

CLEAN LABEL PRESERVATION TO COMBAT MOLD SPOILAGE

in Tortilla and Flat Bread



Anita Srivastava, Ph.D., CFS
Business Development Manager
anita.srivastava@kerry.com

Agenda

The Clean Label Movement

Understanding Mold

The Hurdle Concept

Fermented products and acidulants

Navigating Flavor & Texture

Pulling it together: Case Studies



THE PANTRY PARADOX



“I WANT A
CLEANER
LABEL”

66%

of US consumers say packaged bread contains too many preservatives

vs



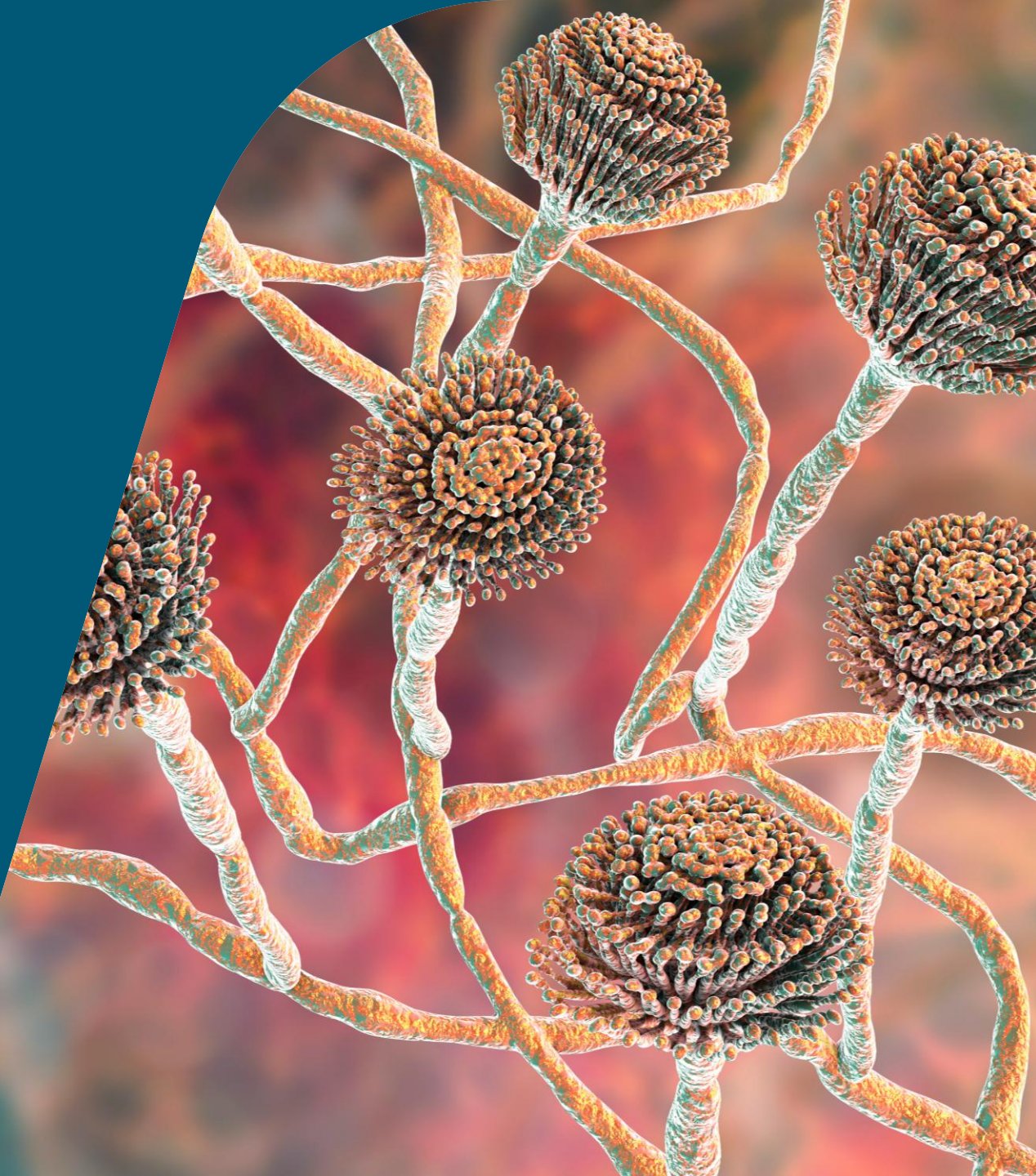
“I WANT A
LONGER SHELF
LIFE”

