EU Fishmeal Conference 2017:
An update on IFFO's Technical Work

Neil Auchterlonie
[Technical Director]
IFFO
[15th September 2017]

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Overview

- Regulation
- Media
- Updates
- Projects

Regulation

- Animal feed additives in the EU:
  - Antioxidants
  - Formaldehyde
  - Undesirable substances
- Codex fish oil standard
- Chinese fishmeal standards (salt)

Antioxidants: Ethoxyquin - reauthorisation

- Reauthorisation process
  - Timing (regulation runs to 2020)
  - Science (reports in 2018 – further EFSA Opinion)
  - Specific points (e.g. p-Phenetidine and Roadmap)
  - If reauthorized, MRL? [MRL for EQ and EQ Dimer?]
- IMO process (to 2020 to achieve mandatory amendment)
- Market may change anyway?

_p_-phenetidine

- **Contaminant in ethoxyquin**
- **On SCoPAFF agenda (Sept 2017) for possible future amendment of EC 32/2002**

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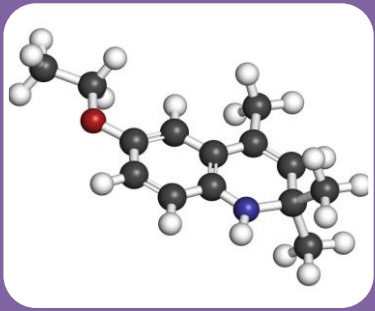
IFFO trials and ethoxyquin



Trial results

- 300ppm ethoxyquin dosage proven effective (50 ppm residual)
- Tocopherols proven safe but higher loss of omega-3's (250ppm residual)

Amendment of IMDG

- Amended text accepted by UN-TDG in Nov 2016
- Attending IMO meetings 2017 to consolidate text with IMDG
- Possibly only for packages <3,000kg
- IF accepted can be used from 1 Jan 2019

Current shipping practices (Member survey)

- Destination dictates format of shipping
- South America predominantly ships in 50kg bags
- Europe and others still ship in bulk cargo

Formaldehyde

- Used in feed to control salmonella;
- Legislative change from Biocides Directive to Feed Additives – required authorisation;
- Status unclear on feed additive register, or for use as a biocide;
- EFSA Opinion – risk is to operator, not farmed animals;
- Application for authorisation as a feed additive seems only to be for pigs and poultry (i.e. no fish data);
- Delays in SCoPAFF process reflect tense discussions and differences of opinion at Member State level;
- EU MSs seem to be providing an allowance to place it on the market;
- If listed as a feed additive would likely only be for 3 years in first instance – review;
- EC seems to want to deny authorisation;
- Issue is now political with some MSs threatening to do their own thing...

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Undesirable substances - Animal Feed and Food

- p-Phenetidine (as above)

Dioxins

- Joined Codex eWG revising CoP in prevention and reduction of dioxins and dioxin-like PCBs in Food and Feed

MCPD*s and GE**s in refined fish oils

- Increasing awareness of presence in refined fish oils
- Concern about possible toxicity (EFSA risk review)
- IFFO has joined Codex eWG to assist in development of Code of Practise (COP) to reduce the formation of these

*3-monochloropropane-1,2-diol (3-MCPD) and 2-monochloropropane-1,3-diol

**Glycidyl fatty acid esters

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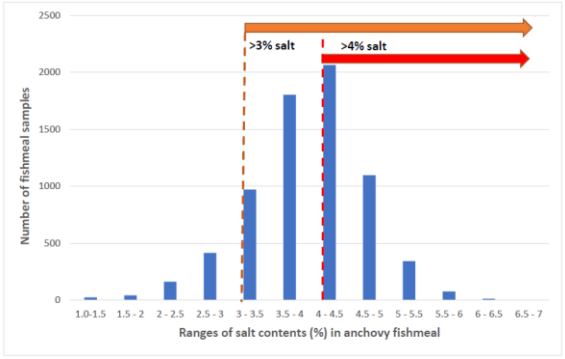
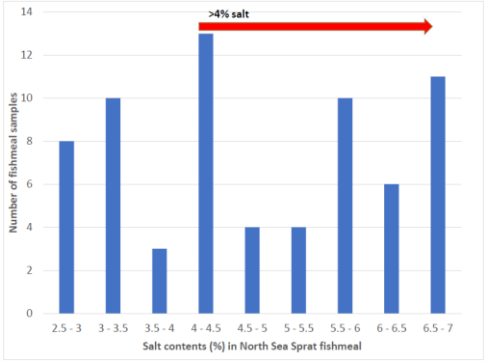
Chinese Fishmeal Standard – Salt levels

Table 1: China Standard for fishmeal (GB/T 19164-2003) salt specifications along with proposed levels (in red)

ITEM	SPECIFICATIONS			
	Superfine	Grade I	Grade II	Grade III
Salinity (NaCl) % (current)	≤ 2	≤ 3	≤ 3	≤ 4
Salinity (NaCl) % (proposed)	≤ 2 (white fishmeal) ≤ 3 (red fishmeal)	≤ 3 (white fishmeal) ≤ 4 (red fishmeal)	≤ 3 (white fishmeal) ≤ 4 (red fishmeal)	≤ 4 (white fishmeal) ≤ 5 (red fishmeal)





- IFFO provided data to the Chinese authorities suggesting that the levels are not realistic;
- Awaiting response (meetings late September 2017).

