

TECHNICAL-COMMERCIAL MONOGRAPH

Next-generation antioxidants for animal
feed

OXIPROTECT™ Feed & Pet Range



1. INTRODUCTION

Lipid oxidation is one of the main factors leading to loss of quality, stability, and nutritional value in modern animal feed. The increased use of raw materials rich in polyunsaturated fatty acids (PUFAs), recycled by-products, marine oils, and intensive thermal processes has intensified the need for effective, safe, and robustly regulated antioxidant systems.

INTABIOTECH develops the OXIPROTECT™ range as an antioxidant architecture: not generic products, but systems designed according to the matrix, process, and economic objectives of the feed manufacturer. Each formulation addresses a specific sector need, combining technical efficacy with full regulatory compliance.





2. OXIDATION IN ANIMAL FEED: A REAL PROBLEM, A HIDDEN COST




Where oxidation occurs

- Animal/vegetable oils and fats
- Fish and meat meals
- Complete feeds (fat phase + solid phase)
- Vitamin-mineral premixes
- Extruded pet food and snacks



Technical and economic consequences

- Formation of peroxides, aldehydes, and ketones
- Loss of metabolizable energy
- Degradation of vitamins A, D, E, and K
- Rancid odours and feed rejection
- Oxidative stress and reduced productive performance

 **Conclusion:** Oxidation is not just a quality issue; it's a profitability issue. The hidden costs directly impact the manufacturer's competitiveness.

3. REGULATORY FRAMEWORK (EU – PRACTICAL APPROACH)

Legal Basis

Regulation (EC) No 1831/2003 on additives for use in animal nutrition

Category: Technological additives – Antioxidants (1b)

Authorised Antioxidant Types



Natural Tocopherols

Tocopherol-rich extracts (E306–E309) with wide acceptance



Organic Acids

Ascorbic acid and derivatives (E300–E304), citric acid and salts (E330)



Authorised Synthetics

Propyl gallate (E310), BHA (E320), BHT (E321), TBHQ (E319)



Natural Flavourings

With secondary antioxidant activity (e.g. rosemary extract)

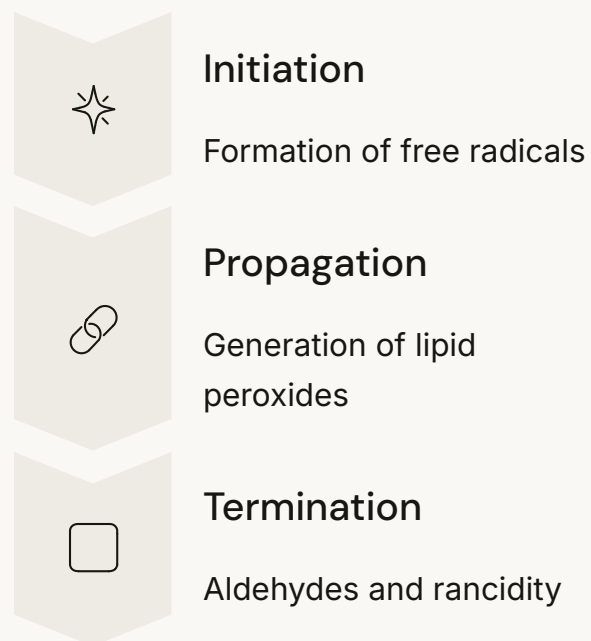
Regulatory Trends

- Increased pressure on purely synthetic antioxidants
- Review and restrictions on Ethoxyquin in certain markets
- Growing demand for "natural-based" and documented solutions

