

Global Aquaculture – Norwegian Salmon farming

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How to feed the growing world population in a sustainable way?



Our mission

feeding
the future

Nutreco: A global Animal Nutrition and Fish Feed company



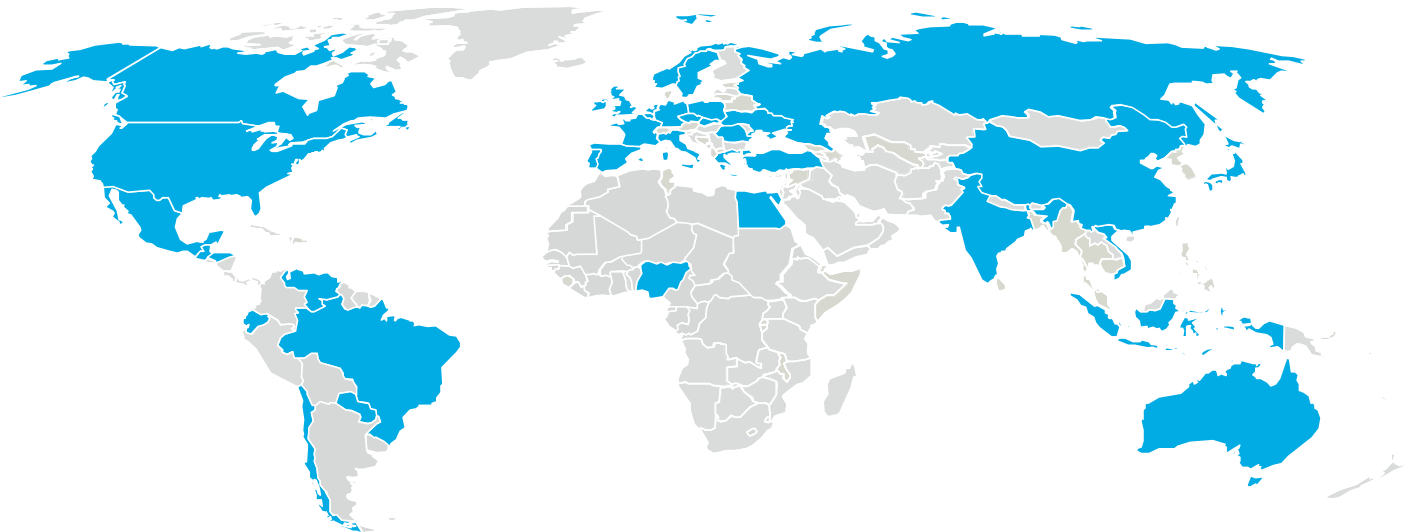
> 100 production plants in 29 countries and sales > 80 countries



14 R&D units in 12 countries

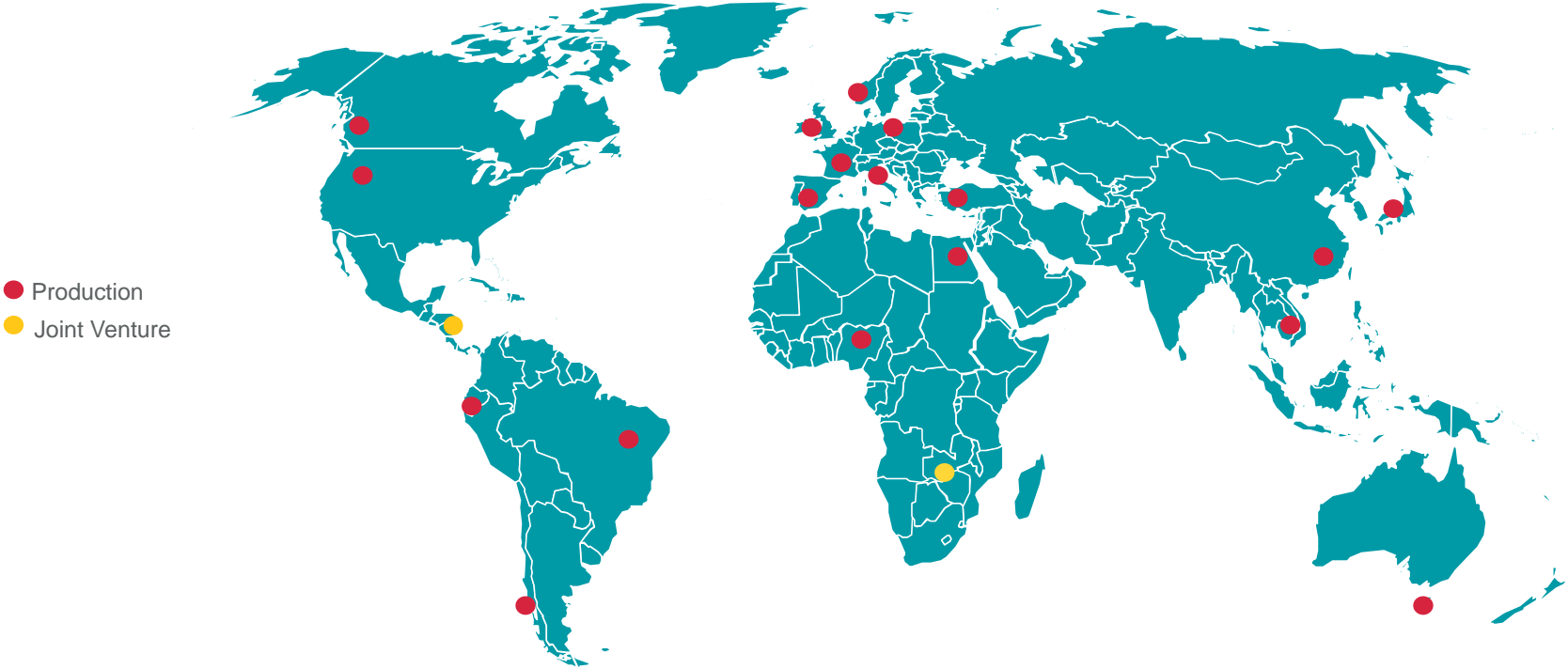
Two global company brands

Local company brands in Canada & Iberia



Aquaculture

Skretting – a global company



2,900 employees

2 million tonnes of feed

Production in 20 countries

Skretting core value proposition



Skretting Aquaculture Research Centre (ARC)

