



Corbion
purac

**VERDAD® CLEAN LABEL
ANTIMICROBIALS FOR
MEAT & CULINARY**

Opportunities & challenges



Introducing Corbion

- Built on the strong foundations of **Purac and Caravan Ingredients**
- Global market leader in lactic acid, lactic acid derivatives and lactides
 - Natural preservation & fortification for Food
 - Biobased ingredients for Biochemical markets
 - Monomers for Bioplastics
- A leading company in functional bakery blends containing enzymes, emulsifiers, minerals and vitamins.
- Sales 2013 of € 744 million
- Employees: ~1,885
- 11 production facilities



Corbion Meat & Culinary

What needs are we addressing?

The Corbion portfolio delivers against two primary customer needs:

- Food Safety (e.g. Listeria control)
- Shelf Life

Next to this our portfolio and propositions are targeting a range of secondary needs, among others:

- **Label friendly**
- Cost effective
- Sodium reduction
- Food safety through carcass treatment
- Acidification
- Flavor enhancement



VERDAD CLEAN LABEL ANTIMICROBIALS

Meat & Culinary



Clean label

What matters to lunch meat consumer

“47% of lunch meat consumers say they’d eat more lunch meat/deli meat if it was less processed looking/tasting.”

“Purity and simplicity have become powerful in a world full of dangerous chemicals, additives, toxins and allergens.”



What matters to lunch meat consumers

US, February 2012

Answer: “very important” and “somewhat important”	%
<u>100% natural (i.e., no artificial preservatives, additives, colors)</u>	59
Premium/gourmet (i.e., made with higher quality ingredients)	56
Low sodium/sodium free	54
Low fat/fat free	53
Low calorie	49
Nitrate/nitrite free	36

Base: 1,765 internet users aged 18+ whose household uses lunch meat

What is Verdad?

- A family of label friendly antimicrobials
 - ✓ Sugars are naturally fermented using specific food cultures that produce a range of organic acid salts and fermentation products
 - ✓ Verdad contains a mixture of natural organic acid salts, peptides, sugars
 - ✓ Composition of Verdad products is consistent due to fixed metabolic routes of the cultures
- Labeled as cultured (corn) sugar or dextrose, and vinegar
- Light brown solutions
- Blended with vinegar to aid in Listeria control
- Enhances meat flavors- meaty, brothy, savory
- Good for sodium reduced products
- Portfolio for meat & culinary

