ACETIPRO™ Powder

Buffered Vinegar Powder for the Production of Egg Products and Other Foods

Technical-commercial document presenting **ACETIPRO™ Powder**, an innovative powdered ingredient developed by INTABIOTECH as a clean label solution for the preservation of egg products and other food applications. This document details its principles of action, technological benefits, technical specifications, and specific applications, with emphasis on its synergy with PreserFood™ UOVO Original Formula to extend the shelf life and ensure the microbiological safety of products.

www.intabiotech.com

Introduction

ACETIPRO™ Powder represents a significant innovation in the field of natural preservatives for the food industry. Developed by INTABIOTECH under the Clean Label philosophy, this ingredient consists of buffered vinegar in powder form that effectively combines the natural antimicrobial properties of acetic acid and its salts.

The soluble powder formulation, obtained through an advanced spray-drying process, guarantees a free-flowing product that greatly facilitates its industrial handling. This characteristic solves the logistical problems traditionally associated with liquid ingredients, such as transportation, storage, and precise dosing in automated production lines.

One of the main advantages of **ACETIPRO™ Powder** is its application versatility. While it has been specifically designed for the egg product industry, its effectiveness extends to a wide range of food matrices where microbiological safety and shelf-life extension are critical factors.

Spray-Dried Powder Format

Water-soluble, free-flowing, and easy to dose in industrial environments.

Clean Label Philosophy

A natural alternative to artificial preservatives, responding to current consumer demands.

Functional Synergy

Optimized efficacy in combination with PreserFood™ UOVO Original Formula for pasteurized egg products.

When used in synergy with PreserFood™ UOVO Original Formula, **ACETIPRO™ Powder** forms an integral preservation system specifically formulated for pasteurized egg products such as liquid whole egg, egg white, and egg yolk. This combination not only ensures robust microbiological protection but also contributes to the technological stability of the final product and significantly extends its shelf life under refrigeration conditions.

The development of **ACETIPRO™ Powder** responds to a growing demand from the food sector for preservation solutions that maintain the organoleptic characteristics of final products without compromising their microbiological safety, all within the framework of clean labeling that current consumers demand.

ACETIPRO™ Powder

Far More Than Natural Preservation

Principle of Action

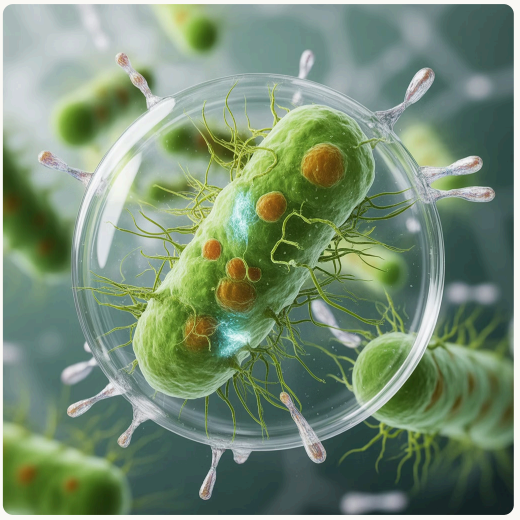
The scientific foundation behind the efficacy of **ACETIPRO™ Powder** is based on three main mechanisms that act complementarily to ensure comprehensive food protection:

Direct Antimicrobial Action

Acetic acid and its salts (acetates) exert a powerful broad-spectrum antimicrobial effect. This action is particularly effective against critical foodborne pathogens such as *Salmonella* spp., *Listeria monocytogenes*, and *Escherichia coli*. The mechanism of action involves altering microbial cell membrane permeability, denaturing essential proteins, and interfering with enzyme systems vital for bacterial metabolism.

