Vorráðstefna FÍF haldin 4. og 5. apríl 2019

á Grand Hótel, Reykjavík

An Overview of IFFO Antioxidant Project Work

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Technical Director
IFFO, The Marine Ingredients Organisation

4th April 2019

IFFO THE MARINE INGREDIENTS ORGANISATION

FÍF

IFFO is an evidence-based global organisation, representing the Marine Ingredients industry

60% **of world production** of fishmeal and fishoil is represented by IFFO

80% **of trade** in fishmeal and fish oil worldwide is represented by IFFO

50% of the worlds combined production of Marine ingredients is **IFFO RS compliant**

90 **market reports** published by IFFO each year

IFFO works closely with **UN Organisations and the European Commission**

The value and sustainability of marine ingredients

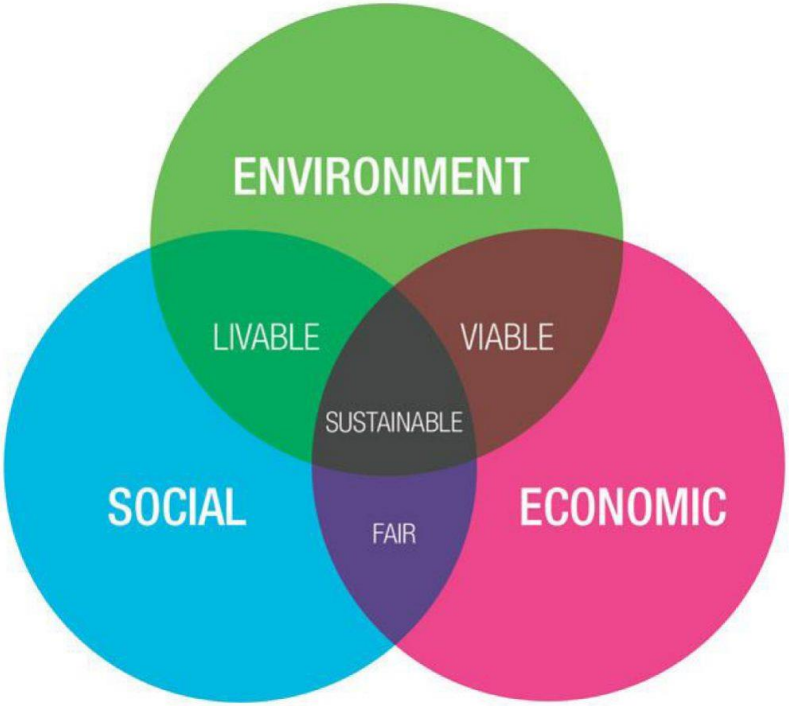
1. Our industry is committed to transparent supply chains

2. Marine ingredients mean quality feed

3. Marine ingredients help feed a growing population

"Sustainable development is development that meet the needs of the present without compromising the ability of future generations to meet their own needs".

UN´s Brundtland commission: Our common future (1987)



Antioxidants Research in IFFO…. A long history

ANTIOXIDANT PROPERTIES OF ETHOXYQUIN AND SOME OF ITS OXIDATION PRODUCTS

A Thesis

presented for the degree of

DOCTOR OF PHILOSOPHY

in the Faculty of Science of the

University of St Andrews

by

SNORRI THORISSON, BSc

November 1987

United College of St Salvator and St Leonard, St Andrews

ACKNOWLEDGEMENTS

I would like to express my thanks to the following: Professor F.D. Gunstone (St Andrews) and Dr R. Hardy (Torry Research Station, Aberdeen) for their help and supervision, and Dr J.C. Walton for his help concerning the ESR spectroscopy.

The International Association of Fish Meal Manufacturers (IAFMM) for financing this project, and Dr S.M. Barlow for useful discussion.

ifoma

International Fishmeal & Oil Manufacturers Association

ETHOXYQUIN AND ITS OXIDATION PRODUCTS IN FISH MEALS, FISH FEEDS AND FARMED FISH

by Ping He and R G Ackman
Canadian Institute of Fisheries Technology, Department of Food Science and Technology, DalTech, Dalhousie University, Halifax, NS, B3J 2X4, Canada

