

Sild eller makrell -er det ett fett?

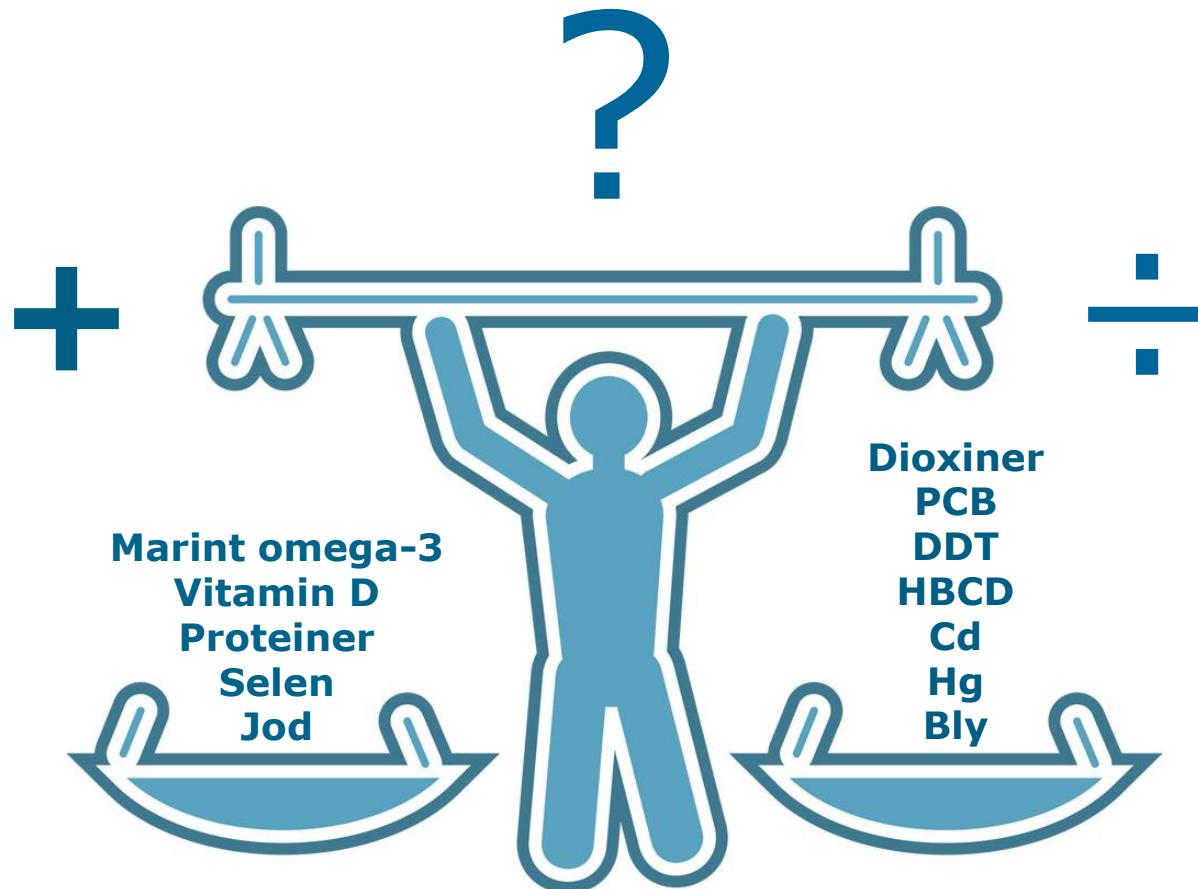


Ingvild Eide Graff
Forskningsssjef
NIFES

Pelagisk samling, Ålesund 4. desember 2012

www.nifes.no

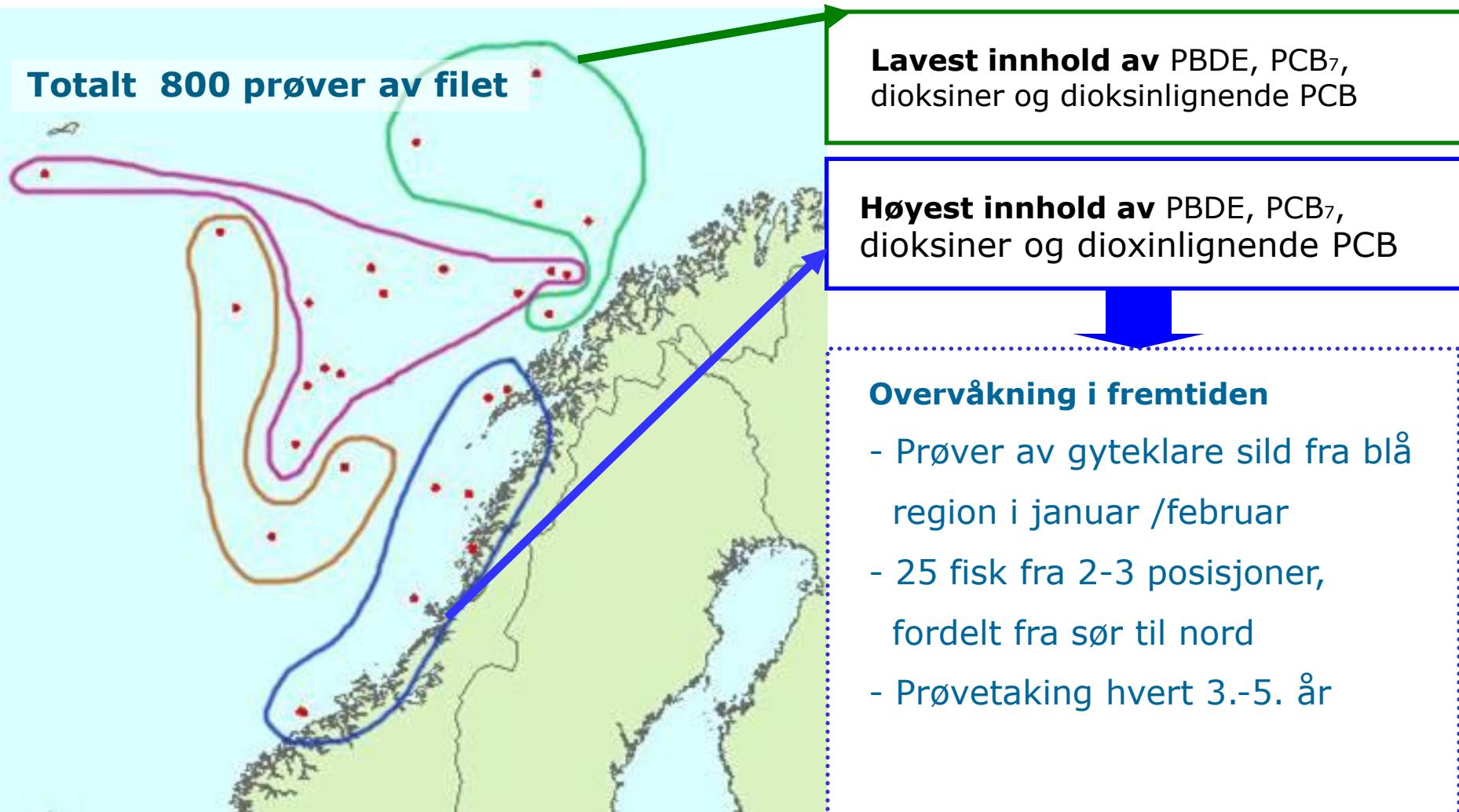
NASJONALT INSTITUTT FOR ERNÆRINGS- OG SJØMATFORSKNING



Hva vet vi om innhold i NVG sild og makrell?

