



Omega-3, omega-6 and contaminants in Atlantic salmon

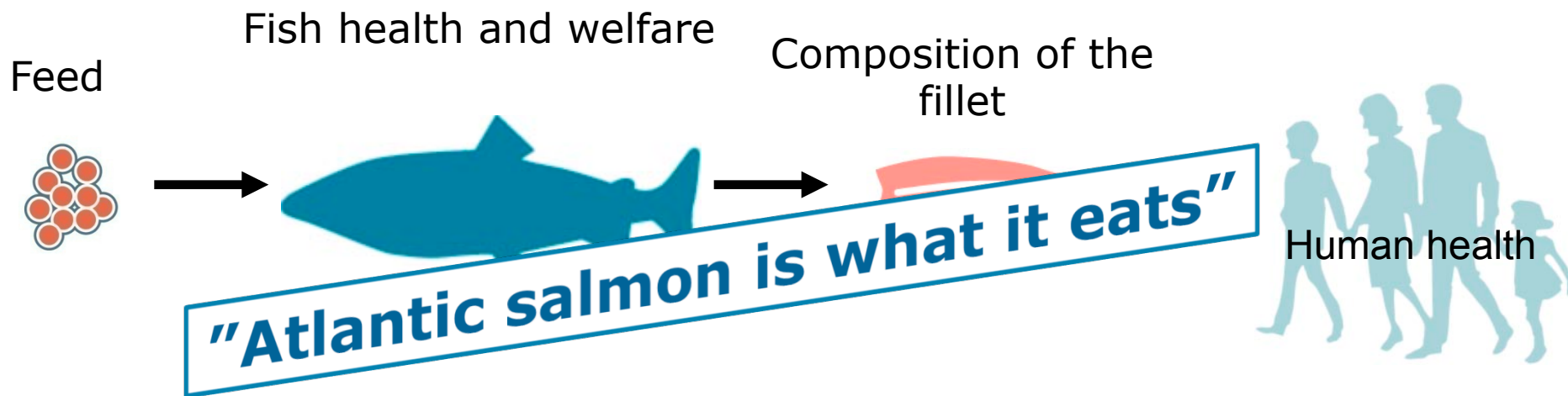
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MIC 2013



Atlantic salmon is changing due to the diet

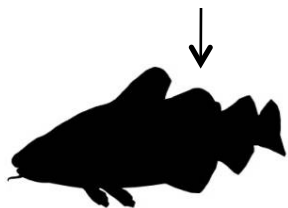


omega-3, omega-6 and marine contaminants

Marine omega-3



Plant plankton



Seafood

EPA and DHA

Plant omega-3



**Alfa-linolenic acid
LNA**

Positive health effects



How much EPA and DHA is required?

Health



Background diet



***Healthy adults and children (2-18 år):
0,25 gram EPA+DHA.***

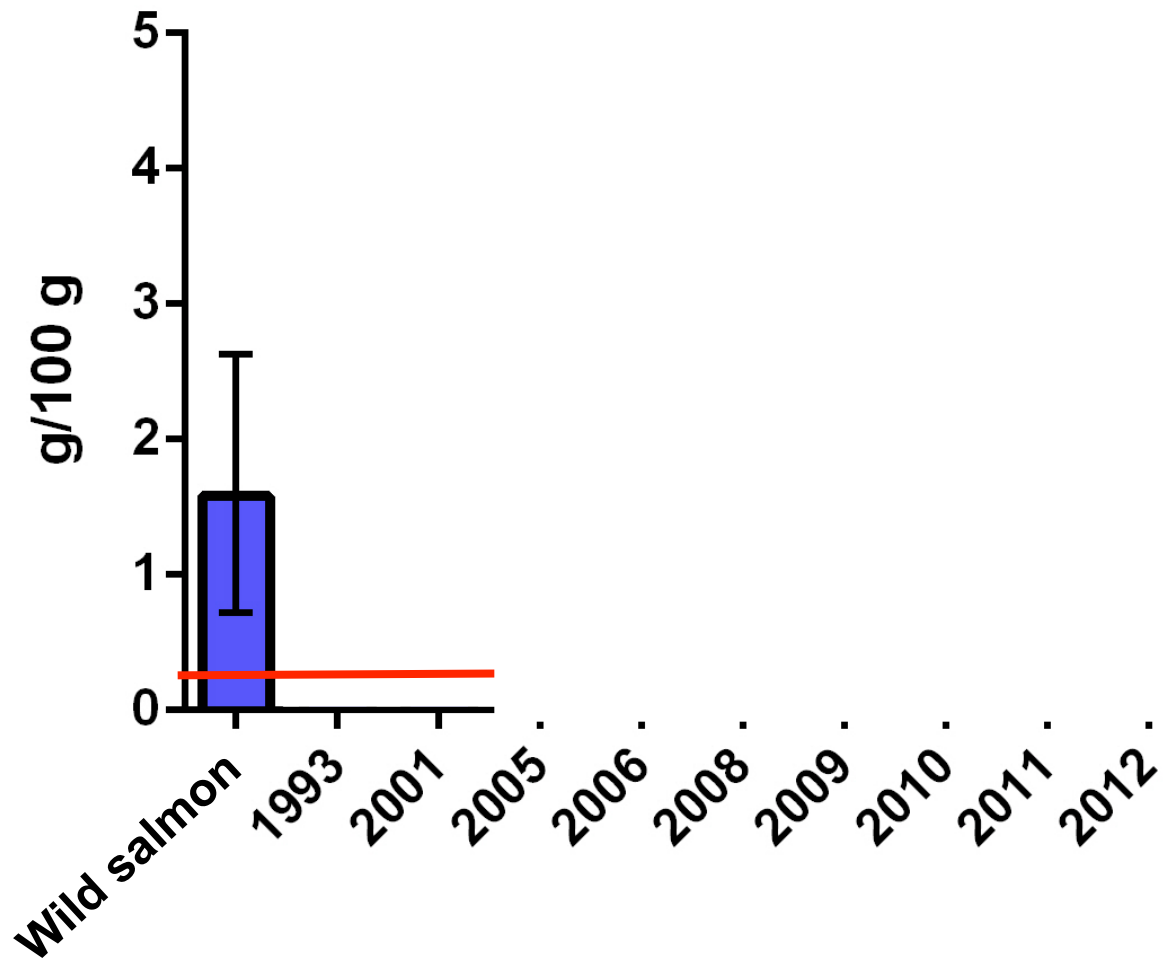
Healthy

Children (6 mnd – 2 years):
0,1 gram (only DHA)