RELEASED
~~PARTLY RELEASED~~
~~CONFIDENTIAL~~
DATE: Nov '93

ifoma

International Fishmeal and Oil Manufacturers Association

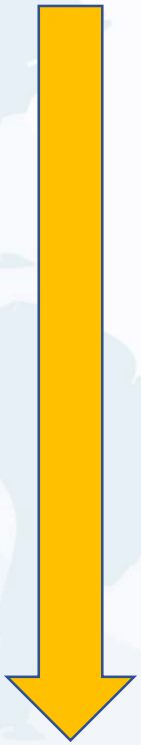
DETERMINATION OF ETHOXYQUIN AND TWO OF ITS OXIDATION PRODUCTS IN FISH MEAL BY GAS CHROMATOGRAPHY PART 2

RESEARCH REPORT 1996-4, September 1996

Determination of the antioxidant efficacies in fish meal of two oxidation products of ethoxyquin

by A.J.de Koning
Fishing Industry Research Institute, 15 Lower Hope Road, Rosebank 7700, Cape Town, Cape Province, South Africa

Regulation that applies in Europe – 2 different elements:

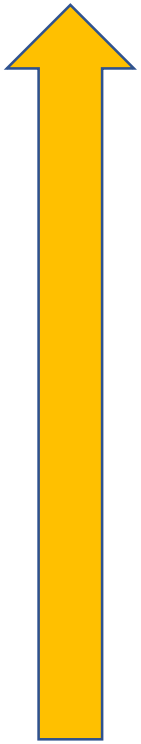


- EU Feed Additives Regulation: Regulation (EC) 1831/2003

- 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



How we arrived here….

- EU Directive 1831/2003 – review of (**all**) feed additives on a 10-year cycle
- ETQ is in the review process (as is BHT)
- November 2015 EFSA Opinion
- “Inconclusive” – more data
- Regulation (EU) 2017/962 Suspension includes legal deadline for use of ETQ in “feed materials of marine origin”
- Anticipating decision

Drivers need to look at:

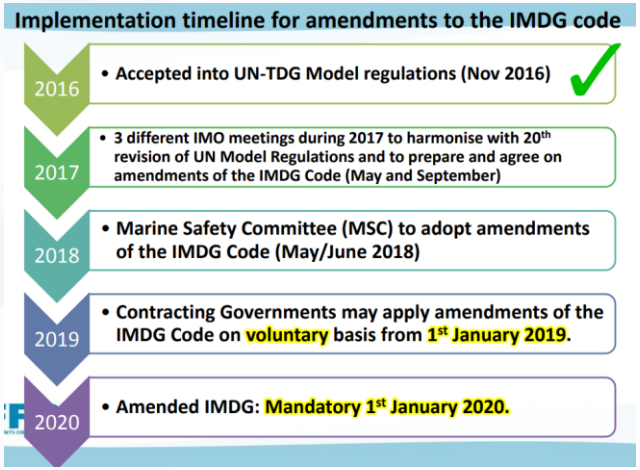
- Reduction in ETQ in shipping regs (in anticipation of any decision)
- Additional listings in shipping regs (tocopherol-based)
- Alternative antioxidants in fishmeal

IMO – IMDG Code Amendment (Packaged Goods)

Shipping of Fishmeal

United Nations Model Regulations Rev 20 accepted text (Nov 2016):

SP 308 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 consignment.



IMO – IMSBC Code Amendment (Bulk Cargoes)

- Requirement to repeat previous work with approach that is appropriate for bulk cargoes
- Trials in Peru, using anchovy fishmeal (regarded as benchmark by IMO)
- 12-month study; ends June 2019
- IFFO drafting report for September IMO meeting

Important background

- 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 limited, but can expect a lot more to come when the EFSA Opinion is published and the EC decision is taken;
- IFFO/FEFAC letter to EC April 2019.

Registration other antioxidants in the EU

- **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)

- **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…

Project Work

Updating the IMSBC Code for Bulk Cargoes

Aim:

- To bring the IMSBC in line with he amendments proposed to the IMDG
- Provide additional data
- Trials work in Peru – Peruvian anchovy is seen as the IMO as a benchmark for fishmeal