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Media

- Articles in press
- Direct responses to media articles

- Particular issues:
  - Ethoxyquin
  - Alternatives - misrepresented
  - Plastics/microplastics – raising profile
  - Antibiotic residues/Antibiotic Resistance Genes (ARGs) – out of context

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Particular issues

- Ethoxyquin
- Alternatives - misrepresented
- Plastics/microplastics – raising profile
- Antibiotic residues/Antibiotic Resistance Genes (ARGs) – out of context

Ethoxyquin…

How healthy is farmed salmon and what is ethoxyquin?

Last updated on Apr 21, 2017

Salmon is known as a healthy food, rich in Omega-3 fatty acids. What you may not have known is that most Atlantic farmed salmon is contaminated with toxic chemicals. Manufacturers use such chemicals as ethoxyquin (EQ), butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA) to preserve fish food.

https://michaelkummer.com/healthy-farmed-salmon-ethoxyquin/

Feed navigator.com

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Alltech ANTIBIOTIC-REDUCTION PROGRAMME

1. REDUCING ANTIBIOTICS

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Ethoxyquin authorization suspended in the EU – are there viable alternatives?

By Jane Byrne

12-Jun-2017

Last updated on 23-Jun-2017 at 12:05 GMT

IntraFish | AQUACULTURE

- The Global Leader In Aquaculture And Fish Farming News -

AQUACULTURE See all articles

A total ban of ethoxyquin in fishmeal could make waves in the coming years. Photo: Shutterstock

EU ethoxyquin suspension alarms fish feed producers

The EU recently suspended the use of ethoxyquin in fishmeal. A total ban could be costly for fish feed manufacturers and fish farmers alike.

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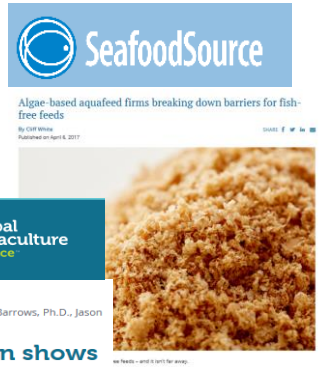
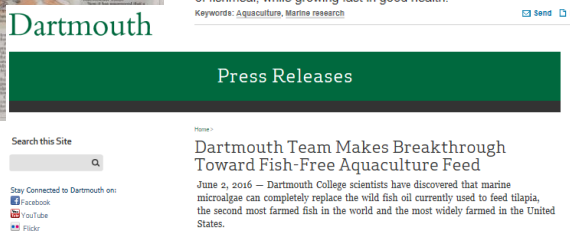
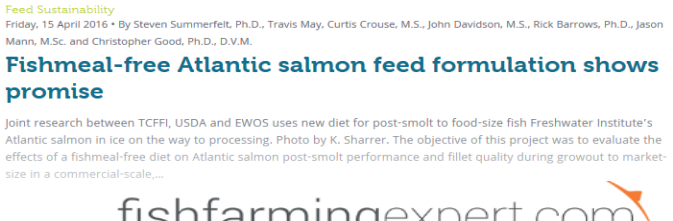
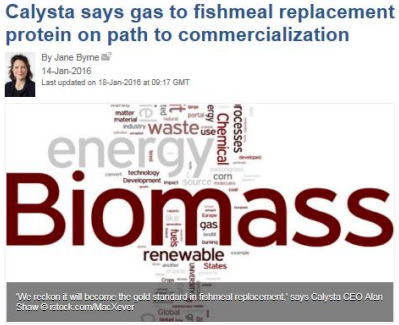
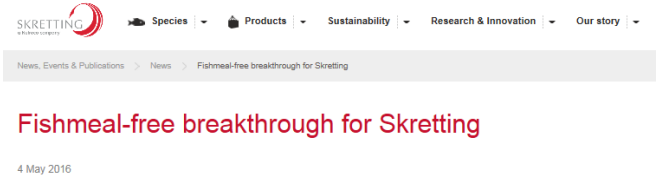
Alternative ingredients – often mis-positioned against FMFO on sustainability grounds











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Plastics/Microplastics

IntraFish

- Thursday, Sep 14, 2017 -

Let's talk plastics

The seafood industry depends on the world's oceans. There's just one huge issue that might sabotage it all.

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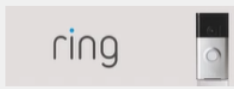

Sponsored By Currys PC World

Microplastics in seafood could be a health risk, experts fear

The increasing amount of tiny plastic pieces being absorbed into the bloodstream is an urgent concern, scientists say.

