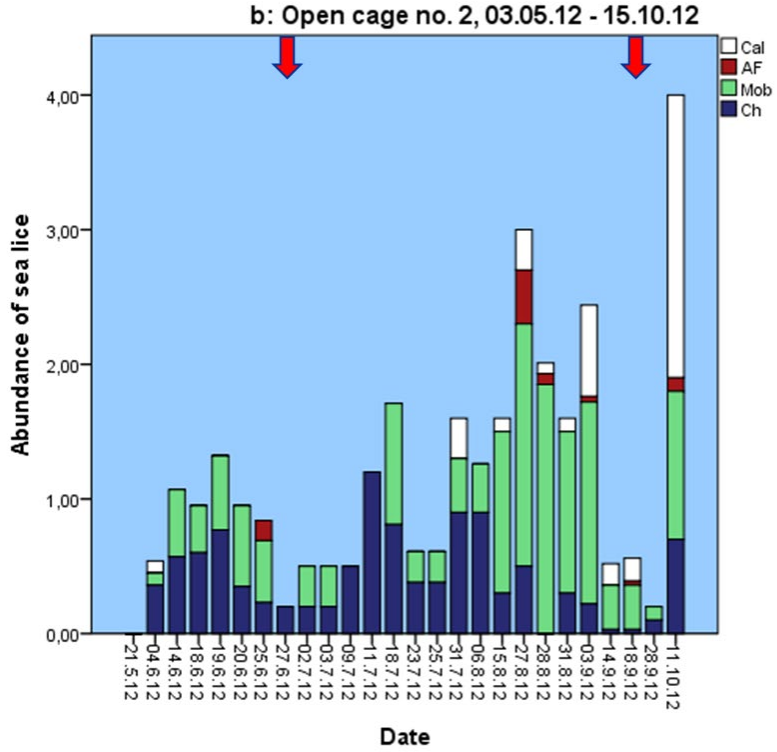
Concrete floating ridge provides stability and safe working area

Net surrounding the strong fiber bag provides douple security against escapes

No salmon lice– Comparative Research



Closed Cage no.1: 80 000 smolt, no treatments



Open Cage no.2: 20 000 smolt, 2 chemical treatments

Nilsen, A., Vale Nielsen, K., Biering, E., Bergheim, A., 2017. Effective protection against sea lice during the production of Atlantic salmon in floating enclosures. Aquaculture 466, 41-50.

Support from stakeholders

Norwegian Salmon Rivers (Norske Lakseelver)
Vegard Heggem (*Project Manager*):

"The salmon produced in closed cages from AkvaDesign does not threathen the wild salmon"

Green Warriors of Norway (Norges Miljøvernforbund)
Kurt Oddekalv (*President*):

"This is a technology that all salmonfarmers should use"

Norwegian Coastal Fishermen (Norges Kystfiskarlag):

"The interests of coastal fisheries is taken care of with this technology"

Steven Damato, BlueCircle, buyer for Whole Foods:

"You have the most sustainable salmon farms in the world, by far"

Pier reviewed articles

Aquaculture
Volume 466, 1 January 2017, Pages 41-50

Effective protection against sea lice during the production of Atlantic salmon in floating enclosures

Arve Nilsen [a], Kristoffer Vale Nielsen [a], Eirik Biering [a], Asbjørn Bergheim [b]

Aquaculture
Available online 30 September 2018
In Press, Accepted Manuscript

The importance of exercise: Increased water velocity improves growth of Atlantic salmon in closed cages

Arve Nilsen [a], Ørjan Hagen [b], Chris Andre Johnsen [b], Halvor Prytz [b], Bingfei Zhou [b], Kristoffer Vale Nielsen [a], Marit Bjørnevik [b]

Aquacultural Engineering
Volume 78, Part B, August 2017, Pages 221-227

Short communication

The impact of production intensity on water quality in oxygen enriched, floating enclosures for post-smolt salmon culture

Arve Nilsen [a], Kristoffer Vale Nielsen [a], Anders Næss [b], Asbjørn Bergheim [c]

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Ecosalmon – sustainable production – no salmon lice