



THE IMPORTANCE OF FISHMEAL AND FISH OIL IN SALMON DIETS

HAVSBRÚN - BAKKAFROST GROUP
HIRTSHALS 30TH August 2016
Odd Eliassen, COO Havsbrún



- THE FARMING HISTORY OF FAROE ISLANDS
- THE BAKKAFROST STORY
- NEW MARINE STRATEGY
- WHAT HAVE WE ACHIEVED



Why is feed important.....

For the fish?

For the product?



Formulating feed to satisfy salmon needs

- ✓ optimal nutrient digestibility
- ✓ good health
- ✓ feed conversion and growth
- ✓ feed deposition to proper muscle and organ growth

Formulating feed to create superior product quality

- ✓ good flesh quality with
- ✓ obtain correct flesh colour
- ✓ generating the best salmon taste

- Is it possible to produce a 6 kg salmon without fishmeal inclusion in the diet? Yes it is
- Is it possible to produce a 6 kg salmon without fish oil (EPA/DHA) inclusion in the diet? No it is not
- Will a massive reduction in marine ingredients in diets affect the quality of the salmon? Yes it will
- Will limited percentages of marine ingredients affect the fish well fair? Yes it will
- Will limited percentages of marine ingredients affect the taste of salmon? Yes it will
- Will it be less healthy to eat salmon fed with limited percentages of marine ingredients? Yes it will
- Will changes in the ratio omega 3 / omega 6 affect the consumers not likely

- Will the consumers stop eating farmed salmon? I don't think so

So why bother?

Nofima

<http://nofima.no/forskning/naringsnytte/riktig-for-halverte-dodeligheten/>



: I dette anlegget til Blom har Nofima fått helt ny kunnskap om hva som påvirker dødeligheten til laks som får PD og HSMB. Foto: Helge Skodvin/Nofima



Prosjektår 2015

Riktig fôr halverte dødeligheten

Forskning under naturlig utbrudd av laksesykdommene PD og HSMB i oppdrettsanlegg, viser at dødeligheten kan halveres ved optimal bruk av fôr.

Pankreassykdom (PD) og hjerte- og skjelettmuskelbetennelse (HSMB) er to av de mest utbredte og vanlige sykdommene hos norsk oppdrettslaks, og de opptrer ofte samtidig. Årlig koster PD alene norsk oppdrettsnæring over 1 milliard, ifølge estimat fra Havforskningsinstituttet.

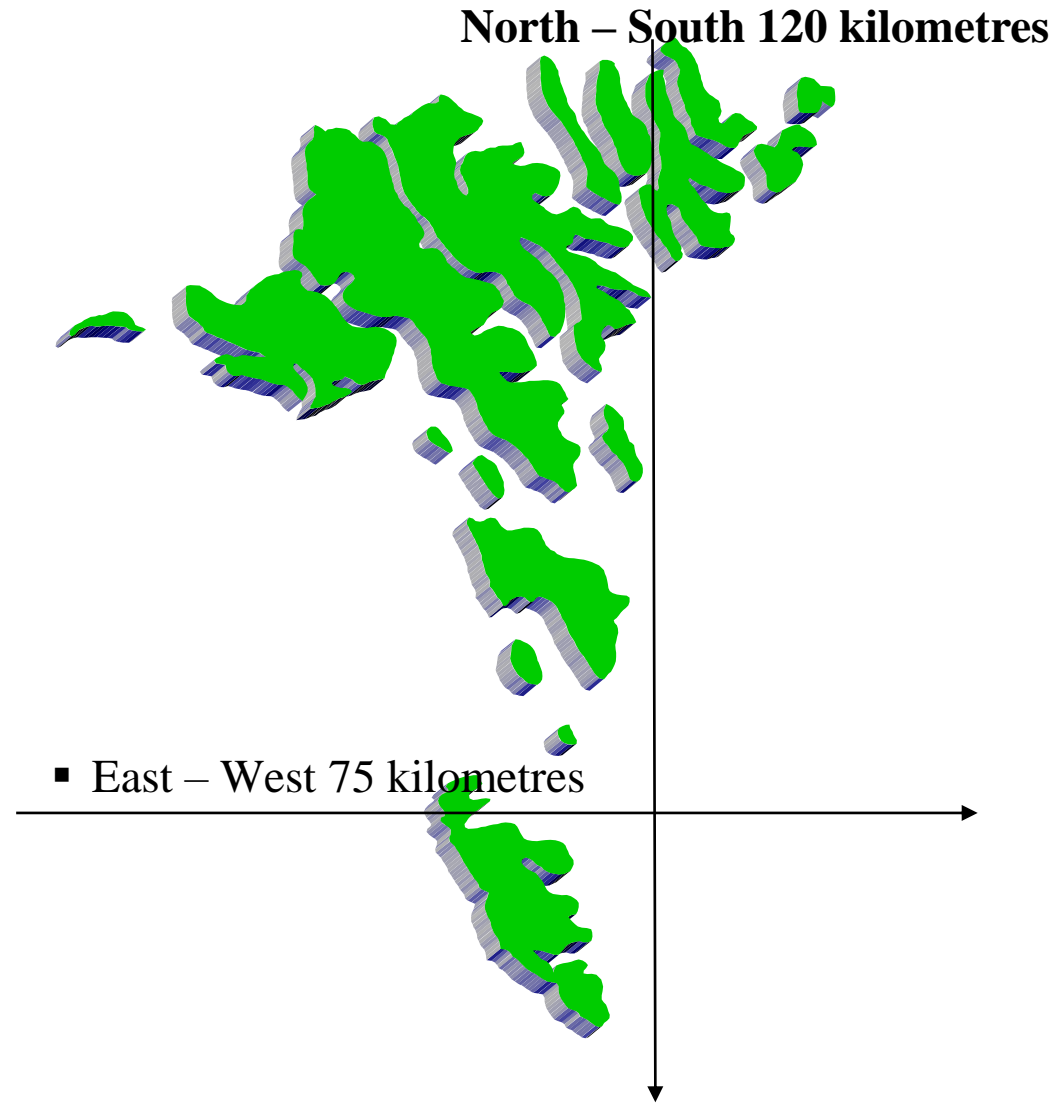
Prosent fileter med mørke flekker

	Hele Norge	Sør og Midt-Norge	Nord-Norge
2011	13	16	11
2012	16	18	15
2013	18	20	13
2014	19	23	15
2015	19	24	13

