Acarisin™: Multifunctional Solution for the Animal Feed Industry

Enhance the quality, stability, and performance of feed with our innovative combination of 100% Natural-Mineral origin feed ingredients, backed by scientific evidence and regulatory approvals.

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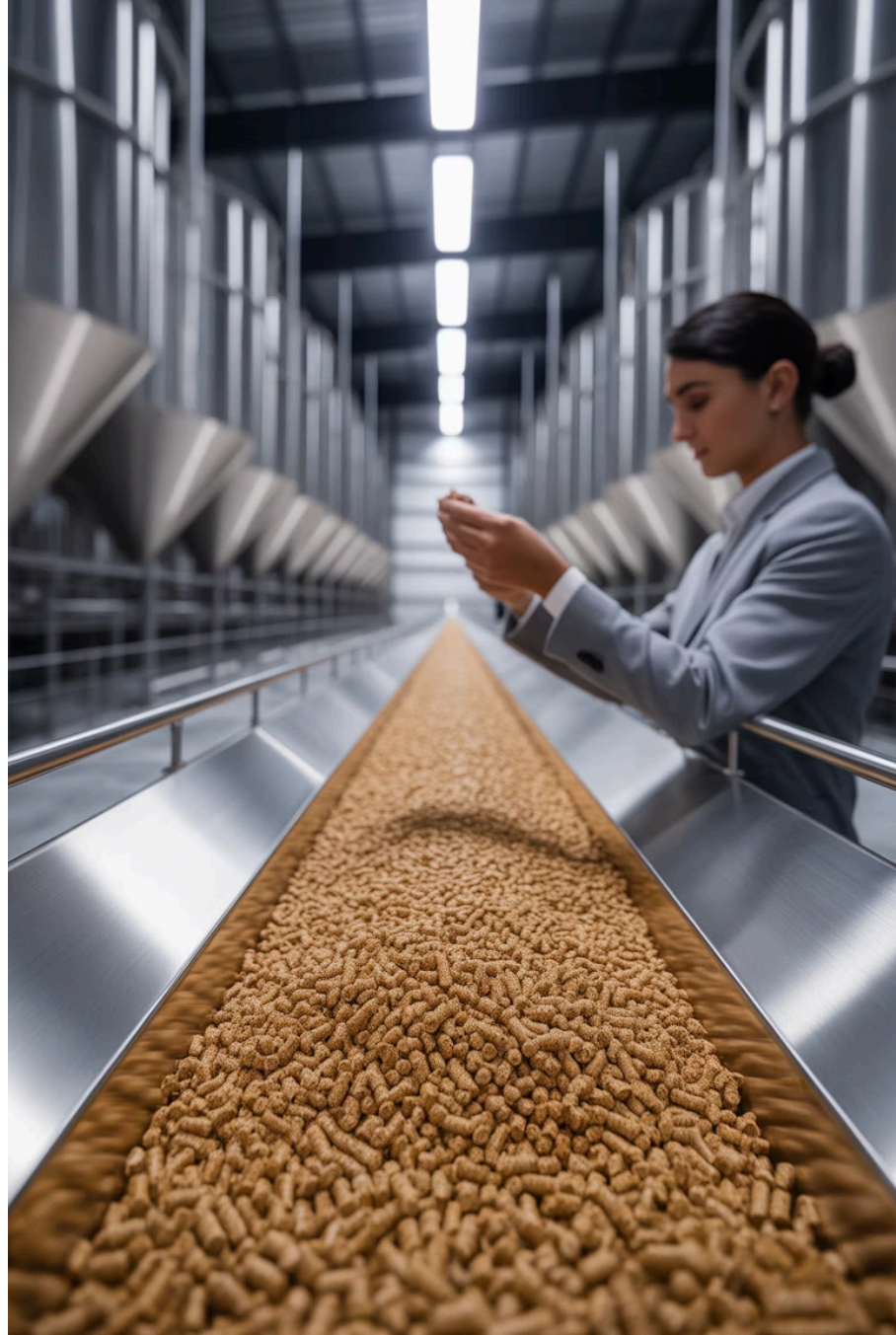


Prevention of Rancidity: Comprehensive Nutrient Protection

Acarisin™ acts as an effective barrier against lipid oxidation, a critical issue in feed manufacturing. Its specialised formulation **inhibits the progression of oxidative reactions** in oils and fats, significantly reducing peroxide and aldehyde indices, which are chemical markers of fat deterioration.