#1

Bread format concept consumers are interested in is 'bread with extended shelf life'

UNDERSTANDING MOLD

Types & Characteristics





ASPERGILLUS
Black, yellow,
green



RHIZOPUS
“Black bread
mold”
rapid decay



MUCOR
Rapid Growth
Cottony
colonies



**YEAST
GEOTRICHUM**
Creamy
colonies
(Machine
Index)



NEUROSPORA
Red bread
mold



**BACTERIAL
BACILLUS
SUBTILIS**
Rope
formers

What are Common Molds?

PRESERVATIVE RESISTANT MOLD (PRM)



- Various colors, typically green
- A few species are PRM (Preservative resistant mold)

e.g., *Penicillium roqueforti*, *P. paneum*, *P. carneum*
Penicillium roqueforti, also called “Cold Weather Mold”

HEAT RESISTANT MOLD (HRM)



- They can survive kill steps e.g., pasteurization, baking
- Also called “Summer Month Mold” or Ascospores

e.g, *Monascus spp*: e.g., *Monascus ruber*, *M. pilosus*

COMMON MOLDS



But where does mold come from?



INCOMING RAW/
PACKAGING
MATERIAL



QUALITY / STORAGE



PROCESSING
CONDITIONS



EQUIPMENT

FOOD BUILD UP



PACKAGING



QUALITY

CONDENSATION

PACKAGING MATERIAL



ENVIRONMENTAL
CONTAMINATION



SANITATION

PERSONAL HYGIENE



FORMULATION



ANTIMICROBIALS,pH,a_w

THE HURDLE CONCEPT

Optimization in Baked Goods

EXTERNAL HURDLES



inactivate spoilage or
pathogenic microorganisms



e.g. temperature management,
humidity, thermal treatments,
plant conditions

INTRINSIC HURDLES



inhibit sporulation and
retard mold growth



e.g. water activity, pH, salts
& antimicrobials

Each hurdle **adds stress to mold outgrowth**, lengthening lag
phase of mold sporulation & *increasing food protection*



Mold Free Shelf-Life & Three Common Terminologies

1

MOLD INHIBITOR (CONVENTIONAL& CLEAN LABEL)



Mold Inhibitors/Antimicrobial:
Substances that Inhibit the
growth of Microorganisms

Propionic Acid
Sorbic Acid

2

ACIDULANTS (CONVENTIONAL& CLEAN LABEL) **WATER ACTIVITY**



Acidulants: pH adjustors or
acidity Regulators
Water Activity(a_w) : available
water for microbial metabolism

