



*Lessons to be learned across
“aquacultures”*

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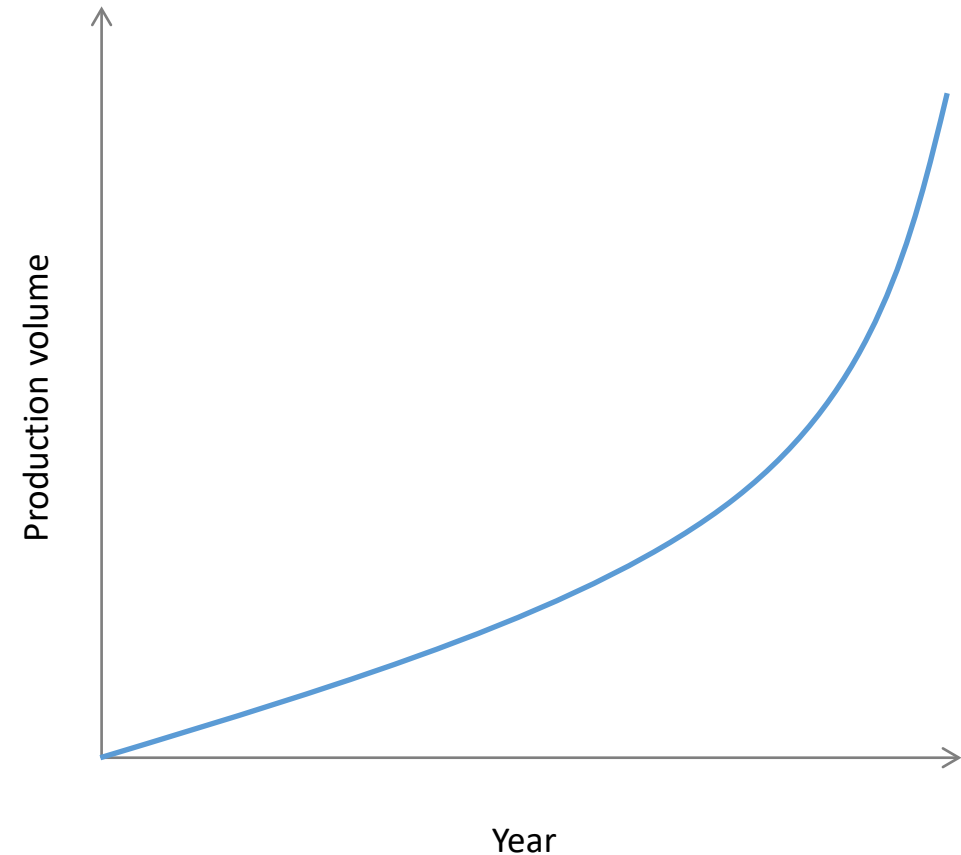




Introduction

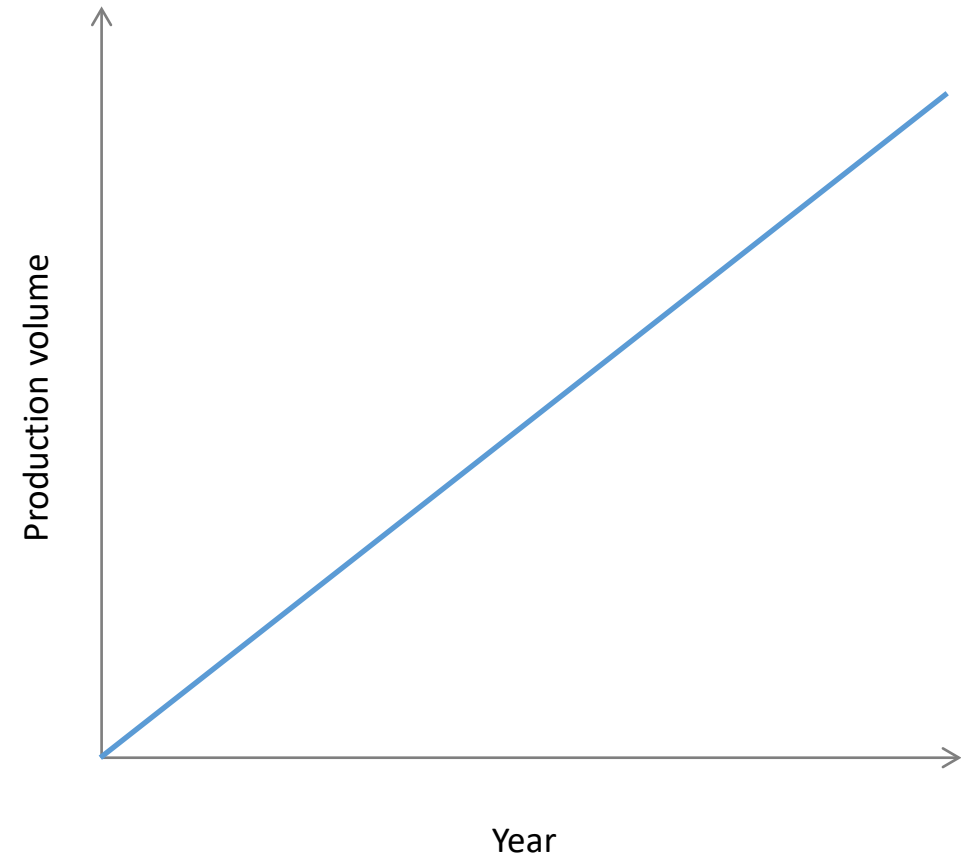
“The rise and falls of aquacultures”