Beyond lipid protection, Acarisin™ improves the stability of fat-soluble vitamins (A, D, E, K), essential nutrients extremely sensitive to oxidative processes. This vitamin protection ensures that the nutritional value of the feed remains intact throughout its shelf life.

Maintaining the palatability and safety of the feed during storage and distribution leads to better acceptance by the animal and a reduction in risks associated with rancidity.

Improved Fluidity and Processability: Technological Optimisation

Anti-caking Agent

The 100% Natural-Mineral food-grade ingredients present in Acarisin™ act as an effective anti-caking and flow agent, preventing feeds and premixes from compacting during transport or prolonged storage, even under conditions of high pressure and temperature.

Superior Homogeneity

The 100% Natural-Mineral food-grade ingredients present in Acarisin™ promote mixing homogeneity in premixes containing micronutrients (vitamins, minerals, enzymes), ensuring a uniform distribution of critical ingredients present in minimal concentrations.

Precision in Dosing

The 100% Natural-Mineral food-grade ingredients present in Acarisin™ increase precision in automatic dosing systems, reducing deviations in large-scale feed mills and minimising formulation errors that affect animal performance.

These technological properties make Acarisin™ an essential component in modern feed manufacturing facilities, where fluidity and precision are critical factors for the quality of the final product.

Moisture Control and Microbiological Risk Reduction

The 100% Natural-Mineral food ingredients present in Acarisin™ function as a **natural moisture adsorbent**, significantly reducing the water activity (a_v) in the feed matrix. This parameter, critical but frequently underestimated, determines the availability of water for chemical reactions and microbial growth.

The low moisture conditions generated by Acarisin™ hinder the proliferation of moulds and yeasts, reducing the probability of contamination by mycotoxins, fungal metabolites with serious negative effects on animal health and productivity.

This protective effect is particularly relevant in warm and humid climates, where the risk of fungal growth is critical for feed stability during storage and distribution. Acarisin™'s ability to control moisture provides an additional barrier against microbiological deterioration.

Buffering Effect and Digestive Regulation: Physiological Balance

The 100% Natural-Mineral food ingredients present in Acarisin™ act as a recognised physiological buffer, with specific benefits depending on the animal species:

Ruminants

Helps maintain ruminal pH within optimal ranges (6.0–6.5), reducing the risk of subclinical acidosis in high-producing dairy cows and intensive fattening steers. This ruminal stabilisation is crucial for fermentative efficiency and animal health.

Poultry

Contributes to balancing intestinal pH and promoting a better digestive environment, especially under conditions of heat stress or highly energetic diets that can alter the intestinal microbiota.

The presence of this buffer in the diet also improves the stability of exogenous enzymes and pH-sensitive additives, enhancing their efficacy in the digestive tract and optimising their economic investment.

Synergies with Antioxidants: Effect Potentiation

Acarisin™ creates an optimal environment for antioxidant action by reducing moisture and modulating acidic pH, factors that potentiate the efficacy of primary antioxidants such as:

- Tocopherols (natural vitamin E)
- Synthetic compounds (BHA, BHT)
- Plant extracts (rosemary, green tea)

The **homogeneous dispersion provided by the 100% Natural-Mineral food-grade ingredients present in Acarisin™** significantly improves the distribution of lipophilic antioxidants within the feed matrix, maximising their contact surface with lipids susceptible to oxidation.

The result of these synergistic interactions is more effective antioxidant protection with optimised doses, which translates into cost reduction and greater sustainability of the production process.