Vinegar
Citric Acid
Malic acid

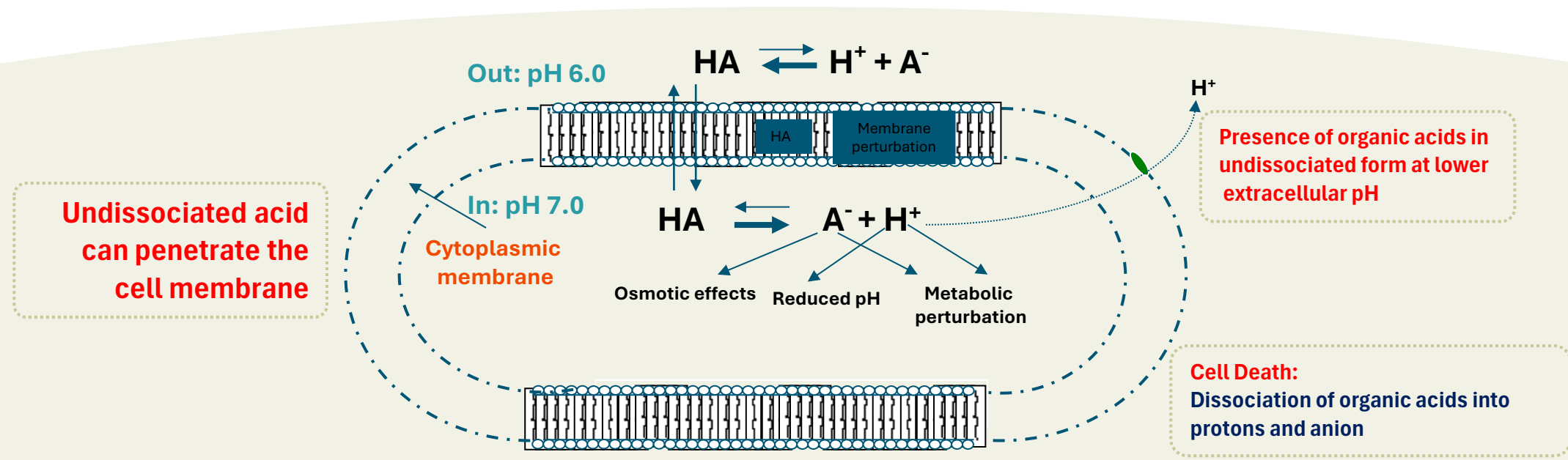
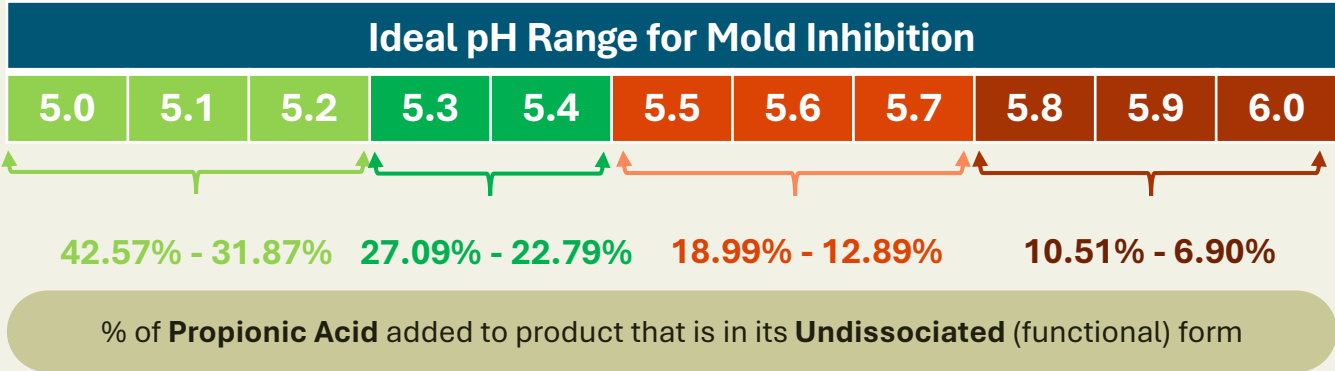
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UNDISSOCIATED ACIDS