21:11, UK,
Wednesday 25 January 2017

The Telegraph HOME | NEWS

Science

Science

Seafood eaters ingest up to 11,000 tiny pieces of plastic every year, study shows

Rubbish disintegrates in the ocean and can be ingested by marine creatures

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Antibiotics

Environmental Science & Technology

Article

pubs.acs.org/est

Fishmeal Application Induces Antibiotic Resistance Gene Propagation in Mariculture Sediment

Ying Han, Jing Wang,* Zelong Zhao, Jingwen Chen, Hong Lu, and Guangfei Liu

Key Laboratory of Industrial Ecology and Environmental Engineering (Ministry of Education), School of Environmental Science and Technology, Dalian University of Technology, Dalian 116024, Liaoning, P.R. China

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American Chemical Society » News » News Releases » 2017 » Fish food for marine farms harbor antibiotic resistance genes

FOR IMMEDIATE RELEASE | Wed Aug 30 13:17:00 EDT 2017

Fish food for marine farms harbor antibiotic resistance genes

"Fishmeal-Application-Induces-Antibiotic-Resistance-Gene-Propagation-in-Mariculture-Sediment"

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Research shows antibiotic resistant genes in fishmeal

By Jane Byrne

31-Aug-2017

Last updated on 07-Sep-2017 at 15:46 GMT

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Fish farming

Antibiotic resistance in fish farms is passed on from fish food

Feeding-time worries

Print edition | Science and technology

Sep 7th 2017

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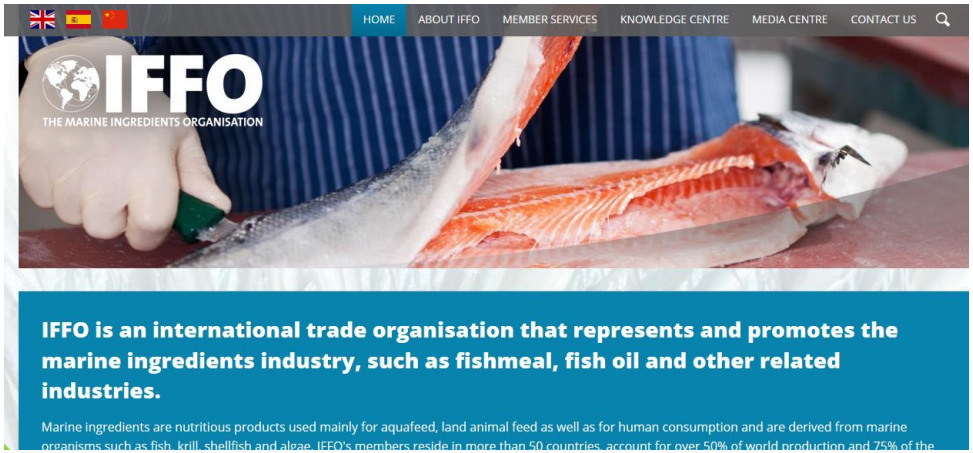
Other Updates

- TACs & Quotas – document updated;
- FFDR position paper– relevance? ASC consultation open;
- FIFO calculation;
- Website.



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Projects

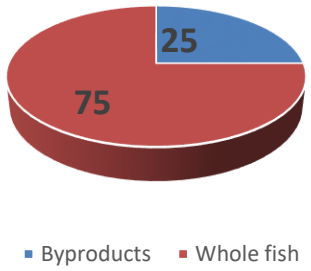
- Current & Recent project work
- Future projects

Current projects

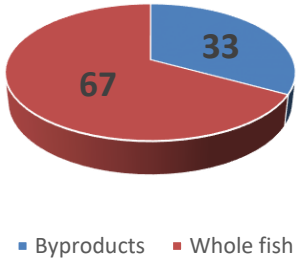
- Byproduct
- Forage fish
- Ethoxyquin safety
- SE Asia supply chain
- GFLI – Environmental Impact of Feed Ingredients in Europe

Byproduct:
Raw material: Changing proportions

Estimated by Shepherd, 2012



Calculated by Newton, 2016



Predicted by FAO for 2025 (2016)

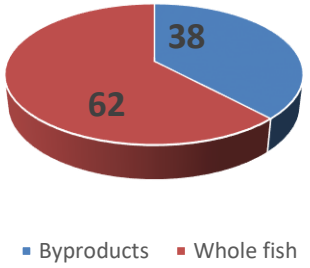


TABLE 2
FISHMEAL PRODUCTION (TONNES ,000)

Region	From Whole fish	From By-product	Total	% from By Product
Europe	320	381	701	54
Asia (exc China)	580	454	1,034	44
China	281	152	433	35
M East	42	13	55	23
CIS	57	27	84	32
Africa	146	60	206	29
S. America	1,532	289	1,821	16
N. America	170	118	288	41
Oceania	2	14	16	85
Totals	3,131	1,508	4,639	33