The story about global aquaculture is **NOT** the story about the tree that grew into space



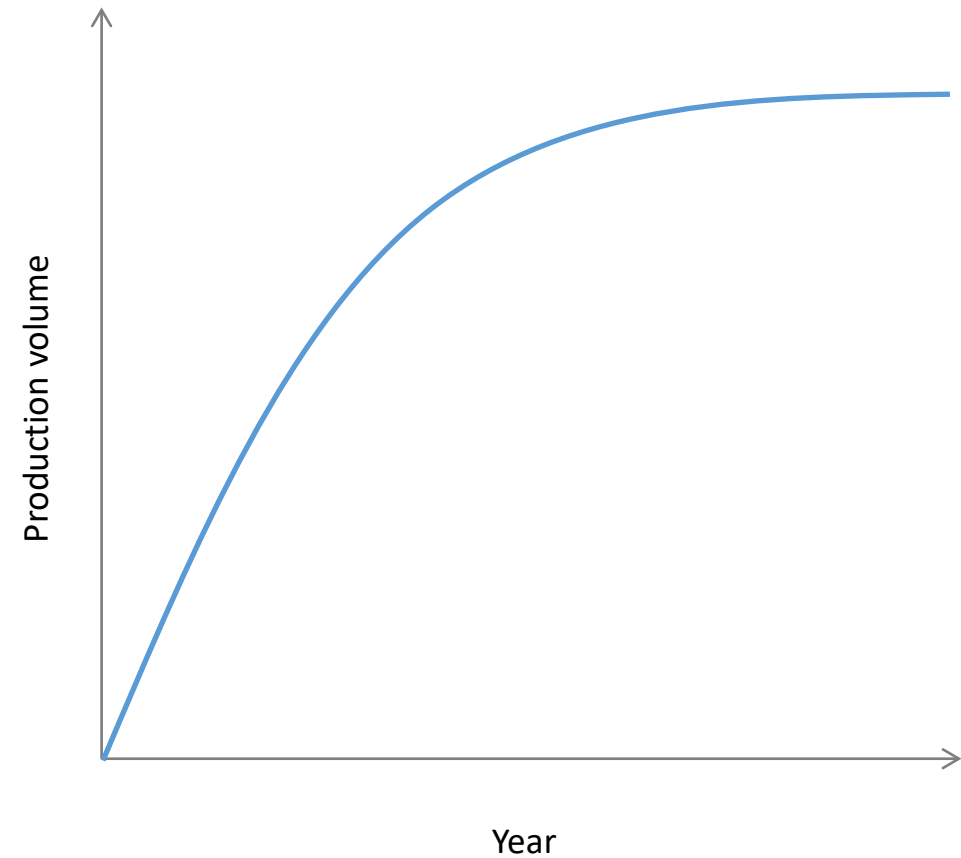
Ragnar Tveteraas 2013

The story about global aquaculture is **NOT** even the story about the tree that grew at all...