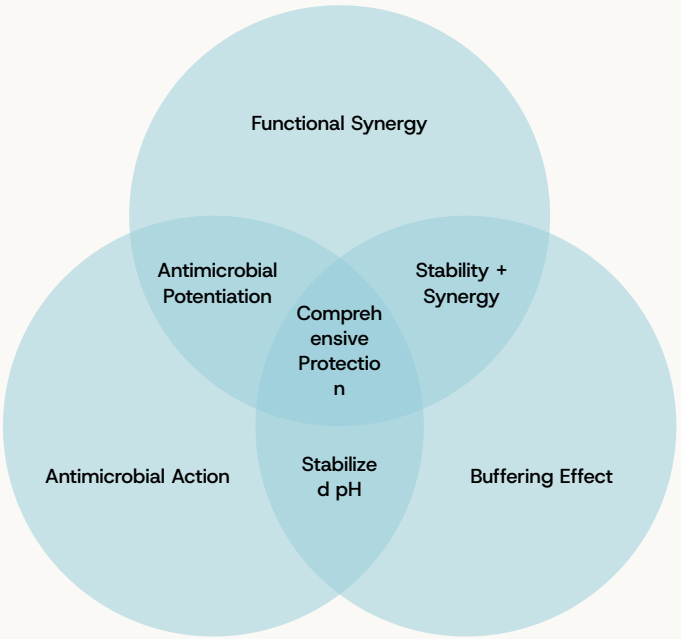
Balanced Buffering System

A distinctive characteristic of **ACETIPRO™ Powder** is its ability to maintain a stable pH in the optimal range of 4.5-5.5. This buffering effect is crucial in complex food matrices such as egg products, where pH oscillations can compromise both microbiological safety and functional properties (foaming, gelling, and emulsifying capacity). The buffering system acts as a chemical barrier that resists sudden pH changes even when facing process or storage variables.



Enhanced Functional Synergy

When **ACETIPRO™ Powder** is combined with PreserFood™ UOVO Original Formula, there is a significant enhancement of the bioactive mechanisms of both components. This synergy multiplies efficacy against spoilage and pathogenic flora, establishing multiple protective barriers that hinder microbial development under diverse environmental conditions.



This triple action gives **ACETIPRO™ Powder** a significant advantage over other traditional preservatives that typically act through a single mechanism. The multiplicity of antimicrobial barriers drastically reduces the likelihood of microorganisms developing resistance, thus ensuring consistent and long-lasting protection throughout the product's shelf life.

Additionally, the optimal pH profile achieved with **ACETIPRO™ Powder** helps preserve the organoleptic characteristics of the final product, preventing excessive acidity that could compromise the taste, aroma, and technological functionality of egg products.

Technological Benefits

ACETIPRO™ Powder provides a series of technical and commercial advantages that position it as a high-value-added solution for the food industry, especially for egg product manufacturers:

Exceptional Product Stability

The lump-free powder format ensures excellent stability during storage and industrial handling. Its high water solubility facilitates homogeneous incorporation into liquid matrices like egg products, eliminating the uneven distribution problems typical of other powder preservatives. This feature ensures consistent protection throughout the entire volume of the final product.

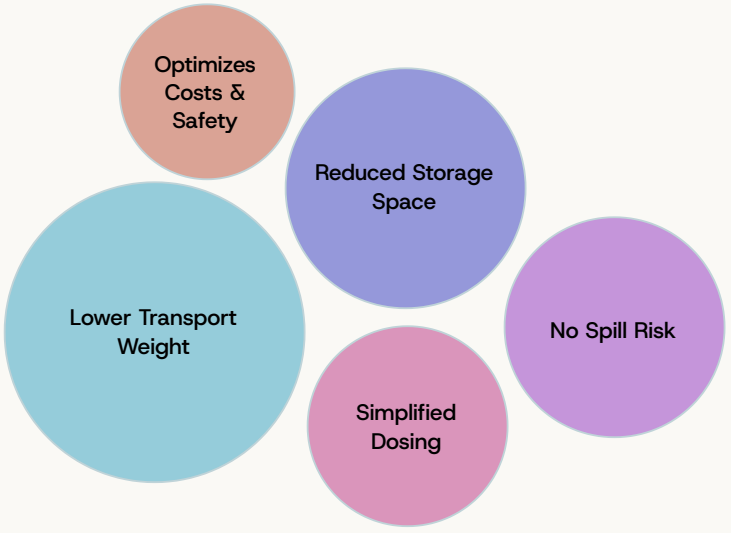
Significant Shelf Life Extension

In egg product applications, **ACETIPRO™ Powder** has demonstrated the ability to double shelf life under standard refrigeration conditions, reaching up to 45 days of shelf life. This benefit represents a decisive competitive advantage for manufacturers, distributors, and exporters, expanding commercial windows and facilitating logistical management.

Application Versatility

Although optimized for egg products, **ACETIPRO™ Powder** offers excellent results in various food matrices: processed meats, fresh cheeses, bakery products, refrigerated sauces, and vegetable preparations. This versatility allows manufacturers to standardize preservation systems across different production lines.