UNIVERSITY OF STIRLING

Project to model the use of fisheries by-products in the production of marine ingredients with special reference to omega-3 fatty acids EPA and DHA, Jackson A and Newton RW, IFFO and University of Stirling, July 2016

FAO (2016) “non-official estimates for FM production from byproduct are 25-35%”

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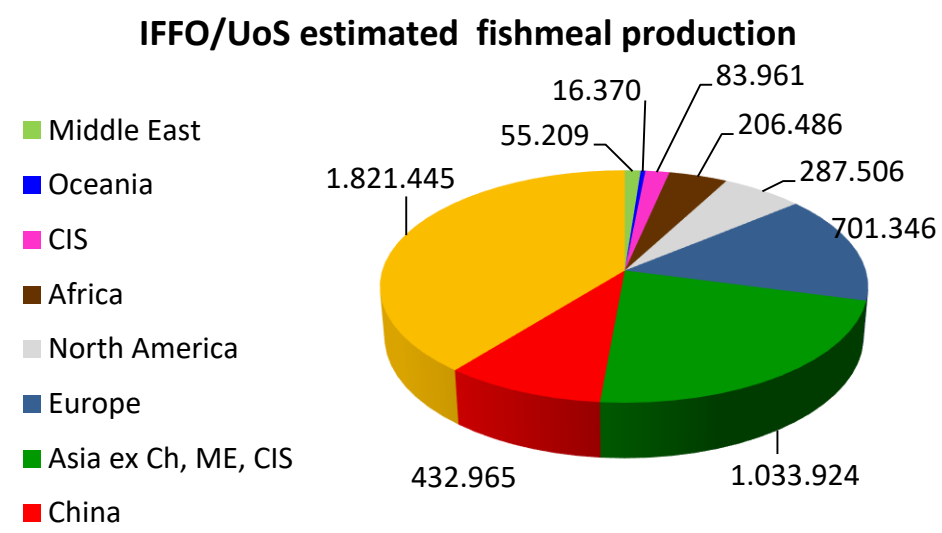
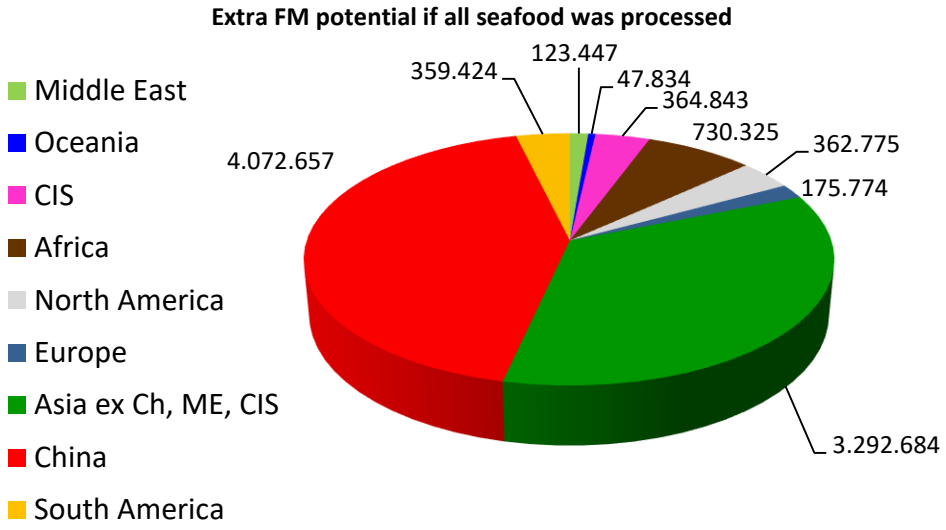
More raw material is available than is being used…





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Utilisation of salmon by-products

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Farmed salmon heads for sale at a market in Dong Thap province, Vietnam

- How is UK salmon by-product currently utilised?
- Are there opportunities to add value that are being missed?

