Shortening & Fat Reduction With Good Texture Machineability and High Fiber Tortilla

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ENZYME INNOVATION

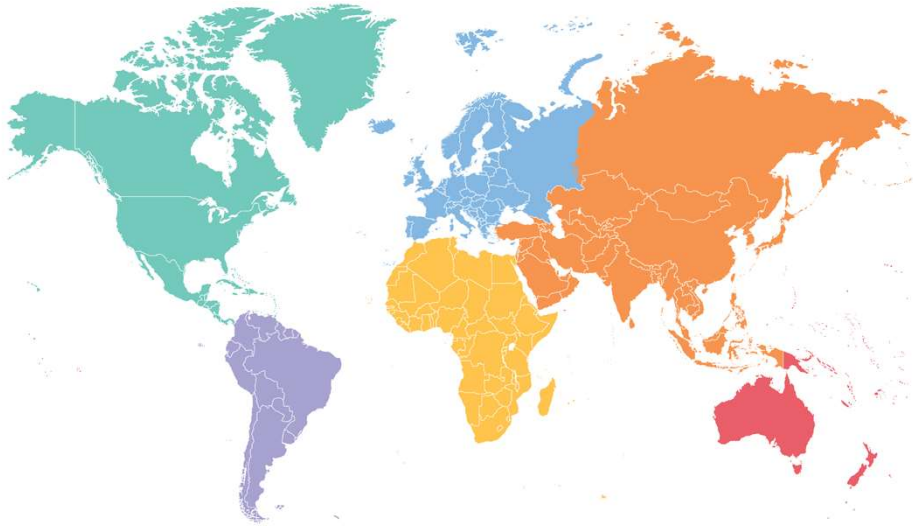
TORTILLA INDUSTRY ASSOCIATION TIA

Content

- Current Industry Trends
- Understanding Healthier Tortilla
- Challenges in Healthier Tortilla Making
- Our Solutions
- Performance & Results
- Conclusion