Ingen overskridelser av EUs øvre grenseverdi

- innholdet av miljøgifter varierer med sildens livssyklus



Makrell: Generelt lave nivåer av dioksiner, furaner og dioksinliknende PCB

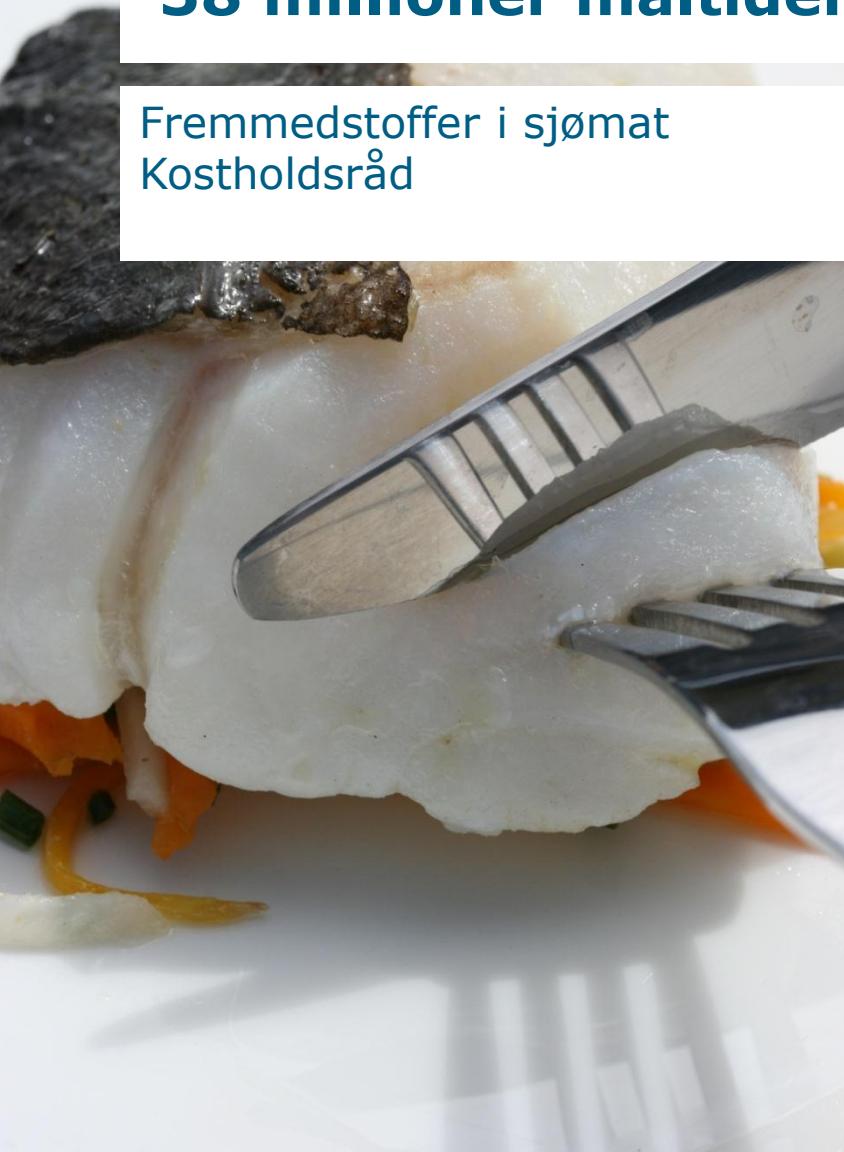
Fremmedstoff	Status 2009
Sum dioksiner	Generelt lave nivåer, høyere i Skagerrak
Sum dioksiner og dioksinliknende PCB	Generelt lave nivåer, Høyere i Skagerrak: 1 fisk overskred EUs øvre grenseverdi



- 850 prøver
- hovedsakelig sentralt i Nordsjøen om høsten (viktigste område og sesong)

38 millioner måltider norsk sjømat hver dag

Fremmedstoffer i sjømat
Kostholdsråd



Hvorfor skal vi da
spise sjømat?

Det er sjømat vi spiser!

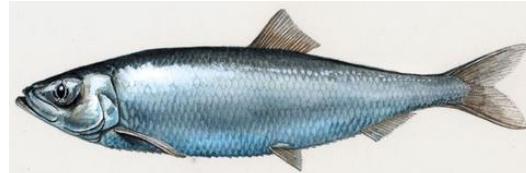


Hva med næringsstoffene?

Har noe data på næringsstoffer i sjømat, men få og gamle tall.

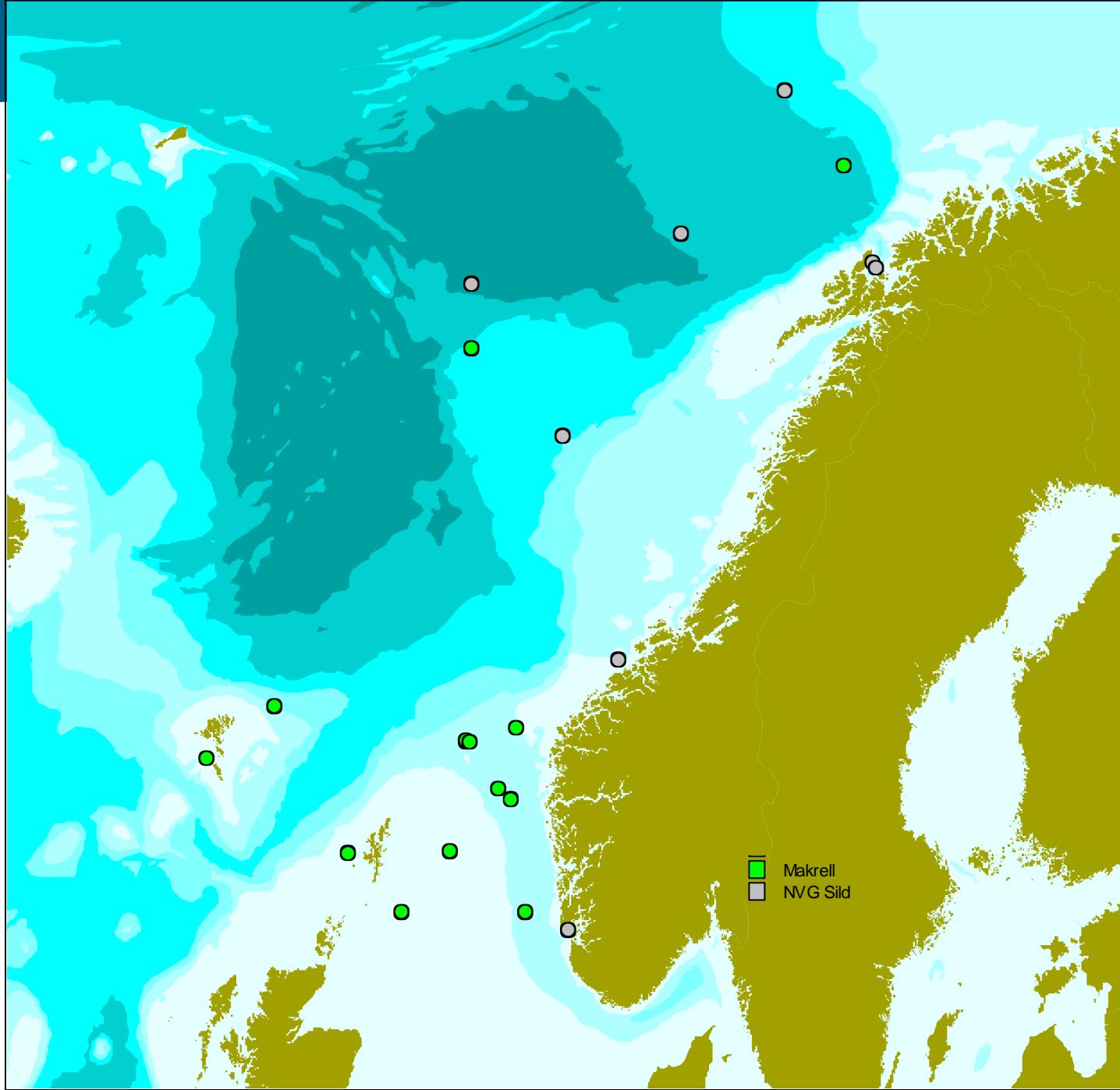
FHF-prosjekt #900663: Næringsstoff sild og makrell