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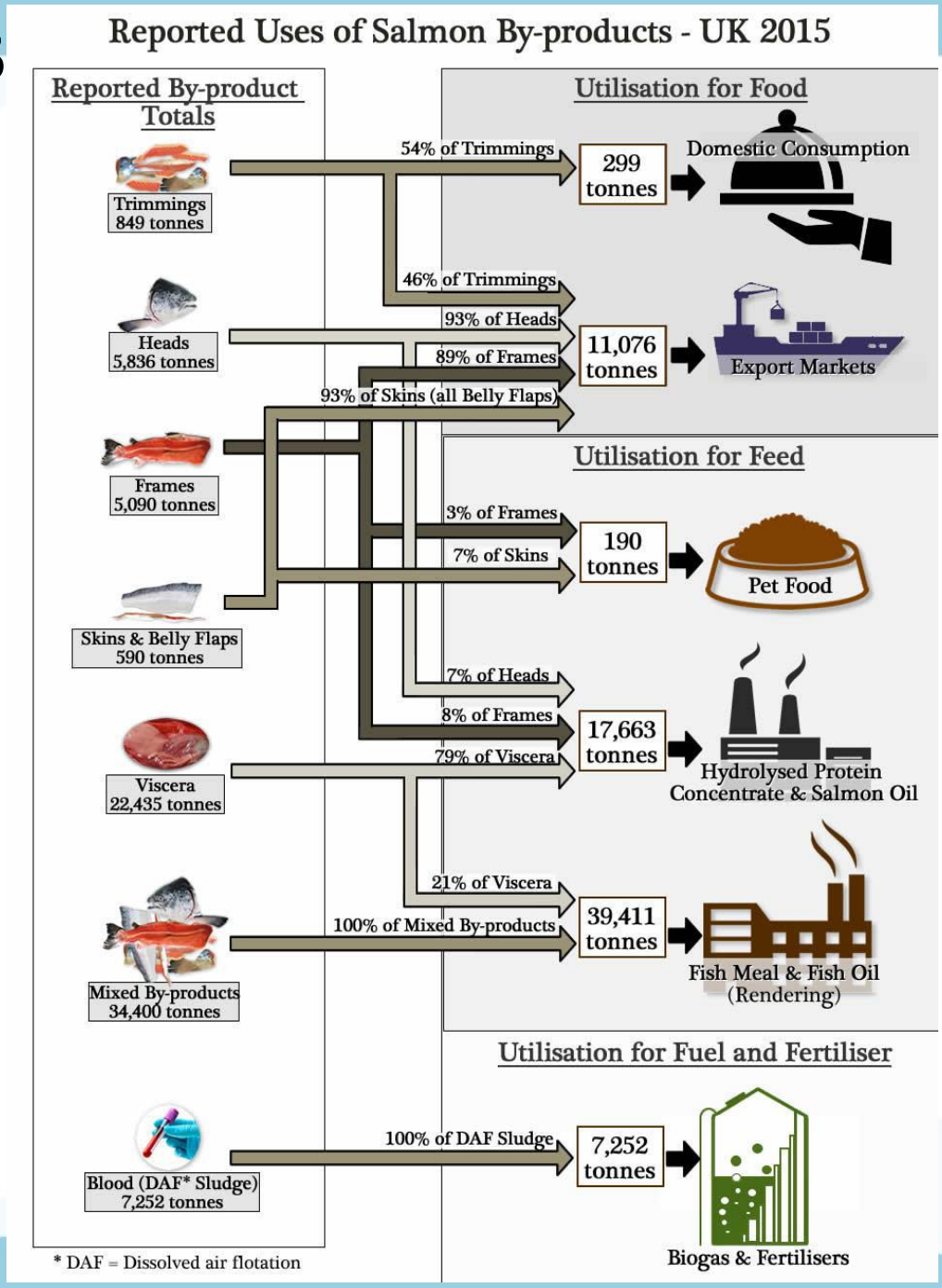
Salmon by-product use 2015

from J. Stevens –
IoA MSc student 2015-16

- 15% of UK by-products exported abroad
- 52% used as fishmeal
- UK exports 58% of HOG salmon (premium markets)
- …but imports almost the same amount (81353 t)



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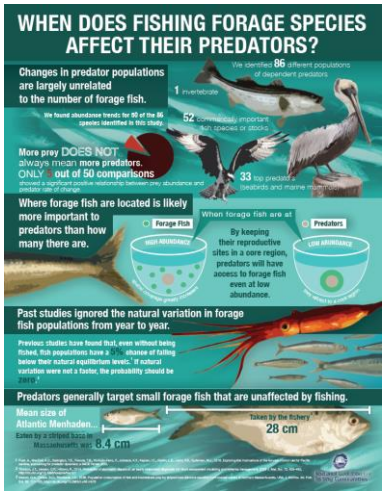
Forage Fish Project

- Counters the science in Lenfest;
- Consortium of researchers in the field, led by Prof Ray Hilborn
- Series of papers planned
- First paper published April 2017
- Press Release (+IFFO)
- Expect a further 3-7 papers over the rest of 2017/early 2018
- IFFO looking at ways to develop findings into policy

UNIVERSITY of WASHINGTON



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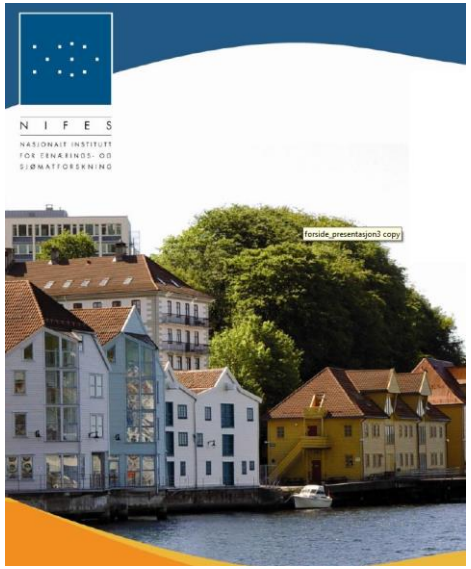
Sponsorship: Symposium on Small Pelagic Species, Victoria, Canada March 2017