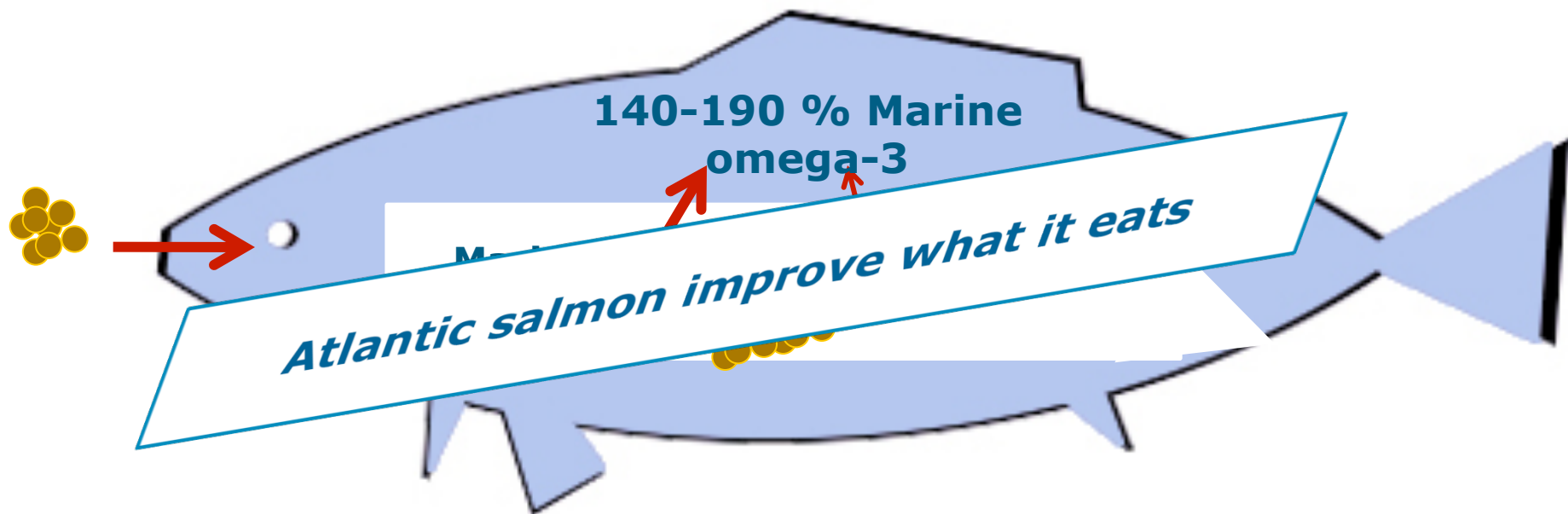
Pregnant and lactating:
0,35-0,45 gram.

**Adult women and men with increased blood pressure and blood
TAG levels:**

To reduce plasma TAG: ca 2-4 g/d
To reduce blood pressure: ca 3 g/d



- 1) Atlantic salmon conserve marine omega-3 in its tissues
- 2) Atlantic salmon **PRODUCE** marine omega-3 from plant omega-3

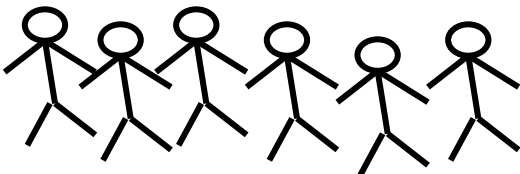


1 kg fish oil with 30% marine omega-3 (300g)



0.05 kg oil with 90% marine omega-3

45 g omega-3

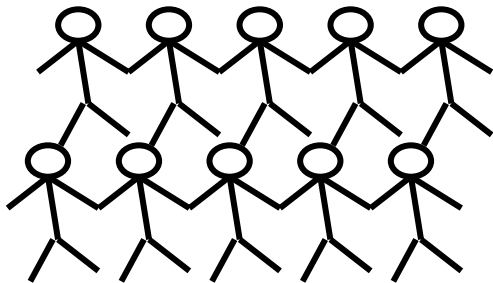


EFSA: 0.250g/day, 1 month



2010 farmed Atlantic salmon fillet

78 g omega-3



96 g omega-3

By products - marine ingredients

Kilde: Ytrestøyl et al, 2011 (Nofima-rapport)

1 kg fish oil with 30% marine omega-3 (300g)

Feed with 0,5% marine omega-3
Calculated using the same model:



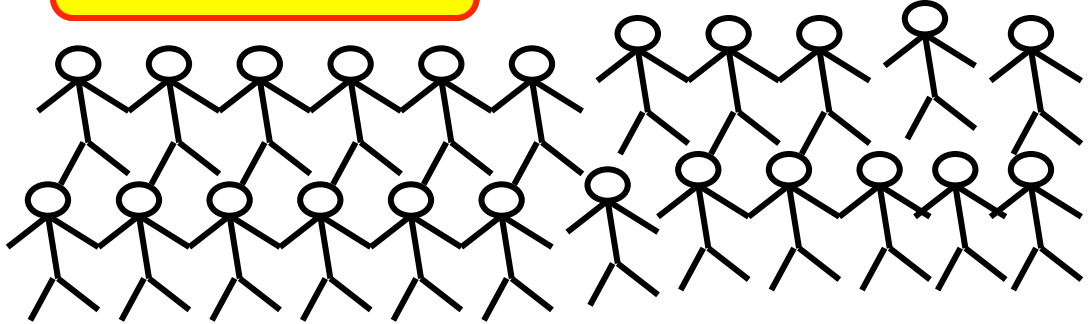
Experimental Atlantic salmon fillet

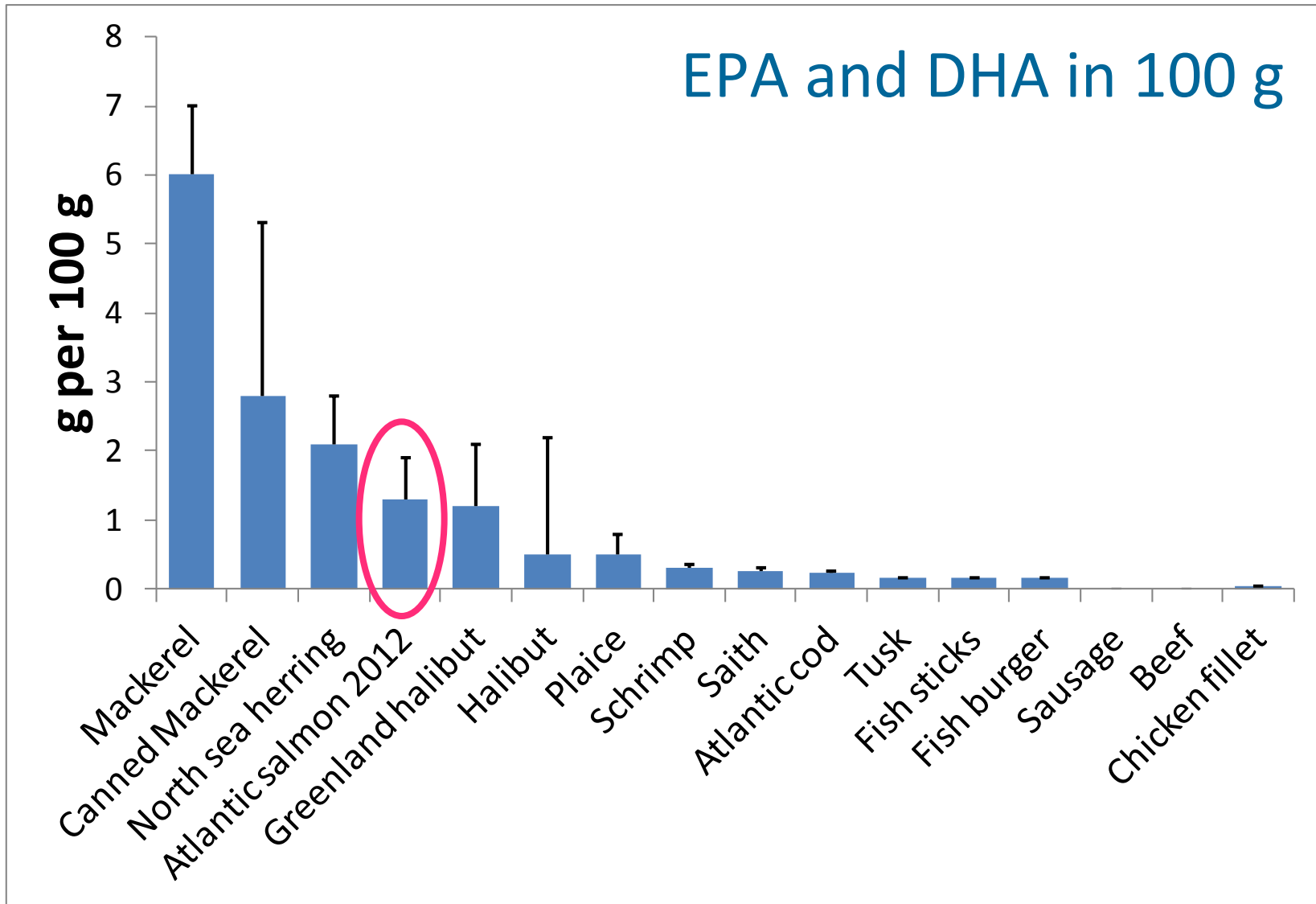
169 g omega-3



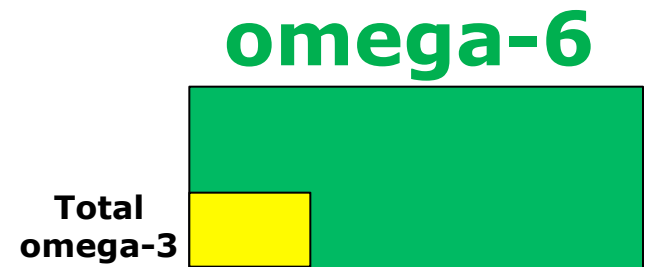
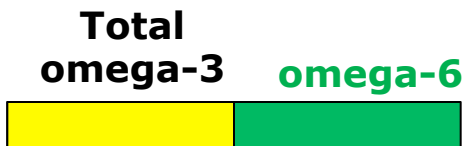
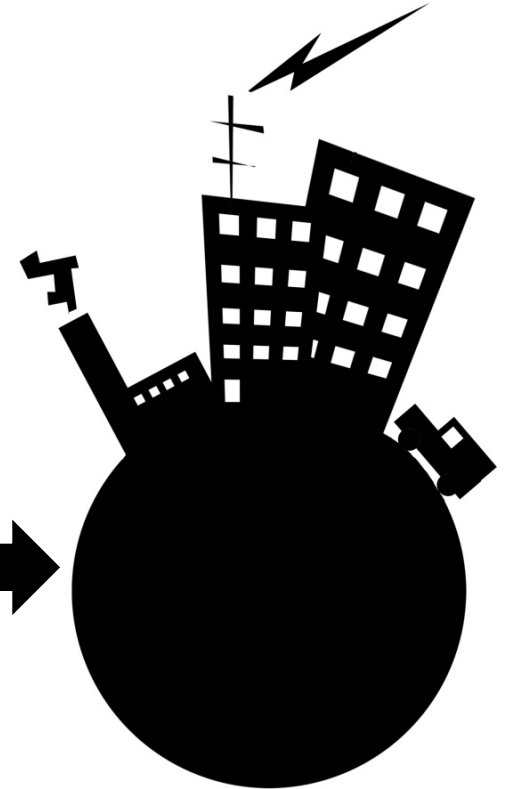
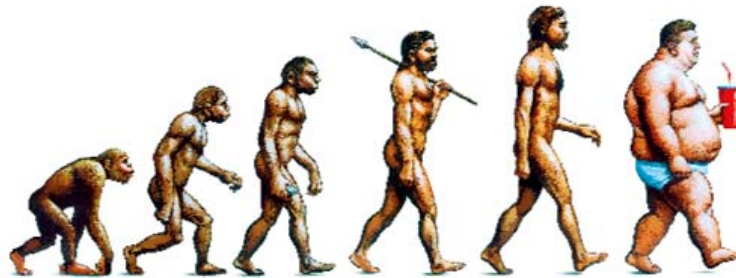
206 g omega-3