Animal Performance Optimisation: Productive Impact

+8%

Improvement in FCR

Feeds with greater nutritional stability result in more efficient feed conversion ratios.

+5%

Voluntary Intake

Increased palatability due to absence of rancidity and improved texture without caking.

+12%

Shelf Life

Significant extension of feed stability under standard storage conditions.

The preservation of energy and vitamin nutrients thanks to Acarisin™ directly translates into **improved feed conversion ratio (FCR) and weight gain.** In poultry production, greater lipid stability results in **better meat and egg quality, with less rancidity, improved pigmentation, and an extended shelf life for the final product.**

For the dairy sector, the buffering effect of Acarisin™ **reduces ruminal metabolic stress and can contribute to a significant increase in milk production, especially in high-performance animals subjected to intensive diets.**

Logistical and Sustainability Benefits: Impact on the Value Chain

Extended Shelf Life

Acarisin™ significantly extends the shelf life of feed and premixes, reducing returns, losses, and waste throughout the entire supply chain, from manufacturing to animal consumption.

1

Formulation Stability

Reduces the need for frequent reformulation to compensate for nutritional losses, with a positive impact on factory efficiency and a reduction in operational costs.

2

Environmental Impact

By optimising nutrient utilisation and improving preservation, it contributes to more sustainable animal production with a smaller environmental footprint, aligning with circular economy objectives.

3

These logistical and sustainability benefits make Acarisin™ a solution that transcends the nutritional scope to become a strategic component in the efficient management of resources in the animal feed industry.

Regulatory Compatibility and Safety: Normative Backing

The formulation of Acarisin™ is based on components with extensive regulatory backing:

- The 100% Natural-Mineral food ingredients present in Acarisin™ are **authorised in the EU as technological additives** under Regulation (EC) 1831/2003, which guarantees their compliance with strict European regulations.
- The European Food Safety Authority (EFSA) has ruled on their safety for all animal species, with no adverse effects for consumers or the environment at the usual application doses.
- The 100% Natural-Mineral food ingredients present in Acarisin™ are recognised as GRAS (Generally Recognized As Safe) by the FDA in the United States, which reinforces their international acceptance and facilitates the export of Acarisin™-treated feed to demanding global markets.

This solid regulatory backing provides **reassurance to feed manufacturers incorporating Acarisin™ into their formulations,** eliminating normative barriers and facilitating the commercialisation of their products.

Conclusion: Acarisin™ as a Comprehensive Solution for the Animal Feed Industry

Acarisin™ transcends its primary function as a lipid rancidity preventative to become a that positively impacts the entire animal production chain.

Indirect Antioxidisation

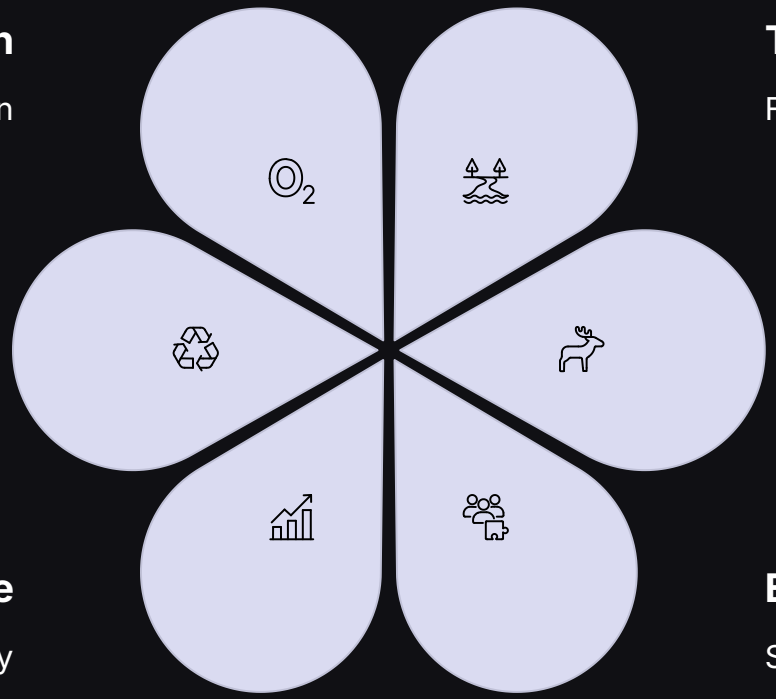
Rancidity control and vitamin protection