- First gathering of academics since 1983
- Update on forage fish science
- Included contributions from Lenfest authors
- Some of UoW team presented
- Throughout the Symposium consistent reference to environmental parameters having most influence on stock levels

Ethoxyquin safety – Nifes, Norway

- Feeds information into EU reauthorisation process
- IFFO, Biomar, Cargill, Skretting funded
- 3 aspects of safety:
  - In fish (salmon)
  - In edible tissues of salmon (Residue studies on the presence and permanence of EQ and its metabolites)
  - In food derived from animals given feedingstuffs containing the additive or its metabolites (mouse studies – identifying and quantifying risks to the consumer)
- 18 months, commenced October 2016
- On schedule to report

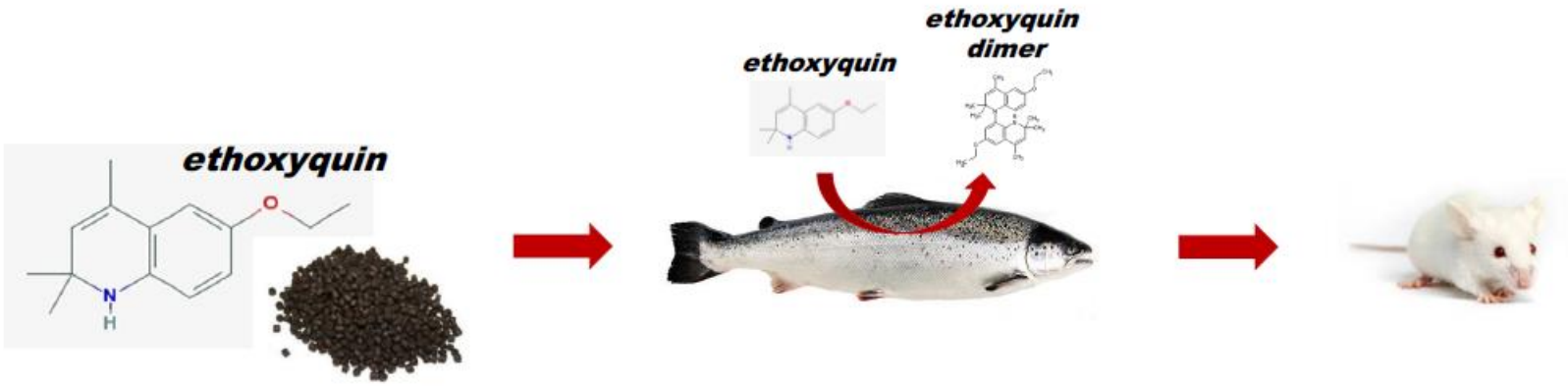


Ethoxyquin safety

NIFES

Ongoing trials at NIFES

1) 90-days dietary EQ exposure in Atlantic salmon
2) Kinetic study EQ and metabolites in Atlantic salmon
3) 90-days dietary EQDM exposure in mice



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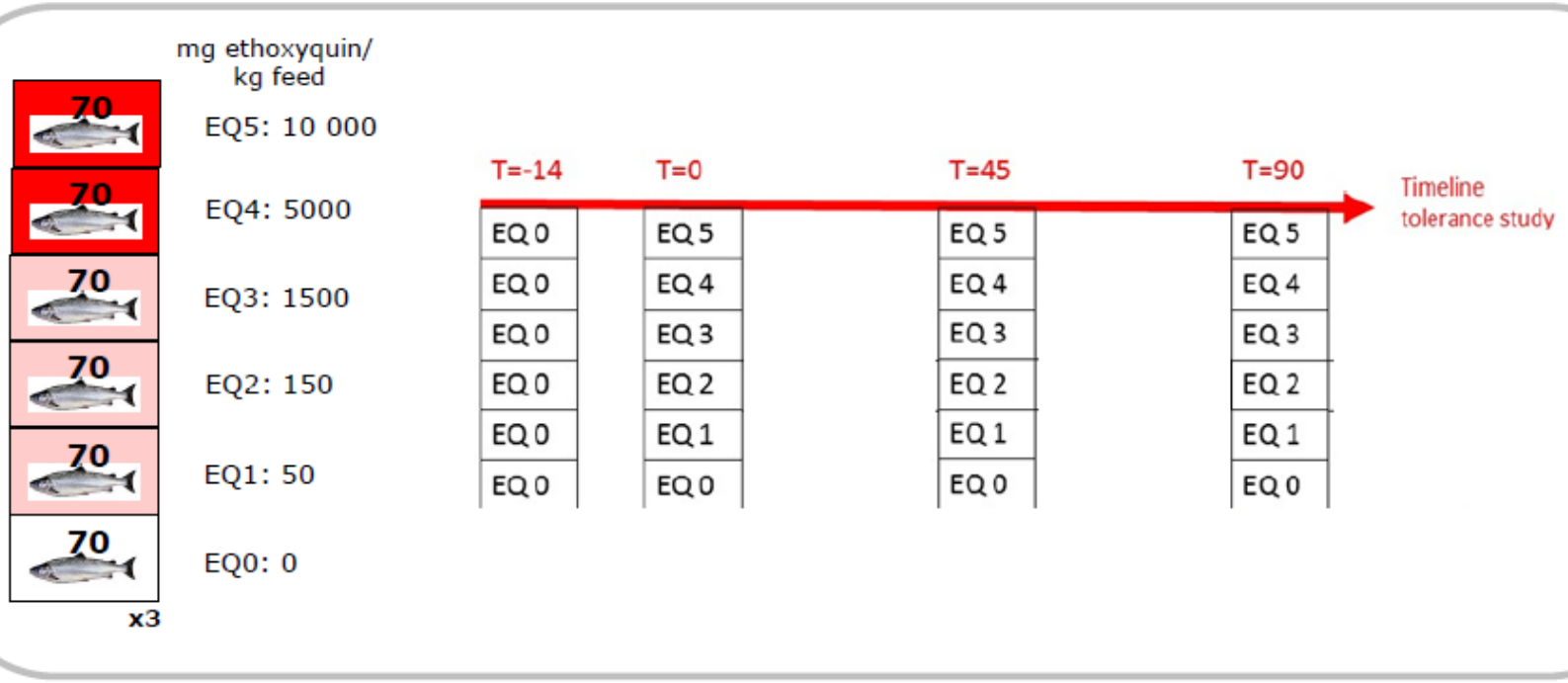