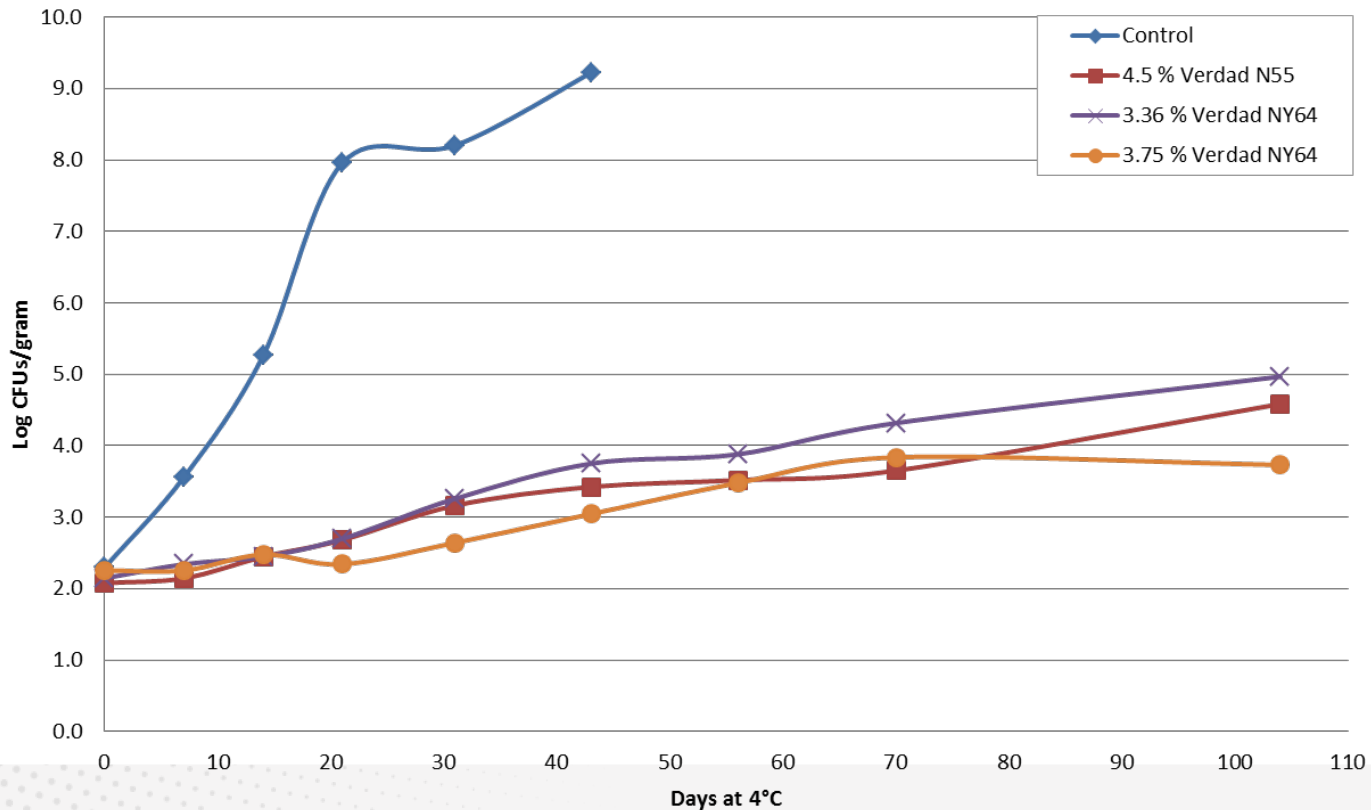


Verdad® N64 in Uncured Turkey

Inhibition of Listeria

Formulation: Uncured turkey with salt, phosphate, maltodextrin, carrageenan, starch, 43% pump; Composition: 70.0% moisture, pH 6.4, 1.68% salt, uncured