- 200 NVG sild
- 200 Stillehavssild



- 350 Nord-østatlantisk makrell
- 200 Japansk makrell





Status norske farvann

Art	Tidspunkt	Antall	Har mottatt	Har analysert	Gjenstår
NVG sild	Sept 2011	1 (25 fisk)	OK	X	
	Okt-Des 2011	3 (75 fisk)	OK	X	
	Jan-Feb 2012	3 (75 fisk)	OK	X	
	Mars 2012	1 (25 fisk)	OK		X
Makrell	Juli-Aug 2011	2 (50 fisk)	OK	X	
	Sept-Nov 2011	10 (250 fisk)	OK	X	
	Mai-Juni 2012	2 (50 fisk)	OK		X (syngeri med nytt prosjekt)

Stillehavssartene: prøveinnsamling pågår.

**Fett (totalt fettinnhold)
Fettklasser (fosfolipider)
Fettsyrer (for eksempel EPA og
DHA)
Vitamin D**

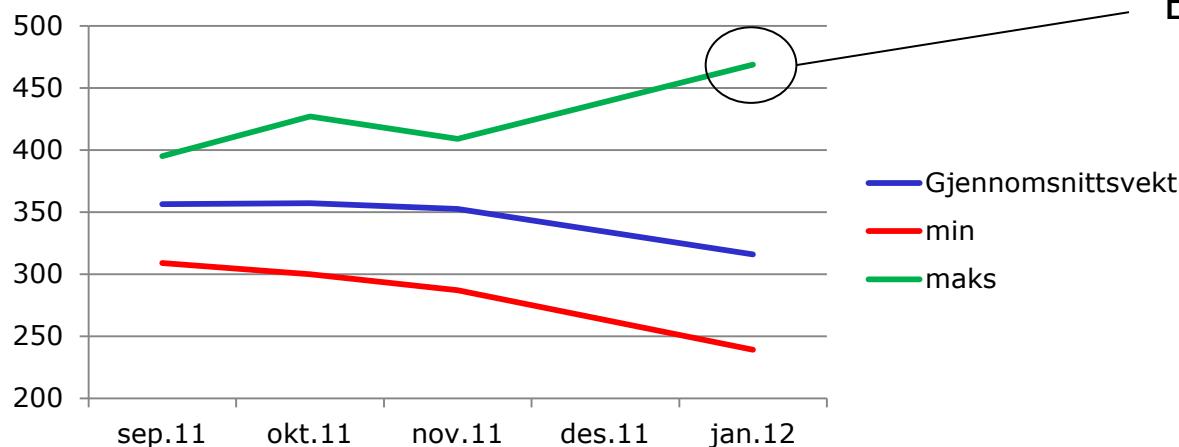


Foto: NIFES

Vekt gjennom sesongen

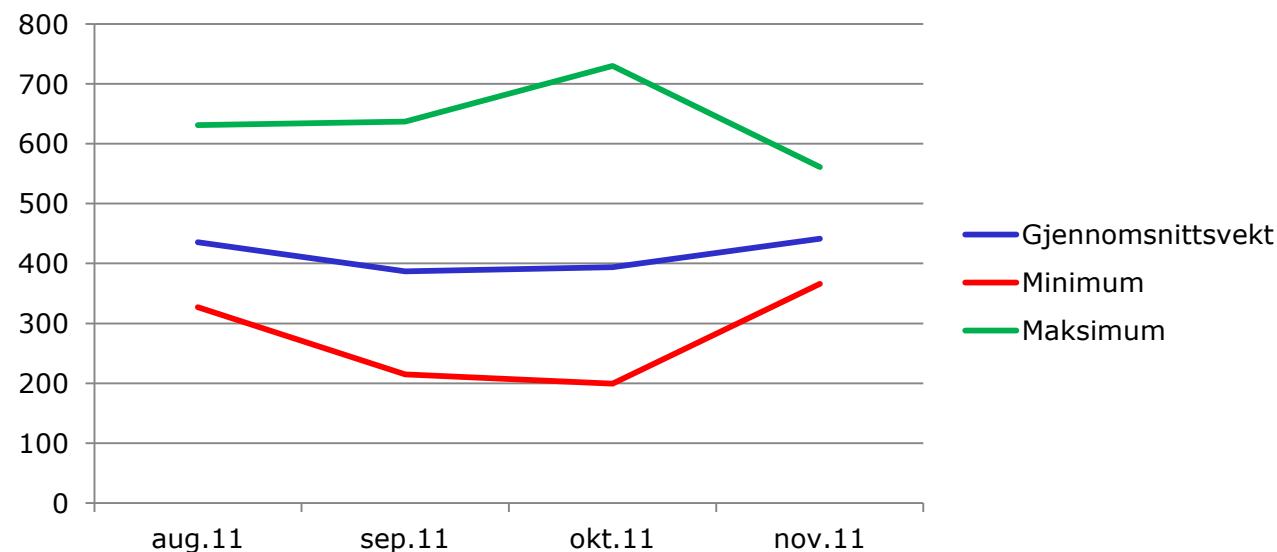
N I F E S

NVG Sild



Ett unntak på 469g

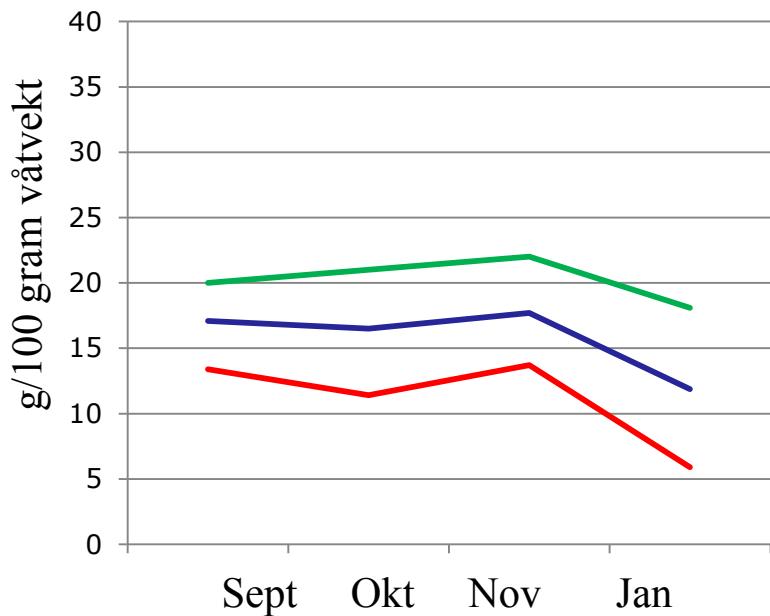
Makrell



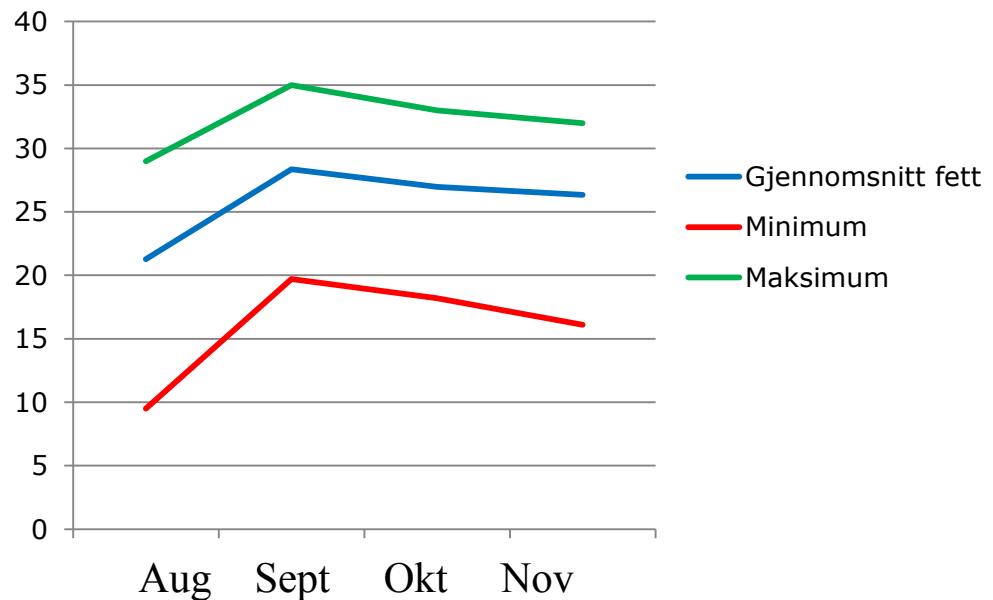
Fett i sild og makrell

