

PROTERIA[®]

CULTURED SUGAR, VINEGAR



6

Key benefits

- Microbial stability improvement
- *Listeria* or mold control
- a_w and pH management
- Maximization of taste and flavor
- Color retention
- Clean-label

MAXIMIZING OVERALL QUALITY AND MICROBIAL STABILITY

With the increase in consumer demand for clean-labels and more transparency from food sources and process, producer feels the pressure to reformulate by replacing artificial ingredients with natural or organic alternatives, as well as minimally processed. Sugar and vinegar are easy for both consumers and processors to understand as clean-label ingredients, traditionally used to increase food stability and shelf life.

Proteria[™] cultured sugar and vinegar are produced by the fermentation of sucrose, originating from cane, beet, or corn. The substrates are fermented to organic acids by *B. coagulans*, *L. paracasei*, *P. freudenreichii* or mixtures of these microorganisms. The products are used to control a_w and pH value to form barrier of microorganism growth, maximizing overall quality and microbial stability in a variety of foods.

Brands



Table 1 Applications

Food categories		Cases	Proteria™ CP	Proteria™ CA	Proteria™ CV	Proteria™ DV	Proteria™ AL
Key benefits			Control mold	Maximize taste and flavour, microbial control	Improve overall quality and microbial stability	Inhibit spoilage microorganism and <i>listeria</i>	<i>Listeria</i> control
Bakery	Bread and bun	Pan bread	0.5-0.8%				
		Sugar-rich breads	0.5-0.8%				
		Buns and tortillas	0.5-0.8%				
		Steam or rye bread	0.5-0.8%				
	Dough products	Sourdough	0.5-1.0%				
Culinary	Condiments	Cooking sauces		0.5-1.5%			
		Pasta sauce		0.5-1.5%			
		Dips and spreads		0.5-1.5%			
		Deli salads		0.5-1.5%			
	Ready-to-eat meals	Fillings and stuffing		0.5-1.5%			
		Refrigerated soups		0.5-1.5%			
Meat, Poultry and seafood	Raw meat and poultry	Fresh sausage			1.5-2%		
		Turkey breast				1.5-2%	1.5-2%
	Cooked (cured) meat and Poultry	Pate			1.5-2%		
		Bacon			1.5-2%		
		Pressed ham			1.5-2%		
		Frankfurters			1.5-2%		
		Hot dogs			1.5-2%		
		Smoked ham				1.5-3%	1.5-3%
		Turkey breast				1.5-3%	1.5-3%
		Roast beef				1.5-3%	1.5-3%
		Ham				1.5-3%	1.5-3%

PROTERIA™ CP Cultured corn sugar

Mold and spores may still grow during the shelf life of baked goods, the result will cause food rancid taste, off-color and nutrition loss. Traditionally, propionic acid and its salts are used as preservative to extend the shelf life of baked goods. But, while consumers are turning away from products containing chemical additives, they still expect their foods to be tasty and fresh.

Case 1. Wheat bread

Figure 1 shows when replacing Calcium propionate, after 7 days, breads containing Calcium Propionate begin to show mold growth; however, bread containing Proteria™ CP is protected for up to 11 days, allowing you to achieve 3 additional days of mold free shelf life.

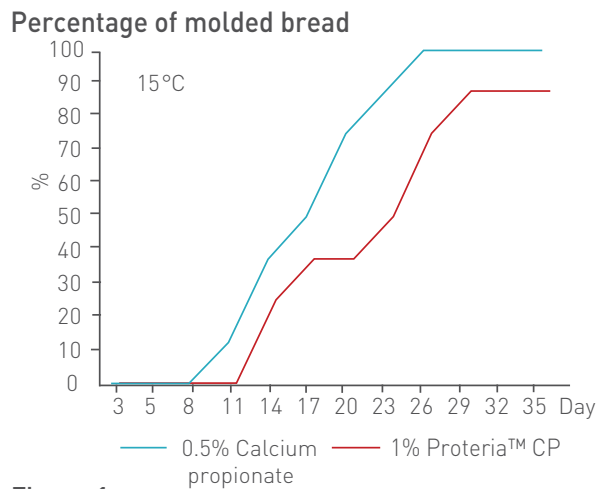


Figure 1

Proteria™ CP is a label friendly ingredient of corn sugar cultured with *Propionibacterium acidipropionici*, and can help you tackle this growing trend by delivering clean label mold inhibition that won't force you to sacrifice the quality, freshness or taste of your bread, buns or tortillas.