People

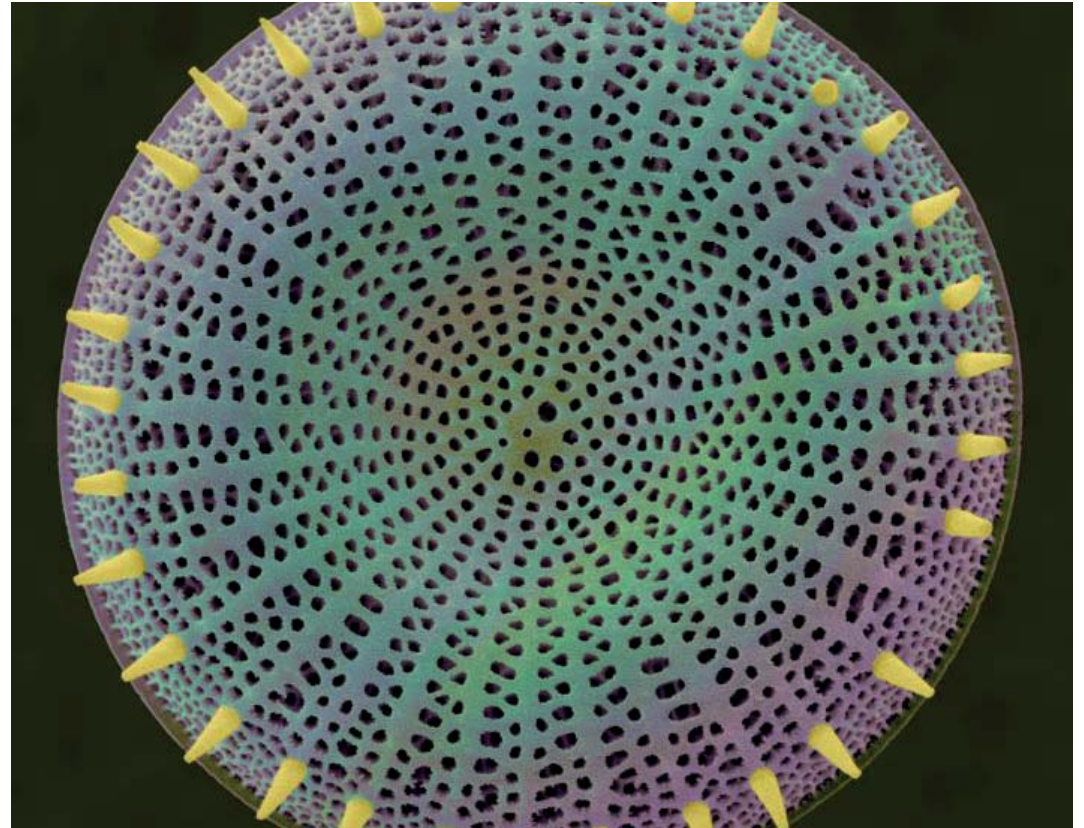
27 nationalities
120 employees

Researchers

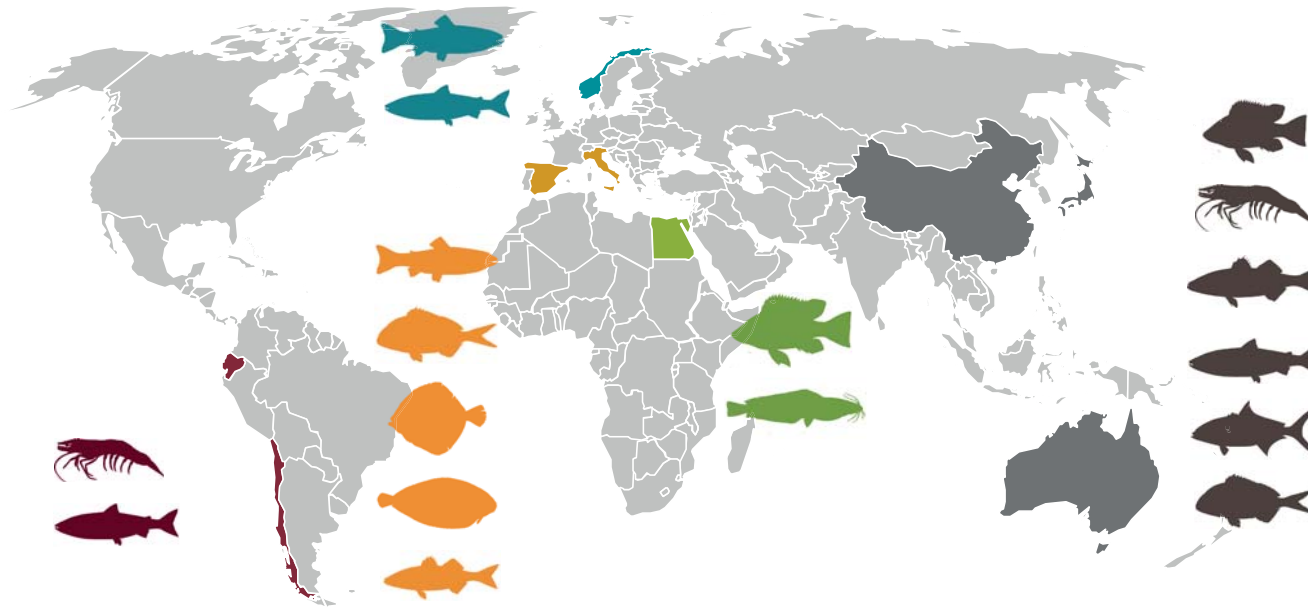
Experts in Nutrition,
Health and Feed Technology