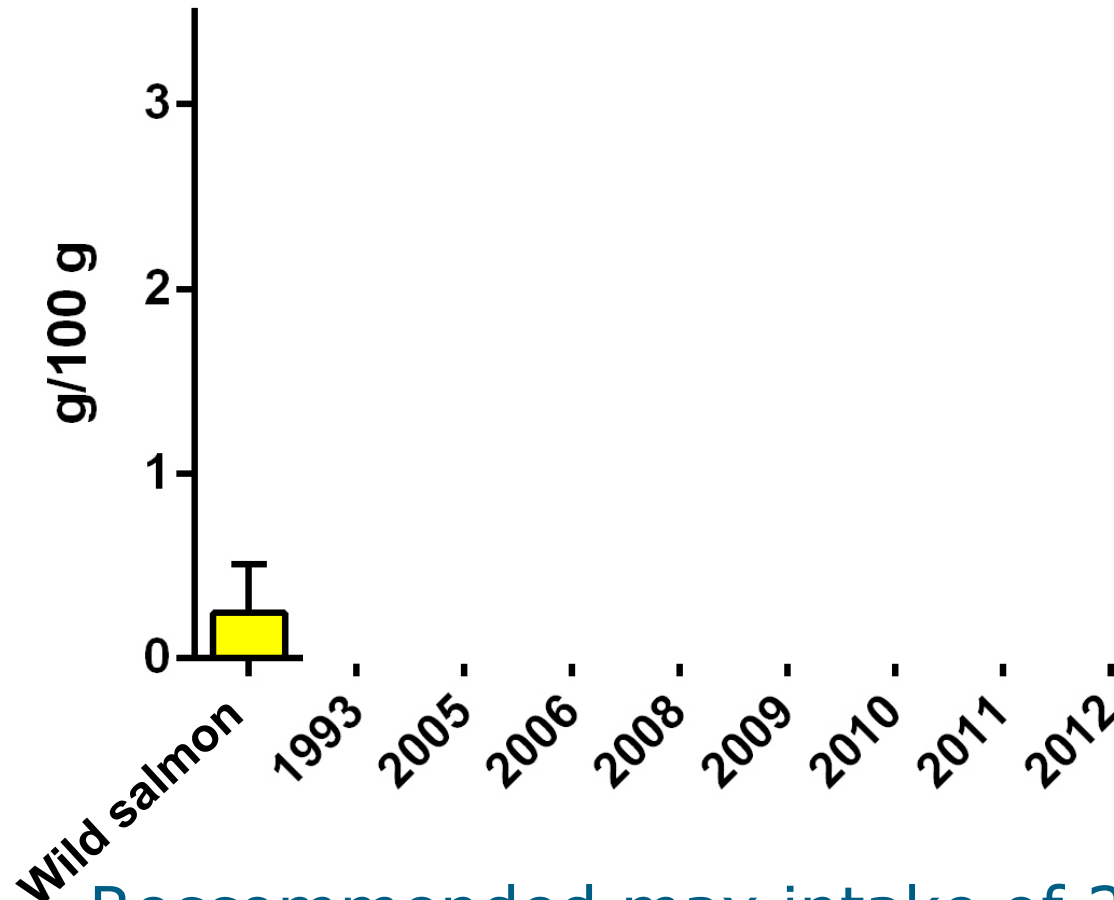
By products for marine ingredients





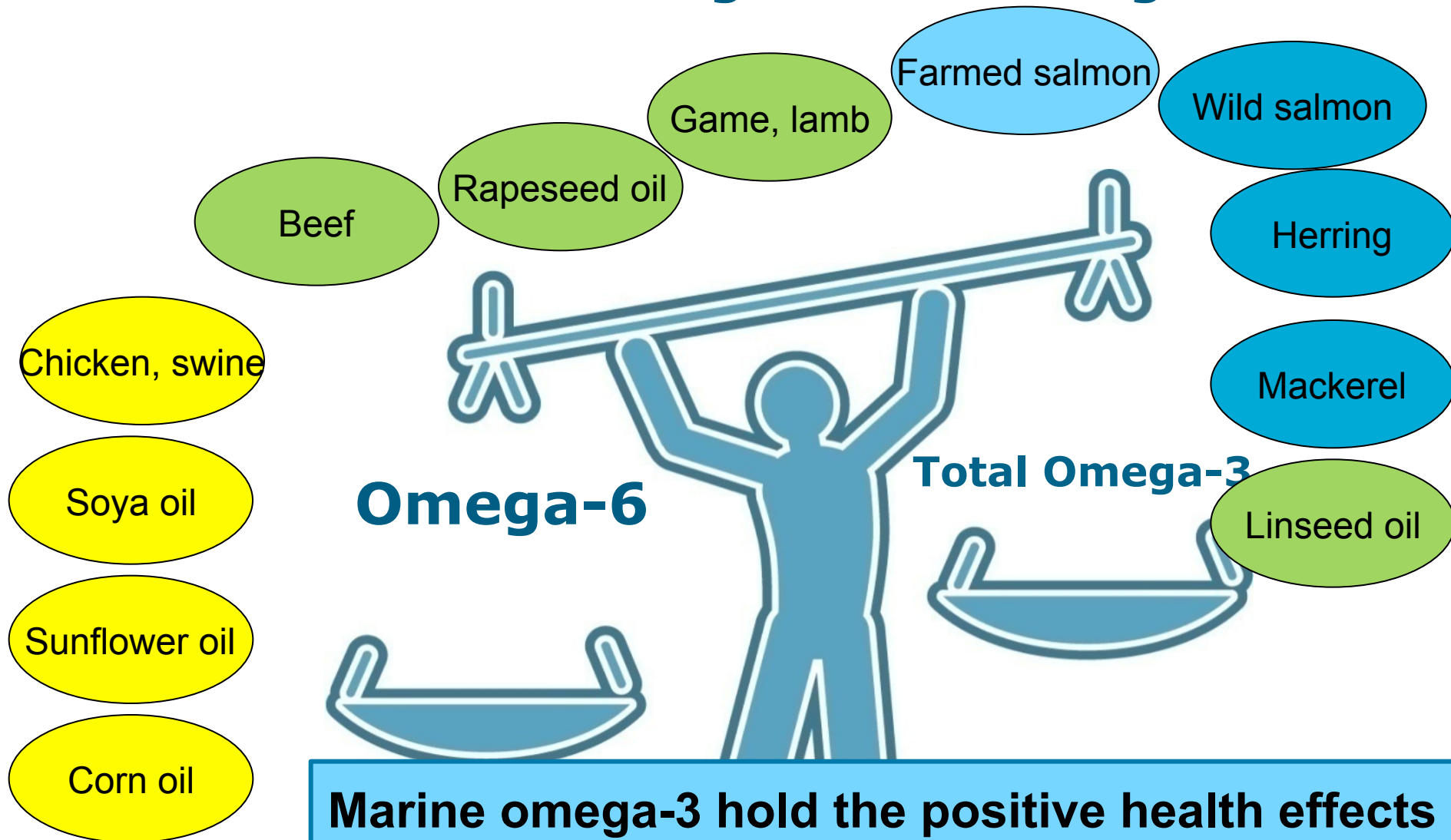
