Why Farming of Marine Fish?

Carlos Massad

Marine Farms Vietnam

&

Bjørn Myrseth

Marine Farms ASA

CARLOS F. MASSAD

Marine Farms Vietnam

Mr. Massad has over 25 years experience in various commercial aquaculture operations in different countries around the world.
Since 2008, Mr. Massad has been Managing Director for Marine Farms Vietnam - an international company and subsidiary of Marine Farms A/S Norway - dedicated to the production of cobia, with a total annual production of 1,500 tonnes. The company employs a workforce of over 100 and posts annual sales of US$ 6 million.
Before, he was Business Manager for Armstrong-Keta Inc. in Juneau, Alaska (USA), a regional salmon enhancement hatchery based in Alaska.

Environmental Concerns

- Freshwater – limited resources.
- Seawater - higher availability of resources.

Fish Prices (Value in USD/kg)

Freshwater Fish	1.06 USD/kg
Diadromous Fish	3.26 USD/kg
Marine Fish	3.48 USD/kg

Growth In Farmed Finfish
(Mill. Tonnes)

	1996	1999	2002	2005	*Av. Growth pr. year*
Freshwater fish	14.6	18.6	23.0	25.8	8%
Diadromous fish	1.7	2.1	2.6	2.9	7%
Marine fish	0.6	0.9	1.2	1.6	17%

Source: FAO

A Conclusion

Marine fish offer:

- Less environmental concerns.
- Better prices.
- Better growth prospects.

Marine Fish Characteristics

- Carnivorous – high feed costs.
- Difficult intensive hatchery technique.
- High fecundity – many eggs per kilo, but small larvae.
- Good water quality.
- White flesh.
- Many species to choose from.
- Popular as food.
- Many well known and popular local species.

Cold Water Farming Candidates

Species	Tons Farmed	Price to Farmer (USD)
Halibut	2,000	12
Cod	20,000	4-5
Turbot	10,000	12+
Sole	1,000	12+

Temperate Water Species

Europe

- Mediterranean sea bass - 150 000 tons
- Mediterranean sea bream - 150 000 tons

- Corvina (meagre) - 5 000 tons?
- A number of other candidates – but similar eating quality

Asia

- Japanese sea bream
- Rockfish in Korea
- Flounder in Korea
- Yellowfin tuna

What Is The Next Area To Be Developed For Marine Fish?

The Tropics!!

Many Carnivorous Fish Farming Candidates in The Tropics

Group A

- Wrasses
- Groupers
- Tunas
- Rabbit fish (herbivorous)

Group B

- Snappers
- Pompano
- Barramundi / Asian sea bass
- Mahi-mahi
- Seriola sp. (yellowtail/kingfish)
- Cobia