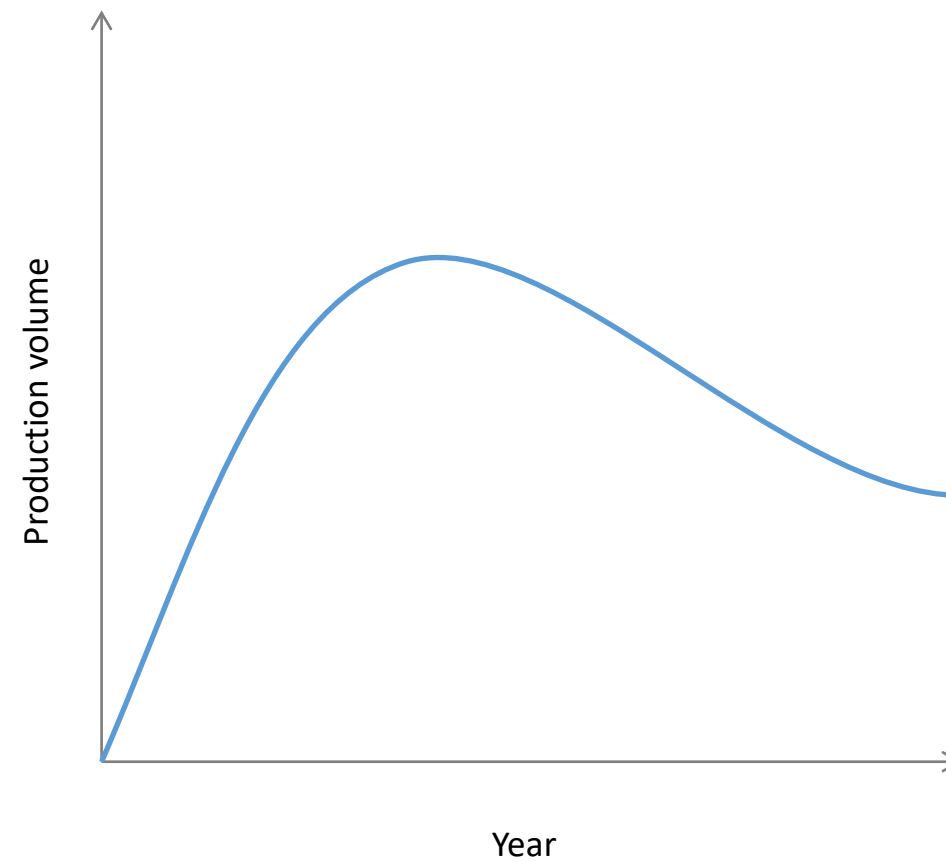
Ragnar Tveteraas 2013

...but often a story about
STAGNATION...



Ragnar Tveteraas 2013

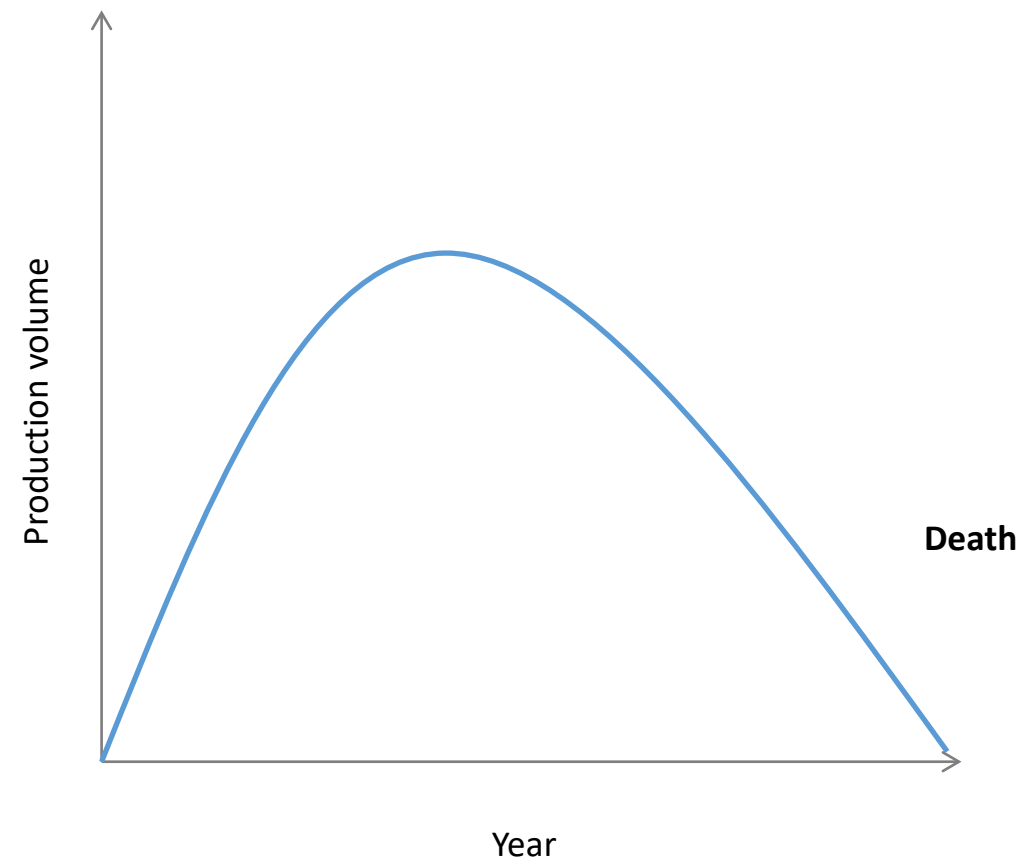
...and **DECLINE**...



