



# ANTIOXIDANTS IN FISHMEAL: CONCERNS & REGULATORY RESPONSES



Southern  
Shrimp  
Alliance



# ANTIOXIDANTS IN FISHMEAL: CONCERNS & REGULATORY RESPONSES



## PRESENTATION OUTLINE

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- **Context:** Overview of Fishmeal and Antioxidant Use
- **Ethoxyquin: A Global Concern**
  - **Concerns:** Animal & Human Health
  - **Stakeholders & Actions:**
    - Key Stakeholders in Fishmeal Supply Chain
    - Global Concerns & Response
    - Supplier Response
    - U.S. Response
- **Alternative Antioxidants**
- **The Future of EQ and Antioxidants used in Fishmeal and Seafood**
- **Looking Ahead:** Next Steps?



# **A BRIEF OVERVIEW OF ANTIOXIDANT USE IN FISHMEAL**

# Purpose of Antioxidants in Fishmeal



- **What is fishmeal?**
  - Nutrient-rich feed ingredient
  - Made from small, oily fish, by-catch, or by-products of seafood processing
- **Purpose of Antioxidants**
  - Preservative
  - Maintain nutritional value
- **Antioxidants used in fishmeal can be synthetic or natural**



## ETHOXYQUIN: A GLOBAL CONCERN

# Ethoxyquin: What is it?

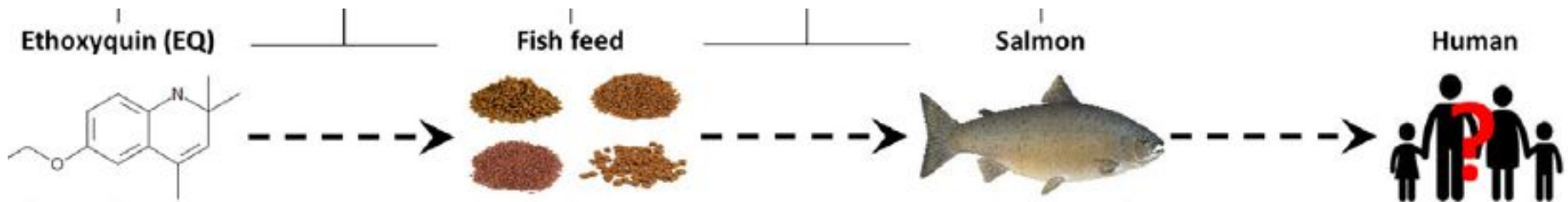


- Ethoxyquin is an antioxidant used in various animal feed products
  - Preservative to keep fishmeal from oxidizing and spoiling
- Originally used as pesticide to control scald on pears after harvest
- Frequently used in pet food to lengthen shelf life while maintaining its nutritional content
- In fishmeal, it is used for its antioxidant properties to prevent spontaneous combustion during transportation

# Ethoxyquin Concerns: Human & Animal Health



**Main Question:** Can EQ in fish feed can be transferred to the edible parts of farmed seafood and thereby affect food safety?



# Ethoxyquin Concerns: Key Studies on Human Health



| Study                                                       | Key Findings on Human Health Risks                                              | Key Findings on Animal Exposure                                                                                           |
|-------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <i>EU EFSA (2022)</i>                                       | Potential risk from unknown levels of p-phenetidine in animal products          | Mutagenicity concerns for long-lived and reproductive animals due to p-phenetidine impurity                               |
| <i>South Korean Ministry of Food and Drug Safety (2020)</i> | No significant health risk from EQ under current consumption patterns           | Farmed fish highly exposed to EQ, leading to EQDM accumulation and food chain persistence concerns                        |
| <i>International Journal of Food Science (2013)</i>         | Chronic exposure could raise concerns about toxicity and mutagenicity in humans | EQ and EQDM can bioaccumulate in long-lived animals like breeding livestock and fish, increasing long-term exposure risks |

# Ethoxyquin Concerns: U.S. Studies on Human Health



## U.S. EPA's 2004 Dietary Risk Assessment re Health Effects of EQ on Human and Animal Health

- EQ poses a relatively low risk to human health
  - **Short-term toxicity** → Low to moderate toxicity when swallowed, inhaled, or absorbed through the skin.
  - **Long-term toxicity** → Affects liver and kidneys in animal studies, but the implications for humans at normal exposure levels are unclear.
  - **Cancer risk** → Uncertain. EQ itself has not been fully tested for carcinogenicity, but a related chemical showed some cancer risk in rats.
  - **Reproductive/developmental risk** → No clear evidence of harm to fetal development or reproductive health.