Both society and our diet has changed



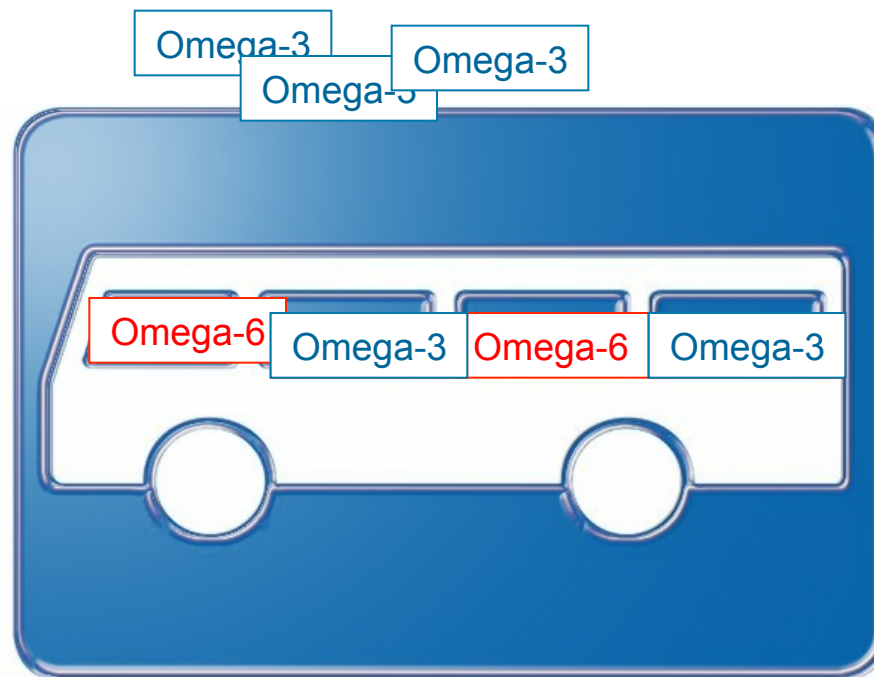


Recommended max intake of 21 g per day
(based on a 2000 kcal diet)