mg ethoxyquin/
kg feed
70
EQ5: 10 000
70
EQ4: 5000
70
EQ3: 1500
70
EQ2: 150
70
EQ1: 50
70
EQ0: 0
x3
T=-14
T=0
T=45
T=90
Timeline
tolerance study
EQ 0
EQ 0
EQ 0
EQ 0
EQ 0
EQ 0
EQ 5
EQ 4
EQ 3
EQ 2
EQ 1
EQ 0
EQ 5
EQ 4
EQ 3
EQ 2
EQ 1
EQ 0
EQ 5
EQ 4
EQ 3
EQ 2
EQ 1
EQ 0

Conclusions:

- An EQ level of >1300 mg/ kg feed affects the feed intake and growth performance of the fish
- Histopathological evaluation liver, spleen, kidney: no adverse outcomes
- Indication for oxidative stress and altered lipid metabolism in EQ3 (1300 mg/kg feed)

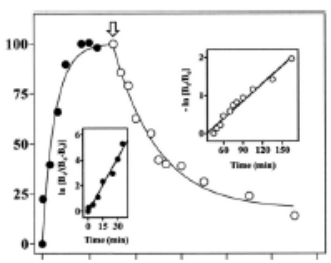
→ So far: no indications for toxicity of ethoxyquin in fish feed