Ragnar Tveteraas 2013

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...and even DEATH



Ragnar Tveteraas 2013

Why... What are underlying factors shaping the growth curve of "aquacultures"

- ▷ **Externalities within aquaculture**, particularly related to disease and fish health
- ▷ **Externalities to other** sectors and users
- ▷ Ability to exploit **internal and external returns to scale**
- ▷ Ability to **innovate** in several areas

Ragnar Tveteraas 2013

① Innovation

Not at all left to the private sector

The example of Norway

1

Strong political support to the industry– aquaculture ministry is promoting growth, not only executing control

- ▷ Industry development with targets into 2050
- ▷ Growth ambitions with conditions, if green targets are not met - no growth
- ▷ Culture of dialogue with industry and science

2

Investing in R&D and innovation over years

- ▷ The unique triangle of funding, science and industry
- ▷ Rich R&D funding has been available in over 40 years

3

Current focus is on commercialization of R&D

- ▷ Industry clusters
- ▷ Link capital and corporates with entrepreneurs
- ▷ Mobilizing risk-capital for the sector

4

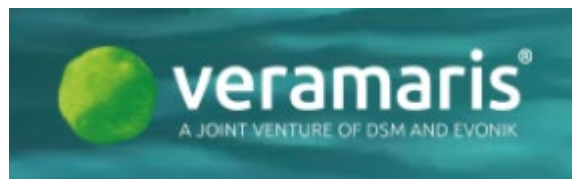
Scaling/risk off load

- ▷ Research licenses
- ▷ Development licenses

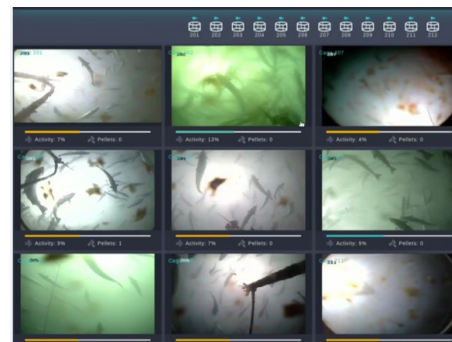
Why do we not see the same shrimp Innovation success

- ▷ Many and diverse countries involved
- ▷ Risk profile is different, shrimp farmers have been more opportunistic, not seeking the root causes
- ▷ Less access to R&D funding; ie no EU funds
- ▷ Less organised industry to drive consorted efforts
- ▷ Educational level in the industry
- ▷ All scaling risk on private hands

