

Fishmeal
Preservation
throughout the
value chain:
Summary of
IFFO
Antioxidant
Work

Presented by Neil Auchterlonie, Technical Director, IFFO The Marine Ingredients Organisation

at:

Workshop on Fishmeal and Fish Oil

Supported by the Nordic Centre of Excellence Network, Copenhagen, Denmark

November 14th- November 15th 2018

Summary



REGULATION



IFFO PROJECT WORK

Project work –
IFFO is investing in
the evidence base

FM Quality (referred to yesterday – Brett
Glencross at University of Stirling)

FIFO

Forage fish stocks

Plastics

Raw material sustainability (SE Asia; West Africa;
Byproduct)

Antioxidants.....

Regulation that applies in Europe – 2 different elements:



EU Feed Additives Regulation: Regulation (EC) 1831/2003

- Focus on safety (in production & consumption)
- Requires authorisation of additives
- Process = review of safety data for animal, consumer, environment
- Regulated by application of a maximum permitted level (in feed)

International Maritime Organisation: IMDG and IMSBC Codes



- Focus on safety (in shipping)
- Requires named antioxidants and evidence of stability
- Process = review of data by committee
- Regulated by application of a minimum level

Antioxidants – current status in EU (for animal feed)

- **Within reauthorisation process:** ETQ, BHT, BHA, propyl gallate, rosemary extract, citric acid
- **Authorised:** Vitamin E; alpha-tocopherol and tocopherol rich extracts; ascorbic acid; sodium + calcium ascorbate; ascorbyl palmitate
- **Note:** BHA, BHT, TBHQ and propyl gallate have already been approved for use as food additive (different legislation)

Important background: Current status of ethoxyquin in the EU

- ETQ is legal for use as a feed additive in fishmeal until 30/09/2019;
- Deadline provides time for a further EFSA Opinion on safety;
- EFSA Opinion will be followed by a European Commission decision (likely mid-2019);
- Some indications of market movement away from ETQ (especially in salmon);
- GSI applied voluntary max limit of 400ppm 2017 in received FM at feed plants;
- Media interest has been slow for c.6 months, but can expect a lot more to come when the EFSA Opinion is published and the EC decision is taken.

Important
background:
Another recently
raised issue:

- **Ethoxyquin in farmed organic salmon**
 - Synthetic a/ox not allowed in EU organic aquaculture regs;
 - Possible carryover in manufacturing;
 - Possible contamination in storage and shipping;
 - Risk of contamination likely to be a problem in the future if ETQ is not reauthorised – ETQ may still be detected;
 - Could be important 2019 onwards...

Important
background:
BHT
Reauthorisation
in the EU

- IFFO Technical has regular (c. monthly) catch-up with one of the applicants;
- BHT reauthorisation process delayed (lack of clarity on requirements by EFSA);
- Safety studies underway (on pigs and poultry);
- Timeline to report end November 2018;
- Dossier to EFSA via EC;
- Following that, Opinion from EFSA back to EC;
- Decision made perhaps mid-late 2019, or even into early 2020???
- Also noting some indications of market resistance to BHT(?), possibly linked to “synthetics”?
- Difficult to predict the outcome at this stage.

ETQ Safety Studies – work with Nifes & Awaiting Decision in Reauthorisation



Funded by IFFO, Biomar, Cargill, Europharma, Marine Harvest, Skretting



Data & report to EC – December 2017



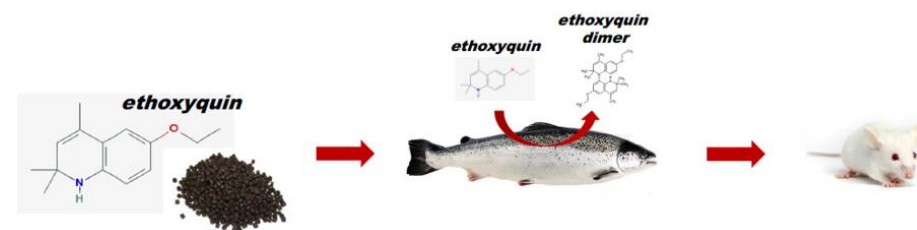
EC (via EFSA) reviewing



EFSA opinion expected



EC to discuss and decide (SCoPAFF)