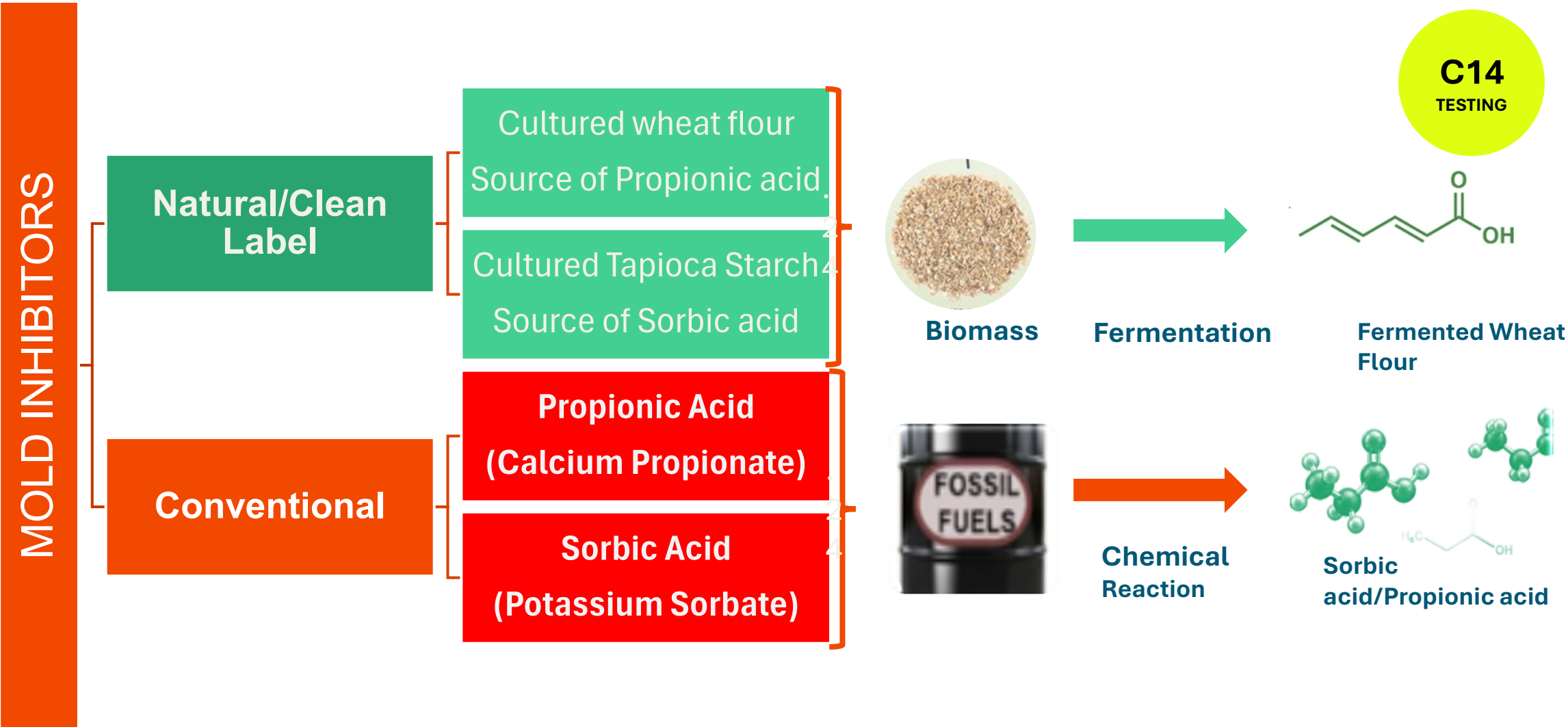


Undissociated acid: an intact
acid
 $[HA = H^+ + A^-]$

Mechanism of Microbial Action



Mold Inhibitors



What are Natural Preservatives



Turning food carbohydrate into natural organic acids

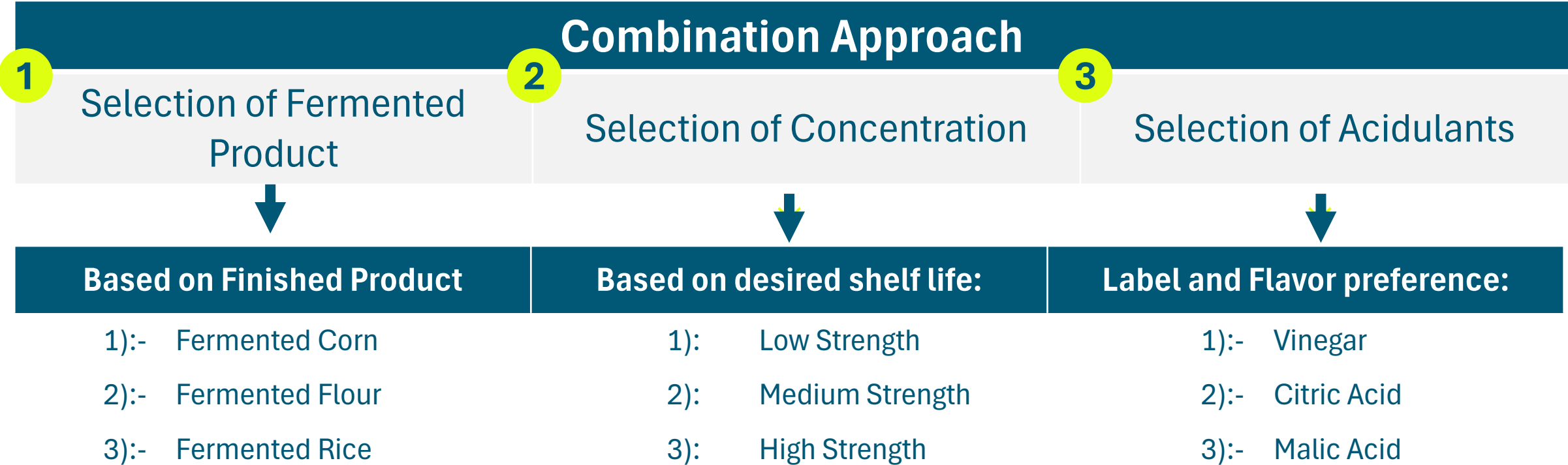


UPGRADE™

Not labeled “calcium propionate” because includes propionic and acetic acids along with spent media, fermented flavors, pasteurized inactivated culture



Formulation Challenges: Selection of Natural Preservation System



UPGRADE™

UpGrade™ is Kerry’s range of fermentation-derived solutions for bakery products offering multifunctional benefits of shelf life and fresh taste.