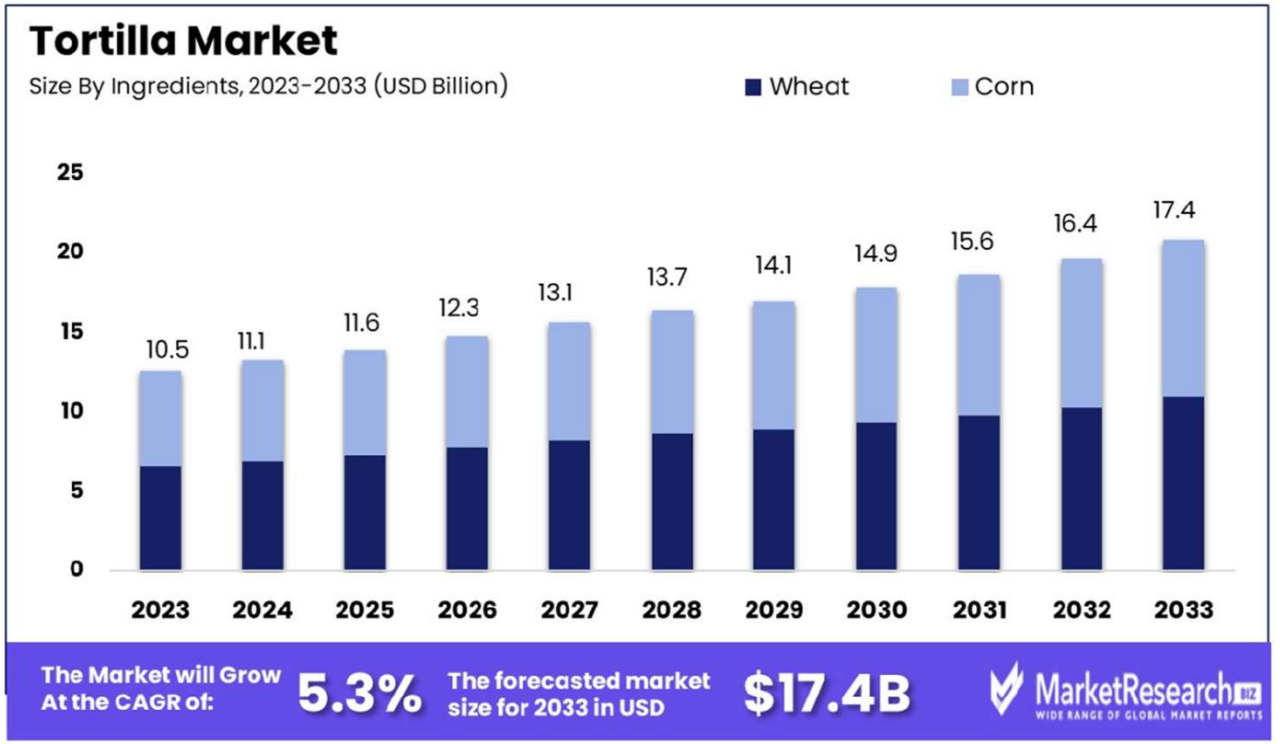
Tortillas: Loved Around the World

- Key drivers behind tortilla industry's strong growth: low cost, ease of preparation, wide range of available options
- Popular everywhere: easy to use, work well in many dishes, make great wraps
- Customers like tortillas are soft & flexible with long shelf life
- Increased market growth driven by: new flavors, healthier choices, easy-to-eat small tacos



Current Trends in the Tortilla Market

- Tortilla market valued at $10.5 billion in 2023
- Expected to reach $17.4 billion by 2033
- CAGR = 5.3%



Why the Tortilla Market is Growing

People Want Quick and Healthy Food

Tortillas are easy to make and good for a balanced diet

Health-driven product innovation

Whole grain, high-fiber, and reduced-fat options

Tortillas are a Good Choice

Fast to prepare, lower in calories, salt & fat, and sold in stores & restaurants

Understanding Healthy Tortillas

Health-Focused Formats

- Low carb
- High fiber
- Low Fat
- Gluten free
- Probiotics

Flavor & Ingredient Innovation

- Manufacturers have introduced new flavors & ingredients

Grain-Free & Allergen-Friendly

Why Healthier Tortillas?

In the U.S.:

Just 5% of consumers get enough fiber each day

74% of adults are overweight

60% have at least one diet-related chronic disease

40% are living with obesity; 9% have severe obesity

38% are pre-diabetic; 11.3% are diabetic

34% of adults have metabolic syndrome

What are Healthier Tortillas?

Reduce

- Fat
- Sodium
- Sugar
- Chemicals

Add

- Fiber
- Whole Grains
- Protein
- Probiotics

Role of Fat in Tortillas

Fat performs several critical functions in tortilla quality & processing:

- Lubricates gluten → improves softness & dough extensibility
- Controls moisture migration → helps maintain texture over time
- Improves rollability & foldability → reduces cracking
- Supports shelf life & sensory quality

Removing fat leads to multiple functional losses

Demand for Reduced-Fat Tortillas

Consumer Demand

- Customer demand for clean-label products
- Interest in lower-fat bakery products

Food Regulations

- Retailers want healthier nutrition profiles
- Pressure to reduce fat in products

Cost & Supply Challenges

- Fat & shortening prices are unstable
- Need for cost-stable solutions

Technical Challenges

- Shortening supports machinability, softness & shelf life
- Fat reduction must maintain quality & processability

What Happens When Fat Is Reduced in Tortillas?