N I F E S

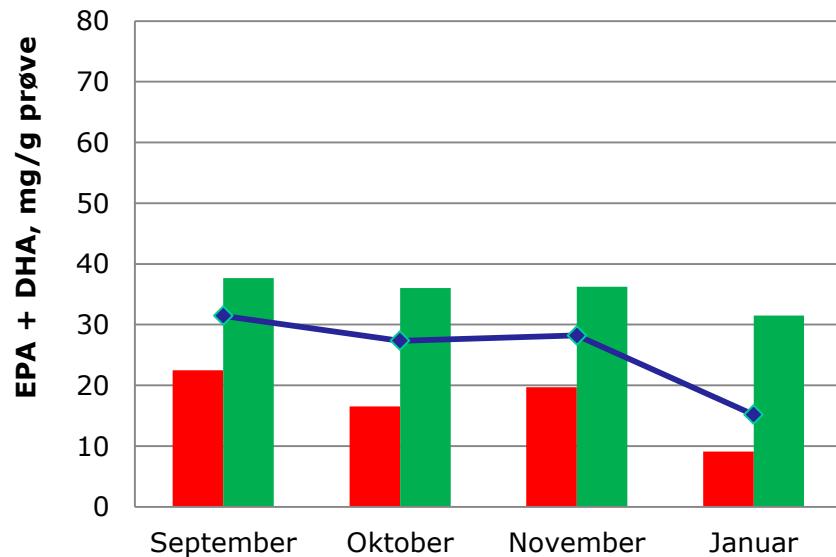
SILD



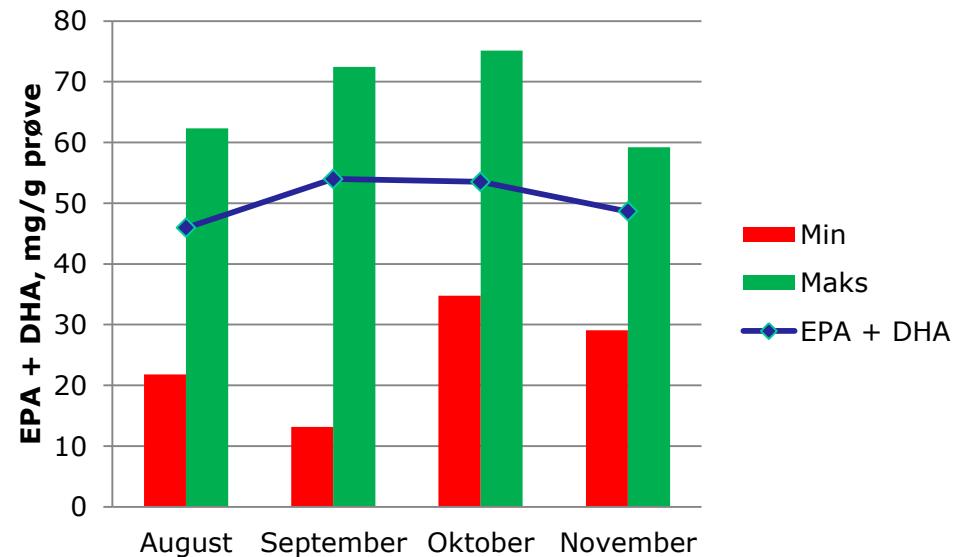
MAKRELL



NVG Sild

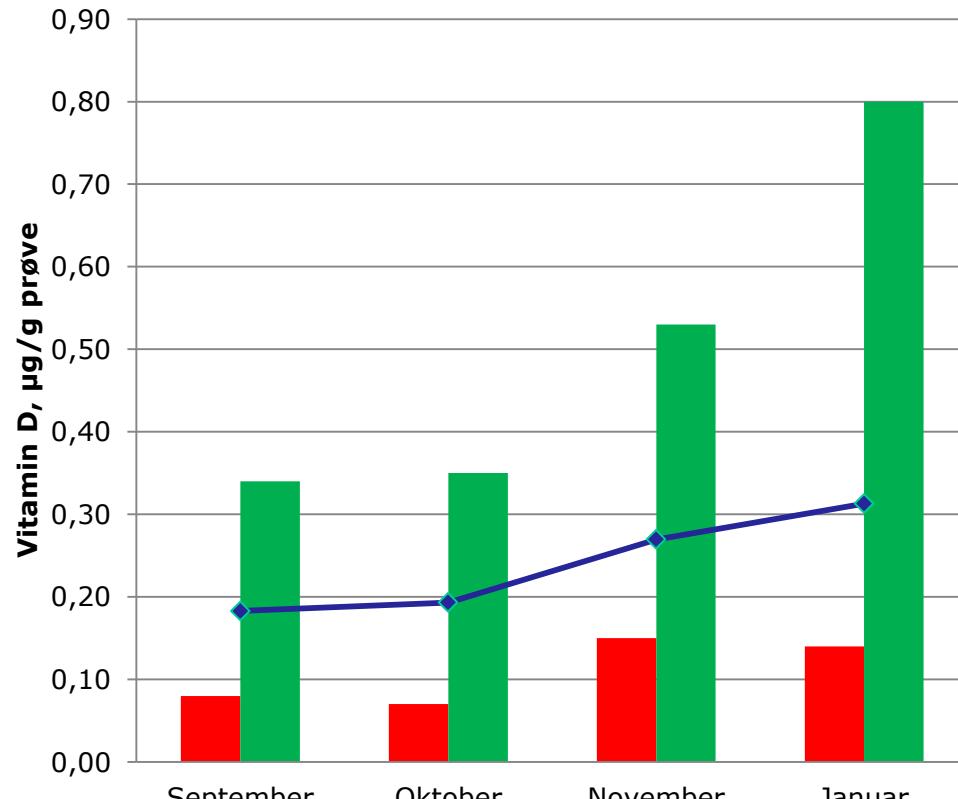


Makrell

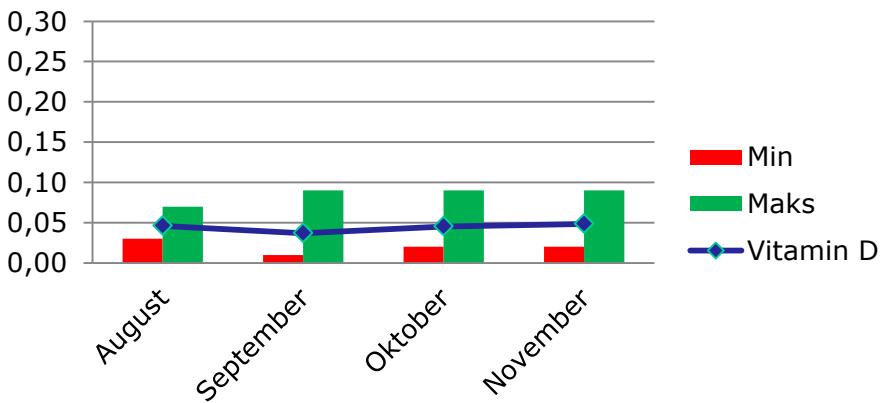


- Sild og makrell er svært gode kilder til marint omega-3
- Innholdet er høyest i makrell
- Laks: ca 21 mg EPA + DHA pr gram

NVG Sild

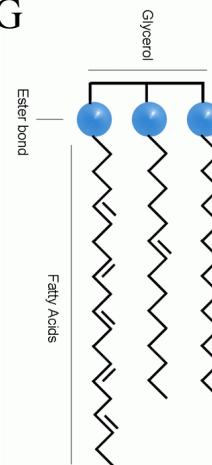
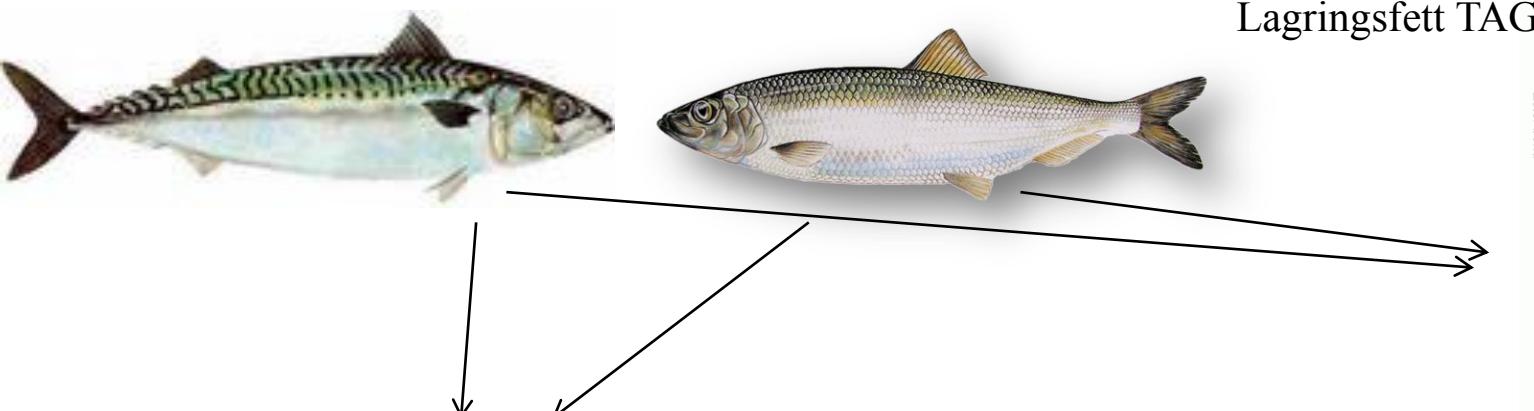