PRODUCT NAME	LABEL DECLARATION	FORMAT	POINT OF DIFFERENCE
UpGrade™ Pro W8	Cultured wheat starch and wheat flour	Powder	Higher strength
UpGrade™ WS Organic	Cultured organic wheat starch and organic whole wheat flour	Powder	Organic 95%
UpGrade™ WS	Cultured wheat starch and wheat flour	Powder	Wheat
UpGrade™ CS	Cultured corn syrup solids OR Cultured dextrose and maltodextrin	Powder	Allergen free
UpGrade™ BR	Cultured brown rice OR Brown rice flour	Powder	Gluten free



DURAFRESH™

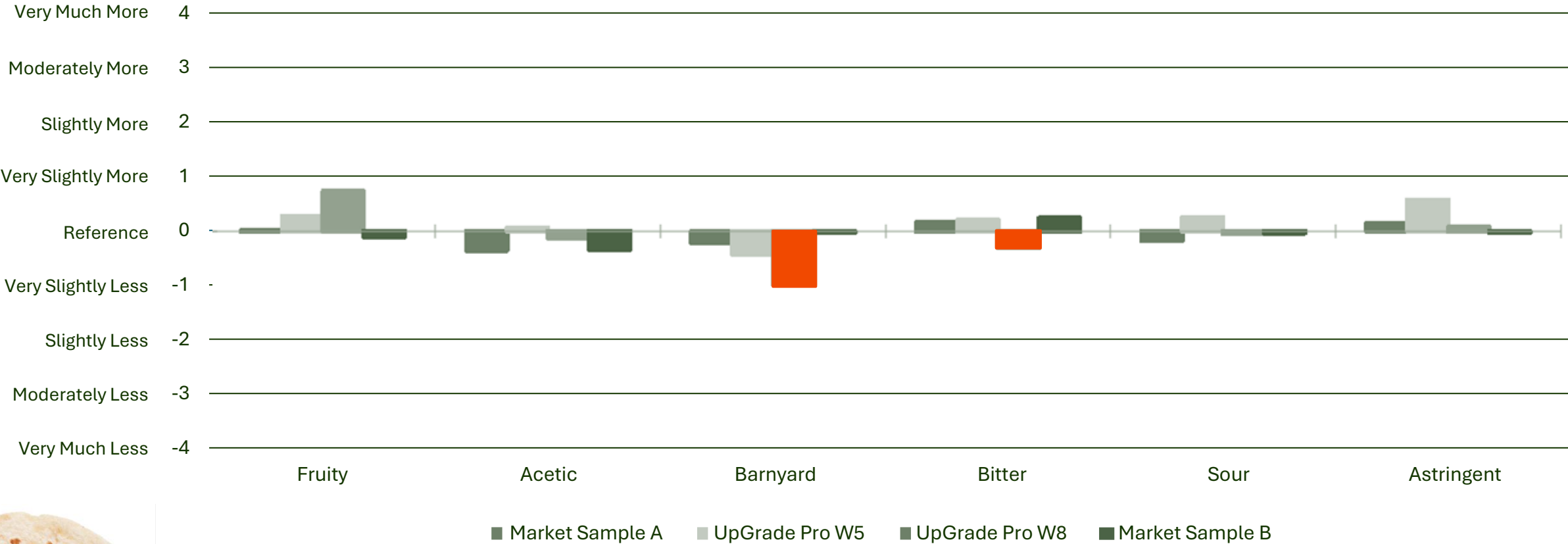
Durafresh™ is Kerry’s range of fermentation-derived solutions for bakery products offering multifunctional benefits of shelf life and fresh taste.