# Key Stakeholders in the Fishmeal Supply Chain

# Key Stakeholders in the Fishmeal Supply Chain



## **Producers and Suppliers:**

- Peru
- China
- Chile
- Denmark
- Morocco
- U.S.
- Vietnam
- India
- Thailand

## **Importers of Fishmeal for Aquaculture Purposes:**

- China
- Norway
- Japan
- Vietnam

## **Importers with Bans/Limitations of EQ in Seafood:**

- EU / UK / EEA Members
- U.S.
- Japan
- Australia
- South Korea



## Global Response to Ethoxyquin Concerns: Regulations & Monitoring

# Global Response to Ethoxyquin: Key Regulatory Systems



## **Stabilization, Transportation, and Safety:**

- Managed by the United Nations International Maritime Organization (IMO)
- Codes and Conventions: IMDG (Packaged Goods) and IMSBC (Bulk Cargoes)
- These regulations specify minimum antioxidant levels to ensure fishmeal stability and safety during transport.
  - **Ex:** U.S DOT regulates EQ levels in fish meal or fish scrap for safe shipping.

## **Animal Feed and Food Safety:**

- Focuses on maximum allowable limits of antioxidants.
- Limits are driven by scientific assessments of safety risks to animals and humans.
  - **Ex:** U.S. FDA regulates EQ levels in animals, fish, and derivatives for human consumption; U.S. EPA regulates EQ levels when used as a pesticide.
- Most jurisdictions regulate antioxidant use in fishmeal and compound feeds, typically by setting maximum concentration limits.

# Global Response to Ethoxyquin: Regulations & Monitoring in the EU, UK, and EEA Members



- **Where ethoxyquin has been banned:** The EU, the UK, and members of the European Economic Area (EEA), including Norway, Iceland, and Lichtenstein
  - In the EU, EQ was authorized as a feed additive for all animal species and categories until 2017; categorized as a “technological additive”
  - EFSA opinion published in 2015
- **2017 Study & Temporary Restriction**
  - Regulation (EU) 2017/962
- **2022 Study & Official Ban 2022**
  - EFSA 2022 study
    - **Safe for:** Meat-producing animals with short lifespans (e.g., poultry, fish)
    - **Uncertain for:** Animals with long life expectancy, animals bred for reproduction, consumers, and ecosystems
    - **Concerns remain:** About contamination risks and worker exposure
  - Regulation (EU) 2022/1375: Instituted zero-tolerance policy for EQ in feed and animal products, including seafood.

# Global Response to Ethoxyquin: EU Import Refusals



## EU RASFF Fishmeal Import Refusals:

| Category       | Type | Subject                                                                                                                                         | Date                   | Notifying Country | Classification                         | Risk Decision  | Origin              | Hazards                                                      |
|----------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------|----------------------------------------|----------------|---------------------|--------------------------------------------------------------|
| feed materials | feed | unauthorized substance ethoxyquin and presence of Salmonella spp. in fish meal from Mexico                                                      | 05-09-2024<br>13:22:54 | Greece            | border rejection notification          | potential risk | Mexico              | Salmonella Montevideo ,ethoxyquin unauthorised feed additive |
| feed additives | feed | Prohibited feed additive ethoxyquin (E324) in protein concentrate from Latvia                                                                   | 28-08-2023<br>16:25:59 | Lithuania         | information notification for follow-up | potential risk | Latvia              |                                                              |
| feed materials | feed | Unauthorised substance ethoxyquin in supplementary feed for dairy cows from Germany, produced in Italy with raw material from the United States | 16-12-2022<br>14:04:28 | Germany           | information notification for follow-up | undecided      | Italy,United States | ethoxyquin no definition                                     |
| feed materials | feed | Unauthorized substance ethoxyquin in feed for fish from Spain                                                                                   | 07-09-2021<br>14:07:03 | Germany           | information notification for follow-up | undecided      | Spain               | ethoxyquin no definition                                     |
| feed materials | feed | DDT / Ethoxyquin in marrokanischem Fischmehl /// DDT / Ethoxyquin in fishmeal from Morocco                                                      | 03-09-2020<br>16:45:51 | Germany           | information notification for follow-up | undecided      | Morocco             | DDT prohibited substance, ethoxyquin no definition           |
| feed additives | feed | Ethoxyquin in feed additive from Germany                                                                                                        | 01-07-2020<br>16:48:50 | Germany           | information notification for follow-up | not serious    | Germany             | ethoxyquin unauthorised food additive                        |
| feed materials | feed | unauthorised feed additive E 324 - ethoxyquin and too high content of E 250 - sodium nitrite in shrimp meal from Ecuador                        | 23-06-2020<br>17:32:57 | Germany           | information notification for follow-up | not serious    | Ecuador             | ethoxyquin no definition,nitrite too high content            |
| feed materials | feed | Prohibited additive ethoxyquin in LIPOFISH 50                                                                                                   | 31-03-2020<br>11:56:26 | Netherlands       | information notification for follow-up | not serious    | United Kingdom      |                                                              |