Makrell

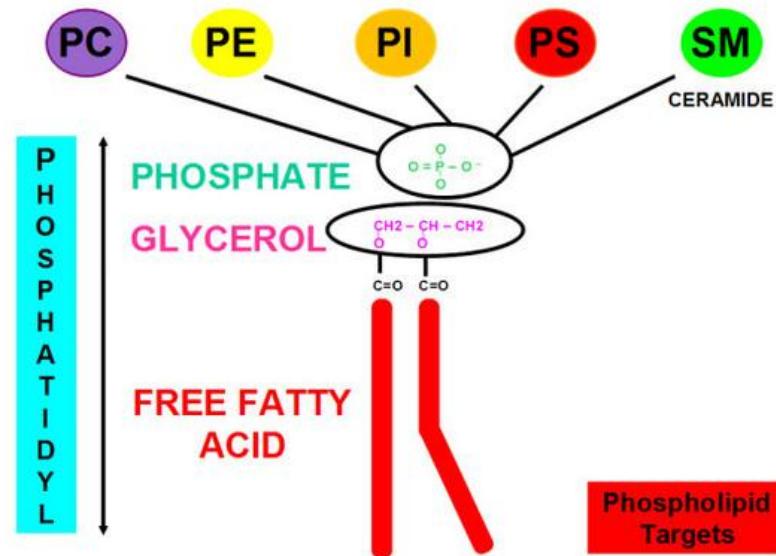
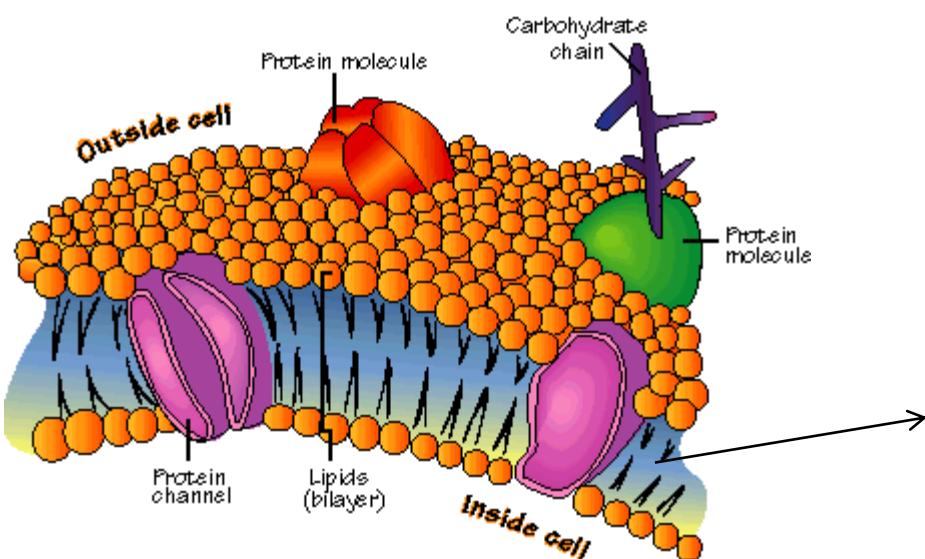


- Sild og makrell inneholder vitamin D gjennom fangstsesongen
- Innholdet er mye høyere i sild enn i makrell

Fosfolipider



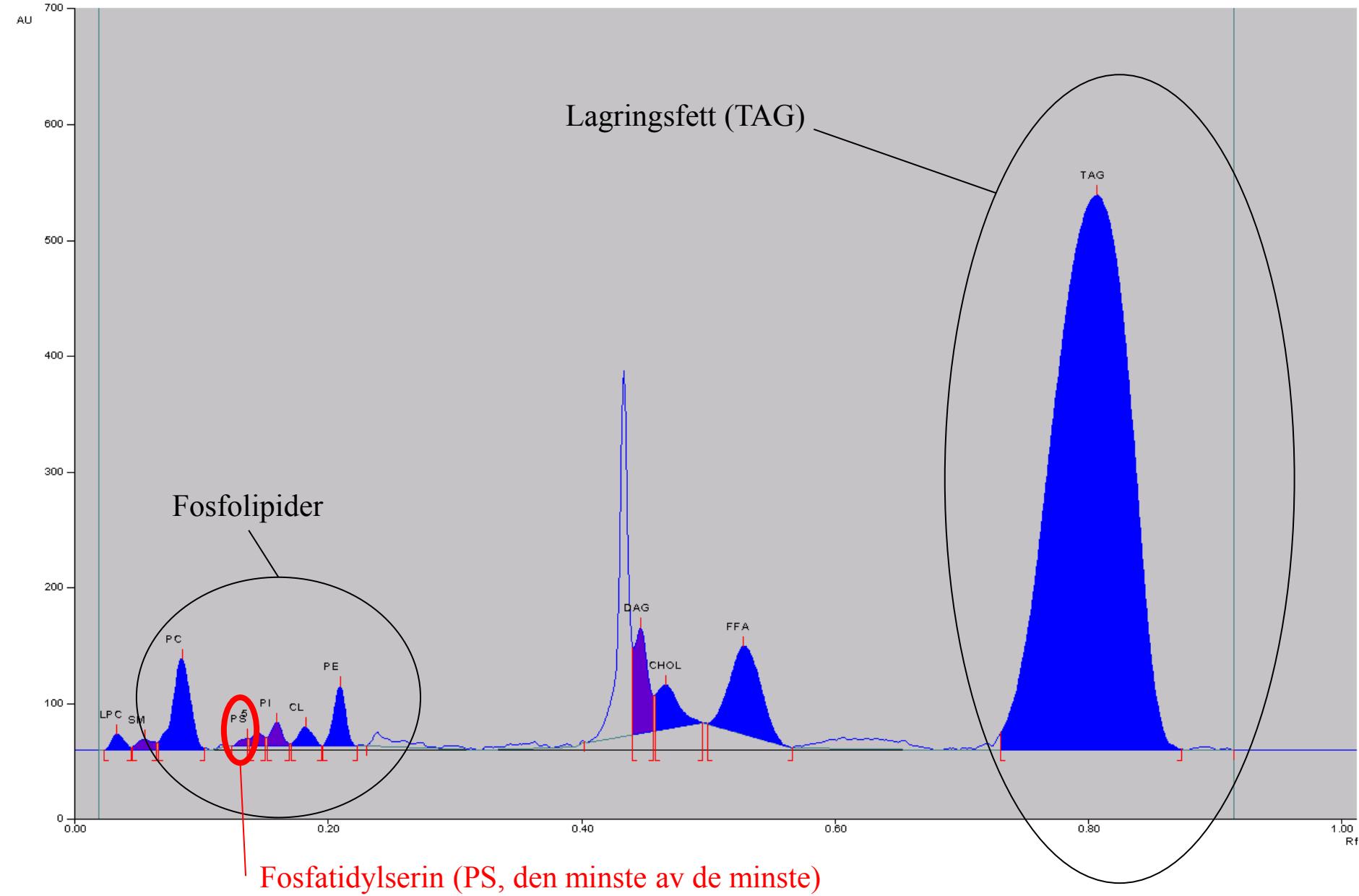
Cellemembran



Fosfolipider makrell (sild veldig likt)

N I F E S

Track 19, ID: 19



Fettklasser i prøver fra prosjektet

N I F E S

SILD –alle prøver
analysert
(mg lipid/g prøve)

	LPC	SM	PC	PS	PI	CL	PE	DAG	CHOL	FFA	TAG
Gjennom-snitt	639	51	648	< 15	180	42	165	147	66	388	11 757
Minimum	497	36	490		141	13	76	54	54	205	3 472
Maksimum	806	72	877		206	77	260	216	83	458	15 804

MAKRELL –analysert
fem fisk pr lokalitet
(mg lipid/g prøve)

	LPC	SM	PC	PS	PI	CL	PE	DAG	CHOL	FFA	TAG
Gjennom-snitt	354	27	541	<15	38	0	107	242	156	619	23 327
Minimum	213	13	446		9	0	59	202	95	437	17 910
Maksimum	637	48	691		121	4	211	303	244	825	28 063

Fosfolipider fra tysk kilde

Here is what the German lab is saying in terms of Phospholipids:

PHOSPHOLIPIDS: Herring

TOTAL PHOSPHOLIPIDS	mg	2580 mg/MJ
PHOSPHATIDYLCHOLINE	mg	1380 mg/MJ
PHOSPHATIDYLETHANOLAMINE	mg	686 mg/MJ
PHOSPHATIDYLSERINE	mg	360 mg/MJ
SPHINGOMYELIN	mg	115 mg/MJ

??