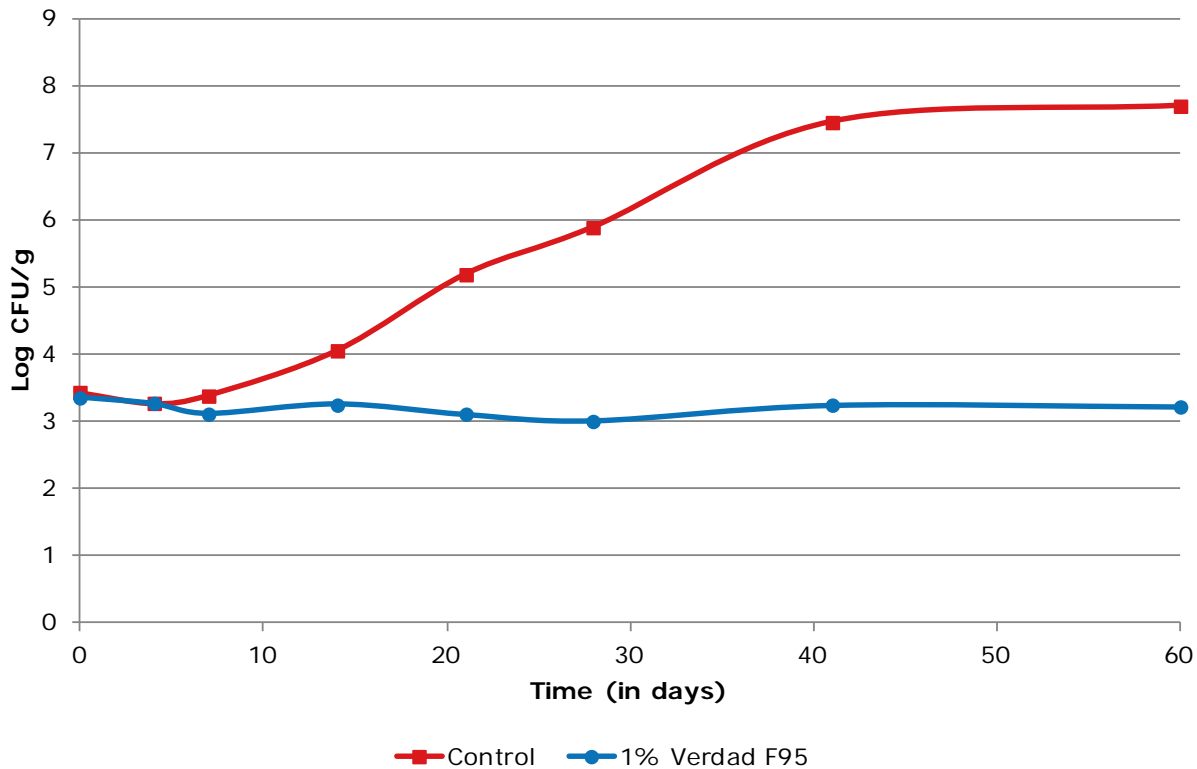
Listeria monocytogenes Growth Over Time



Verdad® F95 in Potato Salad

Inhibition of *L. plantarum*

Lactobacillus plantarum in potato salad



medium

potato salad

pH/temperature setting

pH pH 4.7-4.8
temperature 39.2°F/ 4 °C

microorganism

Lactobacillus plantarum

variables

- 1 0% w/w Verdad F95
- 2 1% w/w Verdad F95

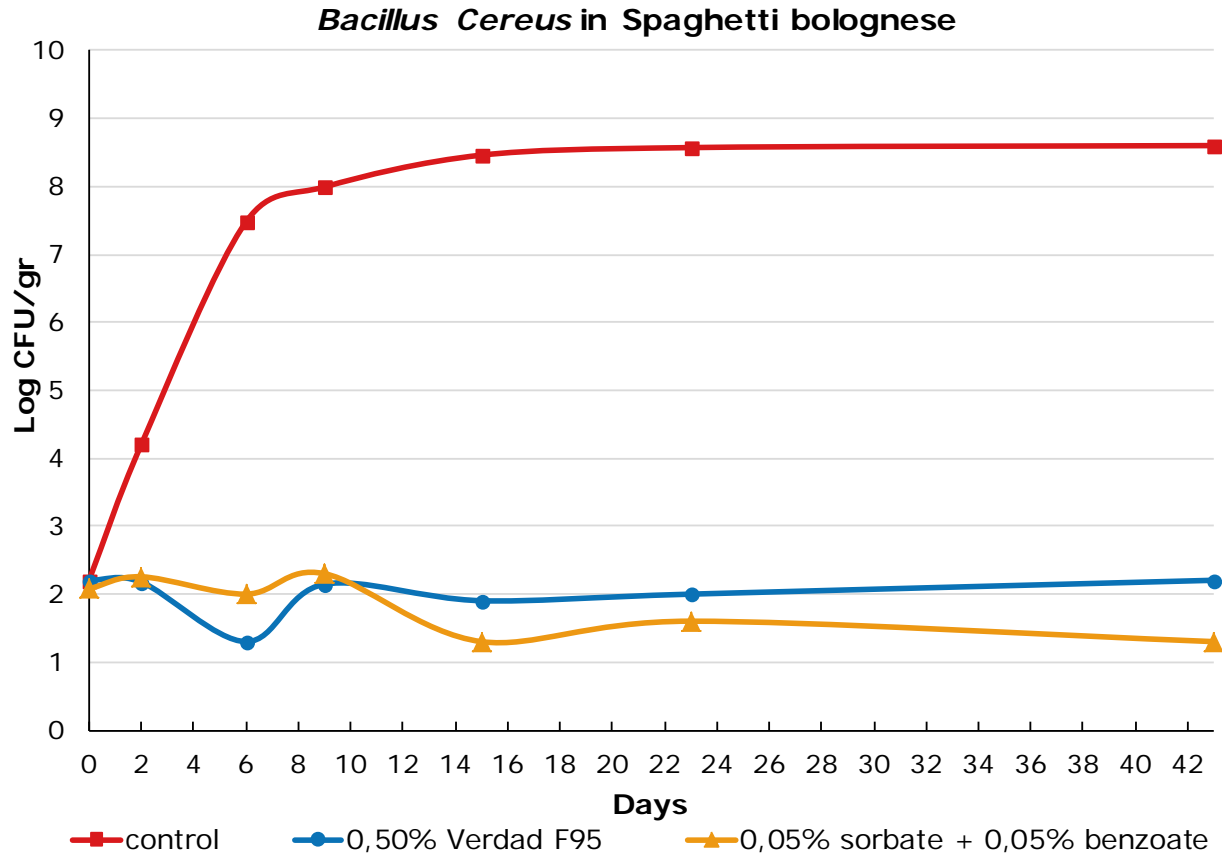
measurements (time interval)

0, 4, 7, 14, 21, 28, 41 and 60 days

In a carbohydrate-rich salad like potato salad 1% Verdad F95 inhibits *Lactobacillus plantarum* for 60 days

Verdad® F95 in Spaghetti bolognese

Inhibition of *Bacillus cereus*



medium

RTE spaghetti bolognese

temperature setting

temperature 15 °C/59 °F

microorganism

Bacillus cereus
(3 strain cocktail)

variables

- 1 control (no additives)
- 2 0.5%w/w Verdad F95
- 3 0.05% sorbate + 0.05% benzoate

pH set to 5.5

At pH 5.5 0.5%w/w Verdad F95 can inhibit the growth of *Bacillus cereus* for at least 43 days