Processing Challenges

- Dough becomes stickier & harder to process
- Reduced machinability during sheeting & pressing

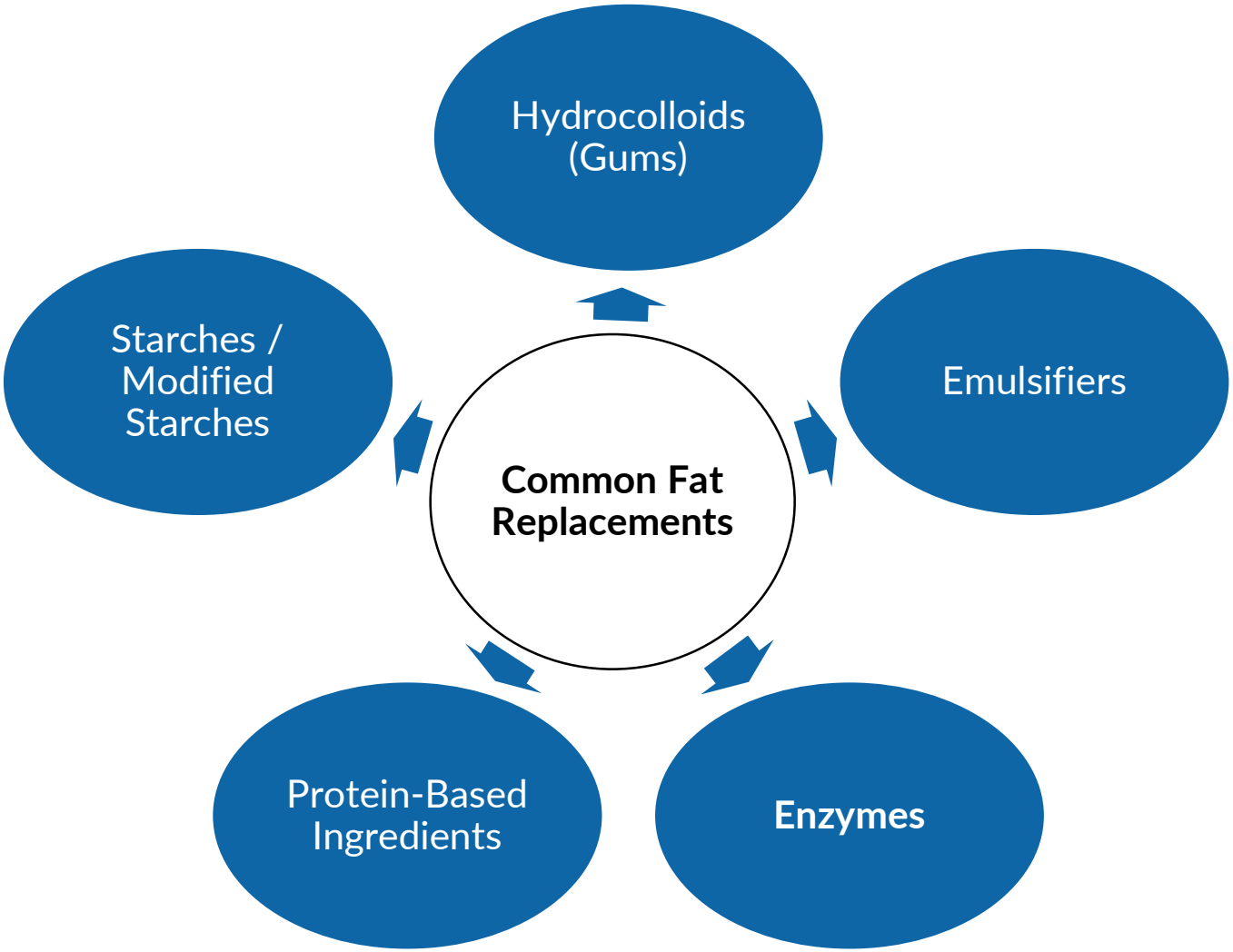
Texture Changes

- Tortillas become firmer & less extensible
- Higher risk of cracking during rolling & folding

Quality & Shelf Life

- staling Faster
- Reduced softness & eating quality

Fat reduction impacts dough handling, texture & shelf life


Hydrocolloids (Gums)
Starches / Modified Starches
Emulsifiers
Common Fat Replacements
Protein-Based Ingredients
Enzymes

Common Fat Replacement Strategies in Tortillas

Hydrocolloids (Gums)