Figure 2 demonstrates that the dough with added Proteria™ CP was just as easy to process as the control in terms of color, oven spring and texture. In the case of Proteria™ CP, the oven spring and softness was better than the control.

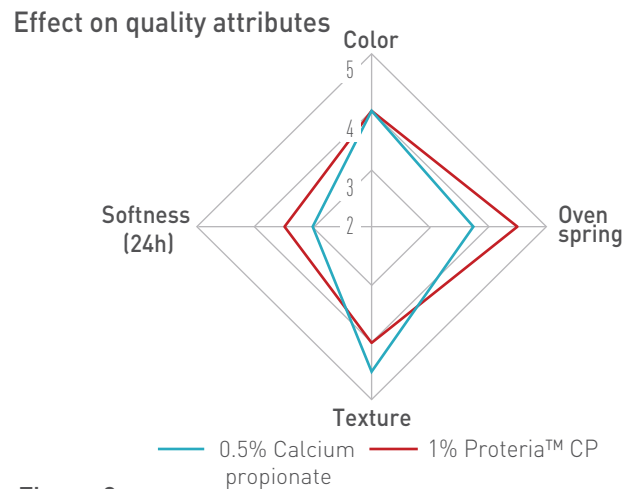


Figure 2

PROTERIA™ CA Cultured cane sugar

Consumers want to maintain their food healthy and fresh for longer time, with no changes in texture or flavor. The greatest challenge of food producers is to fulfil this demand without using any chemicals to prevent the microbial spoilage and without heavily processing the food.

Proteria™ CA is a label friendly ingredient of cultured cane sugar produced with specific food cultures. Specially designed to maximize taste and flavor and improve microbial stability of a wide range of culinary foods.

Case 2. Potato salad

Figure 3 shows that 1.5% Proteria™ CA can inhibit *Lactobacillus plantarum* for 60 days in potato salad.

Lactobacillus plantarum

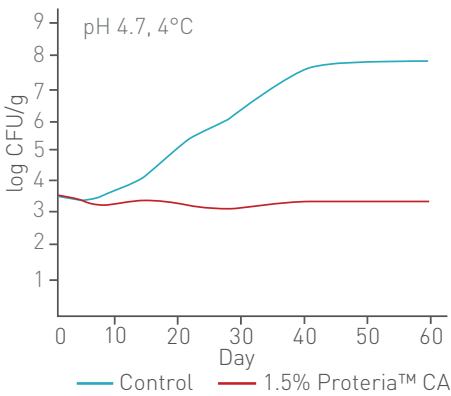


Figure 3

Case 3. Ready to eat meals

Figure 4 shows that 1.5% Proteria™ CA is effective against *Pseudomonas lundenis* in ready to eat meals (potato, spinach, meat).

Pseudomonas lundenis

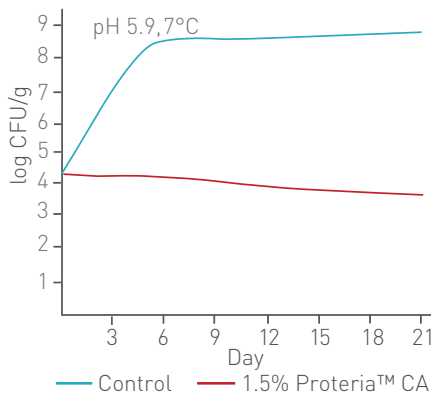


Figure 4

Case 4. Spaghetti bolognese

Figure 5 shows the effects of using Proteria™ CA in Spaghetti Bolognese. The result was the maximization of savory properties, especially the brothness and sweetness were enhanced.