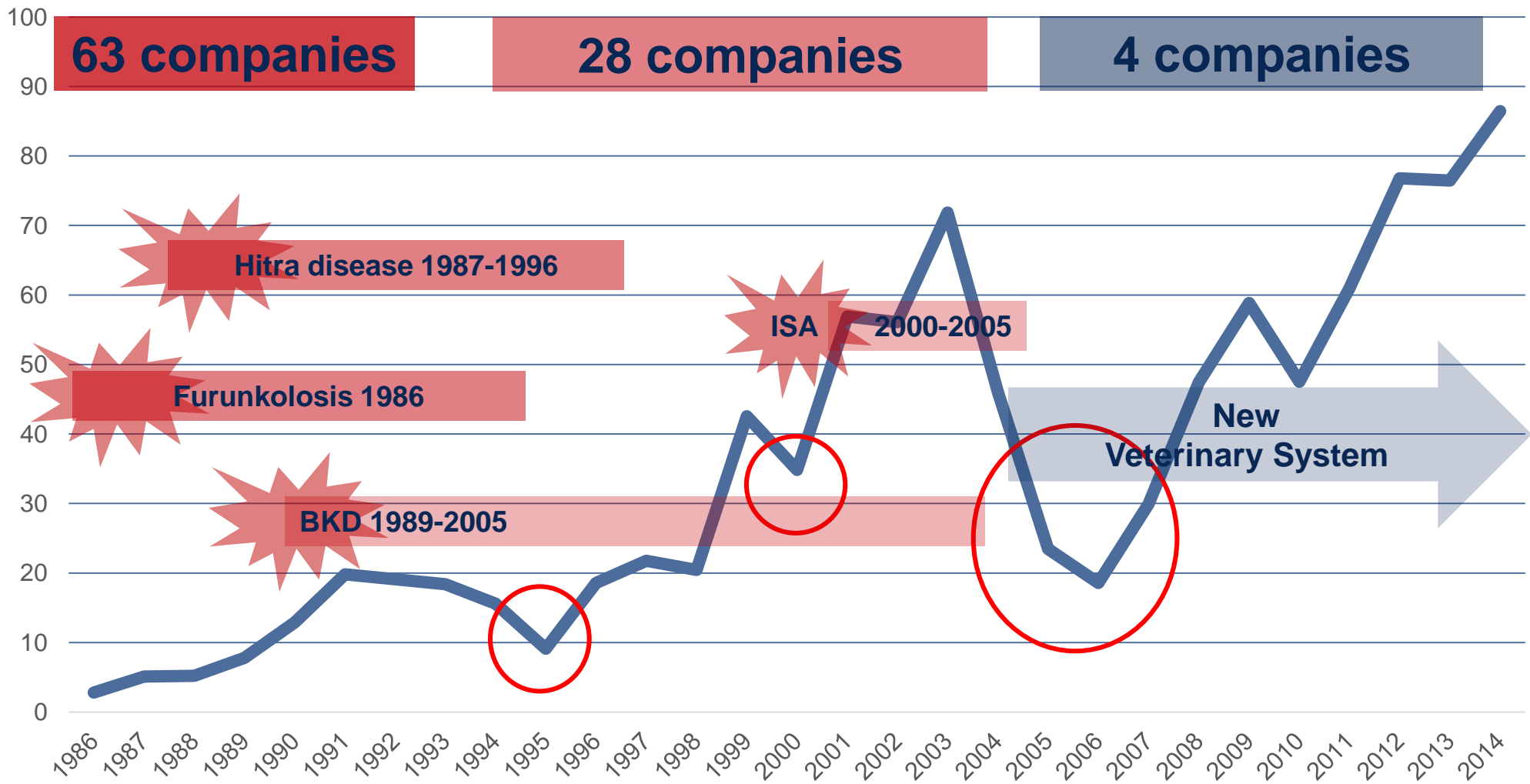


■ IT ALL BEGINS WITH A QUALITY FEED





Development of a new industry 1986-2016



During the period 2001-2004 the Faroe Islands were severely struck by ISA outbreaks



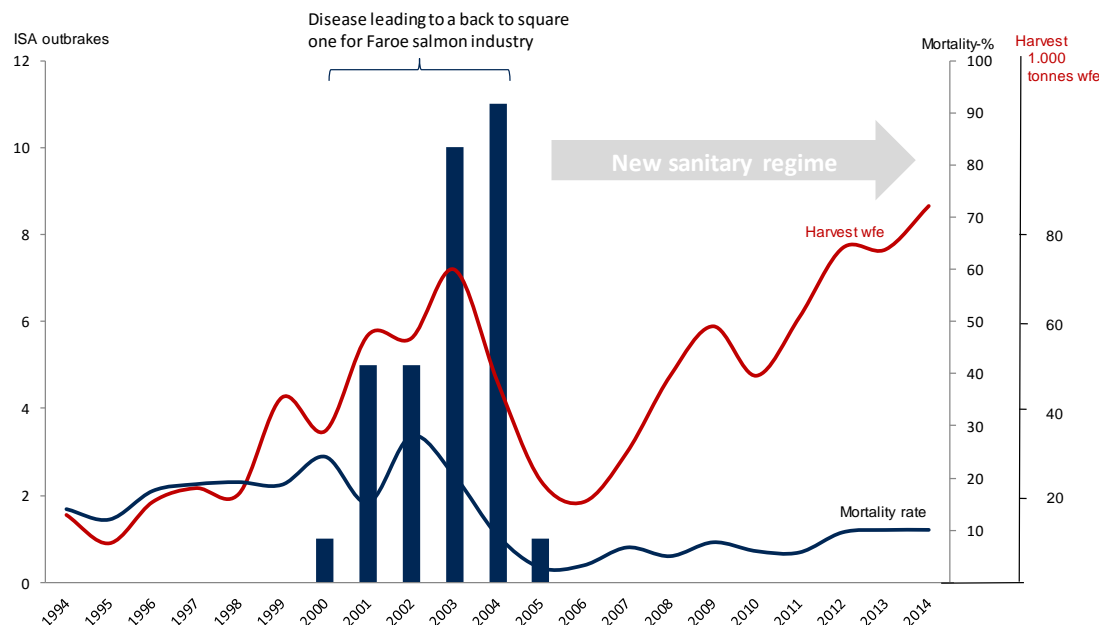
New legislation and regulation was introduced in 2003 known as "The Faroese Veterinary Model":