Examples

- Xanthan gum
- Guar gum
- CMC (carboxymethyl cellulose)
- HPMC

Benefits

- Improve water retention in tortilla dough
- Help maintain softness during storage
- Increase dough viscosity & stability

Limitations

- Can create gummy or dense texture
- May affect dough machinability

Starches / Modified Starches

Examples

- Pregelatinized starch
- Modified corn starch
- Tapioca starch
- Potato starch

Benefits

- Provide structure & body in reduced-fat tortillas
- Help maintain soft texture
- Increase water-binding capacity
- Support volume & tortilla diameter

Limitations

- Can reduce flexibility
- May negatively affect rollability

Emulsifiers

Example

- DATEM
- SSL (Sodium Stearoyl Lactylate)
- Mono- & diglycerides
- Lecithin

Benefits

- Help improve dough handling & structure
- Improve gas retention & stability
- Help maintain uniform tortilla texture

Limitations

- Limited effect on long-term softness
- Do not fully replace fat functionality

Protein-Based Ingredients

Examples

- Soy protein
- Pea protein
- Whey protein
- Faba bean protein

Benefits

- Improve structure & water binding
- Increase nutritional value (higher protein)

Limitations

- Can impact flavor
- May alter texture & dough handling

Most fat replacers solve one functional issue, but introduce new challenges

Enzymes (Multi-Functional Solution)

Examples

- Amylases
- Xylanases / Hemicellulases
- Phospholipases
- Proteases

Benefits

- Improve dough performance & tortilla quality through targeted functionality
- Enhance dough handling, softness, water retention & flexibility
- Delay staling in reduced-fat systems

Formulation & Process Optimization

- Best results need the right dosage and process settings
- Performance changes based on formulation and flour quality
- Using enzyme blends can improve results

Enzymes do not replace fat—they restore functions lost when fat is reduced

Fat Replacement Comparison

Approach	Main Benefit	Key Limitation
Hydrocolloids	Improve water retention	Can create gummy texture
Starches	Improve structure	Reduce flexibility
Emulsifiers	Improve dough handling	Limited long-term softness
Proteins	Improve nutrition & structure	Impact flavor
Enzymes	Support dough handling, softness & shelf life	Require optimized Solution

Why Enzymes?

Enzymes target starch–protein–lipid interactions & improve internal structure

Dough & Processing → Improve dough handling & machinability; Support gluten extensibility

Texture & Structure → Help maintain softness & flexibility; Improve rollability & foldability

Moisture & Shelf Life → Improve water distribution & retention; Help delay firming during storage

Traditional approaches = single function
Enzymes = multi-functional support

Enzymes provide a more balanced, multi-functional solution

How Enzymes Help Replace Fat Functionality in Tortillas

Functional Target	Effect in Tortilla Dough	Examples	Mechanism
Gluten Modification	Improves dough extensibility & machinability	Proteases	Relax gluten structure
		Xylanases	Improve dough handling
Water Management	Improves moisture distribution & softness	Amylases	Help retain softness during storage
		Hemicellulases	Improve water binding
Dough Structure Optimization	Improves flexibility & reduces cracking	Phospholipases	Strengthen dough structure Improve rollability & foldability
Shelf-Life Improvement	Helps delay firmness during storage	Amylases	Reduce starch retrogradation

Enzymes restore multiple functional roles normally provided by fat

With the right enzyme system, you:

- Can use your current production line
- Don’t need new equipment
- Don’t need major process changes

- Reduce shortening 20–50%
- Maintain softness & flexibility
- Improve rollability & rupture resistance
- Support shelf life
- Preserve machinability

Our Solutions for Healthier Tortillas

	Products	Benefits
Reduce Shortening	SEBake LO™	Reduce shortening up to 33%
	SEBake Fresh Ultra™	Improve softness resilience & foldability, and extend shelf life
	SEBake PP™	Relax dough, improve spreadability & diameter