The powder format of **ACETIPRO™ Powder** also offers considerable logistical advantages compared to liquid alternatives: lower transport weight, reduced storage space, elimination of spill risks, and simplified in-plant dosing. These characteristics contribute to optimizing operational costs and improving workplace safety in production environments.



Natural and Transparent Labeling

In line with the growing demand for clean labels, **ACETIPRO™ Powder** can be declared as "buffered vinegar (vinegar, acetic acid salts)" in the ingredient list. This designation, completely understandable to the average consumer, avoids chemical terms that might generate rejection and eliminates the need to use artificial preservatives with E numbers on the label.

Positioning as a natural ingredient allows manufacturers to develop premium products with claims like "no artificial preservatives" or "naturally preserved," aligning with current market trends and improving the perceived value of the final product.

Economic and Logistics Optimization

The shelf-life extension provided by **ACETIPRO™ Powder** directly translates into tangible economic benefits:

- Significant reduction in spoilage losses due to expiration throughout the supply chain
- Greater flexibility to manage production peaks and seasonal demand
- Ability to access more distant export markets
- Decrease in the frequency of returns due to shelf-life issues
- Reduced environmental impact by minimizing food waste

ACETIPRO™ Powder is manufactured in facilities certified under International Quality Standards, guaranteeing complete traceability from raw materials to finished product. Each batch undergoes rigorous analytical controls and is delivered with its corresponding certificate of analysis verifying compliance with all specifications.

The product complies with the food safety requirements of the European Union and the United States, and is free from mandatory declaration allergens according to Regulation (EU) No. 1169/2011. **ACETIPRO™ Powder** is suitable for use in products intended for vegetarian and vegan diets, and does not contain genetically modified organisms or ingredients derived from them.

For additional information on compatibility with specific certifications (Kosher, Halal, organic) or regulatory requirements for specific markets, please consult INTABIOTECH's technical department.

Technical Specifications (ACETIPRO™ Powder)

ACETIPRO™ Powder is manufactured under strict quality controls and complies with rigorous food safety standards. Below are the complete technical specifications that ensure a consistent and high-quality product:

Physical-Chemical Characteristics

Parameter	Specification
Appearance	White to off-white, free-flowing powder
pH (10% in water)	4.5 – 6.5
Moisture	max. 20%
Ash	max. 4%
Total Acidity	max. 10%
Bulk Density	0.5 g/mL (bulk), 0.6 g/mL (tapped)
Solubility	Completely soluble in water

Heavy Metals

Metal	Maximum Limit
Lead (Pb)	≤0.18 ppm
Arsenic (As)	≤0.5 ppm

Microbiological Specifications

Parameter	Limit
Total Plate Count	≤10,000 cfu/g
Molds and Yeasts	≤100 cfu/g
Salmonella	Absent in 25g
Escherichia coli	Absent in 1g
Staphylococcus aureus	Absent in 1g
Pseudomonas aeruginosa	Absent in 1g

Logistics and Storage Information

- **Packaging:** 25 kg drum with sealed inner bag
- **Shelf life:** 15-30 months from manufacturing date
- **Storage conditions:** Store in a dry and cool place (temperature <40°C, low relative humidity).
- **Pallet:** 1,000 kg

Applications in Egg Products and Approximate Dosing

1

Liquid Whole Egg (pH 4.8 – 5.0)

Pasteurized whole egg is especially susceptible to *Salmonella* contamination, with food safety being an absolute priority. **ACETIPRO™ Powder** provides a robust antimicrobial barrier which, combined with PreserFood™ UOVO Original Formula, extends shelf life from 14-21 days up to 30-45 days under refrigeration. This combination maintains the functional properties of liquid egg without negatively affecting its behavior in baking or thermal coagulation applications.

2

Liquid Egg White (pH 4.6 – 4.8)

Egg white presents specific challenges due to its sensitivity to pH changes that can affect its foaming capacity and stability. **ACETIPRO™ Powder**, thanks to its buffering effect, maintains an optimal pH that preserves functional properties while extending shelf life from 7-14 days up to 21-30 days. This is especially valuable for pastry and meringue applications where foaming properties are critical.