- One generation based farming model
- Fallowing periods between each generation
- Immunisation and vaccination programs
- Restricting movement of equipment and fish
- Density limits introduced
- Brood stock facilities allowed on land only
- Fish for harvest not allowed in open waiting cages at harvest station
- Minimum distances between farms and hatcheries
- Rules to fight and control sea-lice introduced



The Model has resulted in one of the most predictable fish production environments in the world with good KPI for salmon farming, such as FCR, Mortality and Growth rate

Key Performing Indicators developed positively post New Veterinary System



Source: Bakkafrost

The mortality rate with the Faroese Veterinary Model has been between 5 and 10%, compared to 20 to 25% before – even though the annual production has never been higher than now.

THE BAKKAFROST HISTORY

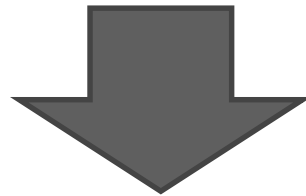
- 2005 Bakkafrost had, 1 farming licence, hatchery, harvest and VAP
- 2006 + 6 licences, hatchery, harvest, well boat
- 2009 + 6 licenses, hatchery, harvest, well boat
- 2010 Listed at Oslo Børs
- 2011 + 5 licenses, fish meal & oil, fish feed, VAP

One of the most vertical integrated salmon farming companies in the world

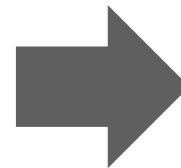


Converting gastronomically unattractive fish to healthy Salmon

- Value increase fish biproduct, fish offcuts
- Fish not suitable for human consumption
 - Fish where there is no marked for
- Rejected pelagic fish for human consumption



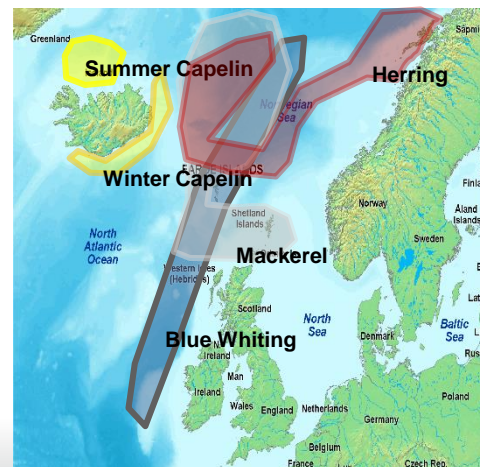
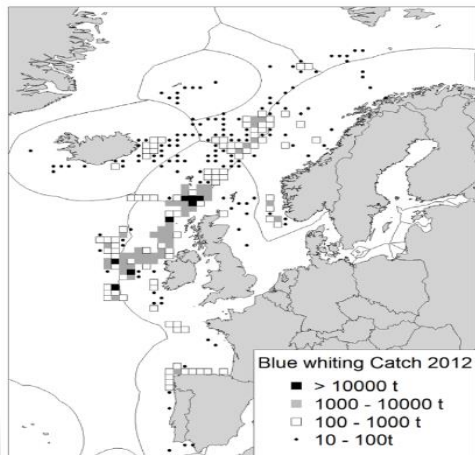
- Valuable fish proteins and vital essential fish oil



3 hour's from raw fish to feeding the salmon

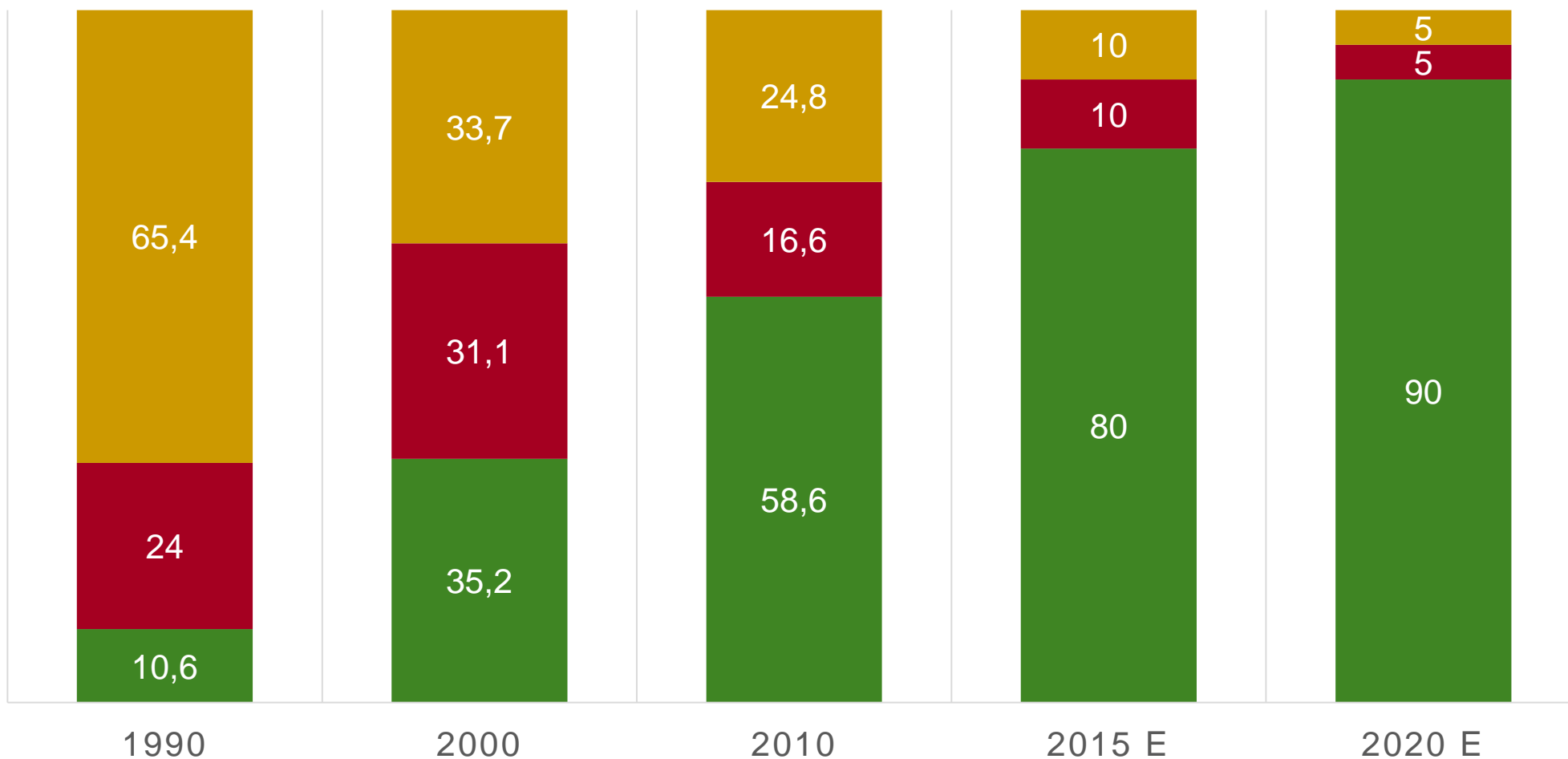
Short distant from fishing ground to feeding the salmon