Feed & Nutrition



Feeding & Digitilization



Health management

PHARMAQ
part of **zoetis**



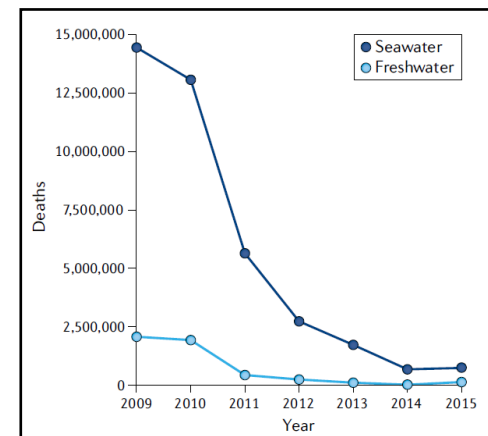
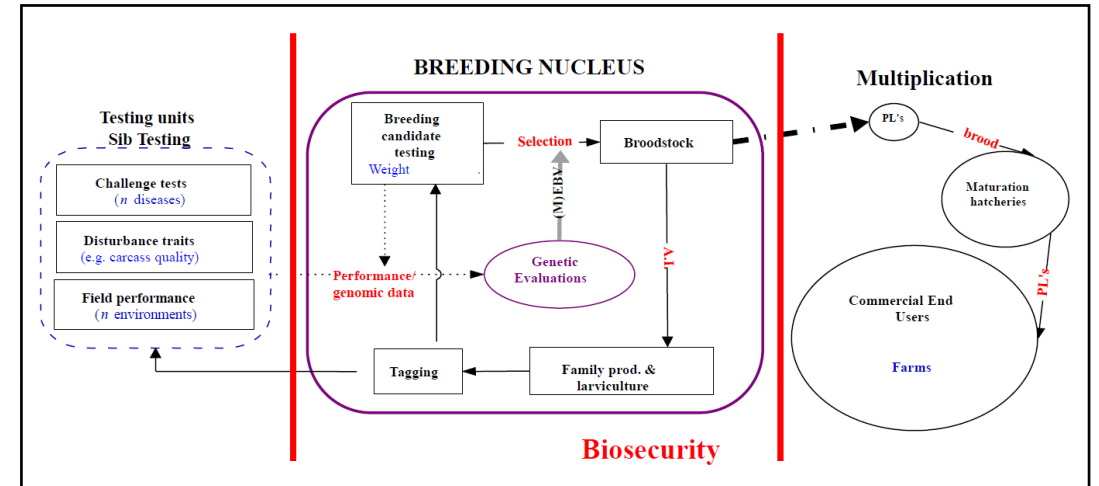
Benchmark Vaccines Ltd



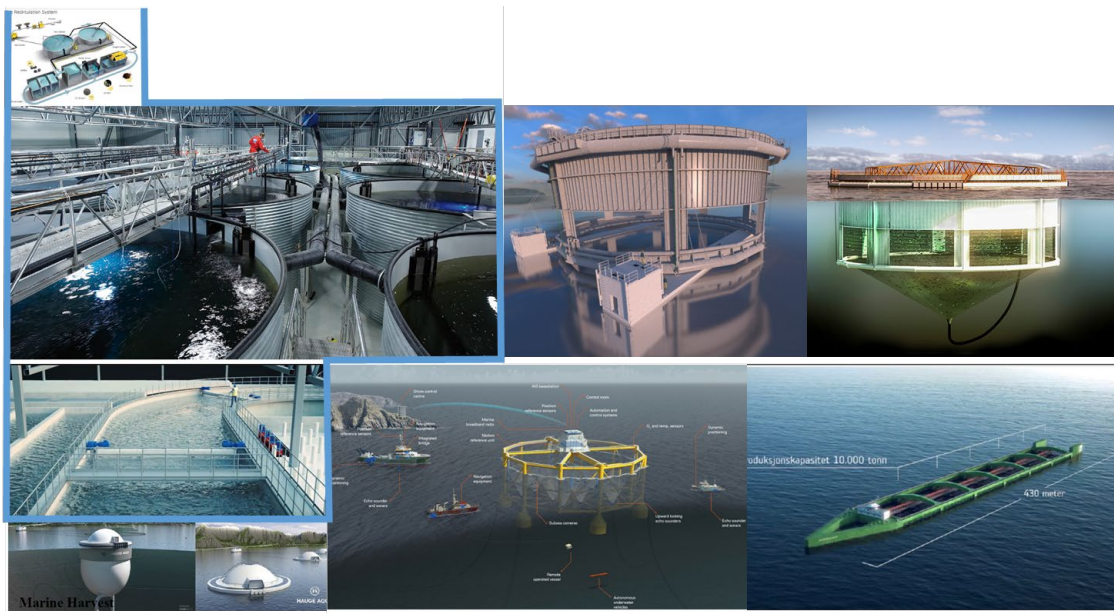
VIAQUA THERAPEUTICS



Genetics



Novel salmon farming technology



The Ocean Farming facility is a new and innovative design, developed to overcome the challenges of more traditional inshore fish farming facilities by being located in deeper waters, further from the coast.