Collaborations

Collaborations with over 40 research
institutions worldwide



Our research facilities



Norway

Salmon
Trout

Mediterranean

Sea bass
Trout
Sea bream
Sole
Turbot

Asia Pacific

Shrimp
Asian sea bass
Tilapia
Yellowtail
Red sea bream
Atlantic salmon

Americas

Shrimp
Atlantic salmon

Africa

Tilapia
African catfish

We make feed for a wide range of species



Atlantic salmon



Rainbow trout



Whiteleg shrimp



Arctic char



Striped bass



Tilapia



Giant tiger shrimp



Turbot



Barramundi



Halibut



Sea bream



Yellowtail



Sea bass

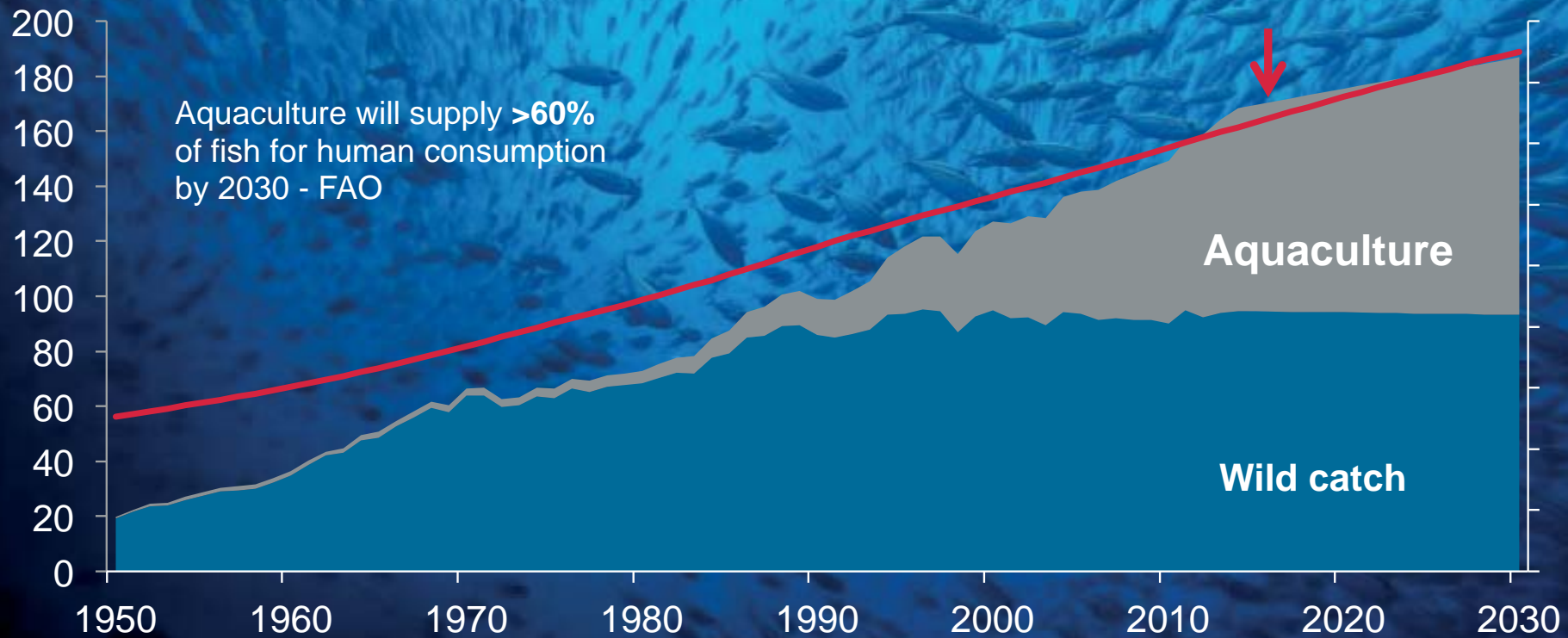


Red sea bream

The blue revolution

Production in million tonnes

World population in billions



Sources: FAO FishStat, UN World Population Prospects – The 2015 Revision

Salmon Farm in Norway



Shrimp farming in Ecuador



Shrimp farming in Vietnam



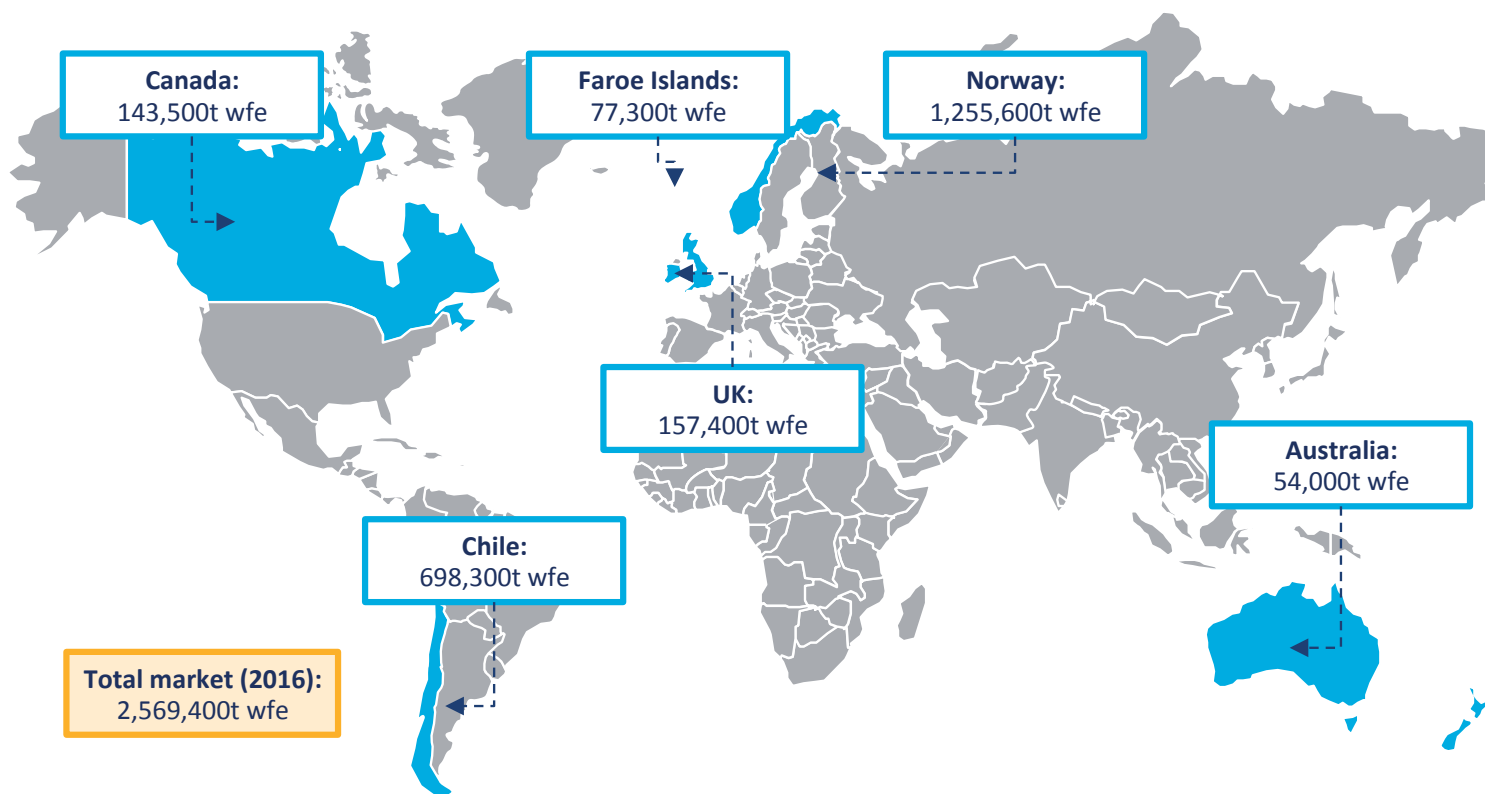
Tilapia farming in Egypt



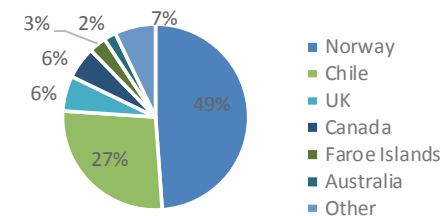


The global salmonid market

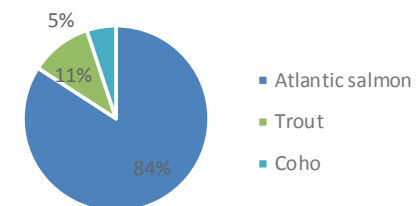
Geography of salmonid market: production volumes 2016*