- Blue whiting concentrated south of Faroe Island
- New Pelagic fleet with super cooling system
- A unique 3 hour's process step
- A marine based recipe
- Advantages in key factors
- Consumers are able to taste the different

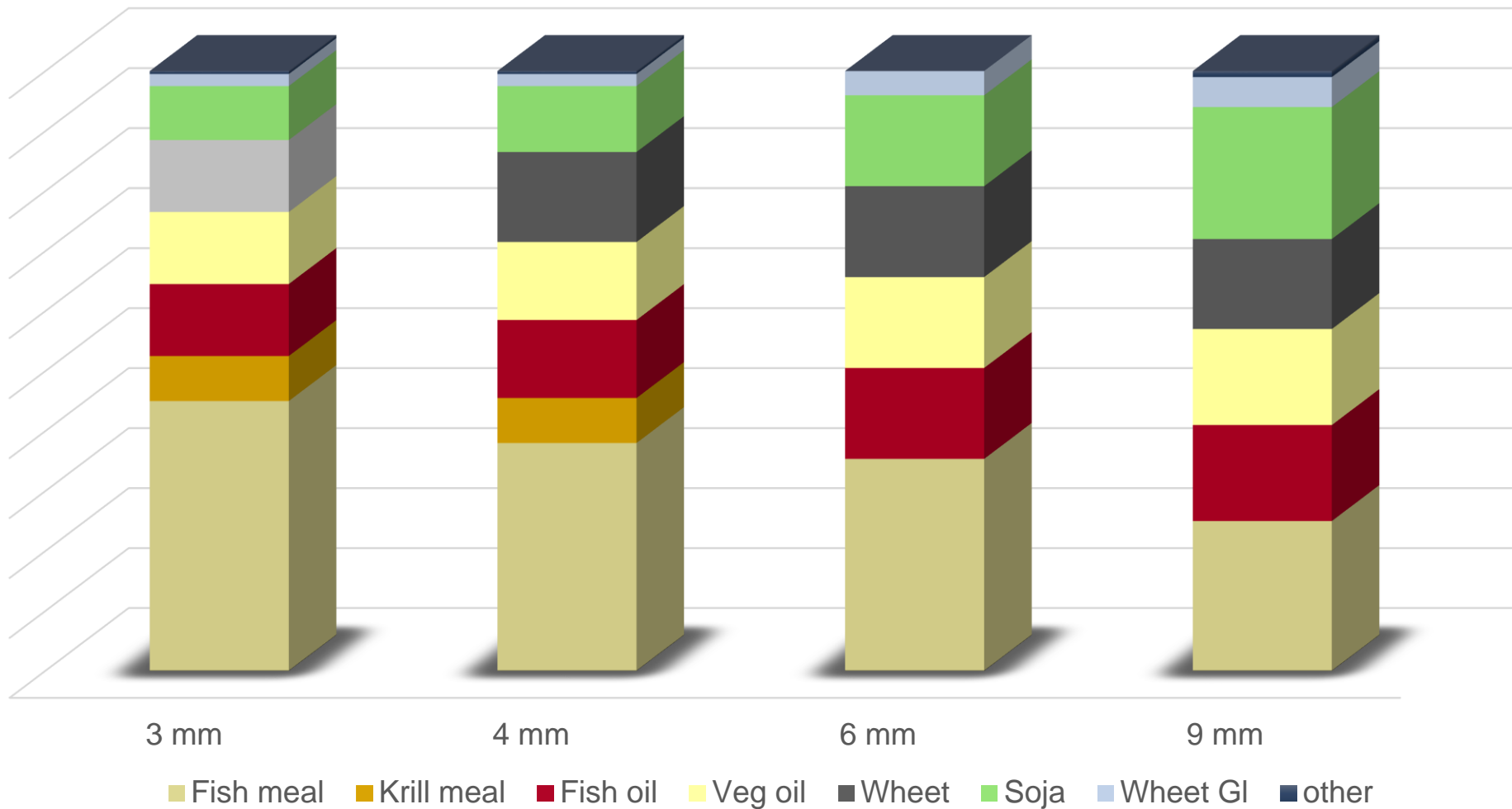


RAW MATERIAL IN SALMON FEED

■ Vegetable protein/oil ■ Fish oil ■ Fish meal

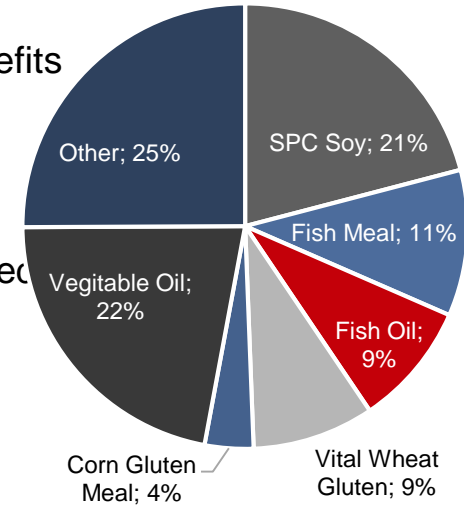


FEED FORMULA

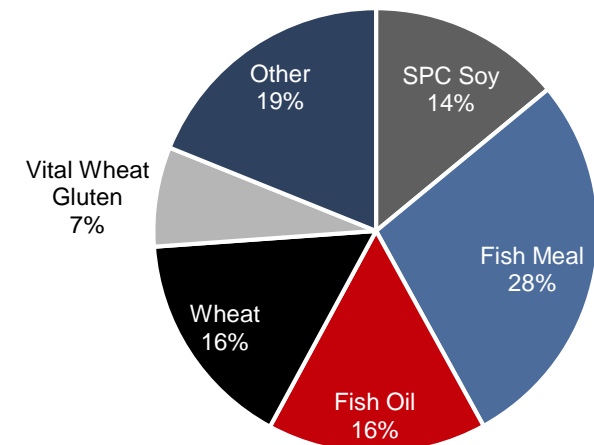


- Supply constraints makes fish oil and fish meal costly ingredients
- Keeping the diet closer to the natural diet of wild salmon provides measurable benefits
 - Healthier nutritional profile of end product
 - Superior meat structure