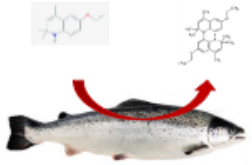
Other work - ongoing

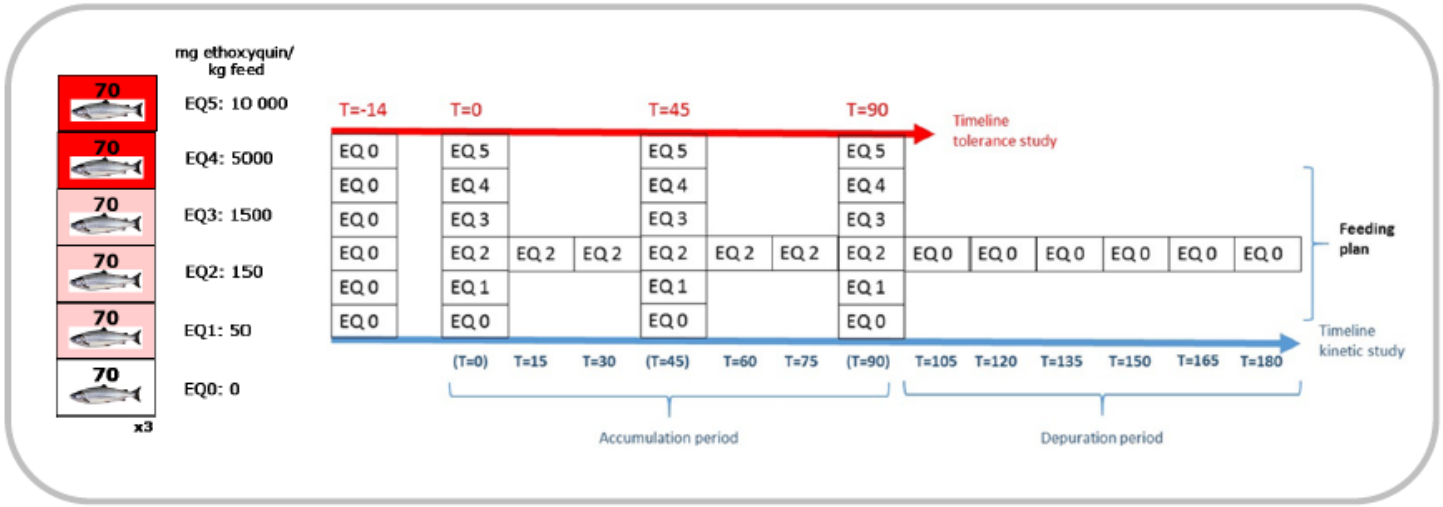
NIFES

Presence and permanence in edible tissues

Kinetic residue study in salmon







EQ and metabolite analyses in muscle tissue: in progress!

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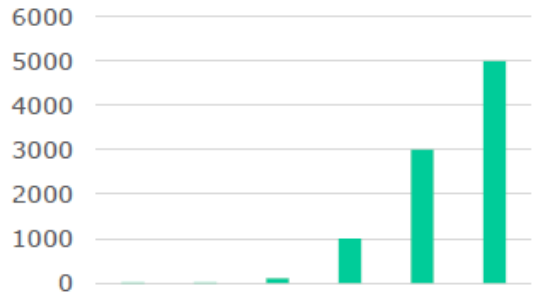
Dietary exposure study in mice

concentration

Group	mg EQDM/kg feed	mg EQ/kg feed
Control	0	-
EQDM 1	0,1	-
EQDM 2	1	-
EQDM 3	100	-
EQDM 4	1000	-
EQDM 5	3000	-
EQDM 6	5000	-
EQ	-	5000



AIN-93M
Purified standard rodent diet

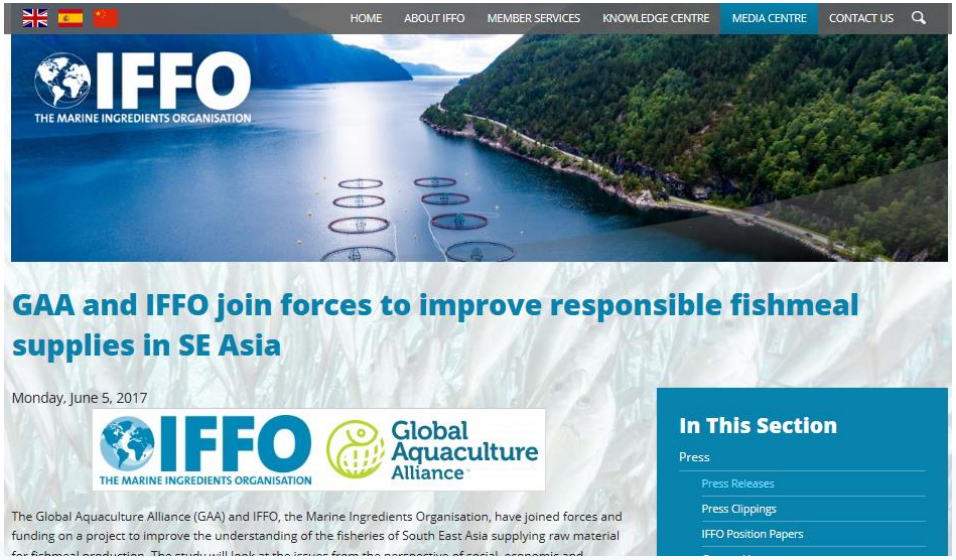
90 days

♂ Balb/c mice
8 weeks old
n=10/group

- Analytical results pending……

SE Asia Supply Chain

- Co-funded with Global Aquaculture Alliance (GAA);
- Seeks to address issues particular to SE Asian raw material supply;
- Contractor appointed (Duncan Leadbitter of FishMatter Pty);
- Project runs until end of 2018;
- Largely a desk study that will provide recommendations for future improvements.



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GFLI

- GFLI – Global Feed LCA Institute
- FEFAC initiative – global database to describe the environmental performance of the main feed ingredients
- FHF (Norway) initiative for a fish (salmon) feed group
- Project group providing information on parameters relating to LCA for ingredients (FM/FO)
- First meeting Sweden February; meetings May, August, – more meetings to come through 2017

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Future Projects

- Process developed;
- Funding allocated to priorities under IFFO 2020 strategy;
- List of 41 possible subjects at this stage;
- Review by Liaison Group – Product, Threat (various sub-categories);
- Proposals to be submitted for review and decision by IFFO board, October.

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Project Proposals

- List of potential subjects produced;
- Reviewed at IFFO LG level;
- Proposals to go to IFFO board for decision in October;

<u>Possible subjects (Product) are:</u>

- Screening fishmeals for performance in aquafeed – salmon
- Fishmeal stabilisation - additional trials for validation and other products
- Fishmeal quality parameters and their relation to the nutritional requirements of fed species

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Thank you for listening!
Are there any Questions?