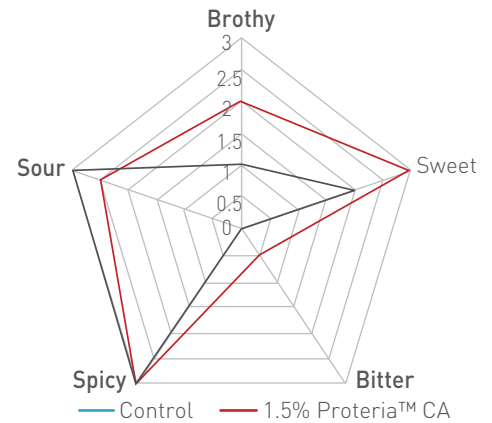


Figure 5

PROTERIA™ CV Cultured cane sugar, Vinegar

Cooked (un)cured meat will lose its stability during the shelf life, for examples pH falls change, the effect of stability loss can be seen by consumers by purge loss, color changes, color loss, lower quality and acidification. How to maintain product quality stabilization with natural consumer-friendly ingredients is an important challenge to many meat manufacturers.

Proteria™ CV is a label friendly ingredient of cultured cane sugar and vinegar. Cultured cane sugar is produced with specific food cultures used to manage the a_w , which is an important hurdle for the reduction of spoilage bacteria. Vinegar is well known for its antimicrobial properties. Specially designed to improve the quality stability and reduce microbial spoilage of cooked (un)cured meat and poultry items.

Cured ham

Figure 1 shows the acidity level of cured ham which is more stable with the addition of 1.5% Proteria™ CV.

Figure 2 shows the total plate count of cured ham with Proteria™ CV. The data indicates that shelf life was considerably improved with the addition of Proteria™ CV.

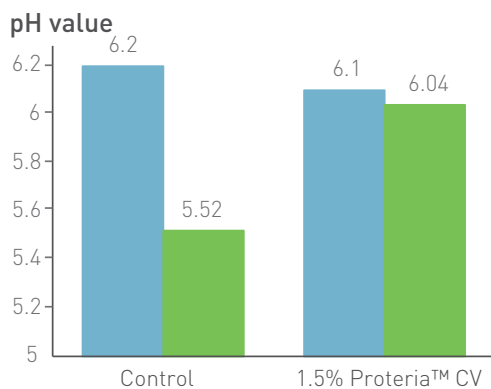


Figure 6

Aerobic plate count

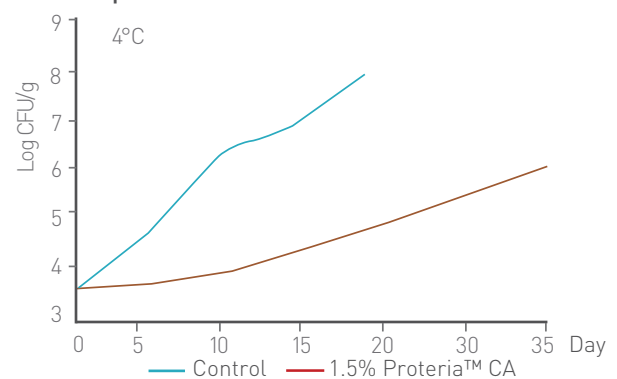


Figure 7

NATURAL ANTIMICROBIALS

PROTERIA™ DV Distilled vinegar

Vinegar are easy for consumers and processors to understand as clean-label ingredient and is a well-known inhibitor of spoilage organisms and pathogens.

Fresh chicken breasts

Figure 8 shows the results of a study measuring the influence of Proteria™ DV on the total plate count in chicken breast. The addition of 1.5% Proteria™ DV resulted in a shelf life extension of over double the control.

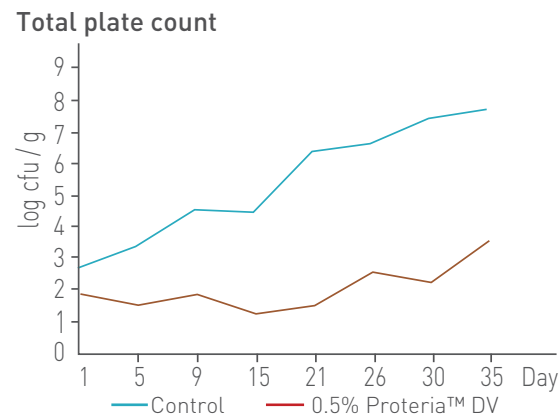


Figure 8

PROTERIA™ AL Cultured corn sugar, vinegar

Today's consumers are carefully checking the labels of the products they purchase. This is especially true when buying meat and poultry, where food safety and spoilage are main concerns, yet an authentic product with a clean label is highly desired.