Shortening Reduction Studies

https://www.istockphoto.com/photo/decorating-christmas-cookies-with-icing-gm623292062-109266917?searchscope=image%

SEBake LO™ - Shortening Reduction

Ingredients	Products	Benefits
Wheat flour	SEBake LO™	Maintain Softness, Rollability & Diameter in Shortening-Reduced Tortillas

SEBake LO™

Control	33% Shortening Reduction	33% SR + SEBake LO™

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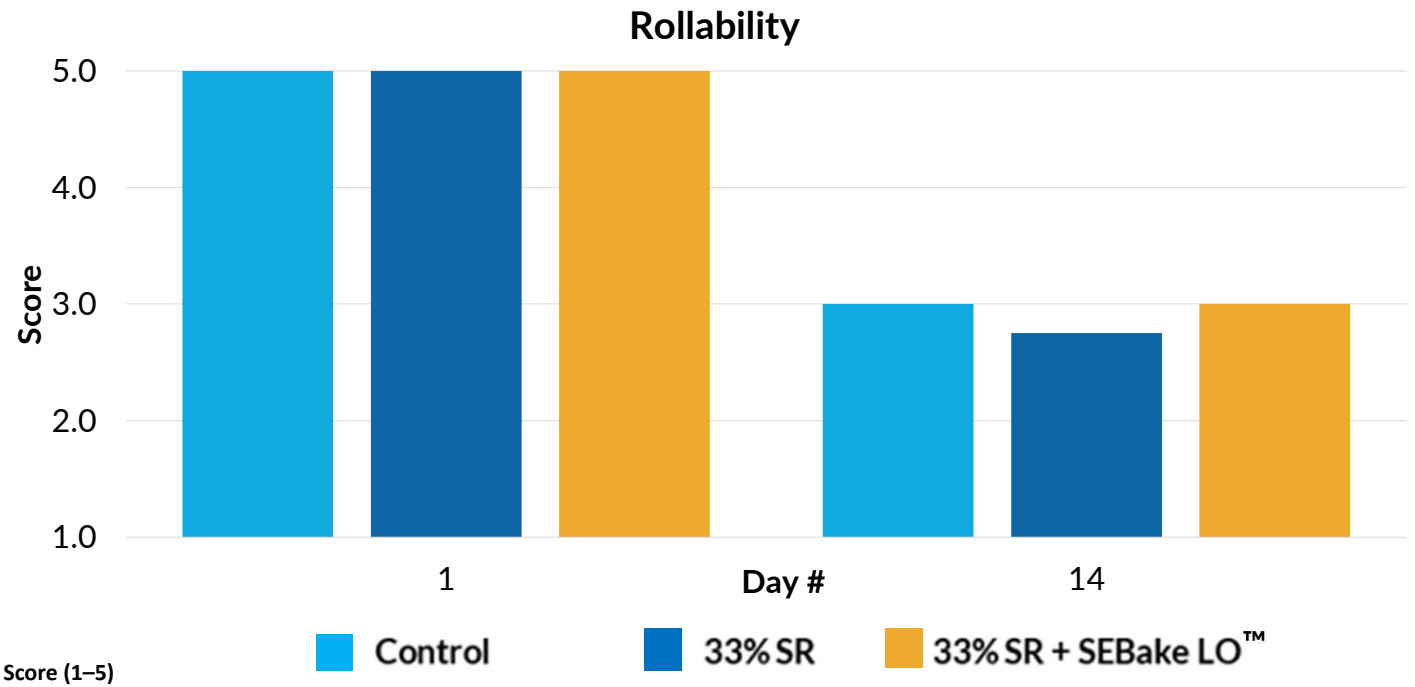
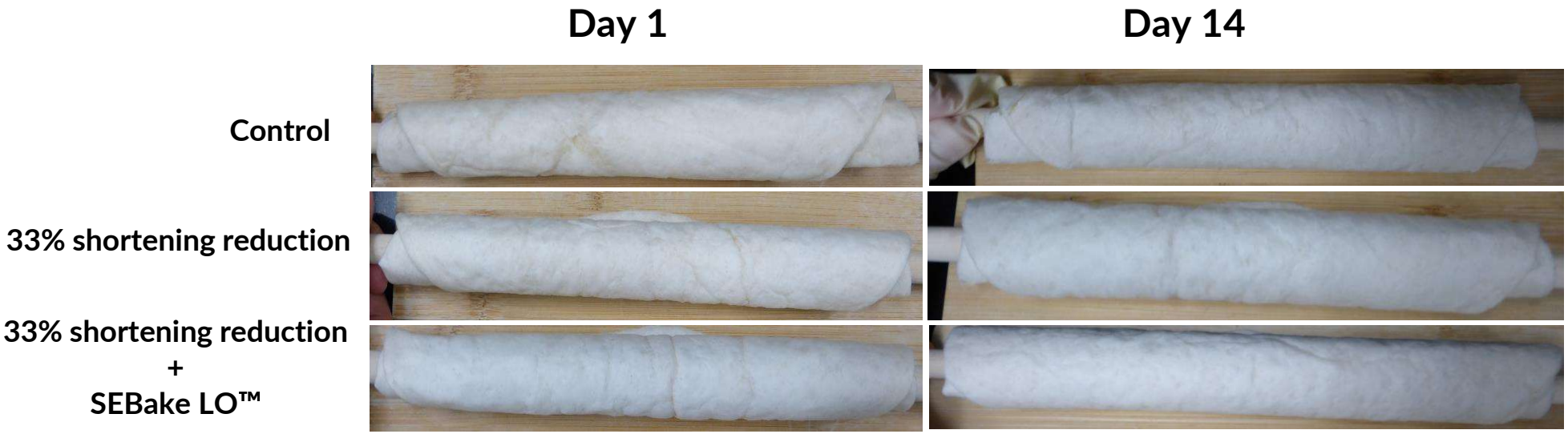
- Enzyme treatment improves dough smoothness & extensibility
- Enzyme Maintains tortilla diameter in reduced-fat formulations