3

Liquid Egg Yolk (pH 4.6 – 5.0)

Egg yolk, with its high lipid content, requires protection against oxidation in addition to microbiological control. The combination of **ACETIPRO™ Powder** and PreserFood™ UOVO Original Formula provides dual protection, extending shelf life from 10-15 days up to 25-35 days. This treated egg product is ideal for applications in mayonnaise, sauces, and pastry products, maintaining its emulsifying properties intact.

4

Industrial Blends (pH 4.7 – 5.0)

Industrial egg-based preparations (mixtures for tortillas, scrambled eggs, pastry preparations) are complex matrices that demand prolonged stability. With **ACETIPRO™ Powder**, these products can achieve a shelf life of 35-45 days compared to the usual 15-20 days, facilitating export operations and significantly reducing spoilage losses due to expiration.

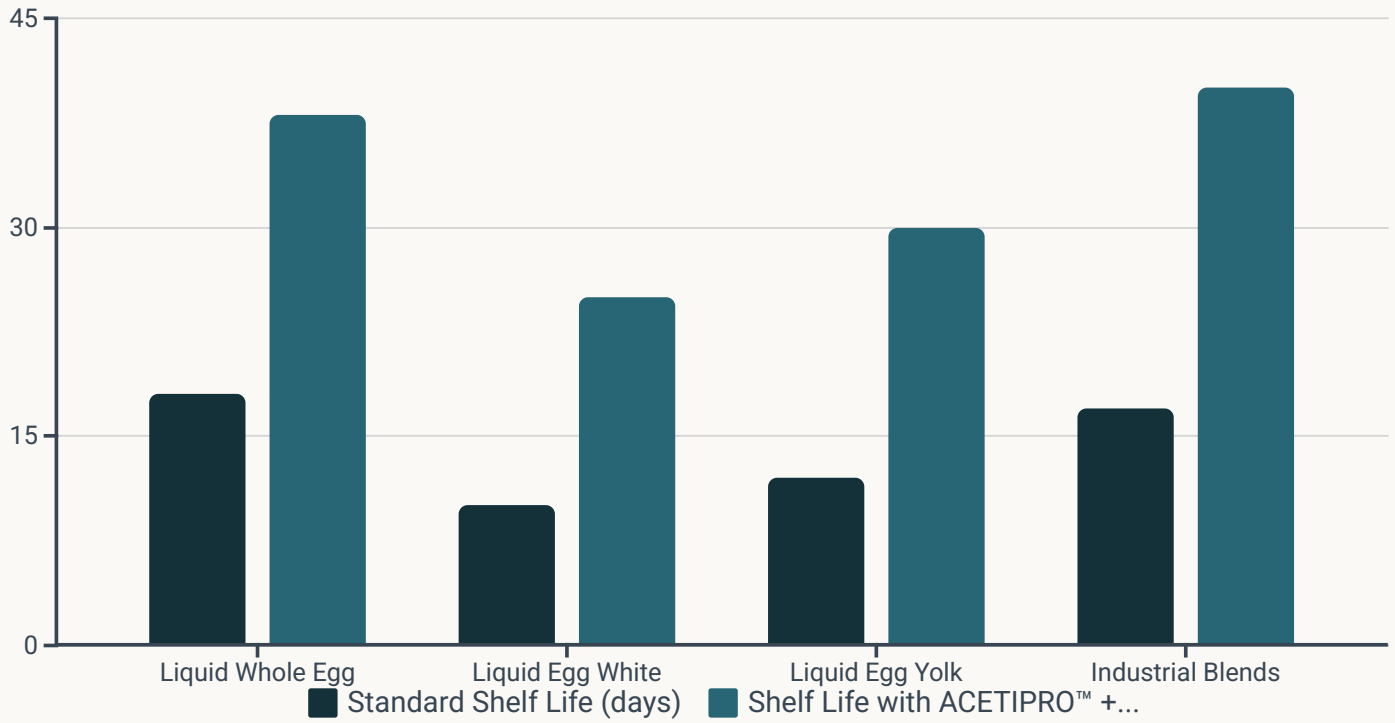
Indicative Dosing and Usage Recommendations

To achieve optimal results, the following dosing guidelines are recommended:

- **ACETIPRO™ Powder:** 0.3 – 1.0% w/w (weight/weight on final product)
- **PreserFood™ UOVO Original Formula:** 0.5 – 1.0% w/w (weight/weight on final product)

The exact dose should be adjusted according to several factors: matrix type, target pH, initial microbial load, anticipated storage temperature, and desired shelf life. It is recommended to perform pilot tests with different concentrations to optimize the balance between antimicrobial efficacy, organoleptic stability, and cost.