Split by countries



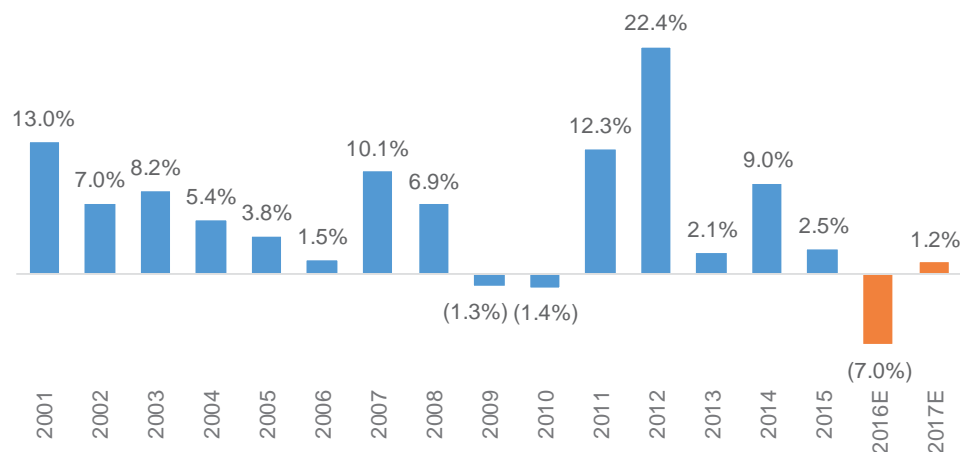
Split by species



* Whole fish equivalent (wfe)
Source: Kontali

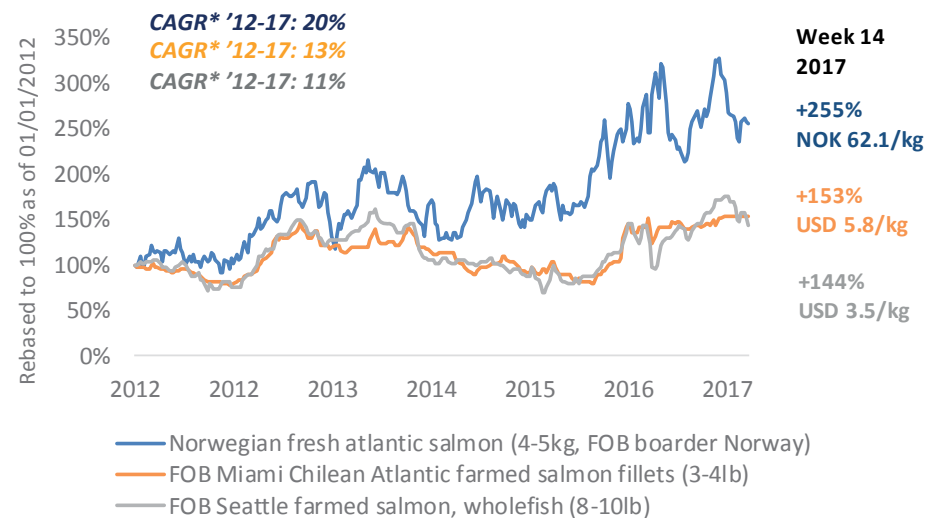
Strong underlying demand and challenges on the supply-side boost salmon prices

Global salmon production annual growth



Source: Rabobank Food & Agricultural research 2016, Kontali (2015-2017E)

Salmonid price development



Source: AkvaFakta, Urner Barry
* Based on annual average prices

Low growth prospects of traditional salmon farming are driven by biological challenges in the sea and tightening regulation both in Norway and Chile. On the other side, strong increase in salmon export prices indicate strong underlying demand

2016

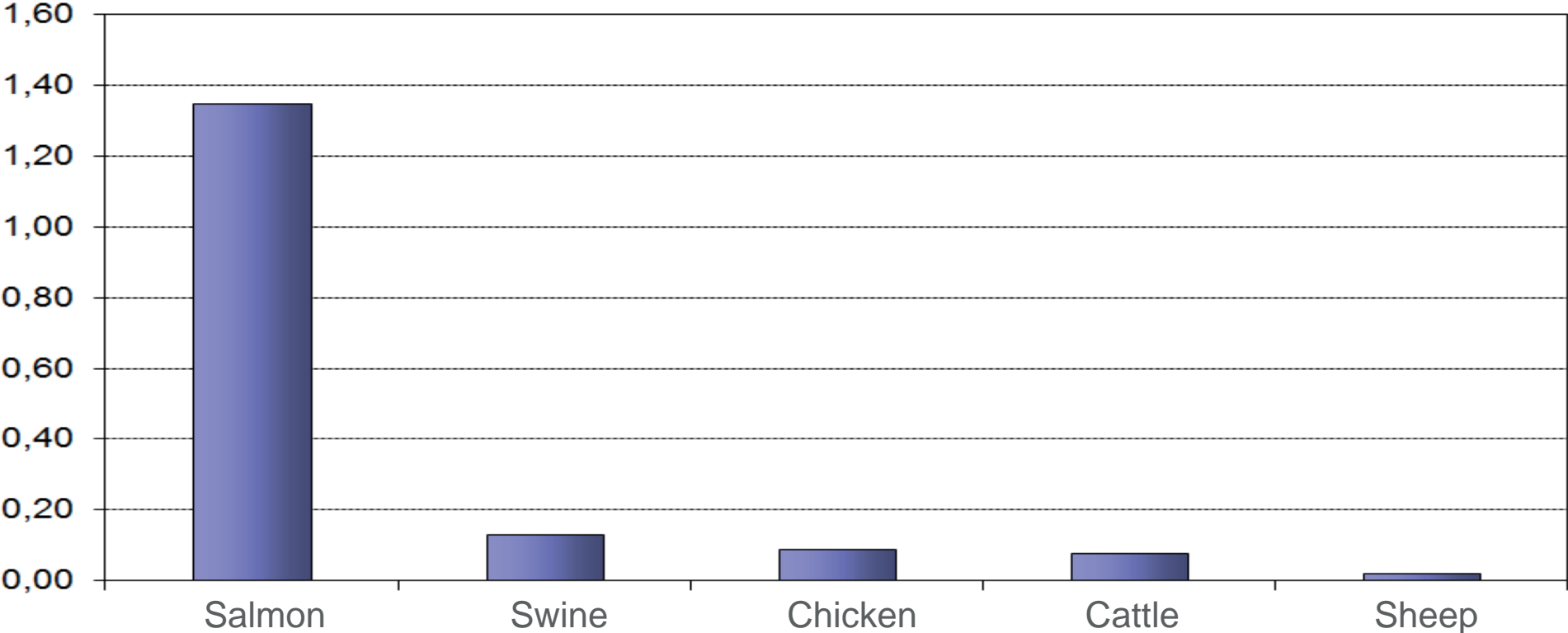
The Norwegian export value of Norwegian seafood exceeded 90 billion NOK
Salmon and trout represented 65.3 billion NOK (= 7 billion €)
Norway exported 2.4 million tonnes seafood to 146 countries – which
represents 34 million meals every day!