Experimental design

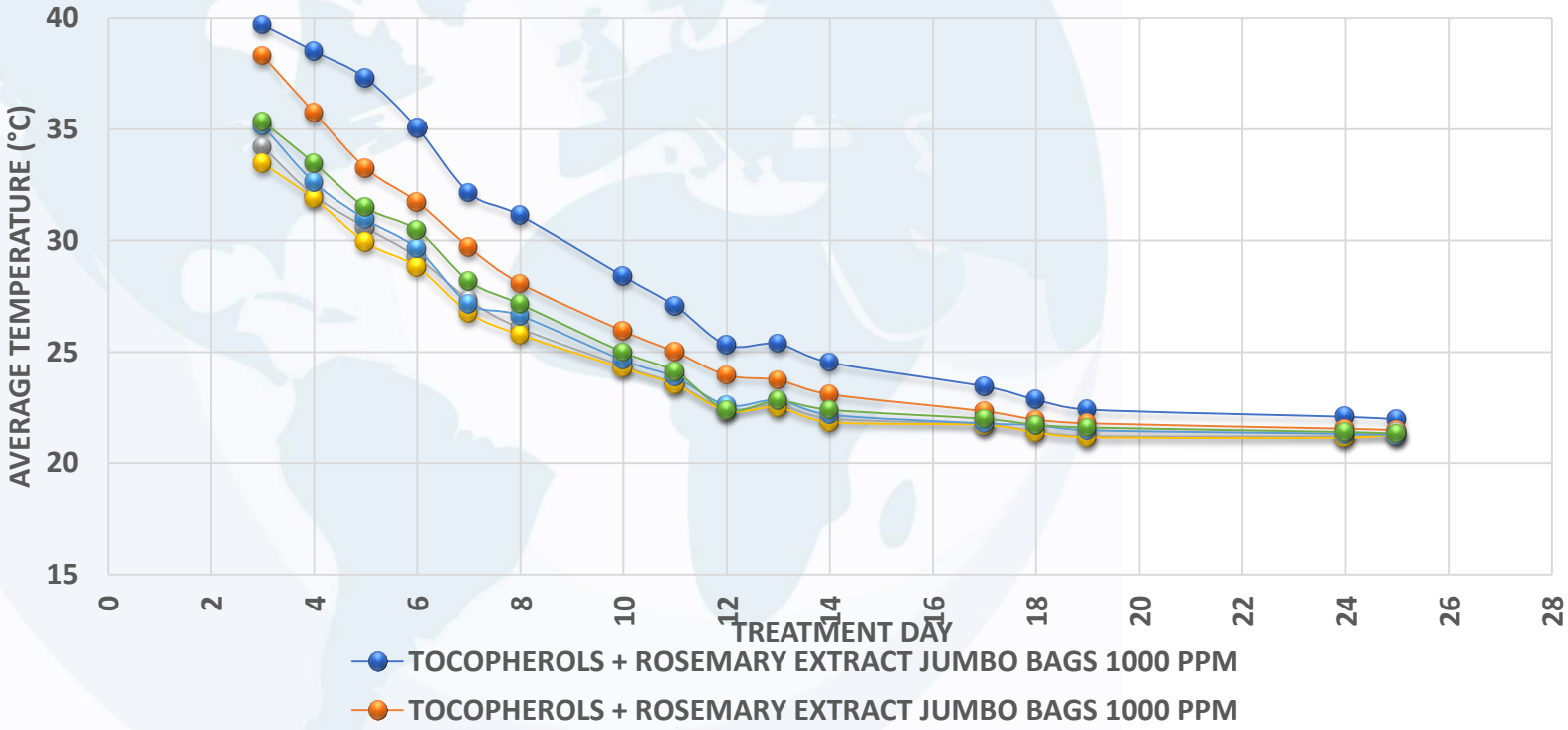
MANUFACTURER	LOCATION	ANTIOXIDANT	DOSAGES (INTENDED TO BE ADDED)(PPM)	TREATMENTS (PPM)	ACTIVE PRINCIPLE (CONVERSION FACTOR FROM LAB ASSAY) (PPM)
COMPANY D	CALLAO	2 x 1 TONNE BAG- TOCOPHEROL + ROSEMARY EXTRACT	1000	995	359
			1500	1386	539
			2000	1935	718
		2 x 1 TONNE BAG- ETHOXYQUIN	202	200	192
		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

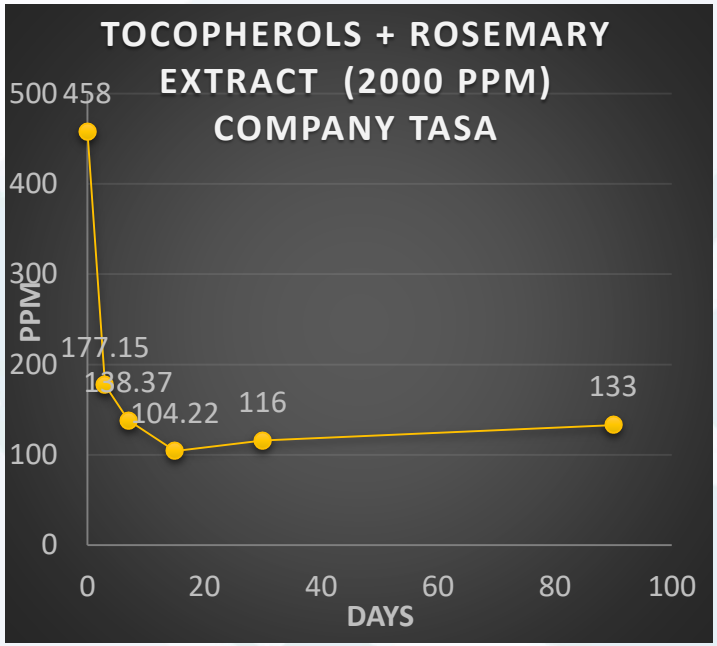
What dosages of product mean in relation to a/ox levels