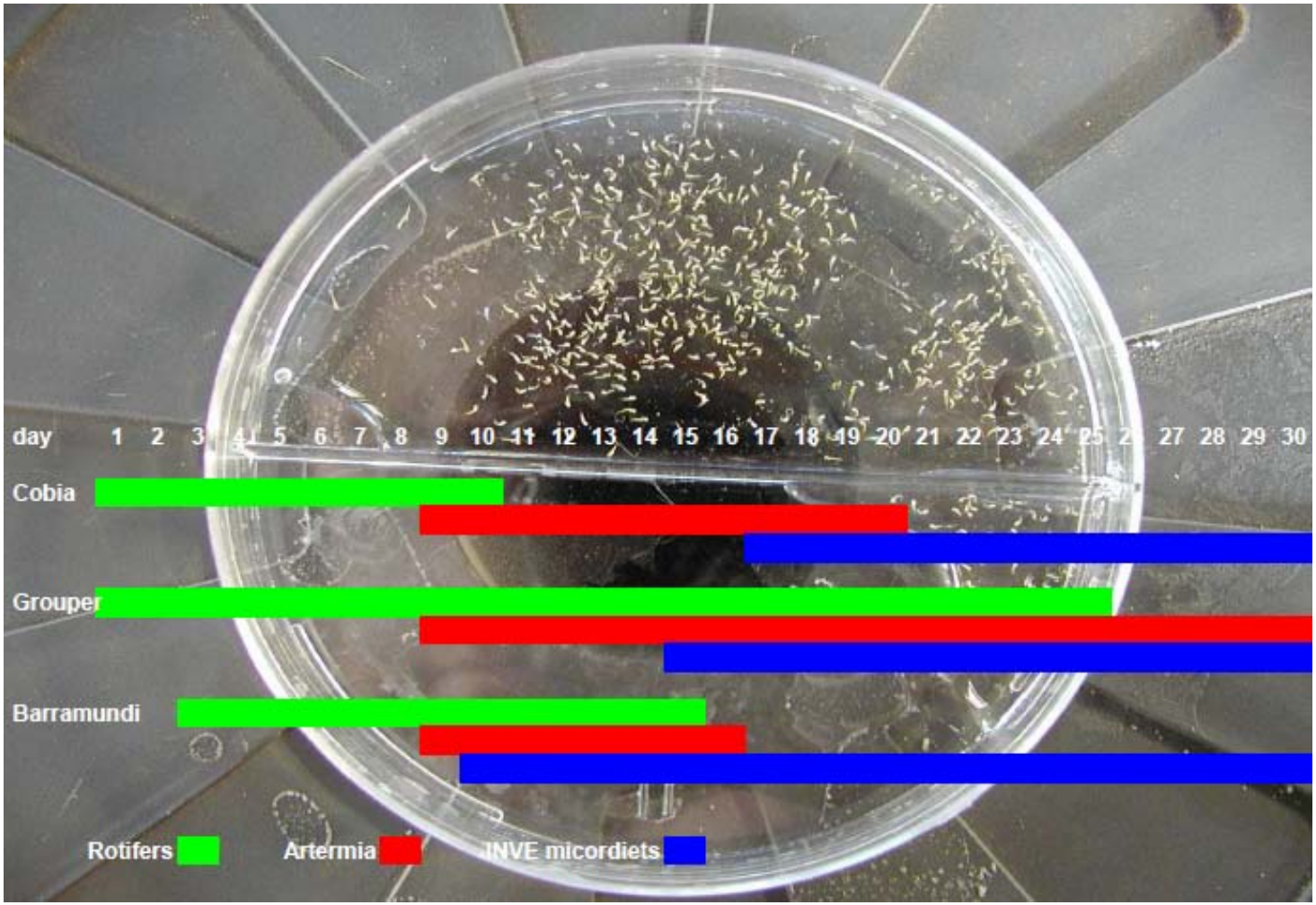
Group A : difficult

Group B : easier

Bottlenecks

- Broodfish and eggs.
- Larval rearing.
- Nutrition – develop plant protein ingredients.
- Diseases and parasites.
- Yield.
- Progress every year.

Hatchery Production



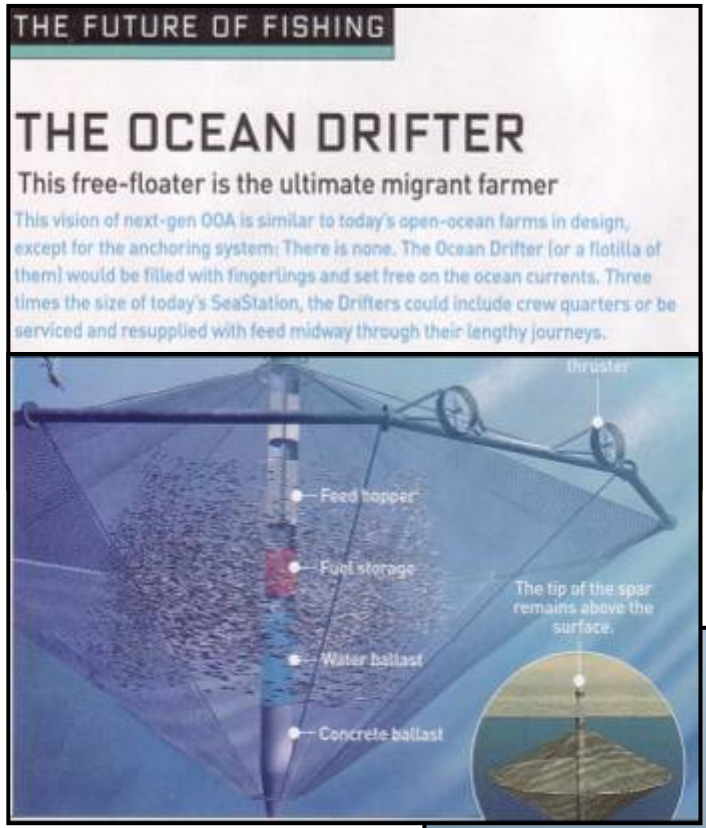
Semi Intensive

Low Investment, Family Unit

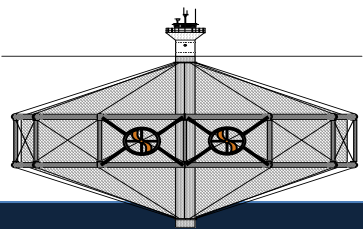
Intensive, High Capital Requirements

Open Ocean Cages, Very High Investment

Aquapod - Ocean Drifter (O.F.T./MIT)



SeaStation 5400



Why Farming Cobia?