ACETIPRO™ Powder has been specially formulated to optimize the preservation of pasteurized egg products, where it demonstrates maximum effectiveness. Its technical and functional characteristics make it particularly suitable for different types of egg products, each with its own preservation challenges:



As the chart shows, the combination of **ACETIPRO™ Powder** with **PreserFood™ UOVO Original Formula** approximately **doubles the refrigerated shelf life** of different egg products, which represents a significant competitive advantage for manufacturers.

For proper incorporation, it is recommended to dissolve **ACETIPRO™ Powder** in a small amount of water before adding it to the egg product, ensuring homogeneous distribution. The addition should preferably be done after pasteurization and before packaging, maintaining rigorous hygienic conditions throughout the process.

Commercial Arguments

ACETIPRO™ Powder represents a strategic opportunity for manufacturers of egg products and other foods seeking to differentiate themselves in an increasingly competitive market. The following commercial arguments highlight its added value compared to conventional solutions:

Proprietary Brand of INTABIOTECH

ACETIPRO™ Powder is not a generic ingredient, but a differentiated and patented solution by INTABIOTECH. This guarantees technical and commercial exclusivity, allowing manufacturers to access advanced technology unavailable to competitors using conventional preservatives. The registered trademark **ACETIPRO™** represents a seal of quality and innovation backed by INTABIOTECH's leadership in the natural ingredients sector for the food industry.

Premium Positioning

Products formulated with **ACETIPRO™ Powder** can be positioned in premium market segments thanks to three fundamental pillars:

- **Clean Label:** The declaration as "buffered vinegar" allows avoiding E-numbers and chemical terms, aligning with current consumer expectations.
- **Proven Performance:** Shelf-life and microbiological challenge studies demonstrate its superior efficacy compared to traditional solutions.
- **Reinforced Safety:** The combination of multiple antimicrobial mechanisms provides robust protection against critical foodborne pathogens.

Synergistic Dual Protection

The combined action of **ACETIPRO™ Powder** with PreserFood™ UOVO Original Formula establishes a comprehensive preservation system that significantly surpasses the performance of solutions based on a single protection mechanism. This synergy not only enhances antimicrobial efficacy but also optimizes the organoleptic and functional stability of the final product.

> **Competitive Advantage:** Comparative tests show that INTABIOTECH's dual protection systems exceed the shelf-life extension achieved with traditional preservatives by up to 40%, directly translating into economic and operational benefits for the entire supply chain.

INTABIOTECH continues its commitment to sustainable innovation in the specialized ingredients sector, offering solutions that combine technical efficacy with responsibility towards consumers and the environment. **ACETIPRO™ Powder** represents a clear example of how applied science can transform traditional ingredients like vinegar into technologically advanced solutions that meet the demands of the contemporary food market.

For more information on specific applications, concept tests, or personalized technical advice, please contact INTABIOTECH's technical-commercial department.

High Potential Target Markets

Egg Products

This is the main segment due to its perfect adaptation to the product. Especially suitable for manufacturers supplying the HORECA channel, the pastry/bakery industry, and prepared meal manufacturers. Shelf-life extension is critical for optimizing logistics routes and reducing returns.

Ready-to-eat

The growing market for refrigerated prepared foods demands clean label solutions that guarantee safety and perceived freshness. **ACETIPRO™ Powder** provides antimicrobial protection without resorting to artificial preservatives, especially in egg-containing products (salads, sandwiches, prepared dishes).