Sustainability

Less waste, longer shelf life, smaller environmental footprint

Animal Performance

Improved FCR, product quality and productivity



Technological Stability

Fluidity, anti-caking and moisture control

Digestive Support

Optimised ruminal and intestinal buffer

Enhancer

Synergy with tocopherols and natural extracts

In a context of increasing pressure for productive efficiency and sustainability, Acarisin™ is positioned as a strategic ally for feed manufacturers seeking differentiation through quality, safety and optimised performance, with the scientific and regulatory backing demanded by the most demanding markets.

Additional Benefits: Beyond Officially Recognised Primary Functions

All that has been presented up to this point regarding applications in feed represents additional benefits of Acarisin™. These applications go beyond its officially recognised primary functions. The following modules will present the product's main and recognised functions. Acarisin™ demonstrates exceptional versatility by offering added value in multiple applications, and the animal feed industry benefits from these secondary properties that enhance the product's value.

> Applications in feed are an added value that complements the primary functions of Acarisin™.

Next, we will discover the officially recognised primary functions that have established Acarisin™ as a leader in the natural protection of feed raw materials and foodstuffs.

Specific Crop Applications: Integrated Protection from Field to Fork

Acarisin™ offers natural protection from the field to final consumption, providing a combined system for harvests of all types of cereals, as well as fruits and vegetables. These include citrus, apple trees and other fruit trees.

It allows effective control of specific pests such as the Codling Moth (Cydia pomonella L.), Botrytis cinerea and others.

Its application is versatile, allowing "wet" and "dry" treatments, and is compatible with automatic and manual spraying or irrigation and dusting systems. It can be used alone or in combination with other products, through methods such as thermal fogging, cold fogging, spraying and atomisation, as in the case of our developments **SterilFood K** or **Knamax.**

Citrus

Post-harvest protection and storage.