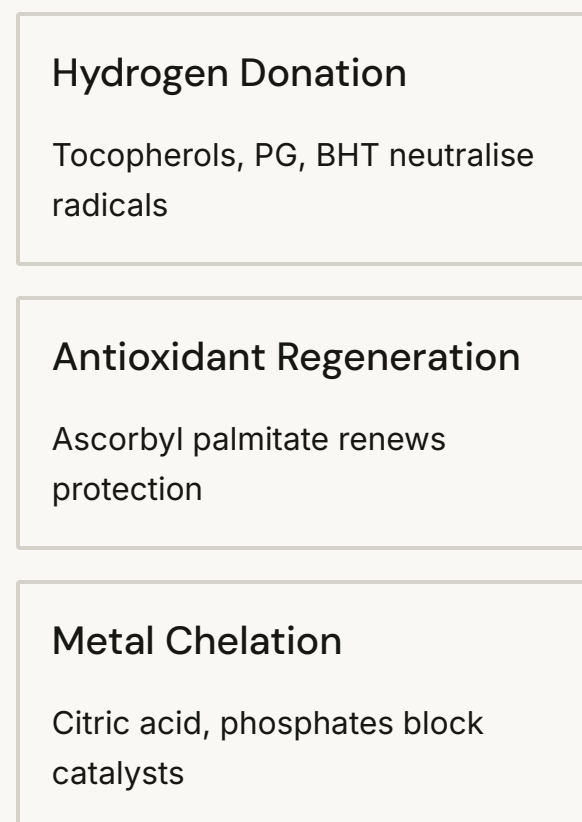


4. ANTIOXIDANT TECHNOLOGY: FROM MOLECULE TO SYSTEM

Oxidation Mechanisms



Protection Mechanisms



OXIPROTECT™ Principle

Real efficacy is achieved through synergy, not by overdosing a single molecule. Each component enhances the action of the others, creating a more robust and economical protection system.





5. LIMITATIONS OF THE CURRENT MARKET

Undifferentiated products

Generic offering without adaptation to the specific needs of each matrix or production process

Limited customisation per matrix

"One-size-fits-all" solutions that do not optimise protection according to the type of fat or feed

Focus on £/kg and not on cost per protected tonne

Purchasing decisions based on unit price without evaluating real efficacy or economic performance

Poor technical documentation for audits

Lack of regulatory and technical support when facing demanding clients and competent authorities

❏ **OXIPROTECT™ was created to fill this gap.** We develop intelligent antioxidant systems that respond to the real needs of the modern feed manufacturer.

6. OXIPROTECT™ FEED & PET RANGE

6.1 OXIPROTECT™ Feed AO-LQ

Synergistic natural system for fats and feedstuffs



Technological Basis

Tocopherols + ascorbyl palmitate + citric acid in an optimised formulation



Application

Vegetable and animal oils, complete feedstuffs, vitamin premixes



Key Benefit

Greater oxidative stability at lower dosages than standard tocopherols



The synergistic combination of natural antioxidants allows for a 20-30% reduction in application dosages compared to conventional formulations, maintaining or improving stability parameters (peroxide value, TBARS, Rancimat test).



6.2 OXIPROTECT™ Feed AO-SX

Hybrid System for Maximum Performance



Technological Basis

Strategic combination of tocopherols + PG + BHT/TBHQ for maximum protection



Specific Application

Fish meals, recycled fats, matrices with high initial peroxide value



Key Benefit

Validated technical alternative to Ethoxyquin with comparable or superior performance

Designed for extreme situations where maximum antioxidant power is required. Especially effective in matrices with high omega-3 fatty acid content susceptible to accelerated oxidation. Meets the expectations of clients looking to move away from Ethoxyquin without compromising final product stability.

6.3 OXIPROTECT™ GrainGuard DRY

Powdered Antioxidant for Dry Matrices



Technological Basis

Tocopherols adsorbed on mineral carrier + synergistic antioxidants in high-fluidity powder format

Application

Vitamin-mineral premixes, floury feeds, concentrates, situations without liquid dosing

Benefit

Perfect dosing without the need for liquid dosing equipment

Ideal solution for premix manufacturers or factories with technical limitations for incorporating liquid antioxidants. Microencapsulation technology ensures homogeneity in mixing and early protection of fat-soluble vitamins from the premix stage.

6.4 OXIPROTECT™

PetPremium NAT

100% natural origin system for premium pet food

Clean label formulation

Base: natural tocopherols + high concentration deodorised rosemary extract

No BHA, no BHT, no propyl gallate, no synthetics

- Ideal for premium and super-premium brands
- Transparent and consumer-friendly declaration
- Compliance with "natural" market trends

Application and advantages

Extruded snacks

Post-processing rancidity control

Premium feeds

Stability without compromising image

Real clean label

Not just marketing, demonstrated technical efficacy

Responds to the growing demand from end consumers for "natural" products without sacrificing real antioxidant protection. Improves aroma, acceptance, and shelf life.



6.5 OXIPROTECT™ AquaGuard

Specific omega-3 protection in aquaculture



Technical Challenge

EPA/DHA fatty acids are extremely susceptible to oxidation, especially during high-temperature extrusion processes.



AquaGuard Solution

System based on tocopherols + PG + ascorbyl palmitate, specifically dosed for marine feed.



Result

Maximum PUFA protection with extended stability during storage.



Designed to withstand the most demanding manufacturing and storage conditions in aquaculture. It protects the investment in high-value marine oils and maintains the nutritional profile of the feed.