# Global Response to Ethoxyquin: Regulations & Monitoring in Japan



- **MRL in shrimp: 0.01 ppm**
- **India's WTO Dispute on Japan's Ethoxyquin MRL Standards**
  - **August 2012:** Japan introduced the MRL of shrimp (0.01 ppm).
  - **October 2012:** India raised concerns over Japan's 0.01 ppm residue limit for Ethoxyquin in shrimp, stricter than the Codex MRL (3 ppm).
  - **March 2013:** India criticized Japan for setting arbitrary MRLs without scientific evidence, pointing out the higher MRL for fish (1 ppm) compared to shrimp (0.01 ppm). Japan explained the 0.01 ppm limit was due to the absence of Codex standards and data for shrimp, with ongoing risk assessments for Ethoxyquin.
  - **June 2013:** India continued to challenge the MRLs, urging Japan to base decisions on scientific evidence.
  - **October 2013:** India proposed a provisional MRL for shrimp; Japan suggested a draft MRL of 0.2 ppm and continued bilateral talks.
  - UN FAO/WHO Codex added EQ to its priority list for evaluation in 2013

# Global Response to Ethoxyquin: Regulations & Monitoring in Australia & South Korea



## Australia

- Permitted for use as a feed additive
- Fish and fish products MRL: 1 ppm

## South Korea

- Fish MRL: 1 ppm
- Crustaceans: 0.2 ppm

# Global Response to Ethoxyquin: Regulations & Monitoring Summary



| Country/Region     | Ethoxyquin MRL (Shrimp) | Ethoxyquin MRL (Fish)  | Additional Notes                                                                                                                                                                                                          |
|--------------------|-------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EU</b>          | Banned, zero tolerance  | Banned, zero tolerance | Banned as feed additive since 2022; concerns for long-lifespan animals and ecosystems                                                                                                                                     |
| <b>Japan</b>       | 0.2 ppm                 | 1 ppm                  | Initially applied a default MRL of 0.01 ppm for shrimp due to lack of Codex standards. Following WTO discussions with India, Japan revised the MRL for shrimp to 0.2 ppm in 2014, while maintaining a 1 ppm MRL for fish. |
| <b>Australia</b>   | Not specified           | 1 ppm                  | Permitted as feed additive, MRL for fish is 1 ppm                                                                                                                                                                         |
| <b>South Korea</b> | 0.2 ppm                 | 1 ppm                  | Australia's MRL at 1 ppm is for fish and fish products.                                                                                                                                                                   |
| <b>U.S.</b>        | 0.5 ppm                 |                        | U.S.'s MRL of 0.5 ppm applies to EQ in or on the uncooked muscle meat of animals, including fish and shrimp. Feed labels must include EQ concentration and purpose.                                                       |

# Supplier Response to Ethoxyquin Regulations



## Peru

- **Compliance with Global Regulations:**
  - As of 2022, 100% of fishmeal exports to key markets (EU, US, Canada, and Australia) are ethoxyquin-free.
  - Fishmeal is now treated with alternative synthetic antioxidants like BHT and BHA to meet stricter regulations.
- **Domestic Market Shifts:**
  - Even within the Peruvian domestic market, there has been a transition toward using BHT-treated fishmeal.
  - BHT-treated fishmeal is used for shrimp feed production for both local use and export.