Cobia has all the traits you want in a farmed fish:

- Excellent eating qualities:
  - Grilled, baked, deep fried and as sashimi.
- White flesh.
- Large fillets.
- High in Omega-3.
- Do well in cages.
- Fast growth.
- Year round egg supplies can be developed.
- Efficient production.

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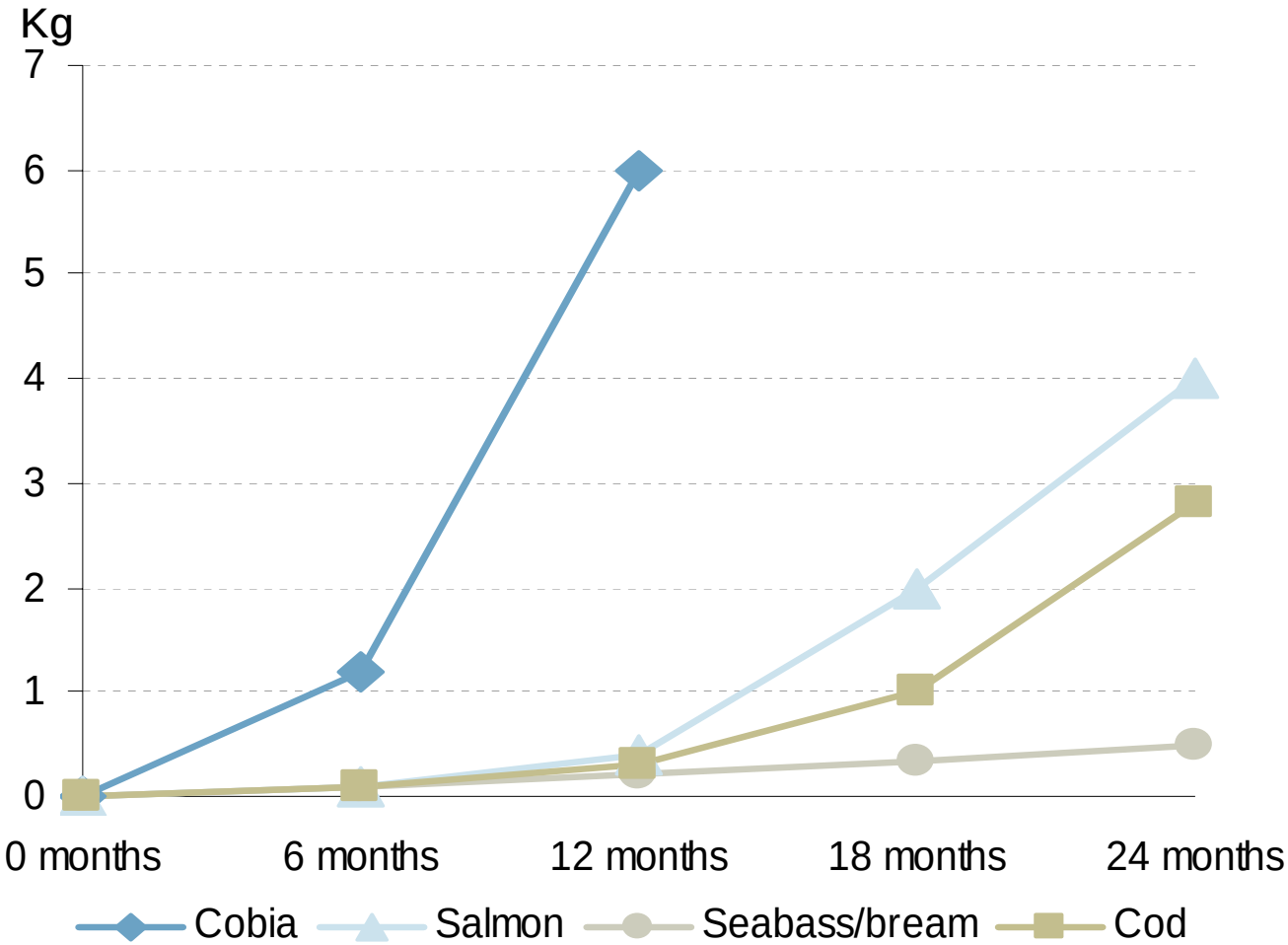
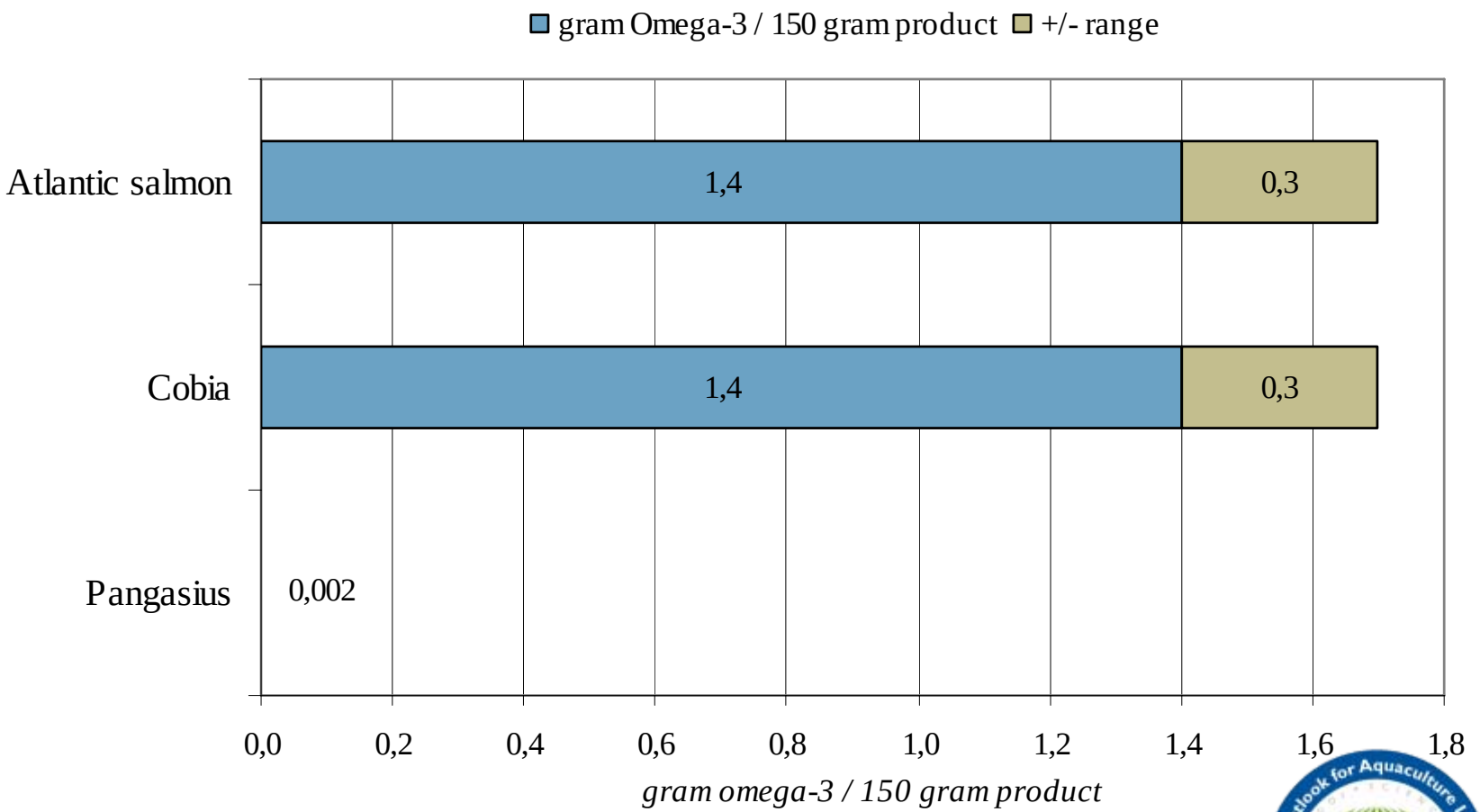
Fast Growth