Verdad® Vinegars

- **Verdad Vinegars are made with natural ingredients and minimally processed**
 - ✓ Labeled as: Vinegar
 - ✓ May be used in products bearing natural claim
 - ✓ Liquid and Powder portfolio
- **Applicable in both cooked and fresh meat items**
 - ✓ *Listeria* control in cooked meat
 - ✓ Shelf life extension in fresh and cooked meat



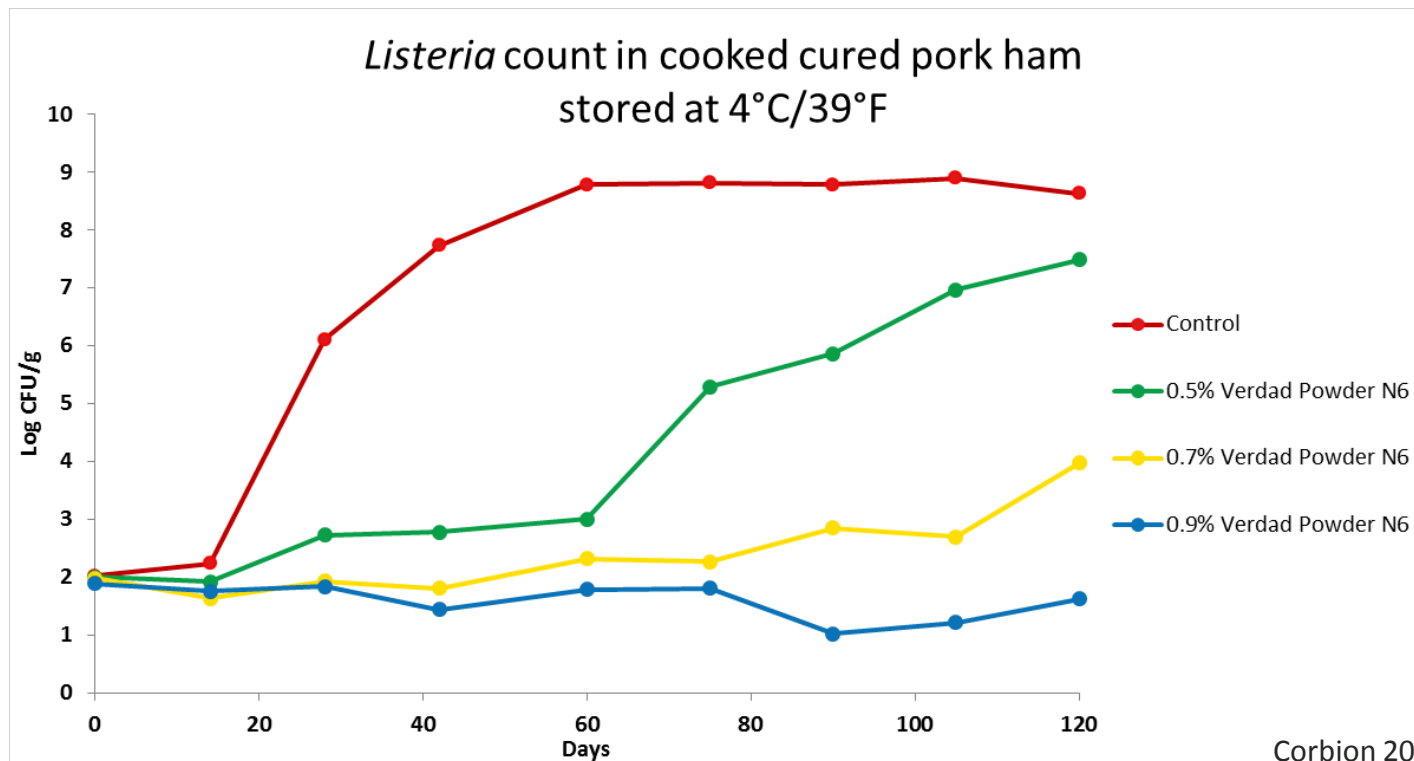
Product	Use level	Form	Labeling	Benefits
Verdad Powder N6*	0.4-0.9	Powder	Vinegar	Low use level, easy to use powder, limited taste impact Complies with Canadian regulation
Verdad N8*	0.9-1.8	Liquid	Vinegar	Balanced flavor; preferred for flavor sensitive products Complies with Canadian regulation
Verdad N9*	0.75-1.5	Liquid	Vinegar	Lowest use level liquid vinegar in market No sodium contribution