SEBake LO™ - Improved Rollability



Rollability Score (1–5)
5 = no cracks, easy roll
3 = some cracks
1 = breaks, not rollable

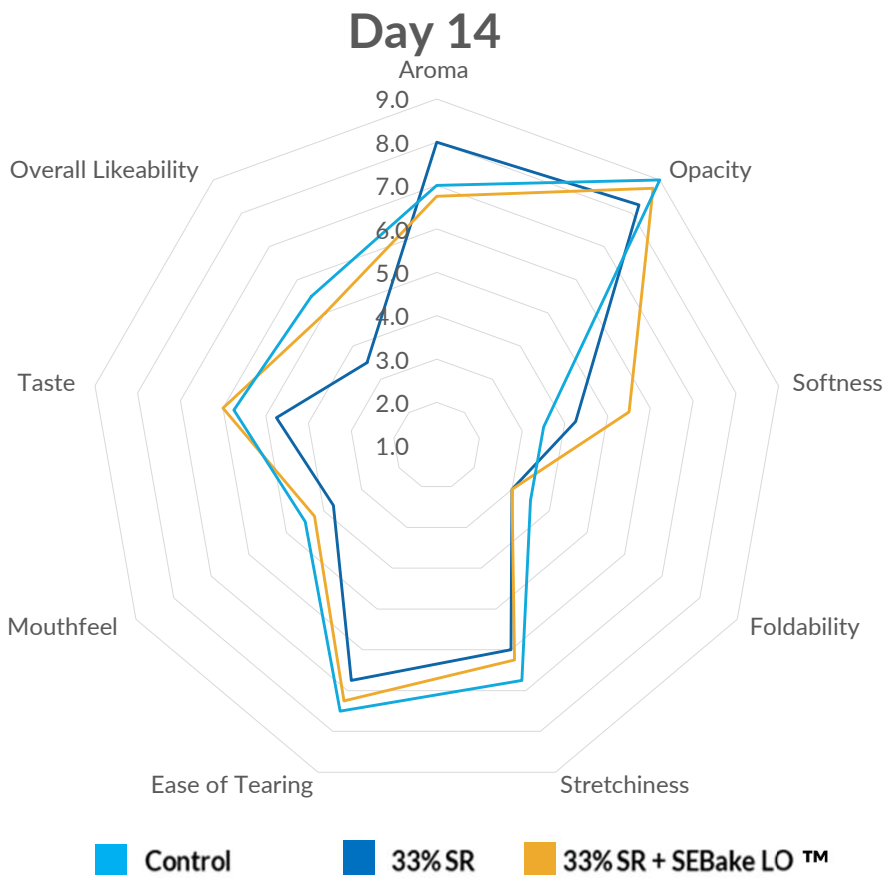
Rollability



SEBake LO™ improved softness, enabling a 33% reduction in shortening while maintaining control-like diameter, firmness, rollability & foldability

Sensory Evaluation

- SEBake LO™ improved sensory stability under reduced-fat conditions
- Helped maintain texture & overall likeability during storage



Key Takeaways

- Fat reduction affects structure, not just appearance
- Enzymes allow controlled functionality replacement
- Successful systems protect processing & quality

High Fiber Tortillas

High Fiber Tortillas

Benefits of Fiber

- Improves Digestive Health
- Lowers Blood Cholesterol
- Weight Management
- Prevents Constipation
- Diabetes Management
- Sugar Reduction

Challenges with Adding Fiber

- Harder Texture & Dry
- Bitterness
- Stiffer Dough
- Increased Water Absorption

Our Innovative Approach to Healthier Tortilla Formulation

	Products	Benefits
High Fiber Tortillas	SEBake Fresh Ultra™	Prolong softness, extend shelf life
	SEBake CLX™	Increase volume in high-fiber bread / rye bread
	SEBake PF™	Replace emulsifiers, improve whiteness
	SEBake AX™,, SEBake FX Ultra™	Smooth dough handling, increase volume, flour correction

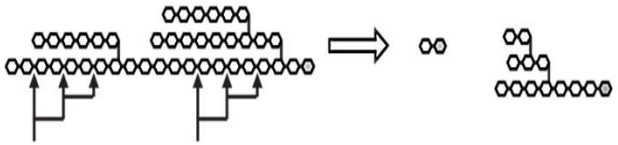
SEBake Fresh Ultra™

What does SEBake Fresh Ultra™ do?

Helps tortillas stay soft, moist, rollable, resilient & fresh longer

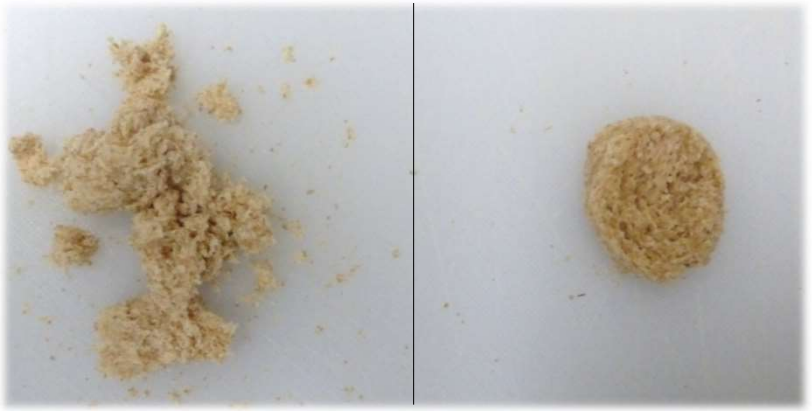
How does it work?

Breaks down starch into maltose & small carbohydrates (oligosaccharides), helping keep products soft.