Dietary recommendation: 5 times more omega-6 than omega-3



The content of marine omega-3 in
the tissue
determine the health effects

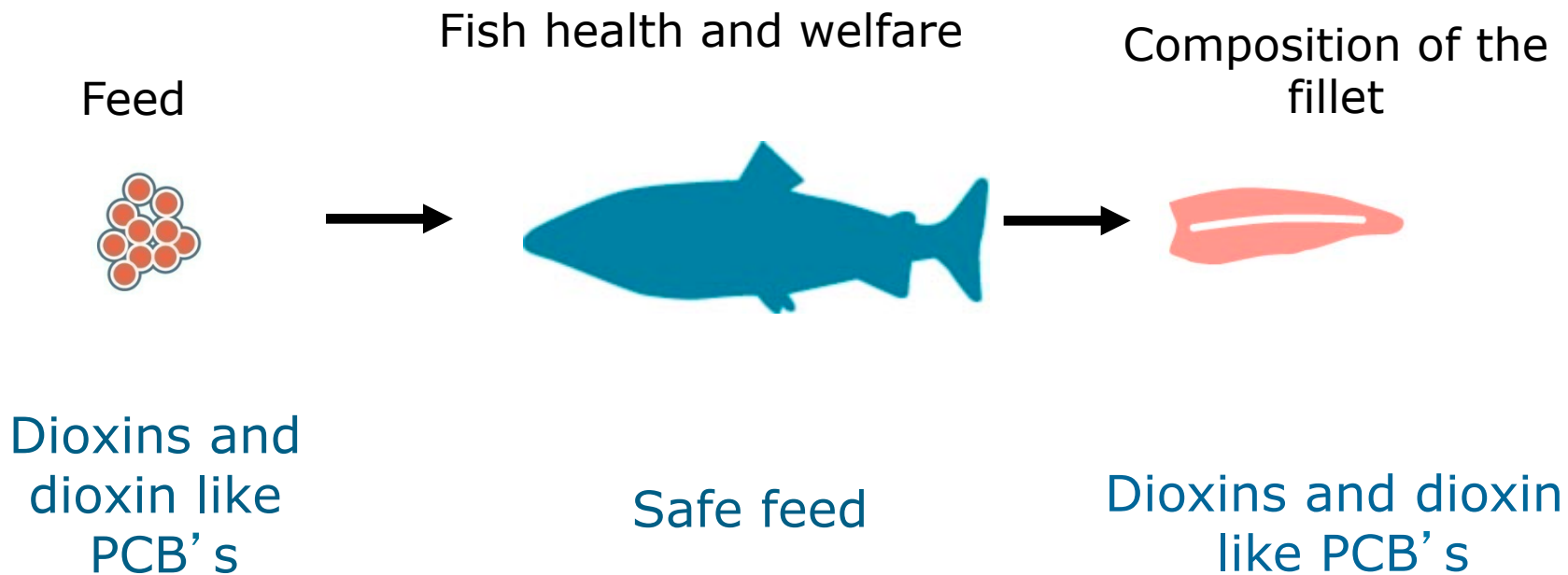


Omega-6 intake affect tissue marine omega-3 content

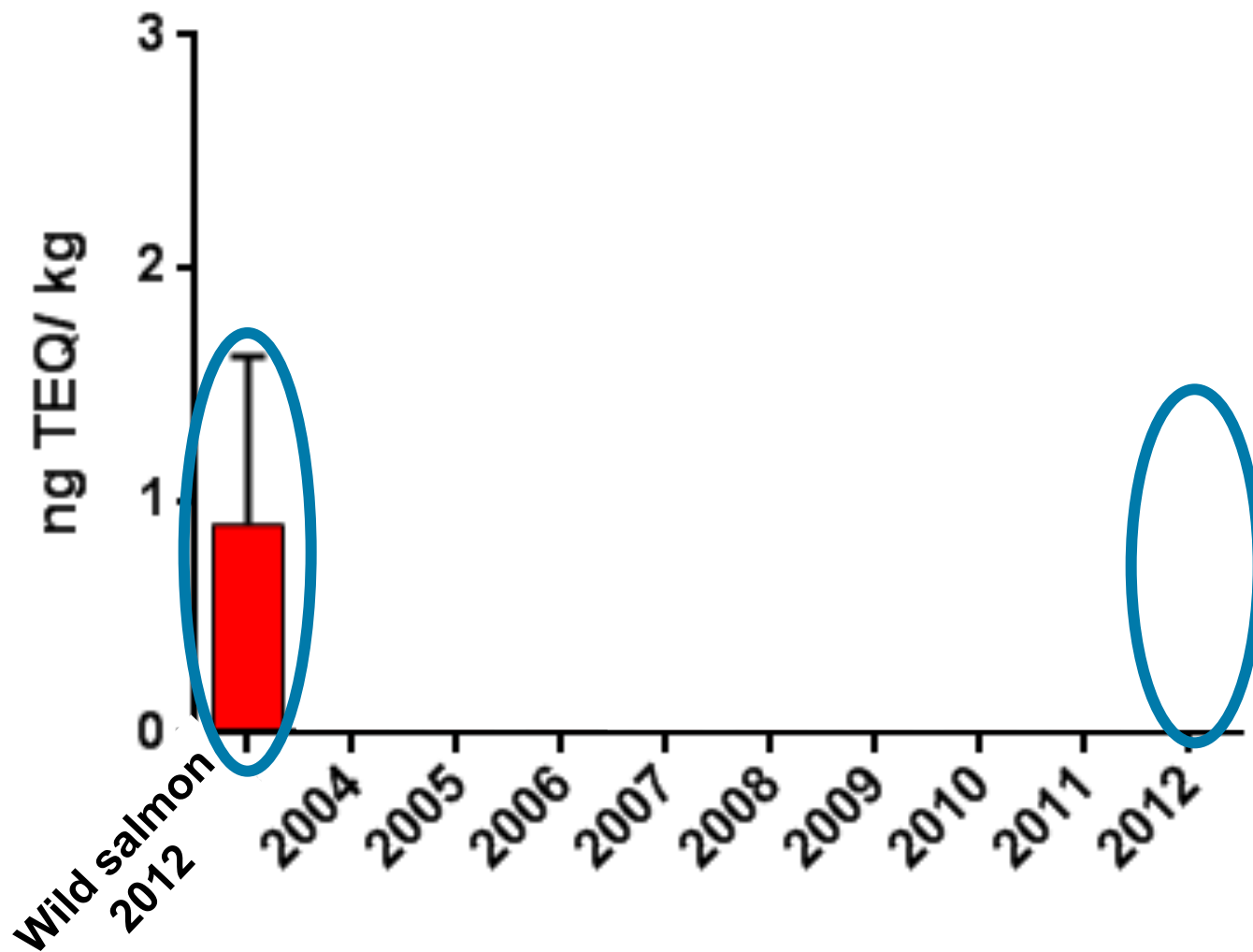
Country	Marine omega-3 intake to achieve the omega-3 index mg/d	Omega-6	Omega-3 index
Philippin			
UK			
USA	2167	+ 8.91	12