Apple Trees

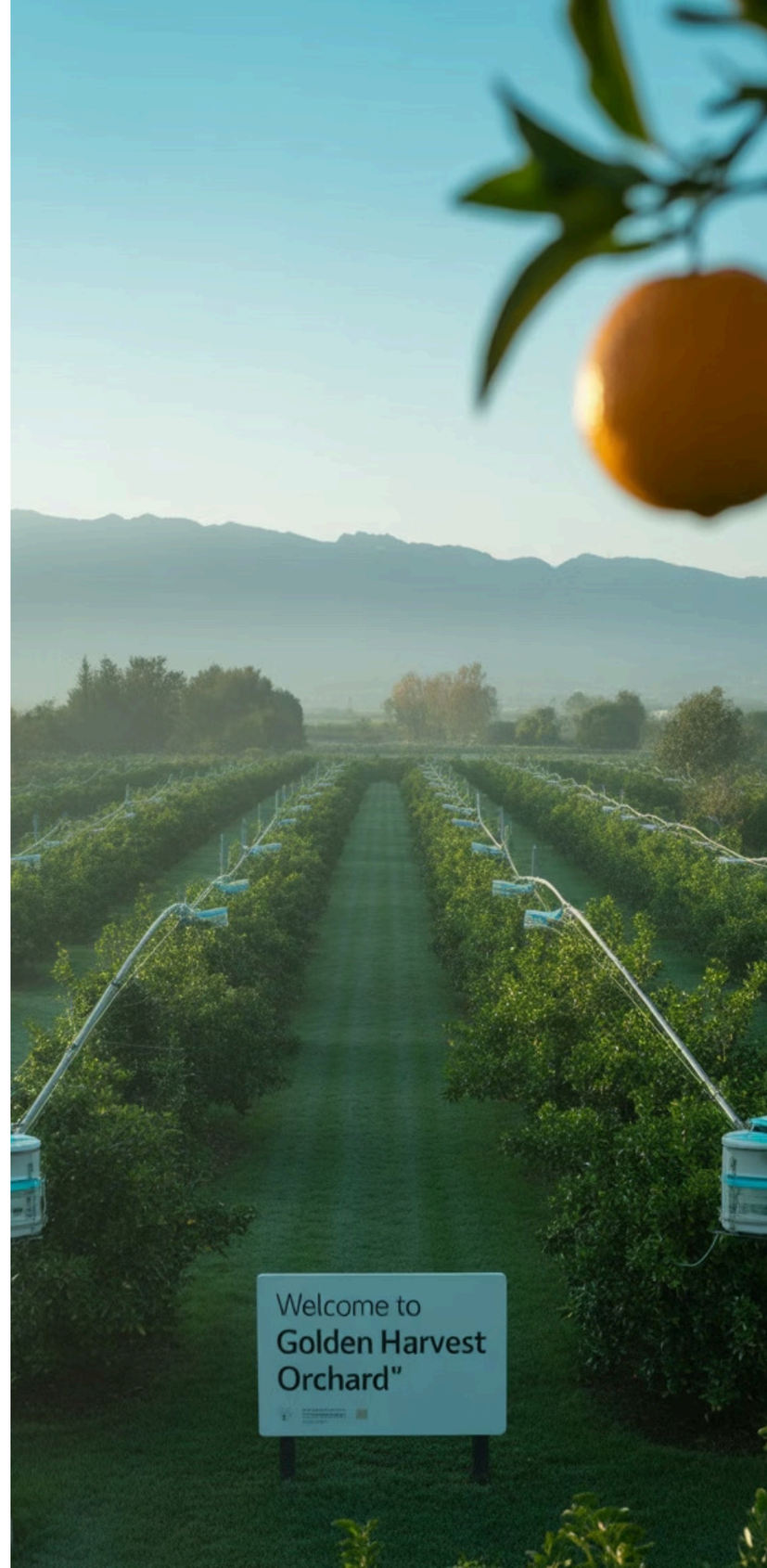
Control of Codling Moth and other pests.

Diverse Crops

Adaptable to multiple species.

Automatic Systems

Integration into industrial processes.



Aflatoxin Control and Silo Protection: Natural Contamination Prevention

Aflatoxins are toxins produced by moulds (*Aspergillus flavus* and *Aspergillus parasiticus*), which represent a significant threat to food safety and animal health.

Acarisin™ is unique in the natural prevention of aflatoxins, acting through various mechanisms:

- Creates a hostile environment for producing moulds.
- Controls grain moisture through specific action.
- Parasitic control of visible and microscopic organisms.
- High efficacy in grain silos.
- Forms a dry barrier that prevents insect access to grain.
- Prophylactic and therapeutic use.

100%

Proven Effectiveness

100% effective in tested species (+80).

0

Zero Residues

No pesticide residues after treatments.

OK

Organic Agriculture

Valid for organic agriculture.

Acarisin™ vs ACARISIN™: Enhanced Formulation for Adverse Conditions

Acarisin™ is the technologically enhanced formulation of ACARISIN™.