 - Higher production efficiency due to animal welfare has positive impact on non-feed

Standard feed recipe 2016E⁽¹⁾



Feed recipe Bakkafrost 2015



Source: Holtermann, Bakkafrost Note: (1) Norway

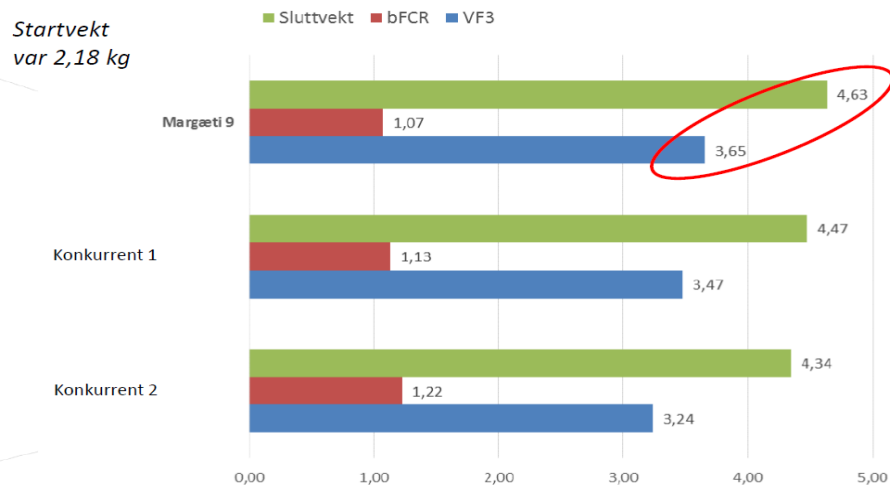
Cleaning of fish oil

- In Q1-2015 Havsbrún started cleaning all relevant fish oil used for Bakkafrost salmon
- Cleaning of fish oils removes and reduce environmental pollutants
- By cleaning pollutants we expect to remove doubts regarding salmon intake
- Should make intake limitations for salmon redundant
- Salmon feed with purified fish oil is new in the global salmon market and could be a differentiator

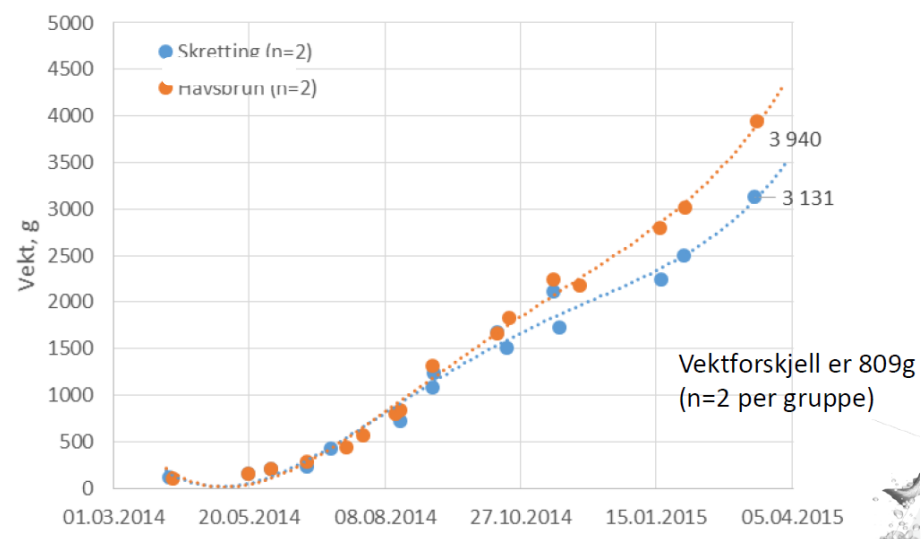
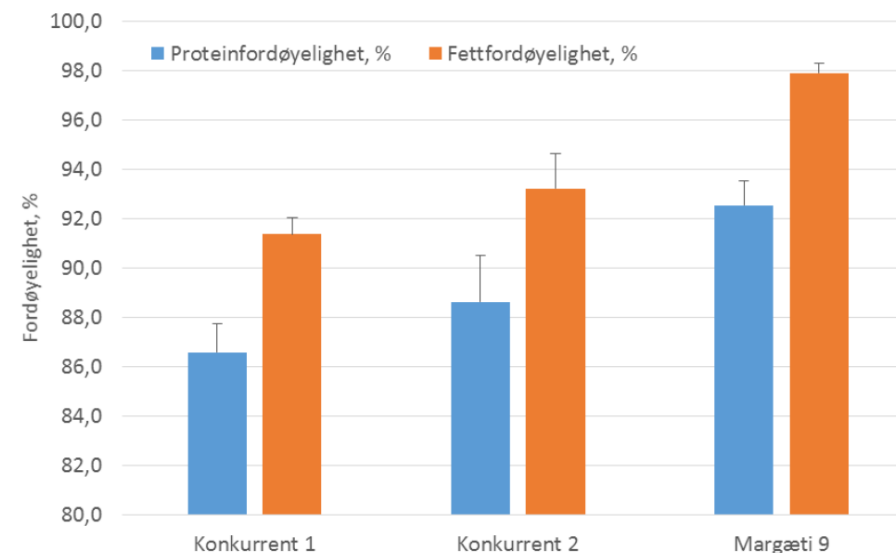