PRODUCT NAME	LABEL DECLARATION	FORMAT	POINT OF DIFFERENCE
DuraFresh 5250	Fermented Tapioca Flour, Sea Salt	Powder	Potassium sorbate replacer, Clean Label

**verifies the biobased origin of ingredients, giving manufacturers added confidence in source and label claims.*

Sensory evaluation: Degree of Difference

1.45% Upgrade W8



UPGRADE™ PRO W8

Kerry's next generation of UpGrade™

Better for clean-label confidence:
A wheat-based mold inhibitor supporting clean-label preservation with dependable performance for today's bakery expectations.



Backed by

 **C14**
testing*

Technology Benefits

Shelf Life

High strength propionic acid to deliver robust mold inhibition

Efficient

Lower dosage rate without compromise on efficacy

Easy-to-handle format:

Incorporate with dry ingredients, easy to distribute into dry mix

No Taste Compromise

Smooth, clean sensory profile, even at reduced inclusion

Scalable

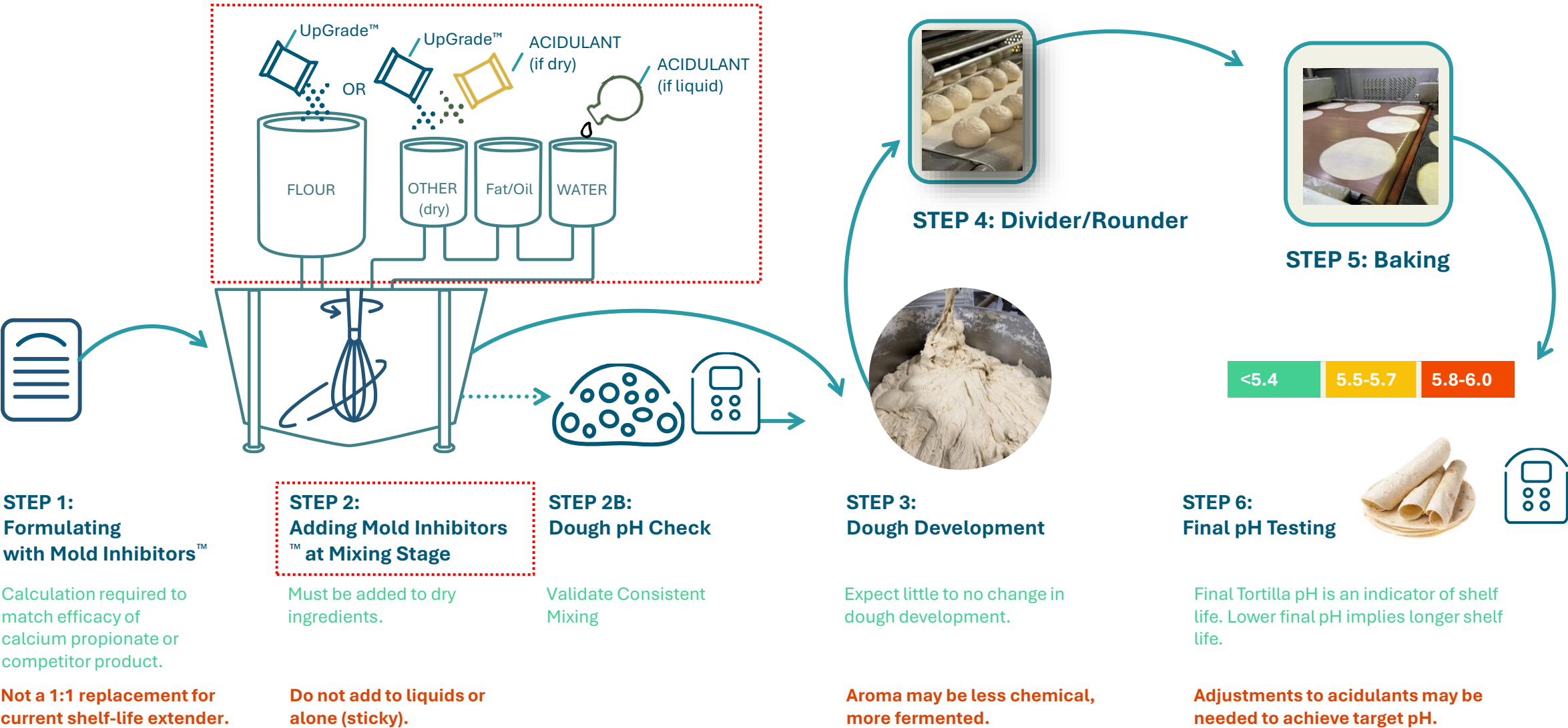
Proven performance in yeast raised bakery products and tortilla/flatbreads

Versatile

- Breads/Buns/Rolls
- English Muffins/Crumpets
- Flatbreads/Naan/Tortillas
- Pizza Crust/Bagels
- Croissants

THE LATEST UPGRADE™ INNOVATION

Where preservation fits into your Tortilla-baking process



APPROACH



High Protein Tortilla

Reformulation : Multi technology Approach

Selection of clean label preservation technologies with modified taste profile.

Softness enzyme for performance and softness over shelf life

Dough relaxing enzymes to improve mixing efficiency by reducing the mixing time