- Specifically designed for adverse weather conditions
- Greater durability of action outdoors
- Improved resistance against rain, flows, and irrigation systems
- Remains longer in application areas
- Combats less sensitive species due to hostile climate, size, or physiology
- Sustained resistance against chemical degradation
- Maintains effectiveness when interacting with other field ingredients

ACARISIN™

Ideal for indoors, silos, warehouses

Acarisin™

Optimised for outdoors, open fields, adverse conditions

Acarisin™ comes from the fusion of 'Ecological' and 'Efficiency'

Technical and Safety Characteristics: Certified Natural Innovation

- 100% Mineral-Natural, ubiquitous in nature
- Eco-friendly, sustainable, and bio-integrative
- Non-toxic - Non-hazardous
- Certified as a food additive/ingredient
- Ingredients commonly used in food
- Combined physical and mechanical action
- Parasites do not develop resistance
- Not subject to evaporation or thermal deterioration
- Long-lasting efficacy
- Effective alternative to conventional pesticides

Safety

Non-toxic, food ingredients

Efficacy

100% effective, no resistance

Sustainability

Eco-friendly, bio-integrative

Durability

Long-lasting, no thermal deterioration

Effective on 100% of tested species (+80)

Revolutionary Mechanism of Action: Single Grain Fusion Technology

Acarisin™ is a globally authorised food product, based on a "single grain fusion" technology developed by ND Pharma & Biotech.

This innovative technology halts the insect life cycle by directly affecting the development of eggs and larvae. Eggs cannot hatch and larvae disintegrate.

- Acts by both contact and ingestion.
- Insects cannot develop defensive mechanisms against Acarisin™.
- Eliminates eggs from inside the grain, offering a novel and unparalleled application.
- Prevents re-infestations and improves results.

Unlike toxic pesticides that kill, Acarisin™ naturally disrupts the reproductive cycle.

01

Contact/Ingestion

02

Development Disruption

03

Larvae Disintegration

04

Hatching Prevention

Broad Control Spectrum: +150 Species Effectively Controlled

Acarisin™ is a broad-spectrum product that offers a robust solution for a wide variety of challenges in pest and contaminant control.

- Over 150 species controlled by the product.
- Over 500 satisfied customers worldwide.
- Over 10 years on the market.
- Tested against a very wide variety of insects, mites, fungi, moulds, hyphae, and bacteria.

Specific Pests Controlled:

- Lesser grain borer
- Sawtoothed grain beetle (weevil)
- Confused flour beetle
- Indian meal moth
- Flour and grain mites
- Granary weevils, rice weevils
- Flour moths

Highlighting Specific Effects:

- Prevents larvae from maturing into adults.
- Eliminates the characteristic "mite dust".
- Reduces the menthol odour of mite infestations.
- Controls cobwebs that hinder adequate aeration.

500+
Satisfied Customers

150+
Species Controlled

10+
Years in the Market

Practical Applications: Versatility Across the Entire Food Chain

Acarisin™ offers unparalleled versatility in its application throughout the entire food chain, ensuring protection where it is most needed:

- Applicable from silos and grain elevators to warehouses and dosing hoppers.
- In-stream treatment of grains during storage.
- Treatment of empty containers to prevent infestations.
- Pre-packaging "booster" doses for final customer dispensing.
- Application in transport vehicles as a preventative.
- Use in facilities where the use of toxic chemical pesticides is prohibited.

Protected Grains and Products:

- Maize, wheat, rice, and other cereals.
- Flours and milled products.
- Vegetable and fruit crops.
- Feed and complementary animal foodstuffs.
- Nuts, seeds, grains.

Operational Advantages:

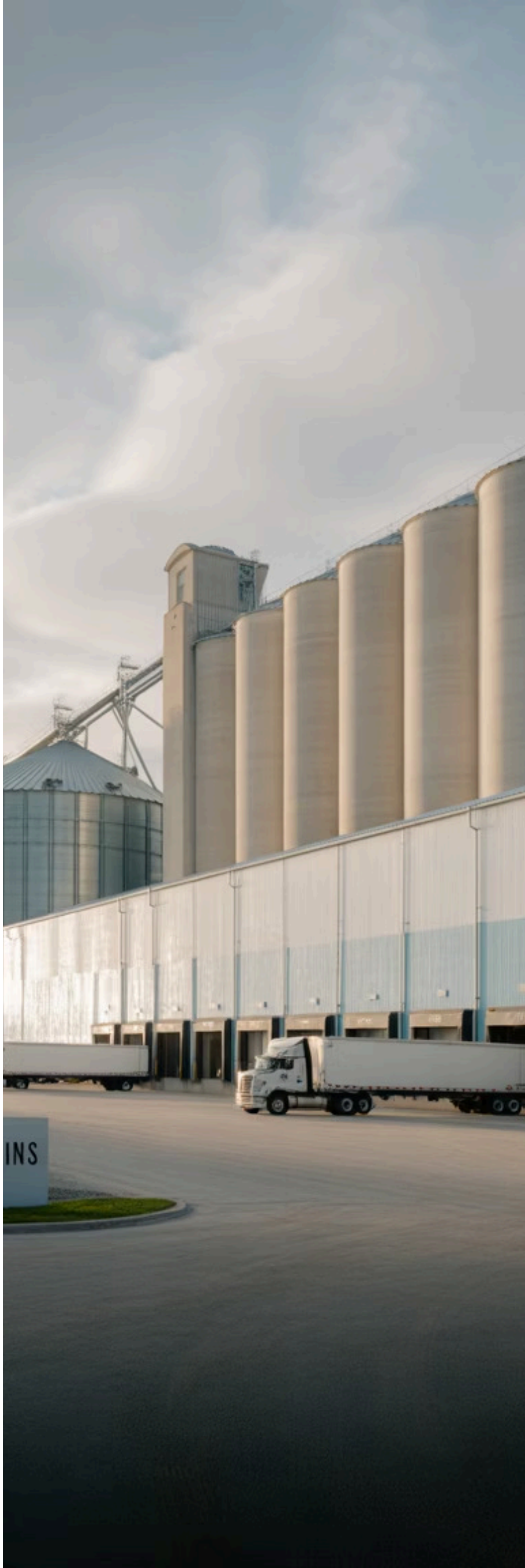
- Easy implementation in any facility.
- Reduces the need for costly fumigations.
- Creates a safer working environment.
- Maintains quality during storage and commercialisation.
- Highly acceptable cost-effectiveness ratio.

Silos & Warehouses

Transport

Packaging

Processing



Specialised Rice Protection: Comprehensive Control of Specific Pests

Rice is one of the cereals most susceptible to infestations during storage.

Acarisin™ offers specific and highly effective protection for this critical cereal. Control of specific rice pests that cause significant losses.

Specific rice pests controlled:

- Rice weevil (Sitophilus oryzae) - penetrates the grain and develops inside
- Lesser grain borer - creates irregular holes that turn the grain into dust
- Sawtoothed grain beetle - contaminates more rice than it can consume
- Indian meal moth - larvae feed on the germ reducing germination
- Flour mites - proliferate in high humidity conditions

Specific benefits for rice:

- Eliminates eggs from inside the rice grain
- Prevents the development of larvae that destroy the internal content
- Maintains the germination capacity of the grain
- Controls critical humidity for rice storage
- Prevents the characteristic sweet and pungent odour of infestations
- Prevents the formation of brownish "mite dust"

Reliable protection for rice, wheat, and maize against a wide range of infestations

Rice Weevil

Humidity Control

Germ Protection

Quality Maintenance

Scientific Evidence: Efficacy Study in Stored Rice

Results from the controlled study on the effectiveness of Acarisin™ in packaged and stored white rice, demonstrating superior pest control:

METHODOLOGY:

- Samples treated with Acarisin™ vs. control samples
- Observations at 15, 30, 59 days, and beyond
- Dosage applied: 1g/kg of rice

KEY RESULTS:

Day 15: Total absence of adult insects in all treated samples. Control samples began to show signs of infestation.

Day 30:

- Control samples: Significant proliferation of adult insects, larvae, moths, and eggs.
- Acarisin™ samples: ZERO live insects identified, achieving 100% effectiveness.