# Supplier Response to Ethoxyquin Regulations



## Vietnam

- **Regulatory Status:**
  - EQ is not banned in Vietnam for animal and aquatic feeds.
  - Allowable threshold: 150 ppm in fish feed per Circular 4/2020/TT-BNNPTNT (Mar. 2020).
- **Compliance with Export Markets:**
  - Vietnam ensures aquafeed destined for the EU does not contain EQ to meet the EU's residue standards.
  - The Ministry of Agriculture and Rural Development (MARD) has conducted inspections and required feed producers to align practices with international standards.
  - Growing demand for BHT alternative fishmeal in Vietnam.
- **Industry Challenges:**
  - Exports to key markets like Japan and the EU have declined. Some processors report reductions of up to 35%.
  - Increased compliance costs for testing and supply chain controls.
  - Reliance on fishmeal imports from Peru and Chile (contained EQ until 2022) complicates local production adjustments.

# Supplier Response to Ethoxyquin Regulations



## **China**

- As of November 2022, China still authorizes using EQ in food and animal agriculture & aquaculture but faces pressure to discontinue purchasing EQ-treated fishmeal as other countries ban or phase it out.

## **India**

- Currently, there is no public record that indicates India is moving towards implementing regulations on EQ. There is a record that indicates India is trying to appeal the FAO/WHO's EQ standards.

## **Ecuador**

- No MRL for EQ. In cases where Ecuador does not have its own established MRLs, it applies UN FAO/WTO Codex standards.

# U.S. Response to Ethoxyquin



- U.S. Government-led studies on the impacts of EQ on human health have been primarily conducted by the U.S. EPA (2004 and 2019). The EPA has evaluated EQ safety in:
  - **Primary Residues:** Direct residues on food products treated with EQ (e.g., pears).
  - **Secondary Residues:** Indirect residues in animal products (e.g., meat, milk, eggs, seafood) resulting from EQ in animal or fish feed.
- In 2019, EPA reviewed industry data on secondary residues in animal products (meat, milk, eggs). EPA also reviewed international studies on EQ residues for seafood.
  - **Conclusions:** Secondary residues in meat, milk, and eggs were deemed to pose negligible risk. There is not enough evidence or reliable data to definitively determine whether EQ or its metabolites are carcinogenic.

# U.S. Response to Ethoxyquin



## U.S. Food and Drug Administration's Role:

- To approve and oversee animal/fish feed additives
- To monitor and regulate seafood imports for safety and compliance with health standards

## Feed:

- The FDA does not routinely test feed products.
- EQ is banned for direct use in food processing but is still allowed in some animal feeds, including those for farmed fish.
- Relevant Regulations:
  - **21 CFR 172.140 - MRL:** The maximum quantity of EQ to be used and to remain in or on the treated article [complete animal food and forage] cannot exceed **150 ppm**.
  - **21 CFR § 573.380 - Labeling Requirements:** **1)** The name of the additive (EQ). **2)** The concentration of the additive. **3)** Directions for use to ensure proper final concentration. Animal feed labels must explicitly state EQ is used as a preservative or retard oxidation.

## Seafood:

- The FDA conducts inspections when EQ levels exceed allowable limits. FDA inspection data of shrimp reveals few instances where EQ was detected.
- **21 CFR 172.140:** The established tolerance for EQ residue is **0.5 ppm** in or on the uncooked muscle meat of animals (including fish/crustaceans).

# U.S. Response to Ethoxyquin



## Response to FDA's Lack of Testing:

“FDA has long acknowledged the ‘deleterious and poisonous’ effects of EQ; Agency correspondence in response to Monsanto’s petition for the chemical’s approval demonstrates that EQ was well recognized as harmful and poisonous. In 1990, FDA nominated EQ for carcinogenicity testing, reasoning that its toxicological effects were unknown and it appeared ‘to have a modifying effect on other carcinogenic chemicals.’ Despite its expressed concern about the safety of EQ, to date the Agency has failed to take meaningful action to reevaluate or restrict the use of the additives.”