Benchmarking GIFAS: Ytelse

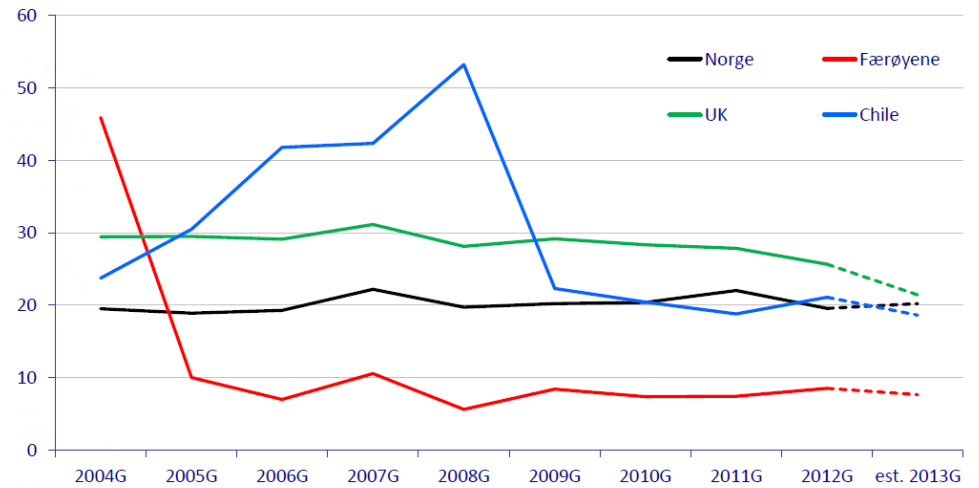
- Sluttveiting etter 84 dager v. 12,2°C



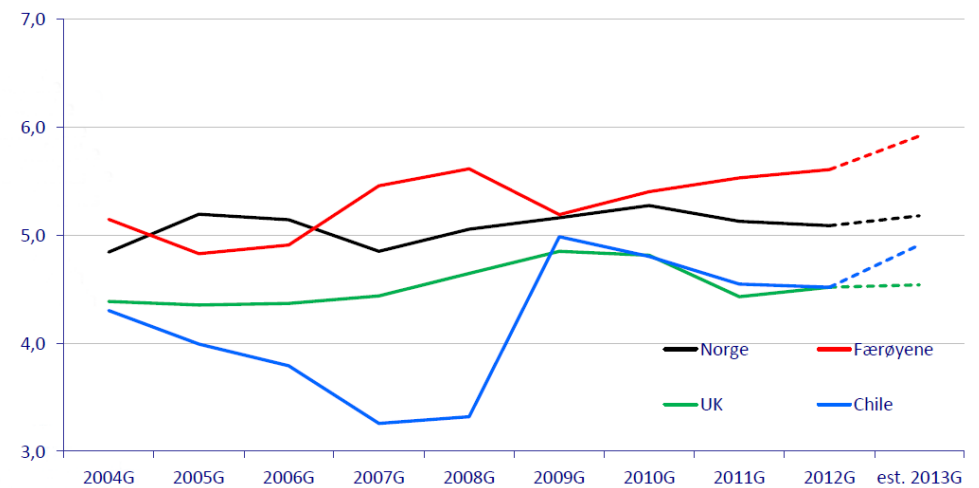
	Prosjekt 1127	Spredning
Utsettsdato	18.05.2011	01.05.-18.05.
Slaktedato	12.07.2012	02.07.-07.08.
Prod. tid, dager *	414	396-432
Slaktevekt, g	3895	3750-4160
Rundvekt, g**	4441	4081-4742
Str. spredning (CV) ved slakt, %	24,1	21,8-27,3
EGI	117	111-122
eFCR	1,06	1,035-1,105
bFCR	1,05	1,025-1,094
Dødelighet, %	2,72	