The more omega-6 in your diet, the more marine omega-3 is required to obtain the exact same tissue omega-3 content

Marine contaminants

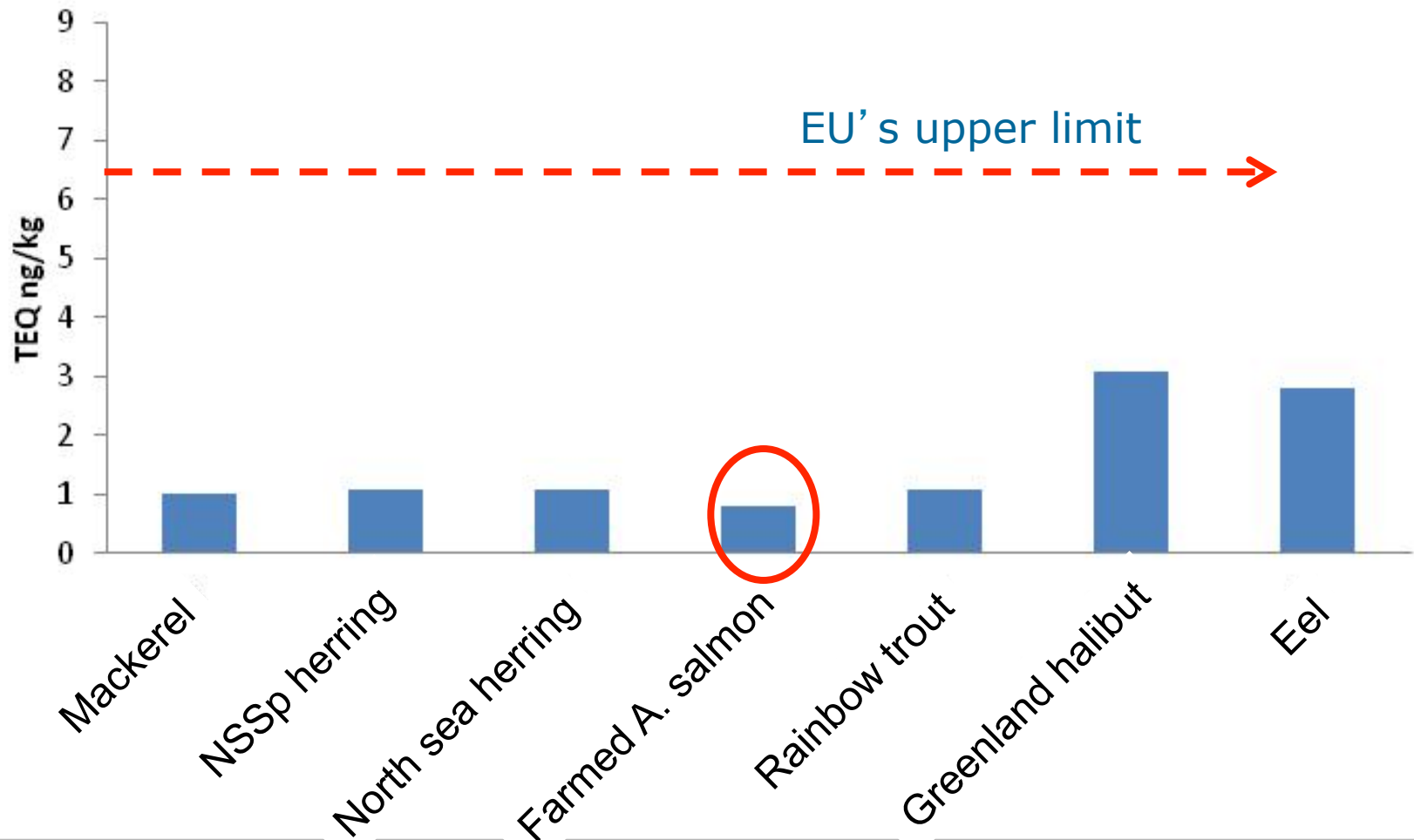


Dioxin and dioxin-like PCB's



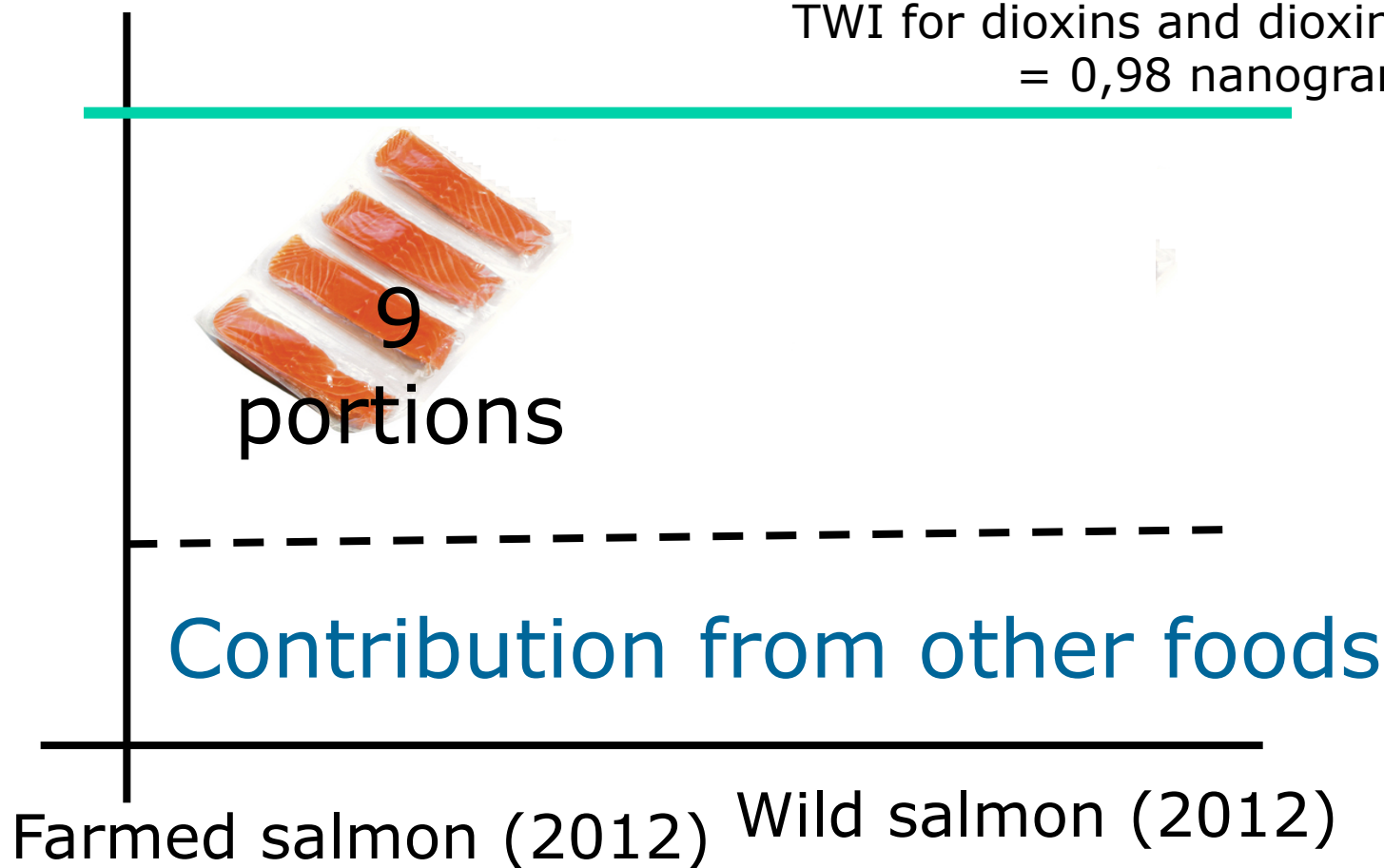
Atlantic salmon compared to other fatty fish

Dioxin and dioxin-like PCB's in fatty fish species
(data from 2006-2011)



Tolerable weekly intake (TWI)

TWI for dioxins and dioxin-like PCB's
= 0,98 nanogram



Farmed salmon is analysed annually for contaminants and other undesirable components

- Illegal substances and drugs



Last update:

Illegal substances: no detections

Drug residues and contaminants: all below upper limits

In accordance with findings since the surveillance started in 2003

- Phosphorous compounds
- Metals (As, Cd, Hg, Pb)

- B3d. Mycotoxins

- B3e. Dyes