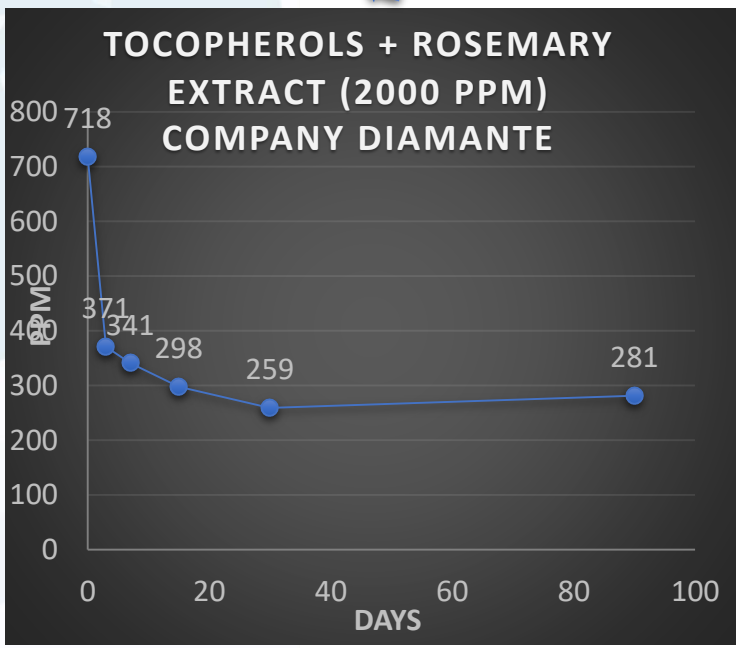
Sampling regime

TREATMENT	0 day	7th day	15th day	1º month	3º month	6º month	9º month	12º month
ALL	A/O, PV, AV, DT, FFA, Ω-3, °C-I, °C-E, Fe, Biogenic amines, TVN, PCA	A/O, °C-I, °C-E			A/O, °C-I, °C-E	A/O, °C-I, °C-E, O_2B	A/O, °C-I, °C-E	A/O, PV, AV, DT FFA, Ω-3, °C-I, °C-E, Biogenic amines, TVN, PCA, SHT, O_2B

Data…


AVERAGE TEMPERATURE (°C)
40
35
30
25
20
15
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TREATMENT DAY
TOCOPHEROLS + ROSEMARY EXTRACT JUMBO BAGS 1000 PPM
TOCOPHEROLS + ROSEMARY EXTRACT JUMBO BAGS 1000 PPM


TOCOPHEROLS + ROSEMARY EXTRACT (2000 PPM) COMPANY TASA
500
400
300
200
100
0
PPM
458
177.15
168.37
104.22
116
133
0
20
40
60
80
100
DAYS


TOCOPHEROLS + ROSEMARY EXTRACT (2000 PPM) COMPANY DIAMANTE
800
700
600
500
400
300
200
100
0
PPM
718
371
341
298
259
281
0
20
40
60
80
100
DAYS