91.6
billion NOK

23%
increase

Norwegian farming

Meat production in Norway (million tonnes/year)



Key factors for success

- Long and clean coastline
- Good public infrastructure
- Predictable and stable regulation regime
- Innovative thinking and exchange of expertise
- Strong focus on research



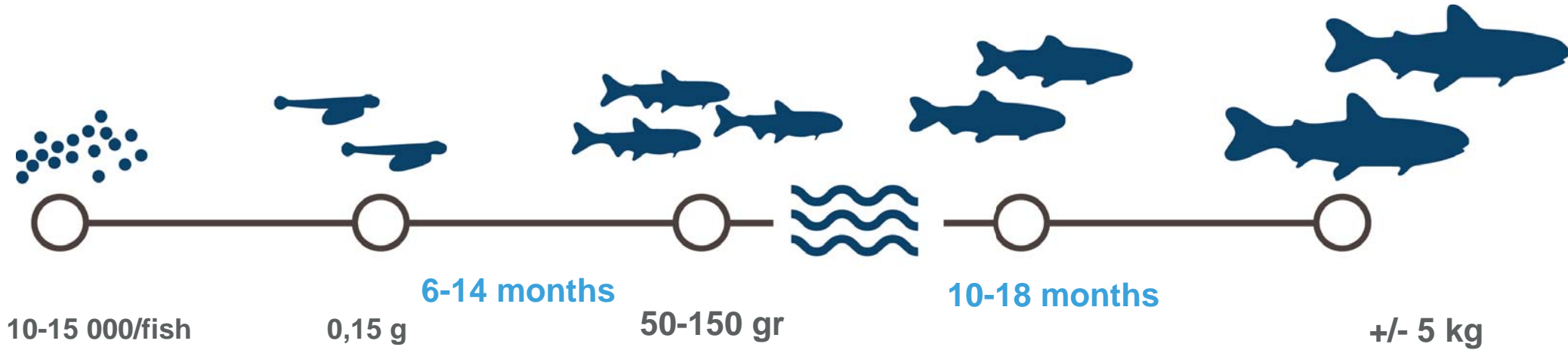
Salmon farming is highly technical



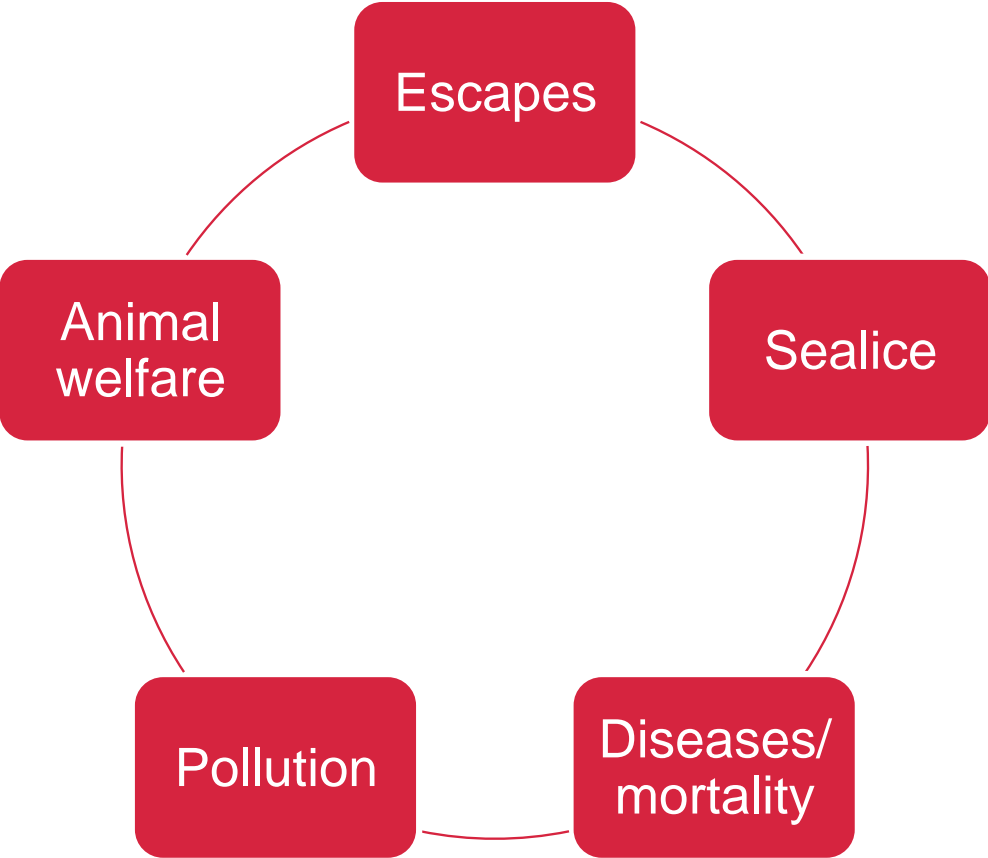
....and so is also fish feed production



Salmon lifecycle



Challenges in Salmon farming





Top health issues

Norwegian salmon

Sea lice



Frequent treatments due to the legal upper limit of 0,5 gravid lice per fish



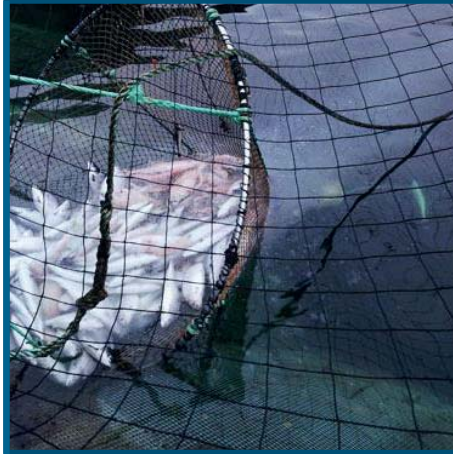
Mechanical and chemical damage causes high mortalities