IMPACT



- Tortilla freshness life : 30 days
- **Upgrade™ ProW8** demonstrated highly effective mold control with clean taste profile
- **Biobake™ Fresh Tortilla** to reduce the rate of retrogradation / staling for fresh-keeping during storage
- **Biobake™ BPN** helped to reduce mixing time by ~25%

MULTI-TECH SOLUTION

Upgrade W8

Inclusion < 2.0%

Smooth & Clean Flavor

Shelf-Life 90 days



Upgrade W8
Fermented Flour

Biobake Fresh Tortilla
Freshness, Resilience

Biobake BPN
Dough relaxer

Case Study

Optimizing tortilla formulation to enhance product quality



Customer Challenge

Customer was facing more than 20% waste in the plant due to dough and tortilla stickiness. At first sight, the solution to high waste was not due to one factor, it required a holistic approach and deep analysis of processing conditions and ingredients.

Approach

Identifying and proposing and route for improvement involved in person visits and collaboration with customer’s technical and plant teams. Analysis two major issues: sticking during processing and over storage.

The Solution



First, minor tweaks were suggested for hydration, timing, and mixing consistency. Complete reformulation was suggested.

- Individual technologies were provided:
- Biobake Fresh Tortilla
 - Biobake BPN
- Customer received ingredient details and recommended amounts to ensure ideal dough texture, softness, and foldability without stickiness.

Enzymes
Biobake™ Fresh Tortilla
Biobake™ BPN



THANK YOU

Any questions?

Anita.srivastava@kerry.com

470.558.5750