Day 59:

- Control samples: Infestation continued to increase with a high density of live insects.
- Acarisin™ samples: 100% protection was maintained, with no live insects present (some dead insects were found, indicating the product's continuous action).

SCIENTIFIC CONCLUSIONS:

- Acarisin™ demonstrates very high efficacy in preventing the appearance and development of insects for up to 50 days.
- Eliminates insects at various developmental stages, including eggs and larvae.
- Effectively prevents the growth of insect populations, ensuring grain integrity.
- Effective even at very small doses: 1g/kg (with proven efficacy down to 0.2g/kg).
- There is a direct relationship between the protected storage time and sustained effectiveness.

0

live insects

at 30 days

0.2g/kg

Minimum dose

proven effective

100%

mortality

in 50 days

+60

days

continuous protection without re-application

Economic Advantages: Cost-Effective Solution for the Industry

Acarisin™ is more effective and less costly than any other existing solution.

It is especially economical for long-term treatment and processing, with minimum effective doses from 0.2g/kg of food.

It has no impact on the production process and causes no changes to the attributes and characteristics of the final product, which facilitates its application and dosage, significantly reducing industrial costs.

SPECIFIC ECONOMIC BENEFITS:

- Elimination of costly fumigations
- Reduction of losses due to infestations
- Reduced need for reprocessing
- Extension of product shelf life
- Reduction of returns and claims
- Reduced reputational damage from infested products

SIMPLE IMPLEMENTATION:

- No costly specialised machinery required
- Easy integration into existing processes
- Application from processing to final packaging
- All-in-one solution for crops, raw materials, and final packaging

Cost reduction

Easy implementation

No process changes

Positive ROI

Ideal cost-effective solution for the industry in food protection throughout its shelf life

Nutritional Safety: Food Ingredients with Added Benefits

Acarisin™ is a food product composed of naturally-occurring mineral salts.

Components classified as GRAS (Generally Recognised As Safe) food ingredients.

Components are ubiquitous in nature.

Its eventual ingestion does not alter values in blood or tissues.

The components are considered nutrients in themselves.

NUTRITIONAL BENEFITS:

- Natural source of nutrients (mineral salts and substances)
- Beneficial source of nutrients
- Safety guaranteed by its food-grade nature
- Consumption may derive additional benefits
- Does not generate toxic residues in treated foods

GLOBAL AUTHORISATION:

- Fully authorised worldwide for food contact
- Scientifically backed proprietary technology
- Internationally recognised components
- No restrictions on use in human and animal nutrition

UNIVERSAL APPLICATION:

- Available to adapt to specific needs
- All-in-one solution for crops, raw materials, and final packaging
- Comprehensive protection from farm to fork

Food Ingredients

Acarisin™ is composed of naturally-occurring mineral salts, classified as food ingredients.

No Ingestion Limits

Its components have no ADI (Acceptable Daily Intake) limits, or the acceptable intake is never exceeded at recommended doses.

Nutritional Benefits

Provides a natural source of nutrients and can generate additional benefits through its consumption.

Global Authorisation

Fully authorised for food contact worldwide, with no restrictions on use.

Global Contact and Distribution: ND Pharma & Biotech via Intabiotech

ND Pharma & Biotech distributes and exports Acarisin™ from Spain worldwide, offering a versatile solution backed by an expert team.

Global Distribution

Acarisin™ is distributed and exported from Spain worldwide.

Solid Corporate and Scientific Support

Backed by ND Pharma & Biotech.

Recognised Functions

Multiple recognised functions: Technological Adjuvant, Additive, Phytosanitary Product, Biocide. (Exempt from Registration as such in the EU)

Simple Application

Simple application without the need for expensive machinery.

Efficiency and Cost

Highly competitive efficiency and cost-in-use.

Technical Advice

Technical advice available.

Contact Information:

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Commercial Manager: José Ramón Castells

Commercial Website: www.acarisin.info

Corporate Websites: www.ndpharmabiotech.com, www.ndpharmabiotech.net, www.ndpharmabiotech.org

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