* patent pending

Verdad® Powder N6: *Listeria* Control in Clean Label Ham



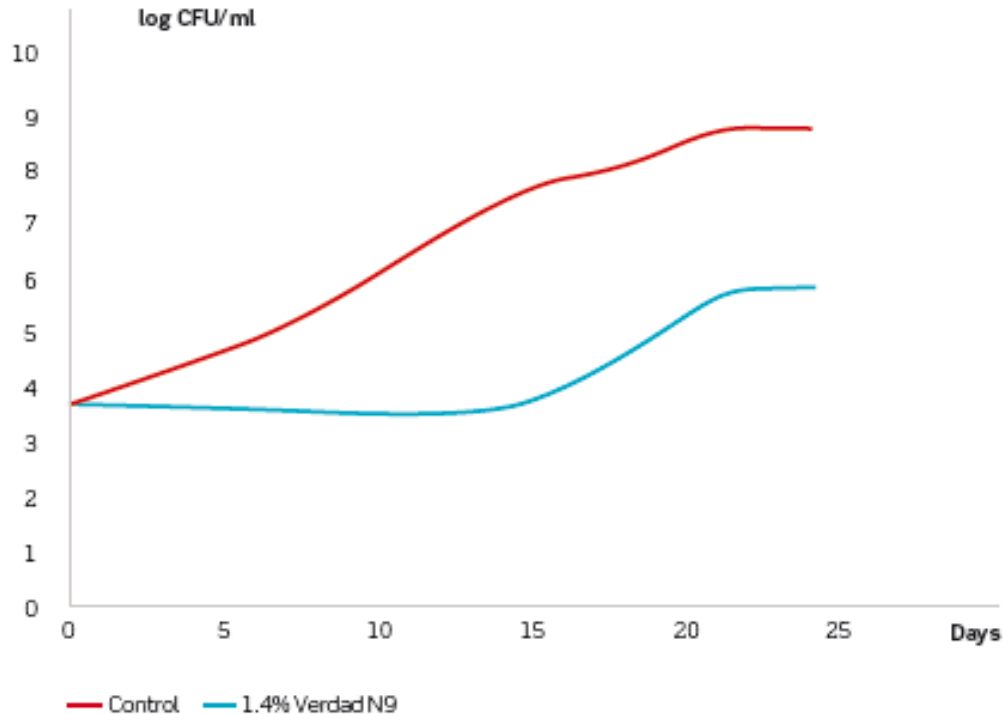
- Boneless pork ham formula:
 - 30% enhanced | 2.0% Salt (NaCl) | 1.0% Dextrose | 0.4% **Phosphate** | 0.5% celery juice powder
 - | Verdad N6: three concentrations | Storage Temp: 4°C
- *Listeria* inhibition for **120 days by addition of 0.9% Verdad Powder N6**
- No significant difference in cooking yield



Corbion 2013

Verdad® Vinegars in fresh beef and pork sausage

Total plate count fresh beef and pork sausage stored at 39°F/4°C



Verdad Vinegars extend shelf life in fresh meat, in this trial from 11 days (control) to 24 days with Verdad N9 (1.4%)

Source: Corbion USA application center 2014

Ingredient Swap



Traditional

Natural / Clean Label

Salt



Sea Salt

Dextrose, corn syrup, sugar

Evaporated cane sugar, Turbinado Sugar, Demerara, Raw Sugar, Sugar, Honey

Sodium phosphate

Sodium Carbonate, Sodium Bicarbonate, Carrageenan, Potato/Rice Starch

Sodium Nitrite



Celery Juice/Powder

BHA, BHT, Propyl Gallate

Rosemary, Green Tea, Cherry Powder

Sodium Erythorbate, Ascorbic Acid

Cherry Powder

Lactate, Diacetate



Vinegar, Cultured Corn Sugar, Cultured Sugar, Cultured Dextrose

Citric Acid

Lemon Juice, Lime Juice, Lemon Juice Solids

Corbion portfolio for Meat & Culinary



Verdad®

Label friendly ingredients meet the increasing demand for more simple and understandable labels, enabling food processors to produce high quality, safe and tasty food products.



PURAC®

Our classic, lactic acid portfolio. Offers excellent preservation and flavoring capabilities and is widely used as an acidulant in the food industry.



Opti.Form®

The golden standard, specifically designed to control growth of *Listeria* in meat and poultry products.



Purasal®

PURASAL® products are an excellent choice to increase shelf life in a wide variety of food and meat products.



Opti.Form® ACE & Protect

Low cost in use *Listeria* control solutions. Chemical based ingredients to increase the level of food safety of finished meat products at a lower cost.



PuraQ® Arome

Fermentation-based, natural flavor used to enhance the overall savory perception of meat and refrigerated foods.