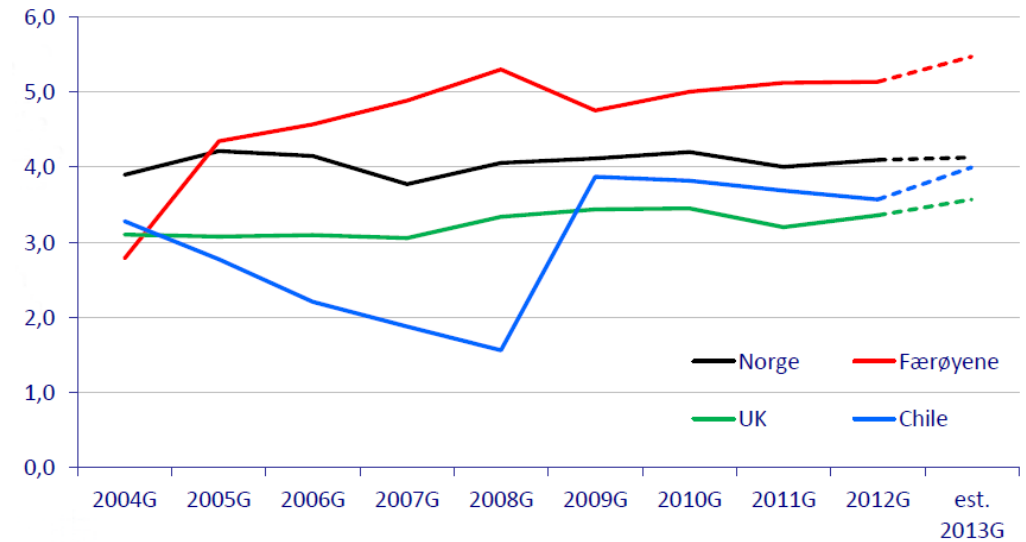
- Low mortality



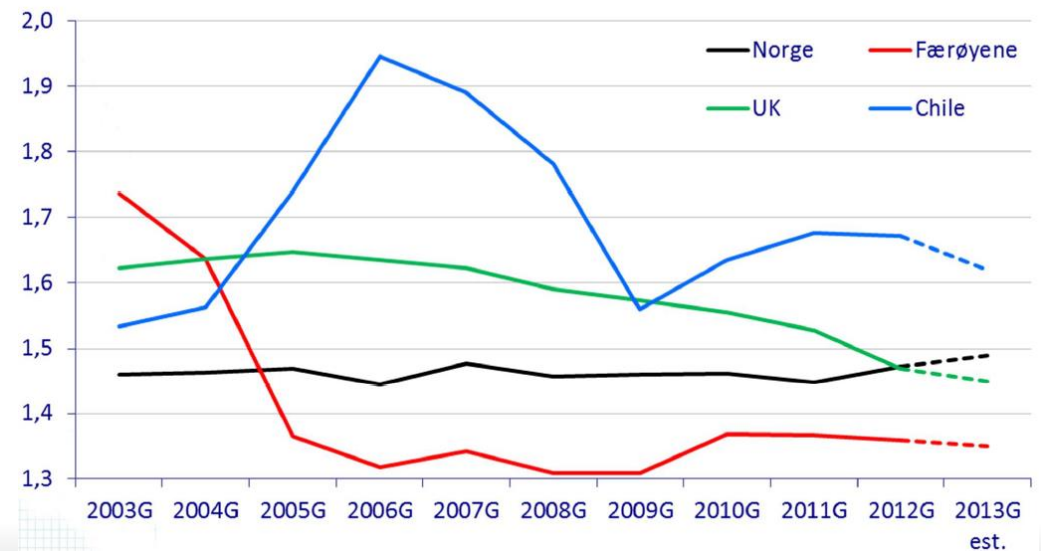
- High Harvest weight wfe



- High Yield pr. smolt



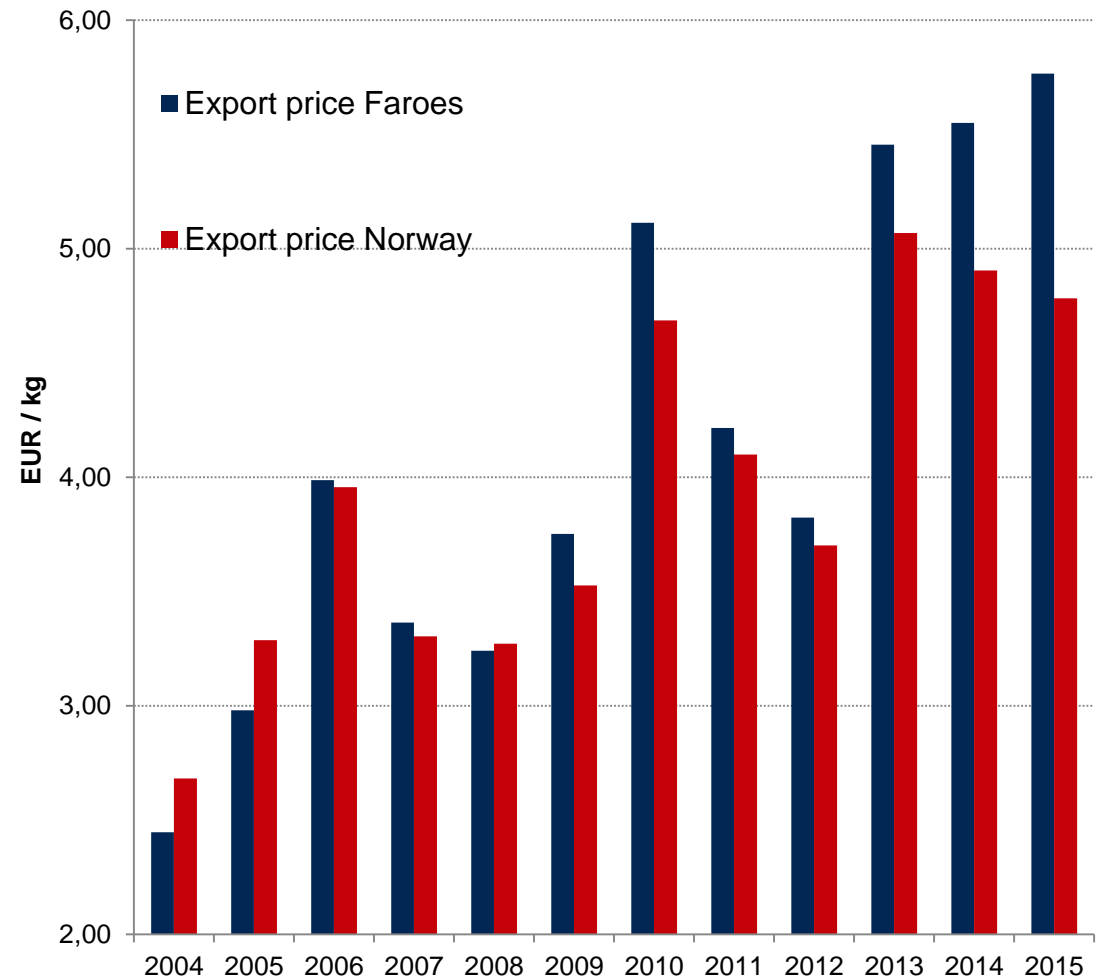
- Low FCR
- Economical FCR harvest



THE MARKET IS WILLING TO PAY UP FOR PREMIUM PRODUCTS

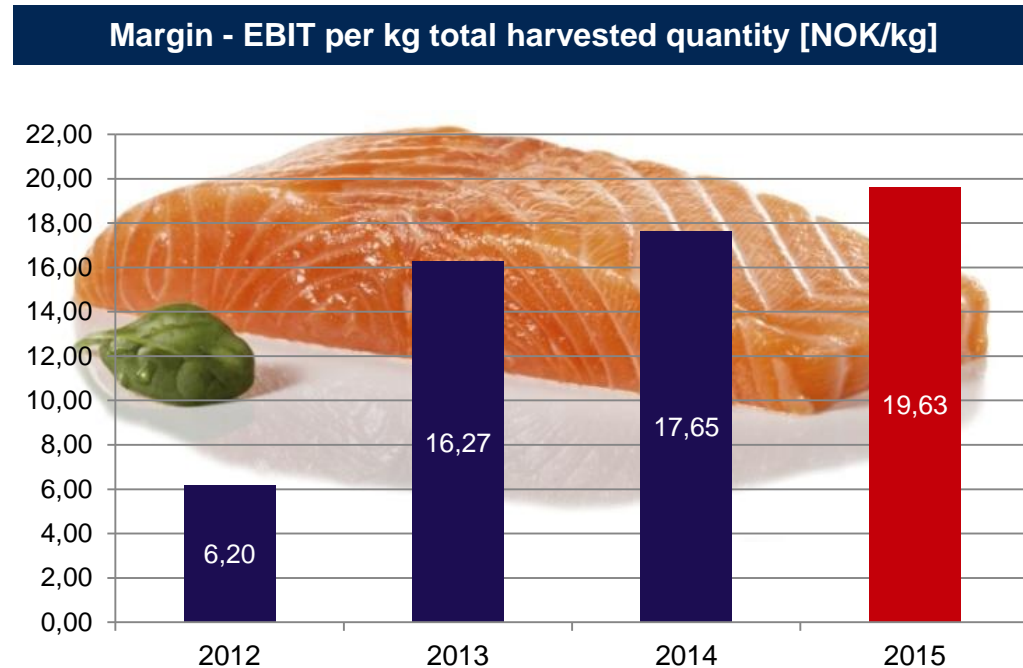
- Consistent large sized fish forms baseline for price premium
- Bakkafrost has further tailored its product for the premium market through
 - Investing in very high inclusion rates of marine raw materials
 - Development of a demand driven value added processing franchise
 - Including capability of “upgrading” parts of ~10% of fish normally sold at discount as “downgraded” due to skin scars, deformities etc.