6.6 OXIPROTECT™ MultiShield

Antioxidant + Preservative: Dual Protection

Innovative Concept

Combination of OXIPROTECT™ antioxidant system with organic acids for preservative action

Strategic Application

Feeds with simultaneous oxidative AND microbiological risk (residual moisture, prolonged storage)

Operational Advantage

Simplification of additive list, reduction of handling, logistical optimisation

Components

- OXIPROTECT™ antioxidant system
- Organic acids (propionic, formic, sorbic)
- Antimicrobial synergists

Economic Benefits

- Reduced administrative cost
- Reduced warehouse space
- Single supplier, single line



7. DECISION MATRIX (SUMMARY)

Matrix / Need	Recommended Product	Key Argument
Standard Fats	AO-LQ	Natural Synergistic
Fishmeal	AO-SX	Ethoxyquin Alternative
Dry Premix	GrainGuard DRY	No Liquid Dosing
Premium Pet Food	PetPremium NAT	100% Natural
Aquaculture	AquaGuard	Omega-3 Protection
Dual Risk	MultiShield	Antioxidant + Preservative

This table simplifies technical prescription and accelerates the commercial decision-making process. Each product addresses a specific market need, eliminating uncertainty in selection.

8. INTABIOTECH VALUE PROPOSITION

Engineered Systems

Not generic products, but customised solutions per matrix and process

Genuine Technical Support

Customisation, pilot trials, dose adjustment, after-sales monitoring



Total Regulatory Alignment

Guaranteed EU compliance, complete documentation for audits

Reduced Dosing and Waste

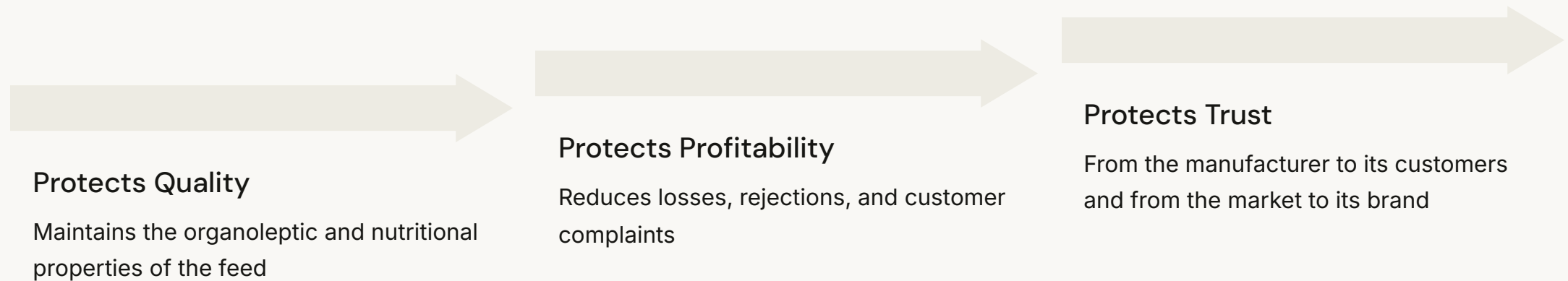
Synergistic efficacy allows lower dosing with equal or greater protection

Improved Sensory Quality

Optimised stability, aroma, and acceptance of the final product



OXIPROTECT™ Doesn't Just Protect Fat



□ When you protect the raw material, you protect the entire value chain. OXIPROTECT™ is the investment visible in every tonne of stable feed, in every successful audit, in every satisfied customer.

INTABIOTECH S.L.

Advanced Feed & Food Protection Systems

Our Mission

To develop advanced protection systems that enhance the quality, stability, and safety of animal and human feed through applied science and regulatory expertise.

Our Advantage

We combine technical expertise, in-depth knowledge of the European regulatory framework, and genuine customisation capabilities. We do not manufacture commodities: we design solutions.



9. QUICK DECISION TABLE FOR SALES REPRESENTATIVES

This table allows for the quick selection of the most suitable OXIPROTECT™ antioxidant system based on the matrix, process, and client objective, facilitating sales work and reducing prescription errors.