IFFO has successfully provided data and information that led to the amendment of the IMO's IMDG (Dangerous Goods) code:

Work relevant to
the International
Maritime
Organisation
(IMO) Codes

"Stabilization of fishmeal shall be achieved to prevent spontaneous combustion by effective application of ethoxyquin, BHT (butylated hydroxytoluene) or tocopherols (also used in a blend with rosemary extract) at the time of production. The said application shall occur within twelve months prior to shipment. Fish scrap or fish meal shall contain at least 50 ppm (mg/kg) of ethoxyquin, 100 ppm (mg/kg) of BHT or 250 ppm (mg/kg) of tocopherol based antioxidant at the time of shipment."

Bulk Cargoes

- However, the IMO has two shipping codes depending on the volume and mode that cargo is shipped in:
- **IMDG:** International Maritime Dangerous Goods: Cargo contained in packaged/container form including fishmeal loose in containers.
- **IMSBC:** International Maritime Solid Bulk Cargoes: Cargo loaded directly into cargo spaces of a ship without any intermediate form of containment.

Objectives....

Aim

- To determine safety (i.e. stability) with lower than current levels of ethoxyquin, as well as tocopherols
- To provide datasets that are relevant to fishmeal in bulk (and the IMSBC amendments can therefore be harmonised with the IMDG)

Approach

- Reactive fishmeal with the same specification as it would have when sold and shipped, will be stored under ambient conditions. The fishmeal treatments should be stored in the largest volume possible (1 ton or larger) for a period of 12 months

Field trials

Peruvian anchovy fishmeal



Ethoxyquin (50 ppm residual) or
Tocopherols + rosemary extract (250
ppm residual)



50 kg and 1 ton bags for a period of
12 months

Field work....

MANUFACTURER	LOCATION	ANTIOXIDANT	DOSAGES (INTENDED TO BE ADDED)(PPM)	TREATMENTS (PPM)	ACTIVE PRINCIPLE (CONVERSION FACTOR FROM LAB ASSAY) (PPM)
COMPANY D	CALLAO	2 x 1 TONNE BAG- TOCOPHEROL + ROSEMARY EXTRACT	1000	995	359
			1500	1386	539
			2000	1935	718
		2 x 1 TONNE BAG- ETHOXYQUIN	202	200	192
			314	300	298
			1000	995	359
		10 x 50 KG BAG- TOCOPHEROL + ROSEMARY EXTRACT	1500	1386	539
			2000	1935	718
			2000	400	458
COMPANY T	PISCO	2 x 1 TONNE BAG- TOCOPHEROL + ROSEMARY EXTRACT	3000	600	687
			4000	800	916
			157	150	153
		2 x 1 TONNE BAG- ETHOXYQUIN	314	300	306

What dosages of product mean in relation to a/ox levels

IFFO IMSBC trials – sample regime



COMPANY	LOCATION	DIMENSIONS	TREATMENTS	DAY 0	DAY 7	DAY 15	1 MONTH	3 MONTHS	6 MONTHS	9 MONTHS	12 MONTHS
Diamante	CALLAO	JUMBOS- TOCOPHEROLS	995 PPM	09.06.18	16.06.18	24.06.18	09.07.18	09.09.18	09.12.18	09.03.19	09.06.19
			1386 PPM								
			1935 PPM								
		JUMBOS- ETHOXYQUIN	200 PPM	07.06.18	14.06.18	22.06.18	07.07.18	07.09.18	07.12.18	07.03.19	07.06.19
			300 PPM								
		50 KG BAGS - TOCOPHEROLS	995 PPM	09.06.18	16.06.18	24.06.18	09.07.18	09.09.18	09.12.18	09.03.19	09.06.19
			1386 PPM								
			1935 PPM								
		TASA	PISCO	JUMBOS- TOCOPHEROLS	400 PPM	04.06.18	11.06.18	19.06.18	04.07.18	04.09.18	04.12.18
600 PPM											
800 PPM											
JUMBOS- ETHOXYQUIN	150 PPM			05.06.18	12.06.18	20.06.18	05.07.18	05.09.18	05.12.18	05.03.19	05.06.19
	300 PPM										