Kg
7
6
5
4
3
2
1
0
0 months
6 months
12 months
18 months
24 months
Cobia
Salmon
Seabass/bream
Cod

Omega-3 Content:

Salmon and Cobia have 1,000x more Omega-3 than Pangasius



World Production of Farmed Cobia

- Estimated world production (tons) in 2007
  - China 20.000
  - Taiwan 4.000
  - Vietnam 2.000
  - Caribbean 1.000
  - Philippines 500
  - Thailand 500
  - Japan 500
- Total 28.500 tons

Cobia Cuisine

Pan Fried Cobia

Cobia Carbonnata

Cobia Sashimi

Vietnam - Sales

- Infrastructure and cages, nets, etc. for 2000 tons.
- Processing – contract production.
- Marketing:
  - Frozen to Nordic Group, Boston.
  - Fresh to Taiwan and Japan.
  - Fresh to other Asian markets.
  - Frozen to Europe.
- Plan to sell 1500 tons this year.

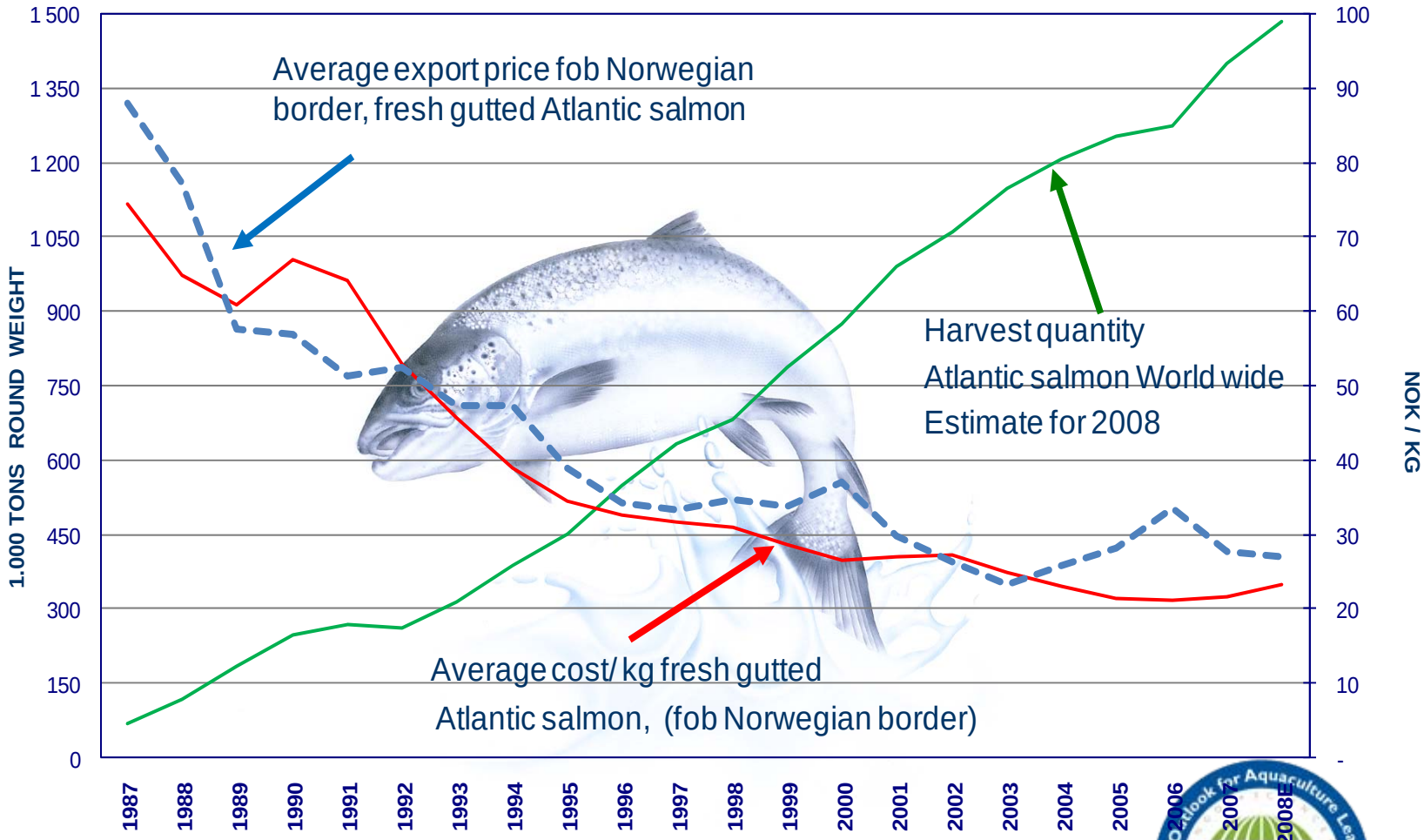
Production Cost for Marine Fish

Feed about 50% of cost

Feed Cost	FCR	Feed Cost	Total Cost
1.40	1.5	2.10	4.20
1.20	1.2	1.44	2.88

Range of cost (USD) for marine fish farmed in cages. Cost round, ex cage.

Development Cost and Market Price (FOB Norwegian border) and World Supply Atlantic Salmon, 1987- 2008E



Adjusted according to consumer index basis 2008 = 100

Source: The Norwegian Seafood Export Council / Kontali

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For marine fish we will see the same developments:

- Better feed – R&D.
- Better fish (genetics).
- Lower costs.
- Higher volume.

Cobia (and tuna) will be winners!