Uncured turkey

Figure 10 shows the effectiveness of Proteria™ AL against *Listeria monocytogenes* in uncured turkey products for more than 90 days.

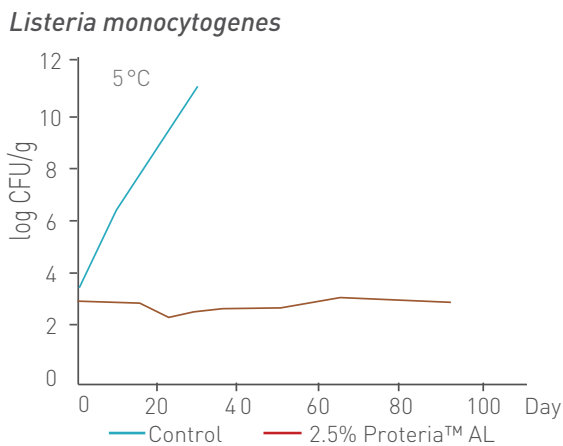


Figure 10

Proteria™ DV is clean-label ingredient of crystal distilled vinegar produced by the fermentation of corn or cane sugar with specifically selected food cultures. It is used to enhance safety by inhibiting the growth of listeria and spoilage bacteria in culinary, meat and poultry products.

Cured ham

Figure 9 shows the outgrowth of *Listeria* in a typical cured ham formulation. The addition of 0.7% of Proteria™ DV is expected to reach 1 log outgrowth for at least 100 days.

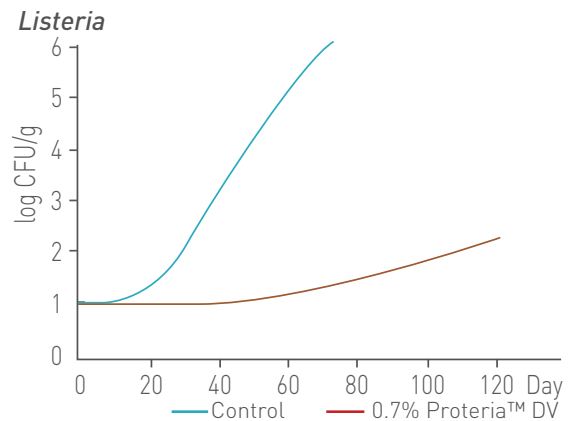


Figure 9

Proteria™ AL is a label friendly ingredient of cultured corn sugar and vinegar. cultured corn sugar is produced by fermentation with specifically selected food cultures. This unique product is highly effective against a wide range of pathogens including *Listeria monocytogenes* in (un)cured meat.

Frankfurter

Figure 11 shows the effectiveness of Proteria™ AL against *Listeria monocytogenes* in frankfurter sausages for more than 120 days.

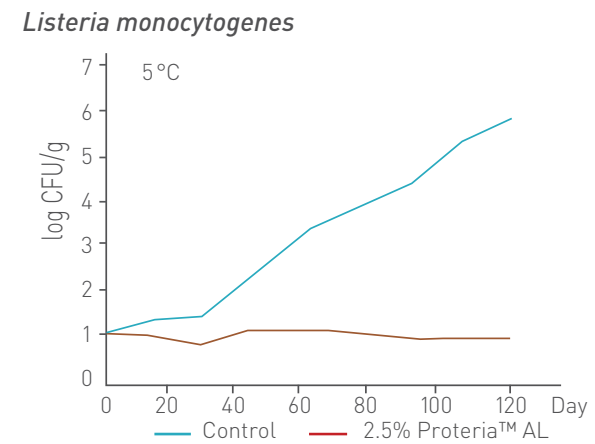


Figure 11