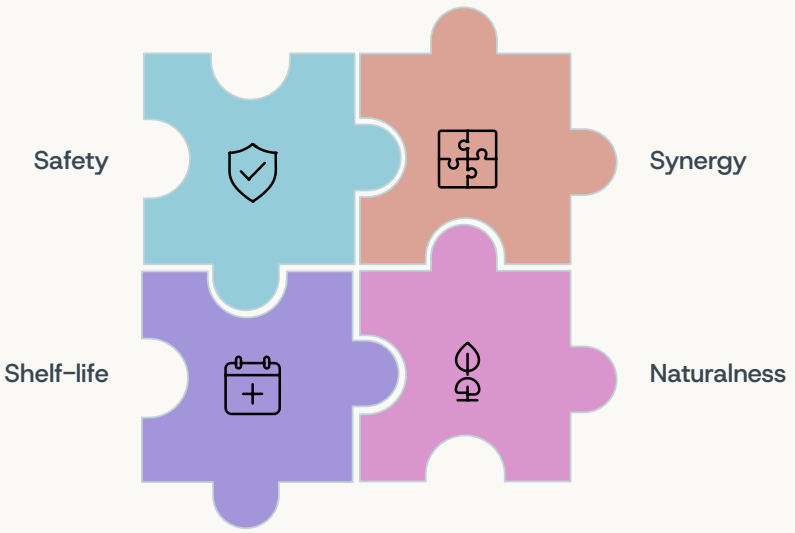
Plant-based

The emerging plant-based alternatives sector also benefits from **ACETIPRO™ Powder**, especially in egg analogs and plant-based emulsions where microbiological stability is challenging. Its declaration as a natural ingredient reinforces the sustainable positioning of these products.

Other sectors with high potential include baking (especially products with moist fillings) and refrigerated sauces (mayonnaises, dressings, salad sauces), where **ACETIPRO™ Powder** demonstrates excellent results in terms of shelf-life extension and maintenance of organoleptic properties.

INTABIOTECH offers specialized technical support to implement **ACETIPRO™ Powder** in formulations, including customized shelf-life studies, pilot tests, and advice on labeling in accordance with current legislation in different international markets.

> "The synergy between **ACETIPRO™ Powder** and PreserFood™ UOVO Original Formula establishes a new standard in the liquid egg and pasteurized egg product industry: enhanced safety, extended shelf-life, and improved perception of naturalness."



This synergistic combination represents a comprehensive solution that simultaneously addresses the three major challenges of the modern egg product industry:

ACETIPRO™ Powder consolidates INTABIOTECH's strategic commitment to developing natural, safe, and highly effective ingredients for food preservation. This innovative buffered vinegar in powder form represents a significant advancement in the technology for preserving egg products and various food matrices, offering manufacturers a comprehensive solution to multiple technical and commercial challenges.

Alignment with Market Trends

ACETIPRO™ Powder perfectly responds to the growing demand for clean label ingredients that allow "no artificial preservatives" claims. Its natural origin and technologically advanced format satisfy both consumer expectations and industrial requirements for performance and consistency.

Enhanced Food Safety

The demonstrated effectiveness against critical pathogens such as *Salmonella*, *Listeria monocytogenes*, and *E. coli* provides additional reassurance to manufacturers and distributors, significantly reducing the risks associated with microbiological contamination and potential food crises.

Logistical and Commercial Optimization

Doubling the refrigerated commercial shelf life transforms the commercial possibilities for egg products, facilitating export, reducing the frequency of returns, and minimizing spoilage losses throughout the supply chain.

Microbiological Safety

Broad-spectrum antimicrobial protection minimizes the risk of pathogen development, even in the event of potential temperature abuses in the cold chain. The multiple barrier system significantly hinders microbial proliferation.

Shelf Life Extension

The ability to double the commercial shelf life under refrigeration offers tangible competitive advantages, allowing manufacturers to optimize production, distribution, and export without compromising the final product quality.

Clean Labeling

The declaration as "buffered vinegar" meets the growing demand for transparency and naturalness, enabling products to be positioned in premium market segments with a perception of added value.

Food Categories Permitted by Current Legislation

Buffered vinegar powder, such as **ACETIPRO™ Powder**, is a natural preservation solution generally classified as a food ingredient or processing aid, allowing its widespread application in various food categories. Its regulatory status varies slightly between jurisdictions, but it is commonly considered a "food" or "food ingredient" derived from vinegar, which facilitates its use without the restrictions associated with artificial additives, perfectly aligning with clean label trends.

Egg Products and Derivatives

- **Application:** Optimal for the preservation of liquid egg products (egg white, egg yolk, whole egg), cooked egg products (omelets, scrambled eggs), and egg-based products (egg salads, mayonnaises).
- **Main function:** Effective control of pathogens such as *Salmonella* and *Listeria monocytogenes*, and significant prolongation of refrigerated shelf life, doubling commercial expiration.
- **Regulation:** Generally permitted in the EU under Regulation (EU) No. 1333/2008 for food additives, where vinegar is classified as an ingredient, or under specific national regulations. In the U.S., the FDA recognizes it as "buffered vinegar," which is GRAS (Generally Recognized As Safe) for these types of applications.
- **Usage levels:** Vary depending on the product and desired effect, but typically within ranges that do not alter the organoleptic properties of the final product.