...still debating farming models in shrimp...

▽ Latin Model



▽ Asian Model



▽ Advanced Asian Model



Innovation Learnings...

- ▷ **Look** at Innovation on an industry level, not limit focus to company level
- ▷ **Define** a few Innovation major focus areas crossing country borders
- ▷ **Drive** consorted initiative, through industry led consortia
- ▷ **Include** supplier industry
- ▷ **Work** intimately with start-up communities

② Industry structure, organisation and governance

Shrimp economics dynamics (Asche et al 2020)

Valuable

Strong global demand make shrimp very valuable

Diseases

Diseases affecting farmed shrimp impacts global shrimp supply and prices and thereby profitability

High cohort profits

The very high profits for a cohort in the absence of diseases, the industry can face that as one region is reeling due to diseases, other regions/countries step up and exploit the economic opportunity

Improved technology

Broodstock management, breeding, nutrition, biosecurity, and pond management have helped farmers better mitigate diseases

Private solutions

Despite “solutions” being found to address the production problems at the aggregate level so that total production and the industry continue to grow, this is primarily based on private solutions

Geographic relocation

This strategy of geographic relocation as a disease mitigation strategy may continue to support crude and sometimes unsustainable production practices because of high short-run profitability.

Not seek best solution

In some cases, it may not be the best solution from an environmental perspective in that the industry just moves to a new geographical region when disease issues become too strong



Global value chain

Shrimp characteristics

- ▷ **Faster growth** than salmon, but in boom and bust shape
- ▷ **Many countries**, 66 producing more than 1000 tons
- ▷ **Less vertical integration** and consolidation to deal with risk
- ▷ Farming/ processing/ export/ import **less structured**
- ▷ Country set demand on sanitary and veterinary requirements as **import rules**
- ▷ **No systematic stakeholder approach**
- ▷ **New technology exists** but less and uneven uptake
- ▷ **Weak ability** between producers to coordinate risk, have given dominance for processors over producers.



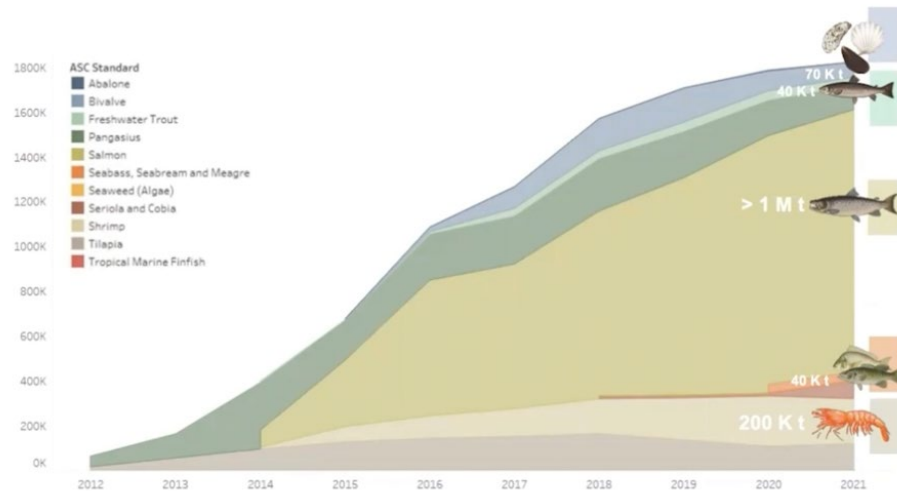
Global value chain Salmon characteristics

- ▷ Informational **complexity**; parasites, disease, pollutants & anti-biotics.
- ▷ **Wide range** of product forms
- ▷ Countered by a **high level of standardisations**:
 - **One species**, few countries
 - **Consolidation** of companies, to drive economy of scale, and reduce risk
 - Vertical integration
 - **Systematic stakeholder** identification and management
 - **Pre-competitive collaboration**
 - Formation of **Clusters**



First decade of ASC: Successful implementation of an idea

1,400 certified farms
1.85 mio tons of certified produce



Industry structure, organisation & governance Learnings.....