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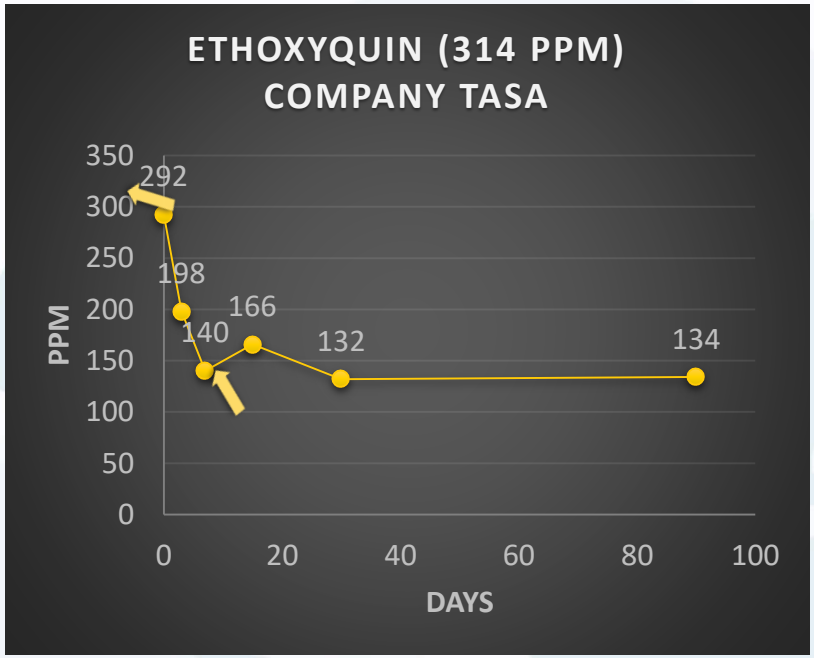

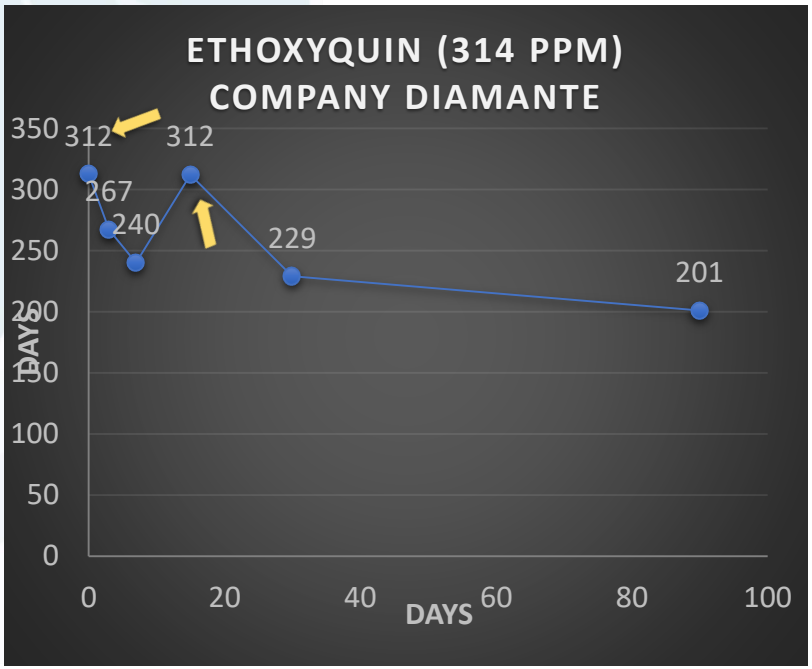

Other fishmeals& their stabilisation?

- Raised by European Members
- Some raw materials likely to produce less reactive meals = less antioxidants to stabilize (e.g. blue whiting)
- Prospect of working on trials to bring this forward to the IMO
- Recent discussions with IMO suggest another approach could be worthwhile

Project work – screening other antioxidants

Some relevant historical work…

18 DEC 1989

THE OXYGEN BOMB TEST

A RELIABLE METHOD TO ASSESS OXIDATION
STABILITY OF FISH MEAL
A CONVENIENT PROCEDURE TO EVALUATE
ANTIOXIDANT EFFECTIVENESS IN FISH MEAL

Submitted to the Scientific Committee Working Groups on Analysis and Processing of the International Association of Fish Meal Manufacturers IAFMM by PESCAPERU.

Prepared by: Dr.Gaston Vargas
Chemical Consultant
Representative of PESCAPERU

December 8, 1989

Aims:

- Screening potential new antioxidants for efficacy (O_2 bomb test)
- Comparison of O_2 bomb equipment performance (possible amendment to IMO Codes as test for verification of stability)

- 31 different antioxidant compounds por preparations (some blends)
- 14 Different manufacturing companies
- Work covered by NDAs
- Experimental work to be undertaken in association with ITP (Lima) using Peruvian anchovy fishmeal
- Fishmeal sourced as a/ox free for trials work
- O_2 bomb results – measure of stability
- Research to be completed in 2019

Some caveats

- Some compounds registered for different applications & may need to undergo application for feed
- Appears to be influence of carriers (protocol is important in getting meaningful results)
- IFFO cannot take the products to market (but is working with manufacturers to indicate the potential market opportunity)
- Amendments to IMO Codes will take additional work (unless a test approach can be adopted)

Thanks for your attention