— Center for Food Safety, *America’s Secret Animal Drug Problem* (2015)

# U.S. Response to Ethoxyquin: FDA Import Refusals



## U.S. FDA Shrimp Refusals:

| Collection Date | Status Date | Origin Desc | Reason for Collection                                                                                           | Product Code Desc                                                 | Product Description        | Firm FEI, Name, Address                                                                           | Country of Origin Name | Lab Conclusion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------|-------------|-------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9/10/15         | 9/14/15     | Domestic    | Collected as part of FY15 Scope Sample Assignment for chemotherapeutic drugs. Check RE: Chemotherapeutic drugs. | SHRIMP AND PRAWNS, AQUACULTURE HARVESTED FISHERY/SEAFOOD PRODUCTS | Head-on farm raised shrimp | 30052373 70 St. Martin Seafood [Grower] P.O. Box 690, 3104 FM 3280, Palacios, TX, 77465-069 0, US | United States          | <p>Product Code: 16X-21<br/>Product: SHRIMP AND PRAWNS, AQUACULTURE HARVESTED FISHERY/SEAFOOD PRODUCTS; Head-on farm raised shrimp</p> <p>Lab Class: 2 Date: 9/24/15 PAC: 04018 LAB: KCLHAF PAF: PES<br/>Conclusion: Diphenylamine found at 0.006 ppm; No tolerance.<br/><b>Ethoxyquin detected at 0.020 ppm; below 0.5 ppm tolerance Per 21 CFR 172.140</b></p> <p>Lab Class: 1 Date: 9/28/15 PAC: 04018 LAB: KCLHAF PAF: ELE<br/>Conclusion: Duplicate portions of sample were analyzed for Chromium (Cr), Arsenic (As), Cadmium (Cd), Mercury (Hg) and Lead (Pb).<br/>Duplicate portions were digested and determined by ICPMS according to EAM 4.7 method.<br/>Findings:<br/>Cr: 0.045 ppm, 0.049 ppm [avg. 0.047 ppm]<br/>As: 0.318 ppm, 0.307 ppm [avg. 0.312 ppm]<br/>Cd: 0.010 ppm, 0.009 ppm [avg. 0.010 ppm]<br/>Hg: 0.008 ppm, 0.008 ppm [avg. 0.008 ppm]<br/>Pb: 0.016 ppm, 0.016 ppm [avg. 0.016 ppm]<br/>Values between LOD and LOQ are trace.<br/>QC recoveries:<br/>Sample was co-analyzed with 659139. Refer to 659139 for QC data<br/>Procedural Blanks were satisfactory.<br/>LOD: Cr: 0.001 ppm As: 0.002 ppm Cd: 0.0002 ppm Hg: 0.001 ppm Pb: 0.001 ppm.<br/>LOQ: Cr: 0.003 ppm As: 0.018 ppm Cd: 0.002 ppm Hg: 0.006 ppm Pb: 0.006 ppm</p> <p>Lab Class: 1 Date: 10/7/15 PAC: 04018 LAB: KCLHAF PAF: ANT<br/>Conclusion: No reportable nitrofurans or chloramphenicol.</p> <p>Note: AHD Curve linearity is 0.983 due to low response from one point. AMOZ 58% &amp; 65% recovery (below 70% criteria), SCA high RPD 31% (above 20% criteria).</p> |
| 9/10/15         | 9/14/15     | Domestic    | Collected as part of FY15 Scope Sample Assignment for chemotherapeutic drugs. Check RE: Chemotherapeutic drugs. | SHRIMP AND PRAWNS, AQUACULTURE HARVESTED FISHERY/SEAFOOD PRODUCTS | Head-on farm raised shrimp | 30052373 70 St. Martin Seafood [Grower] P.O. Box 690, 3104 FM 3280, Palacios, TX, 77465-069 0, US | United States          | <p>Product Code: 16X-21<br/>Product: SHRIMP AND PRAWNS, AQUACULTURE HARVESTED FISHERY/SEAFOOD PRODUCTS; Head-on farm raised shrimp</p> <p>Lab Class: 1 Date: 9/24/15 PAC: 04018 LAB: KCLHAF PAF: PES<br/><b>Conclusion: Ethoxyquin detected at 0.007ppm; below 0.5 ppm tolerance Per 21 CFR 172.140</b></p> <p>Lab Class: 1 Date: 9/28/15 PAC: 04018 LAB: KCLHAF PAF: ELE<br/>Conclusion: Duplicate portions of sample were analyzed for Chromium (Cr), Arsenic (As), Cadmium (Cd), Mercury (Hg) and Lead (Pb).<br/>Duplicate portions were digested and determined by ICPMS according to EAM 4.7 method.<br/>Findings:<br/>Cr: 0.044 ppm, 0.047 ppm [avg. 0.046 ppm]<br/>As: 0.336 ppm, 0.347 ppm [avg. 0.341 ppm]<br/>Cd: 0.009 ppm, 0.009 ppm [avg. 0.009 ppm]<br/>Hg: 0.007 ppm, 0.007 ppm [avg. 0.007 ppm]<br/>Pb: 0.019 ppm, 0.019 ppm [avg. 0.019 ppm]<br/>Values between LOD and LOQ are trace.<br/>QC recoveries:<br/>Sample was co-analyzed with 659139. Refer to 659139 for QC data<br/>Procedural Blanks were satisfactory.<br/>LOD: Cr: 0.001 ppm As: 0.002 ppm Cd: 0.0002 ppm Hg: 0.001 ppm Pb: 0.001 ppm.<br/>LOQ: Cr: 0.003 ppm As: 0.018 ppm Cd: 0.002 ppm Hg: 0.006 ppm Pb: 0.006 ppm</p> <p>Lab Class: 1 Date: 10/19/15 PAC: 04018 LAB: KCLHAF PAF: ANT<br/>Conclusion: No reportable nitrofurans or chloramphenicol.</p> <p>Note: AMOZ curve linearity is 0.964 and SCA is 0.982 due to high response from one point. All spike recoveries quantitated from curves as-is met recovery and RPD criteria.</p>                                         |