- ▷ **Cheer Leaders** Promote industry spokespeople, to stand up as thought leaders among top executives.
- ▷ **Present** the challenges and solutions in political, UN and NGO arena.
- ▷ **Define** a common industry sustainability ambition
- ▷ **Seek** the long term solutions, not the opportunities
- ▷ **Establish** a GSI- shrimp
- ▷ **Encourage & promote** certifications

③ Funding and access to capital



EURONEXT

Listing

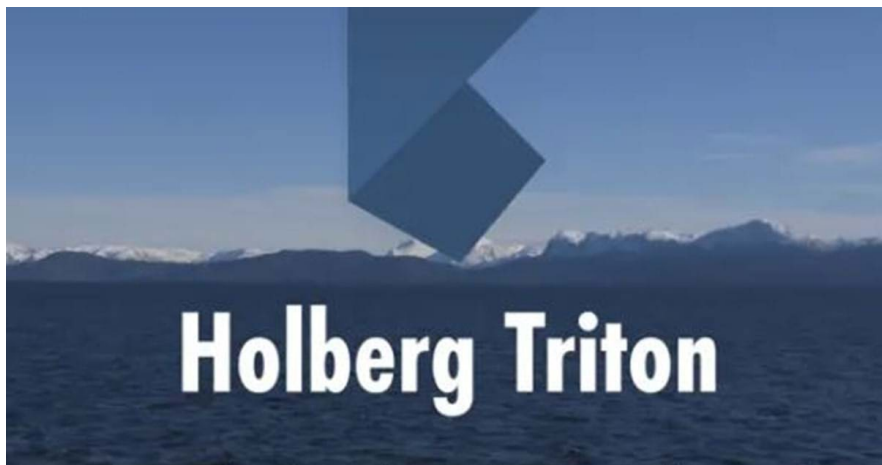


Markets > Oslo > Cash Products > Stocks > Seafood Stocks

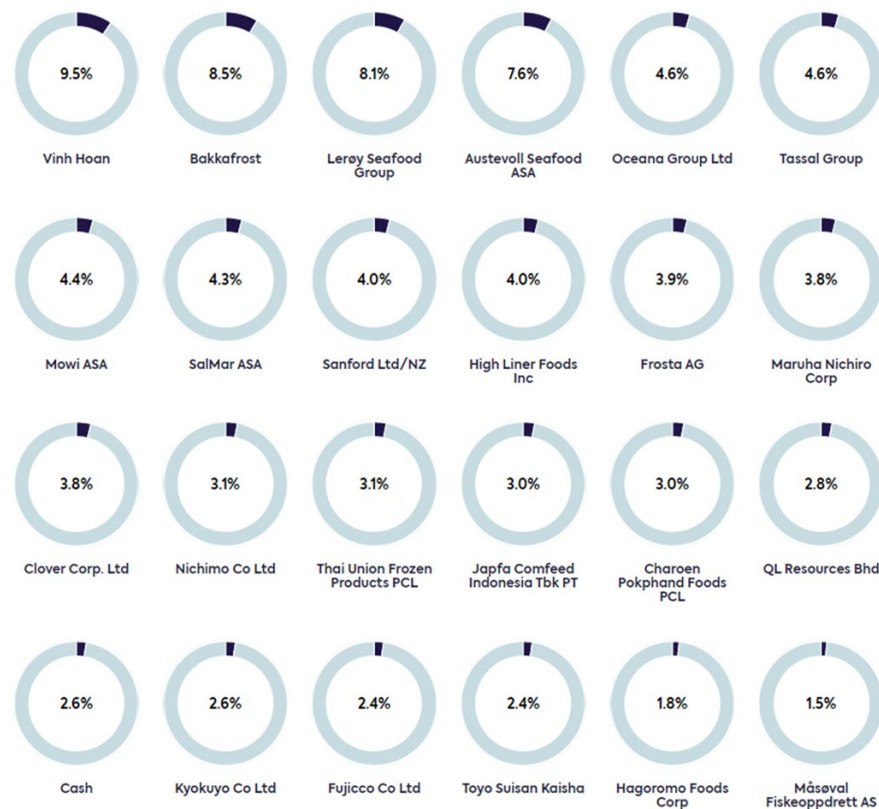
SEAFOOD STOCKS.