- B3f. Other (f.eks. antioxidants, PFAS, PAH)

- Samples are collected at all stages in the production
- Norwegian food authorities collect the samples, NIFES analyse, report and publish the results.

Farmed salmon in development



- A good source of marine omega-3
- Still a limited source of omega-6
- Still contribute to improve the balance between omega-6 and omega-3 in our diet
- Safe food which is carefully monitored

Omega-6 in farmed salmon should not increase further

Thank you



Feed



Fish health and welfare



Composition of the fillet

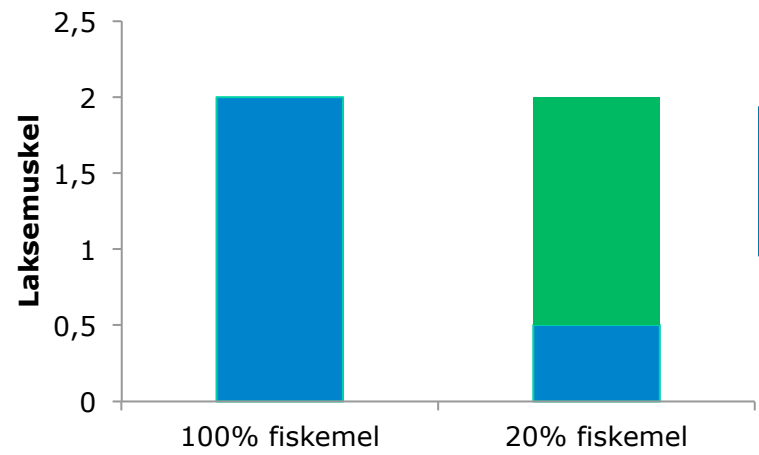


"composition of the fillet DOES NOT reflect the feed"

Cover the nutrient requirements for essential amino acids

Fish muscle protein composition is determined by the genetic code

Protein = amino acids



Net production of marine protein