# U.S. Response to Ethoxyquin: FDA Import Refusals



## U.S. FDA Shrimp Refusals:

### Lab Conclusion

Product Code: 16X--21

Product: SHRIMP AND PRAWNS, AQUACULTURE HARVESTED FISHERY/SEAFOOD PRODUCTS; Head-on farm raised shrimp

Lab Class: 2 Date: 9/24/15 PAC: 04018 LAB: KCLHAF PAF: PES

Conclusion:

Diphenylamine found at 0.006 ppm; No tolerance.

Ethoxyquin detected at 0.020 ppm; below 0.5 ppm tolerance Per 21 CFR 172.140

Product Code: 16X--21

Product: SHRIMP AND PRAWNS, AQUACULTURE HARVESTED FISHERY/SEAFOOD PRODUCTS; Head-on farm raised shrimp

Lab Class: 1 Date: 9/24/15 PAC: 04018 LAB: KCLHAF PAF: PES

Conclusion: Ethoxyquin detected at 0.007ppm; below 0.5 ppm tolerance Per 21 CFR 172.140

# UN FAO and WHO Response to Ethoxyquin



- EQ was on the UN FAO & WHO priority list since 2013
  - Priority list: A list of food additives that require priority evaluation for potential health risks and need further research to establish safe levels of intake and purity standards for their use in food products.
- In 2023, India and the Philippines nominated EQ for review, citing available toxicology and residue data for shrimp muscle.
- As of 2024, no longer on the FAO/WHO priority list for evaluation due to the absence of updated data. FAO/WHO will not be conducting re-evaluation of EQ standards.

**ETHOXYQUIN ALTERNATIVES:**

**OTHER ANTIOXIDANTS USED IN FISHMEAL**



# **THE FUTURE OF ETHOXYQUIN: ALTERNATIVE ANTIOXIDANTS USED IN FISHMEAL**

# ALTERNATIVE ANTIOXIDANTS USED IN FISHMEAL:

## Synthetic Antioxidants



### **Synthetic antioxidants are...**

- Produced through chemical synthesis in labs
- Chemically uniform and designed for specific stability and effectiveness in their applications (consistent in quality)
- Highly effective at maintaining nutritional quality of feed
- Generally more cost effective to produce
- More stable and effective over wide range of condition (e.g., high temperatures, long storage periods)
- Potentially linked to health risks (e.g., EQ)