PHOSPHOLIPIDS: Mackerel

TOTAL PHOSPHOLIPIDS	mg	2870 mg/MJ
PHOSPHATIDYLCHOLINE	mg	443 mg/MJ
PHOSPHATIDYLETHANOLAMINE	mg	1380 mg/MJ
PHOSPHATIDYLSERINE	mg	480 mg/MJ
SPHINGOMYELIN	mg	572 mg/MJ

??

Rådata?
Fosfatidylinositol?

Dear Mrs. Graff,

thanks for your mail concerning phospholipids in fish. First of all I have to correct a **misunderstanding**. The dimension unit used to cite the data from our nutrition tables is wrong. The data refer to **mg/100g edible portion** **not to mg/MJ!!!**

Furthermore you should know that the Deutsche Forschungsanstalt für Lebensmittelchemie (DFA) in Freising is indeed the editor of the Souci Fachmann Kraut Nutrition Tables but **we don't analyse the data by ourselves**.

Staatl. geprüfte Lebensmittelchemikerin
Deutsche Forschungsanstalt für Lebensmittelchemie
Lise-Meitner-Str. 34
85354 Freising

Average data given per 100g edible portion:

	Herring	Mackerel	Cod	Trout
Total fat (g)	17,8	11,9	0,69	2,73
Total Phospholipids (mg)	2580	2870	564	330
Phosphatidylcholine (mg)	1380	443	389	220
Phosphatidylethanolamine (mg)	686	1380	107	70
Phosphatidylserine (mg)	360	480	28	14
Sphingomyelin (mg)	115	572		6
Phosphatidylinositol (mg)				6

Kjente ikke til fosfatidylinositol (vanligvis større enn fosfatidylserine)

Dear Ingvild,

Thanks for your mail giving more information to me what you are searching for. It's not possible to list all the papers we have used to collect our datas. But at least one of it is free available in the net. The link is:

Technical & The Phospholipid Content of Foods 1 - SpringerLink

www.springerlink.com/index/PPKN825255085440.pdf

by JL Weihrauch - 1983

Technical

*The Phospholipid Content of Food¹

JOHN L. WEIHRAUCH² and YOUNG-SUN SON³

ABSTRACT

The content of total lipids and total phospholipids in ca. 140 foods was compiled from requests for data by researchers in many countries to fill the apparent need for a relatively up-to-date compilation of recent data. Eggs, organ meats, brain, and fish were the best sources. Cereal grains and oilseeds are good sources of phosphatidylserine, especially the choline phosphatides: phosphatidylcholine, lecithin, and lysophosphatidylcholine. Roots and tubers are, with few exceptions, poor dietary sources of total lipids and phospholipids. Tissues in which the phospholipids perform similar functions also have similar relative phospholipid distributions. Data were tabulated by food group in separate tables with appropriate discussion. The use of conversion factors for calculating the total and individual phospholipids, sources of error, and research needs are discussed.

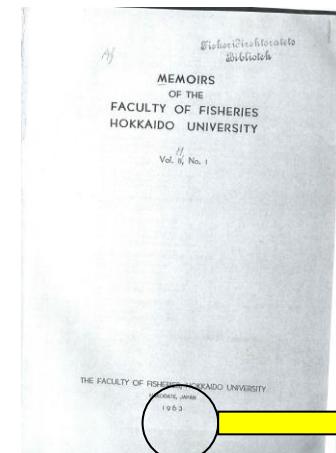
from more complete analyses were selected for this compilation. No foods to which commercial lecithin was added were included.

UNITS AND CONVERSIONS

Consistent with other food composition tables from this agency we report total lipids in g/100 g of food and the phospholipids in mg/100 g of food. Data originally reported on the dry basis were converted to the wet weight basis. Moisture values were taken from Agriculture Handbook No. 8 (3) when they were not given in the reference. Likewise, we reported total lipids from Agriculture Handbook No. 8 when no data were given.

Data that were reported as mole percent were converted to weight percent by first calculating the molecular weight

Ny referanse til bok fra 1963!



1963!

Tabeller fra boken, makrell

Table 43. Lipid Content of the Body Tissues of Mackerel (II)
 (Indicated by Values in mg per 100g of Fresh Tissue)

Japansk makrell!

Tissue	Ordinary muscle		Dark-colored muscle		Liver		
	♂	♀	♂	♀	♂	♀	
Sex							
Total Lipid	g	1.996	1.814	10.138	10.543	5.781	4.967
Lecithin	mg	151.7	239.6	110.5	774.1	414.7	371.9
Phosphatidylethanolamine	mg	257.8	183.1	1441.7	1308.5	1413.0	643.3
Phosphatidylserine	mg	96.0	75.4	624.5	334.5	368.8	176.0
Sphingomyelin	mg	289.8	158.6	150.9	994.3	296.3	889.7
Cerebroside	mg	24.4	58.5	274.5	614.6	426.3	1241.5
Total Phospholipids	mg	795.1	656.7	2327.6	2410.4	2491.8	2080.9
Total Conjugated Lipids	mg	819.7	715.2	2602.1	4026.6	2918.1	3322.4
Neutral Fat	mg	1176.3	1098.8	7535.9	6516.4	2862.9	1644.6

Rød muskel
480 mg/100g

Hvit muskel:
85.7 mg/100g

Fosfolipider i sild

Table 39. Lipid Content of the Body Tissues of Herring (II)

Tissue		Ordinary muscle		Dark-colored
		♂	♀	♂
Lecithin	mg	511.2	486.3	1384.2
Phosphatidylethanolamine	mg	229.0	208.9	686.4
Phosphatidylserine	mg	147.1	132.6	359.7
Acetal Lipid	mg	14.0	12.6	39.1
Sphingomyelin	mg	68.5	62.7	114.6
Cerebroside	mg	187.6	160.8	408.6
Cholesterol	mg	83.5	80.4	265.6
Total Phospholipids	mg	969.8	903.1	2584.0
Total Conjugated Lipids	mg	1157.4	1063.9	2992.6
Neutral Fat	mg	2663.5	2592.7	16347.0
Phospholipid/Cholesterol		11.6	11.2	9.7

Rød muskel: 360 mg/100g

Hvit muskel: 140 mg/100g (gjennomsnitt hun og han)

Hvilke tall finnes på nettet i 2012?