Client Type / Matrix	Main Problem	OXIPROTECT™ Product	Key Selling Point
Vegetable oil manufacturer	Early rancidity, colour loss	Feed AO-LQ	Synergistic natural system, lower dosage than standard tocopherols
Standard feed mill	General feed stability	Feed AO-LQ	Overall fat + feed protection, easy incorporation
Fishmeal	Intense odour, rapid oxidation	Feed AO-SX	Technical alternative to Ethoxyquin, maximum efficacy
Recycled fats	High peroxide value	Feed AO-SX	Oxidative control in extreme matrices
Vitamin premix	Vitamin degradation	GrainGuard DRY	Early protection without liquid application
Factory without liquid dosing	Technical limitation	GrainGuard DRY	Free-flowing powder format, precise dosing
Premium pet food	Clean label, natural marketing	PetPremium NAT	100% natural origin, no synthetics
Pet snacks	Odour and stability	PetPremium NAT	Improved aroma and shelf-life
Marine aquaculture	EPA/DHA oxidation	AquaGuard	Specific protection of omega-3
Wet or sensitive feeds	Oxidation + moulds	MultiShield	Antioxidant + preservative in a single product

How to Use This Table in a Sales Visit

01

Identify the main matrix

Oil, flour, feed, pet food, aquaculture

02

Detect the dominant problem

Rancidity, odour, shelf life, audit, technical limitation

03

Propose the recommended OXIPROTECT™ product

According to the decision table, prescribe the most suitable system

04

Reinforce with the key selling point

Use the specific claim that resonates with the client's need

05

Adjust dosage after pilot test

Propose an on-site test for technical and economic validation

Short message for the sales rep

We don't sell generic antioxidants. We prescribe the correct system for each matrix.

10. DEFENSIVE LEGAL ARGUMENTATION

Regulatory framework, classification and response to audits

This section is designed to be used by quality, regulatory, technical management and commercial teams for internal audits, multinational clients and competent authorities.

Reference legal framework

1 The OXIPROTECT™ antioxidant systems fall under Regulation (EC) No 1831/2003 on additives for use in animal nutrition.

Classification: Technological additives – Antioxidants (functional category 1b). All components are individually authorised as technological additives or permitted as commonly used substances.

Classification of OXIPROTECT™ products

2 OXIPROTECT™ is marketed as **premises of technological additives with antioxidant function**, formulated exclusively from authorised substances.

These are not new additives or unevaluated substances, but technologically justified combinations of already approved additives.

Declaration on label and documentation

3 Depending on the product and destination market, the declaration is made in accordance with: "Technological additives: antioxidants" with individual declaration of active substances when required.

INTABIOTECH provides: technical data sheet, safety data sheet (where applicable), and justification for use and technological function.

Regulatory Positioning and Audits

On natural vs. synthetic antioxidants

European legislation does not negatively discriminate between natural and synthetic antioxidants, provided they are authorised, maximum dosages are respected, and their technological function is justified.

OXIPROTECT™ offers 100% natural versions, hybrid versions (optimised natural + synthetic), and adaptation by country, species, and client.



Ethoxyquin: technical and regulatory position

Ethoxyquin has historically been used as an antioxidant in certain matrices (fishmeal, aquaculture). It is currently subject to restrictions and regulatory reviews in the EU and other markets.

OXIPROTECT™ AO-SX and AquaGuard are designed as viable technical alternatives, total or partial substitution systems, and solutions compliant with the current regulatory framework.

Safety and risk assessment

The components of OXIPROTECT™ have undergone prior safety assessments (EFSA or equivalent bodies). The recommended dosages guarantee a wide margin of safety for animals, operators, and final consumers.

Key arguments for audits

Question: "Is this product legal and compliant with European legislation?"

Answer: Yes. OXIPROTECT™ is a pre-mixture of authorised technological additives in accordance with Regulation (EC) No 1831/2003. All active substances are included in the Community Register.

📄 **Concluding legal phrase:** OXIPROTECT™ complies with current legislation because it is designed from the legislation, not against it.

11. PREMIUM COMMERCIAL VERSION

Claims, Impact Messages, and Conversion-Oriented Texts

This section is designed for commercial catalogues, websites, sales presentations, and trade fairs, with clear, distinctive language aligned with technical and regulatory realities.

Core Positioning

OXIPROTECT™ is a range of intelligent antioxidant systems, designed to protect the quality, stability, and profitability of feed manufacturers.

We don't sell generic antioxidants. We design antioxidant solutions tailored to each matrix.

Key Commercial Claims (Free Use)

- New generation antioxidant systems
 - Advanced protection against lipid oxidation
 - Synergistic antioxidant architecture
 - Greater stability with lower dosage
 - Real-time optimisation of cost per tonne
 - Technical alternatives to Ethoxyquin
 - Clean label available
 - Ready for audits and export
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Impact Phrases for Commercial Visits

- "Not all antioxidants protect equally"
 - "The difference is in the synergy"
 - "Lower dosage, greater stability"
 - "It's not a product, it's a system"
 - "We protect fat and your margin"
 - "From molecule to economic result"
 - "Technical customisation, real profitability"
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Final Commercial Closing Message

OXIPROTECT™ turns oxidation into a controlled variable, not a risk.