### **Commonly Used Alternatives**

- BHT (Butylated Hydroxytoluene)
- BHA (Butylated Hydroxyanisole)
- Propyl Gallate
- TBHQ (Tert-Butylhydroquinone)

# Natural Antioxidants



## **Natural antioxidants are...**

- Extracted from natural sources like plants, fruits, vegetables, and certain oils
- Typically more expensive due to the need for extraction, processing, and sometimes limited availability of raw materials
- Potentially less stable under certain conditions (e.g., heat or light); faster degradation
- Generally regarded as safer since they are derived from natural sources

## **Natural Alternatives in Fishmeal:**

- Tocopherols (Vitamin E and derivatives)
- Ascorbic Acid (Vitamin C and derivatives)
- Carotenoids
- Rosemary Extract



## THE FUTURE OF EQ AND OTHER ANTIOXIDANTS USED IN FISHMEAL AND SEAFOOD

# What does this mean for the U.S. Shrimping Industry?



- EQ as a feed additive and most likely does pose major safety risks or health hazards to humans at its current FDA-determined MRL.
- The U.S. market may be receiving shrimp that has been diverted from the EU, Japan, and South Korea—countries with stricter MRLs for EQ.
- Between 2001 and 2024, FOIA data provided to SSA regarding shrimp sampling reported just two instances where the FDA tested for ethoxyquin. Increased testing may be necessary to ensure shrimp with elevated EQ levels is not reaching consumers.

# RECENT LEGISLATION RE FOOD ADDITIVES (118<sup>th</sup> Congress)



## Food Chemical Reassessment Act of 2023 (H.R. 3927) & Similar Senate Bill Ensuring Safe and Toxic-Free Foods Act of 2023 (S. 3387):

- **Introduced by:** Rep. Schakowsky (D-IL-09); 3 Democrat co-sponsors
- Amend the FD&C Act to establish the Office of Food Safety Reassessment within the Center for Food Safety and Applied Nutrition. The Office will reassess the safety of food additives, food contact substances, substances generally recognized as safe (GRAS), and prior-sanctioned substances.
- **Regular Reassessments of Food Substances:** The Office must reassess at least 10 food substances or classes of substances every three years.
- For each reassessed substance, the Office will issue final regulations to: (1) confirm its safety and establish safe conditions of use, or (2) determine that the substance is unsafe and should no longer be used.
- **Initial Substances for Reassessment:** The first 10 substances to be reassessed include tert-butylhydroquinone (TBHQ), butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT)

# RECENT LEGISLATION RE FOOD SAFETY (118<sup>th</sup> Congress)



## Imported Seafood Safety Standards Act (H.R. 1057):

- **Introduced by:** Rep. Clay Higgins (R-LA-03); 3 Republican co-sponsors
- Enhances seafood safety by strengthening inspection, testing, and certification requirements for imported seafood.
  - Foreign countries must have certified safety programs that comply with U.S. seafood safety standards.
  - The FDA must conduct annual inspections of all foreign seafood facilities exporting to the U.S.
- **Mandatory Testing of Imports**
  - At least 20% of imported seafood must be inspected and tested annually
  - New exporters must have their first 15 shipments tested.
  - Failed inspections lead to additional testing, and multiple failures result in suspension from U.S. markets for at least one year.
  - Countries with repeated failures may face a ban on all seafood imports until compliance is verified.
- **Handling of Rejected Shipments**
  - Shipments that fail inspection must be detained, destroyed, or re-exported.
  - Secretary has the authority to destroy shipments that pose significant health risks.

# RECENT LEGISLATION RE FOOD SAFETY (118<sup>th</sup> Congress)



## **Imported Seafood Safety Standards Act (H.R. 1057) continued:**

- **State-Level Seafood Inspection Program**

- Establishes a cooperative inspection program allowing states to inspect imported seafood.
- Grants will be awarded to states for participating in the program.

- **Penalties for Violations**

- False statements or misbranding related to seafood testing/inspections are prohibited.
- **Fines:** Up to \$250,000 per violation, with a maximum of \$1.1 million for repeated offenses over three years.

- **Annual Report to Congress:** The FDA must submit an annual report on inspections, compliance trends, and recommended improvements to seafood safety enforcement.

# ANTIOXIDANTS IN FISHMEAL: CONCERNS & REGULATORY RESPONSES



## NEXT STEPS?