N I F E S

Wikepedia

Food	PS Content in mg/100 g
<u>Bovine brain</u>	713
<u>Atlantic mackerel</u>	480
<u>Chicken heart</u>	414
<u>Atlantic herring</u>	360
<u>Eel</u>	335
<u>Offal (average value)</u>	305
<u>Pig's spleen</u>	239
<u>Pig's kidney</u>	218
<u>Tuna</u>	194
Chicken leg, with skin, without bone	134
Chicken liver	123
<u>White beans</u>	107
<u>Soft-shell clam</u>	87
Chicken breast, with skin	85
<u>Mullet</u>	76
<u>Veal</u>	72
<u>Beef</u>	69

14

kilde: Souci SW, Fachmann E, Kraut H (2008). *Food Composition and Nutrition Tables*. Medpharm Scientific Publishers Stuttgart

Studier gjort på fosfolipider måler ofte effekt av EPA + DHA, ikke av fosfolipidene i seg selv.

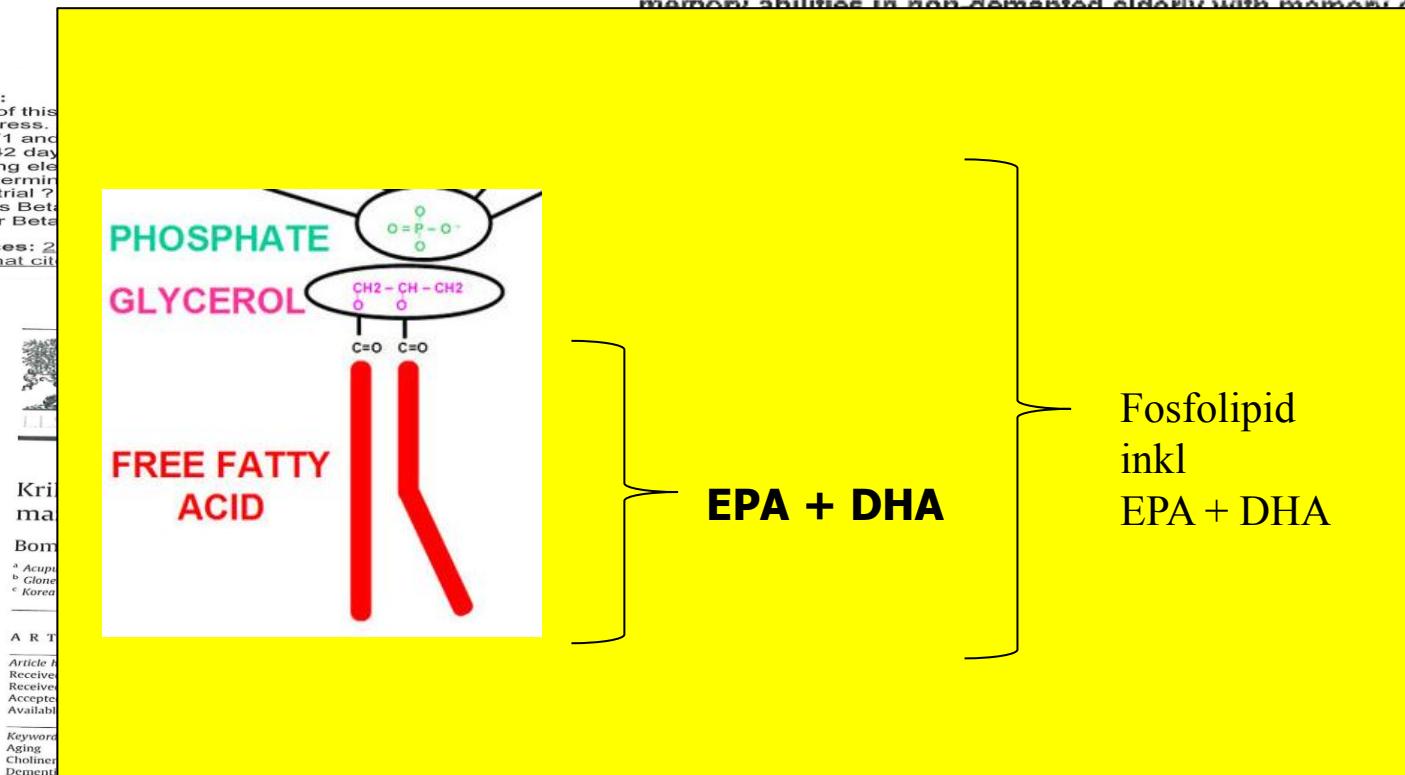
Dement Geriatr Cogn Disord. 2010;29(5):467-74. Epub 2010 Jun 3.

Phosphatidylserine containing omega-3 fatty acids may improve memory abilities in non-demented elderly with memory complaints: a

Abstract:
The aim of this study was to evaluate the effect of phosphatidylserine (PS) on cognitive functions in elderly subjects with memory complaints. The study was a double-blind, randomized, placebo-controlled trial. Sixty non-demented elderly subjects with memory complaints were included in the study. The subjects were randomly assigned to receive either Krill oil (K) or soybean oil (S) supplement for 12 months. Cognitive function was evaluated by the Mini-Mental State Examination (MMSE), the Alzheimer's Disease Assessment Scale (ADAS-Cog), the Clinical Dementia Rating (CDR), and the Geriatric Depression Scale (GDS). The serum levels of total PS, EPA, and DHA were measured at baseline and after 12 months. The results showed that the MMSE score increased significantly in the K group compared to the S group (K: 28.1 ± 3.1 vs. S: 26.8 ± 3.4, p = 0.03). The ADAS-Cog score decreased significantly in the K group compared to the S group (K: 13.1 ± 3.1 vs. S: 15.4 ± 3.4, p = 0.001). The CDR score decreased significantly in the K group compared to the S group (K: 0.5 ± 0.3 vs. S: 0.7 ± 0.3, p = 0.001). The GDS score decreased significantly in the K group compared to the S group (K: 1.8 ± 1.0 vs. S: 2.8 ± 1.0, p = 0.001). The serum levels of total PS, EPA, and DHA increased significantly in the K group compared to the S group (p < 0.001). The results suggest that the Krill oil supplement may improve cognitive functions in elderly subjects with memory complaints.

References: 22 articles that cite this article

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entation on patients suffering

Emilia 12, 27100 Pavia, Italy

I set out to assess the efficacy of a supplemented diet in improving the cognitive activities of elderly subjects assigned to the supplement group (11) and 3M; 86.1 ± 6.5). The significant increase in the supplement group showed a significant reduction and a significant decrease in membrane composition resulted in esterase activity. Moreover, a significant observed in the erythrocyte of the

the hippocampus. These findings demonstrate that KR-PS the neuronal and cognitive impairments that occur with obtained with SOY-PS. These data indicate that oral ad substitute for bovine cerebral cortex PS (BC-PS) as the function in elderly people.

Hippocampal
Erythrocyte
Membrane fluidity

supplement group.
Although this study is a preliminary investigation, we believe these findings to be of great speculative and interpretive interest to better understand the complex and multi-factorial mechanisms behind the possible links between diets, their functional components and possible molecular processes that contribute to increasing the risk of developing MCI and Alzheimer's.

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Oppsummering

- Sild og makrell er begge svært gode kilder til marint omega-3
- Makrell har høyere innhold av marint omega-3 enn sild
- Sild inneholder betydelig mer vitamin D enn makrell
- Tynt belegg for at makrell og sild er gode kilder til fosfatidylserin
- Spennende å følge analysene av stillehavsartene