- Superior market access as the Faroe Islands is rarely part of recurring trade sanctions/embargos/dumping duties etc.

Price differential, Norway/Faroes



MAIN OBJECTIVES FOR FEED FROM HAVSBRÚN

- **Lowest mortality**
- **Best fish welfare**
- **Highest yield per smolt**
- **Highest harvest weight**
- **Lowest FCR**
- **High growth - high TGC**
- **Highest fillet yield, low harvest yield**
- **Highest in Omega 3**
- **Highest marked price**



YOU CAN TASTE THE DIFFERENCE!

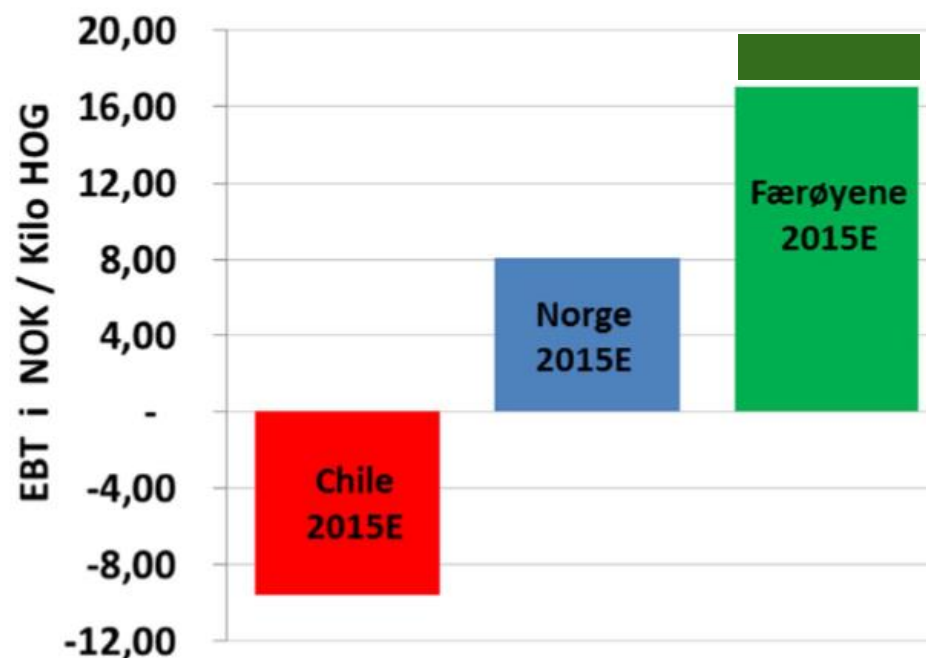
MARGIN



Faroe Islands highest margin

- Chile: – 10 kr/kg
- Norway: 8 kr/kg
- Faroe Islands: 16,50 kr/kg

Margin per kg (NOK/kg HOG)



Source: Kontali Analyse

WHAT DO YOU THINK ?