Stress increases the risk of outbreaks



PD



Reduced performance and production



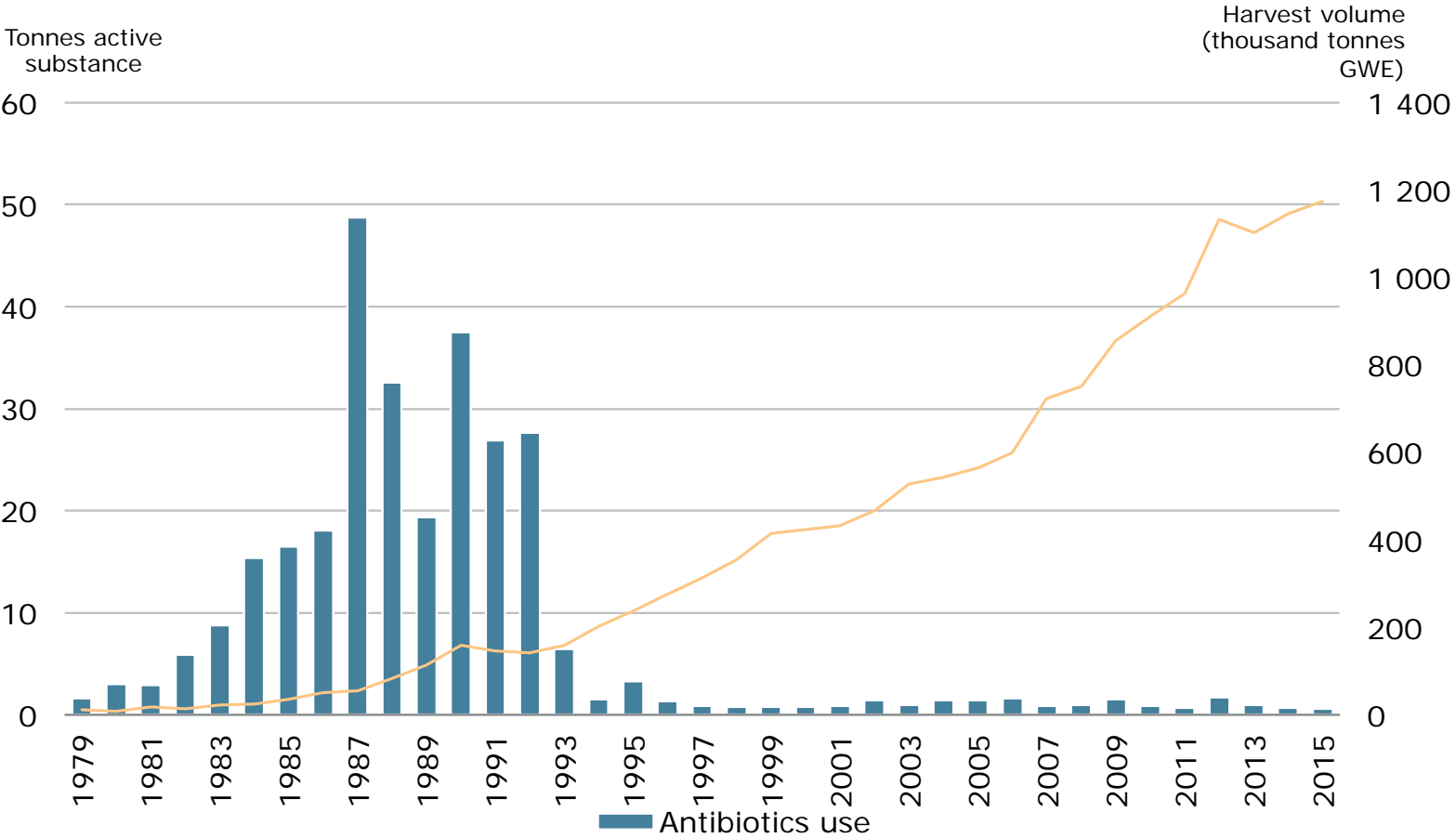
Regulations and early harvest



Gaping and uneven color

Use of antibiotics in Norwegian aquaculture

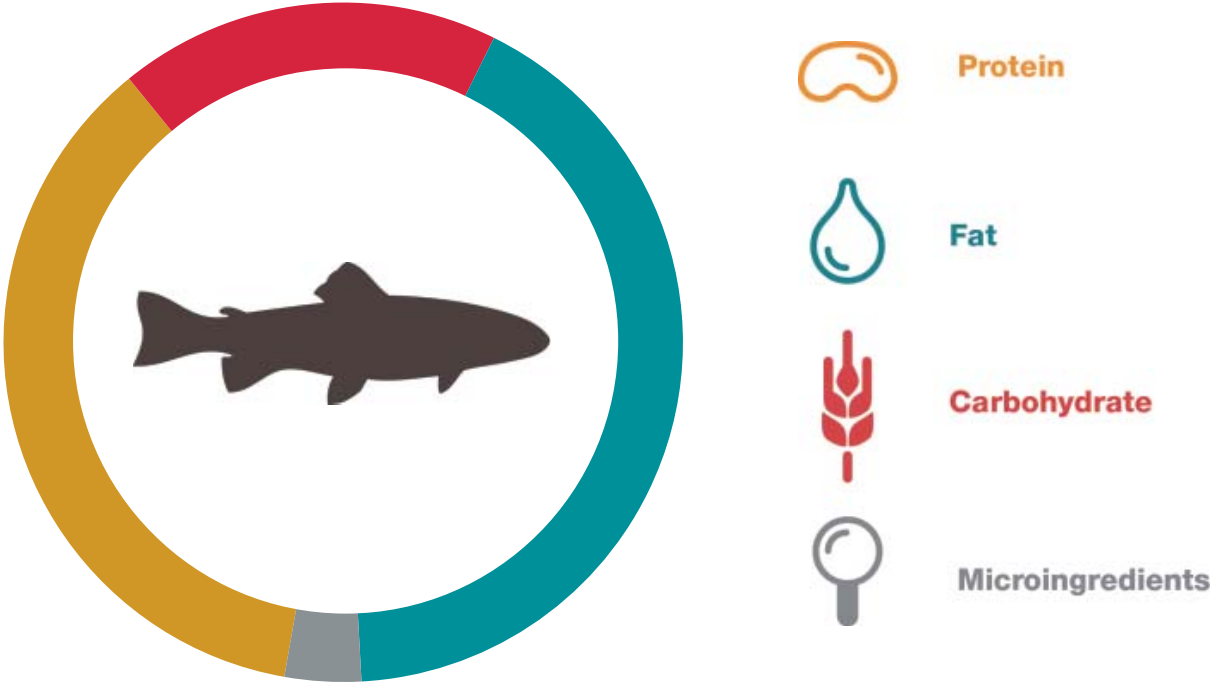
Production of salmon and use of antibiotics in Norway