Parameters measured

- **Protein**
- **Fat**
- **Moisture**
- **Ash**
- **n-3 (EPA + DHA)**
- **TVN**
- **Histamine**
- **Salt**
- **Antioxidant residuals (ETQ & tocopherol)**
- **Peroxide value**
- **Anisidine value**
- **FFA**
- **SHT**
- **Oxygen bomb**

Data coming in....



Collated and compiled
into report



Submit to IMO June/July
2019 (Depends on
analyses timing)



For Meeting of CCC in
September 2019
(assuming timing works)



If accepted, timeline for
incorporation into IMSBC
is approximately 2 years

Work on “new” antioxidants

Approach



Scientific literature search



Google search for commercial/industry information – looking at other industries, especially food



Many approaches made to different companies



Offers of samples for trial work



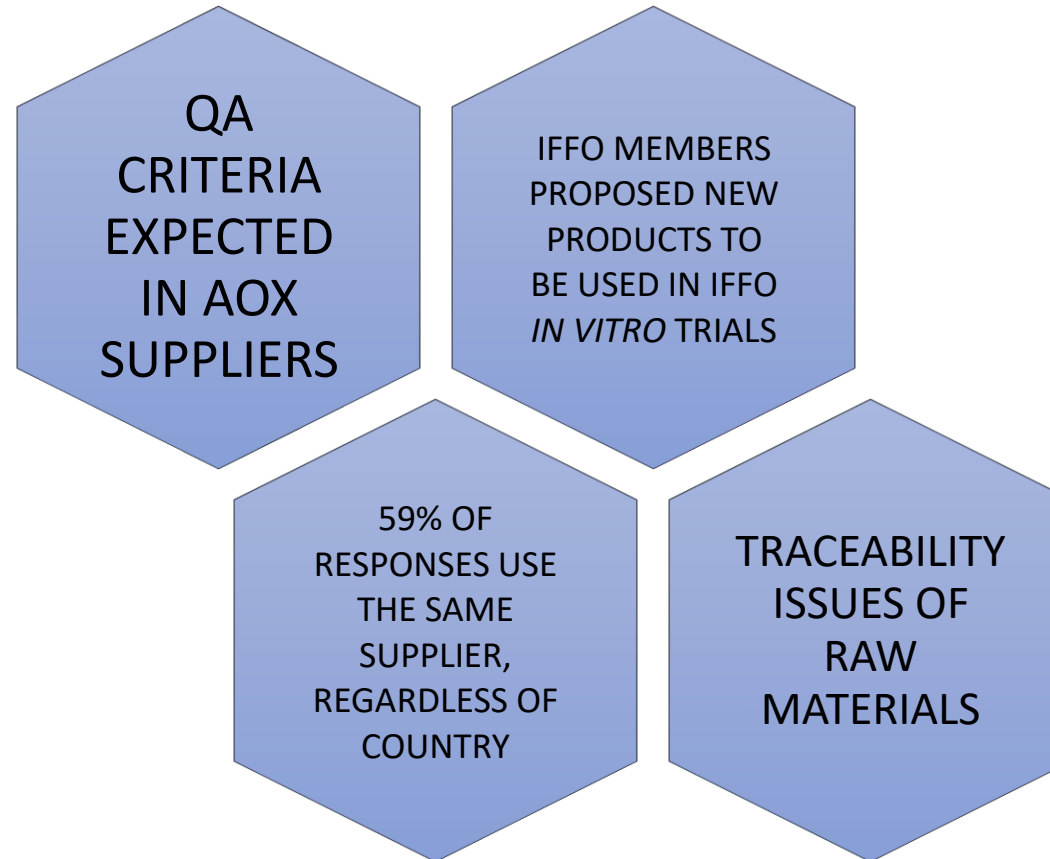
Consultant appointed (ex-antioxidants industry) providing technical support on project work (especially network of contacts)



Aiming to draw this together....