Processed Meat Products

- **Application:** Cooked sausages (cooked ham, frankfurters), prepared meats (ground meats, hamburgers), and processed poultry products.
- **Main function:** Inhibition of *Listeria monocytogenes* and other spoilage microorganisms, contributing to food safety and extended shelf life.
- **Regulation:** Accepted in most food legislations due to its natural origin. It aligns with EU guidelines on microbiological safety in meat products.
- **Usage levels:** Adapted to the needs of each meat matrix to maximize antimicrobial efficacy.

Dairy Products

- **Application:** Fresh cheeses, yogurts, and dairy desserts, extending their freshness and microbiological stability.
- **Main function:** Control of molds, yeasts, and undesirable lactic acid bacteria, maintaining product quality and flavor.
- **Regulation:** Compatible with EU and FDA dairy regulations, which prioritize the safety and naturalness of ingredients.
- **Usage levels:** Formulated to maintain the organoleptic characteristics of dairy products.

Sauces and Dressings

- **Application:** Mayonnaise, salad dressings, tomato sauces, pasta sauces, and other condiments requiring microbiological stability.
- **Main Function:** pH control and antimicrobial effect against a wide range of pathogens and spoilage microorganisms, enhancing safety and shelf life.
- **Regulation:** Widely accepted given the traditional use of vinegar in these applications.
- **Usage Levels:** Optimized for product stability without affecting the flavor profile.

Bakery and Pastry Products

- **Application:** Sliced bread, pastries, cakes, and confectionery products susceptible to spoilage by molds and ropiness-forming bacteria.
- **Main Function:** Inhibition of mold and spoilage bacteria growth, extending freshness and shelf life without the use of artificial propionates or sorbates.
- **Regulation:** Permitted for use as a natural ingredient.
- **Usage Levels:** Designed to prevent spoilage without affecting texture or flavor.

Refrigerated Prepared Foods

- **Application:** Ready-to-eat meals, prepared salads, sandwiches, and other convenience foods with limited shelf life.
- **Main Function:** Delaying microbial growth and maintaining sensory quality, crucial for consumer safety and acceptance in cold chain products.
- **Regulation:** Favorably viewed for its "clean label" profile in this high-growth segment.
- **Usage Levels:** Adjusted to maximize protection without compromising freshness.

Canned and Semi-Canned Products

- **Application:** Pickled vegetables, canned fish, and other products where pH control and microbial stability are critical.
- **Main Function:** Complements the preservation process by optimizing pH and providing an additional bacteriostatic effect, enhancing safety and quality.
- **Regulation:** Its use complements pasteurization and sterilization regulations.
- **Usage Levels:** Integrated into the formulation for effective and natural preservation.

Processed Vegetable Products

- **Application:** Fresh-cut vegetables (fourth range), purees, vegetable juices, and other minimally processed products.
- **Main function:** Reduction of initial microbial load, oxidation control, and delay of enzymatic browning, maintaining appearance and freshness.
- **Regulation:** Its "clean label" nature is an added value in the growing vegetable food market.
- **Usage levels:** Carefully calibrated to preserve the sensory properties of vegetables.

Fishery and Aquaculture Products

- **Application:** Fresh fish, smoked products (such as salmon), seafood (mollusks, crustaceans), seafood salads, and marinated products.
- **Main function:** Effective microbial control to extend shelf life, inhibit pathogen growth, and maintain the sensory quality of fish products.
- **Regulation:** Recognized as a natural alternative for preservation in a sector with strict food safety regulations.
- **Usage levels:** Optimized to ensure safety and freshness without altering the organoleptic characteristics of fish and seafood.

In all cases, the use of buffered vinegar powder like **ACETIPRO™ Powder** allows manufacturers to meet the demand for "clean label" products, as it is declared simply as "buffered vinegar" or "vinegar" in the ingredients list, avoiding the negative perception associated with artificial preservatives. It is essential for manufacturers to consult the specific legislation of each country or region, as well as the guidelines of regulatory authorities (such as EFSA in Europe or FDA in the U.S.) to ensure compliance and permitted usage levels for each specific application.

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Far More Than Natural Preservation

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