NAME	BID/ASK	LAST	%	DATE/TIME	TURNOVER	MARKET CAP	YTD%
AKER BIOMARINE	48.05/48.40	NOK 48.40	2.98%	13:13 CEST	4,377,910.13	4,239M	-58.81%
ATLANTIC SAPPHIRE	48.80/49.00	NOK 49.00	-4.67%	13:24 CEST	16,485,145.95	4,460M	-59.17%
AUSTEVOLL SEAFOOD	109.20/109.30	NOK 109.30	-0.18%	13:22 CEST	5,431,726.20	22,157M	24.63%
BAKKAFRÖST	736.00/736.80	NOK 736.20	-0.78%	13:24 CEST	14,043,417.20	43,541M	20.20%
GRIEG SEAFOOD	85.30/85.40	NOK 85.30	-0.35%	13:21 CEST	4,419,385.00	9,677M	0.35%
LERØY SEAFOOD GP	75.88/75.96	NOK 75.92	0.37%	13:22 CEST	11,313,900.20	45,231M	25.36%
MOWI	233.60/233.80	NOK 233.70	1.43%	13:23 CEST	63,685,051.00	120,849M	22.87%
NORWAY ROYALSALMON	187.80/188.00	NOK 187.80	-0.11%	13:20 CEST	5,638,849.00	8,183M	-11.57%
SALMAR	578.60/579.00	NOK 579.00	-0.24%	13:22 CEST	23,073,177.80	68,206M	14.97%
SALMON EVOLUTION	8.56/8.57	NOK 8.56	-0.12%	13:20 CEST	1,275,939.35	2,613M	24.96%
SALMONES CAMANCH	40.30/41.20	NOK 40.90	-1.45%	07 Sep 2021	46,904.70	2,699M	-19.80%

Norsk BioAkva



Fund return



Highcharts.com



Growth Markets

Selskap	Type selskap	Noteringsdag	Emisjonskurs	nå
Proximar Seafood	Landbasert lakseoppdrett Japan	3. februar 2021	kr 16,20	kr 8,40
Arctic Fish Holding	Lakseoppdrett Island	19. februar 2021	kr 61,20	kr 60,50
Arctic Bioscience	Bioteknologi / sildemelke	24. februar 2021	kr 31,00	kr 20,50
Frøy	Lakserederi	29. mars 2021	kr 61,00	kr 54,50
Statt Torsk	Torskeoppdrett	23. april 2021	kr 2,50	kr 2,65
Nordic Halibut	Kveiteoppdrett	26. april 2021	kr 22,50	kr 26,50
Clean Seas Seafood	Oppdrett av kingfish i Australia	20. mai 2021	kr 3,68	kr 4,00
Måsøval	Lakseoppdrett	17. juni 2021	kr 32,90	kr 39,53
Gigante Salmon	Landbasert lakseoppdrett Nordland	5. juli 2021	kr 5,50	kr 5,20
Biofish Holding	Smoltproduksjon	2. august 2021	kr 21,50	kr 15,30
Barramundi Group	Oppdrett av barramundi i Asia og Australia	12. august 2021	kr 14,70	kr 14,70



Gro-Farm model





Future proofing shrimp production

Three main financiers according to WWF:

- ▷ Buyers and retailers
- ▷ Impact investors
- ▷ International financial institutions

I would add:

- ▷ Local capital
- ▷ Industrial investors
- ▷ International skilled aquaculture investors

\$67.5
BILLION DOLLARS



A **2017 report** by Future Market Insights estimates that the global shrimp market value will rise from \$39.1 billion in 2017 to \$67.5 billion by the end of 2027. During that time, sales revenue is projected to register a compound annual growth rate of 5.6%.

Funding Learnings...

- ▷ **Raise** Investor communities to main stakeholder.
- ▷ **Present and promote** shrimp industry in investor forums.
- ▷ **Attract** institutional investors and use available marketplaces for listing
- ▷ **Seek** support from impact investors
- ▷ **Exploit** local funding opportunities in concerted efforts

In the end it is all about Sustainability.....



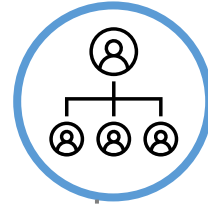
Sustainability of aquaculture

People, planet & profit



Innovation

- ▷ Industry level
- ▷ Define focus areas
- ▷ Drive initiatives
- ▷ Include supplier industry
- ▷ Work closely with start-ups



Industry structure, organisation & governance

- ▷ Promote industry cheer leaders
- ▷ Present in political, UN and NGO arenas
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- ▷ Establish a GSI-shrimp
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Funding

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