Companies
that are
participating
with IFFO (so
far..)

- Kemin (Europe and USA)
- Camlin (USA)
- BTSA (Madrid, Spain)
- Oxiris (Barcelona, Spain)
- 3A (Murcia, Spain)
- Kalsec (UK)
- Naturex (France)
- Mitsubishi International Food Ingredients Inc. (Japan)
- Molinos asociados SAC -Masac- (Peru)
- Silvateam (Italy)



We also asked IFFO members: IFFO SURVEY - "Strategies for reducing/delaying oxidation in FMFO"

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Copenhagen, 15th November 2018

A Variety of Potential Compounds Identified so far....

- Soybean Oil, BHT, Lecithin, Ethoxyquin, Vegetable Fatty Acids of Methyl Ester, BHA and Mono and Diglyceride-
- BHA + Propyl Gallate
- Product based on different gallates +Tocopherols and rosemary-
- BHT + PG
- Glutathione
- CoQ10
- Oligopeptides
- Propyl Gallate
- Tannic Acid
- Maqui berries
- Tanirox-10 DRY (3A) (natural compounds not disclosed)
- BHA, propyl gallate and citric acid
- Rosemary Extract, green tea, acerola and/or mixed tocopherols, plus the addition of quenchers and/or chelators-
- BHT and a “ New Secret compound”
- Other possible blends between PG, Tocopherols, BHT, BHA
- Tocopherols + Rosemary extract
- Tannic Acid

Some Caveats...



IFFO CANNOT TAKE A PRODUCT TO
MARKET



ACHIEVING AUTHORISATION
REQUIRES TIME/MONEY AND IS
COMPLEX



DEPENDS ON COMPANIES SEEING
THE BUSINESS OPPORTUNITY
WITH FM

Next stages

1

Evaluation of performance of antioxidants (oxygen bomb) – planned for early 2019

2

Provides comparative data on potential of new products

3

Need to then look at price data and what is realistic in relation to cost/price calculation

4

Once we have results may be able to influence development of these and other products into the market

A Different Approach in relation to the IMO Regulations.....

- Working on approach to the IMO that removes need for specific a/ox information
- Simplifies the approach & removes complexity of different a/ox listings and need for additional trials to amend text over time (expense)
- Stability confirmed in other way?
- Currently looking at option to correlate SHT with oxygen bomb test
- Test confirms stability (rapid test, reasonable cost)
- Discussing methodology and approach with a/ox producing company
- Also worked with an oxygen bomb manufacture to compare performance of different machines
- But.....no guarantees that the IMO will accept this approach (at this time)

Other work

1. South Africa field study – new a/ox formulation
2. Researched metal concentrations in FM and link with a/ox performance [metals as pro-oxidants] – need practical data from the industry on this
3. Comparison oxygen bomb analytics
4. Companies also carrying out trials work – would be good to partner on these if it is possible
5. Ideally, it is useful for the industry to build up a large dataset of different FMs, a/ox, storage and shipping times, residual a/ox
 - Will be useful over time as a resource for producers to access to estimate concentrations of a/ox needed
 - Optimises a/ox use and avoids overdosing and issues with carryover

Summary

- IFFO investing into project work related to:
 - IMO regulations
 - “New” antioxidants
 - Trial data (on-site)
- Regulation;
 - Monitoring reauthorisation process of ETQ, BHT
 - ETQ carryover in organic feed
- Wish list:
 - More trials/partnering
 - Developing resource with data on antioxidant performance – database for future reference

Thank you for your attention



More information:

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