Salmon need nutrients, not specific raw materials



Salmonid feed ingredients



Skretting enabled fish meal flexibility

- Reduce our dependency on fish meal
- Increased flexibility for raw material use
 - Soy protein concentrate is the biggest protein source
- Functionality of ingredients

MicroBalance[®]

Fish meal in salmon diets



Omega-3 supply is the main challenge for sustainable supply of aquaculture feed



- We need to ensure stable and predictable access to EPA+DHA
- Many potential micro algae solutions include supply of DHA+ EPA

KPIs for Norwegian Salmon production

- All pr kg gutted, head on, packed salmon, including primary processing:
 - Sales price (2016->April2017) 60-85 NOK (6,5-9,5€)
 - Production cost ca 35 NOK (3,8 €)
 - Feed cost ca 18 NOK (1,8 €)
- Feed conversion ratio (FCR): 1,45
- Mortality (from sea transfer to harvest) 25-30%

20 years of
...in Stavanger...

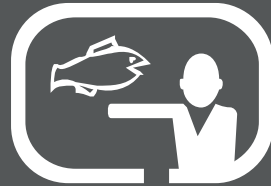


1996



First conference

2018



12th Conference

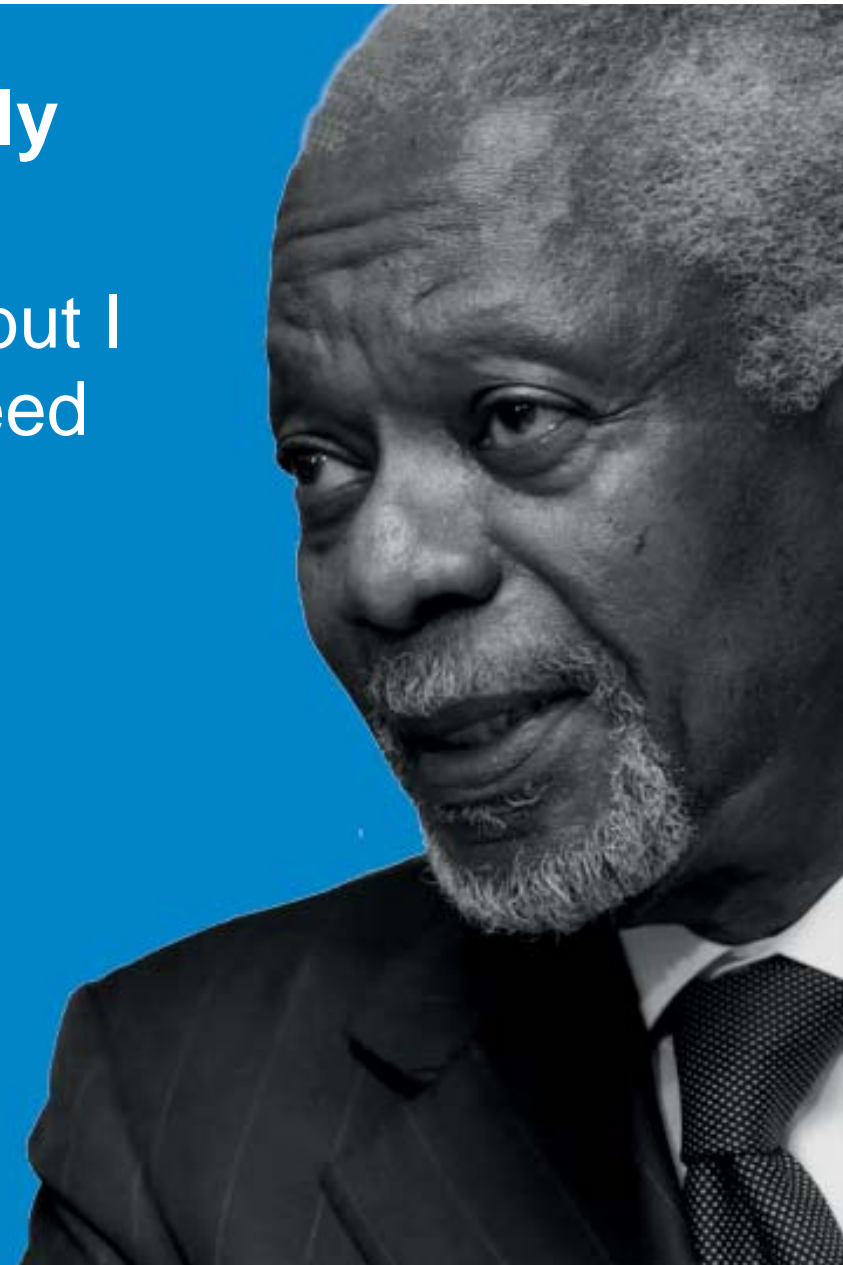
INITIATED & ORGANISED BY:



Feeding 9 billion people sustainably

“I do not ask you to change direction, but I ask you to accelerate progress. We need to work together if we are to overcome world hunger.”

Kofi Annan
Former UN Secretary General
AquaVision 2012



Seafood is good for you! – Thank you!