Benefits

- ✓ Holds more water → tortilla feels moister
- ✓ Keeps tortillas softer, rollable, resilient & elastic
- ✓ Delays staling → extends shelf life
- ✓ Improves overall texture & quality



Control	With SEBake Fresh Ultra™

SEBake CLX™ & SEBake FX Ultra™

Fiber Modification

SEBake CLX™

Benefits

- Helps make softer baked goods
- Improves dough machinability & quality

Function

- Modifies fibers in flour

SEBake FX Ultra™

Benefits

- Improves dough handling
- Softens baked goods

Function

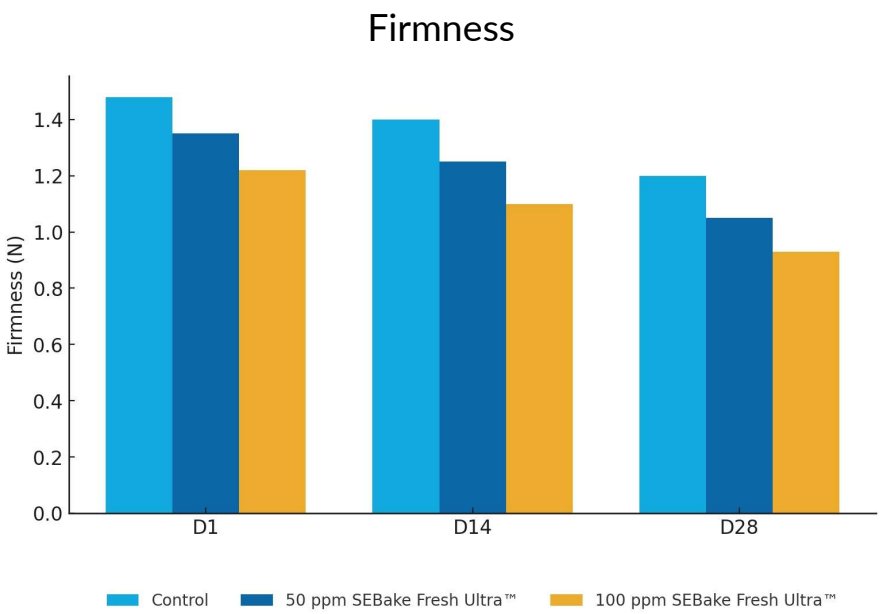
- Modifies fiber in flour

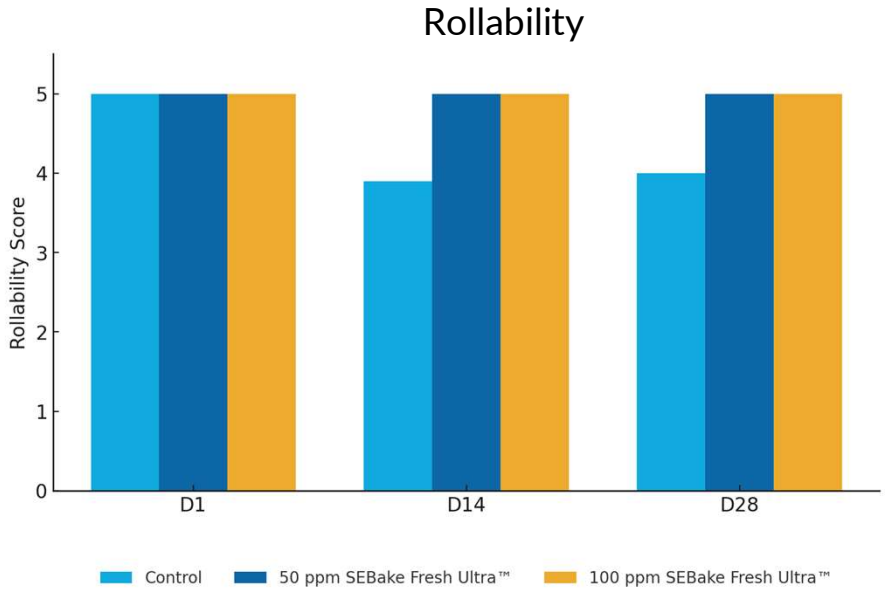
SEBake Fresh Ultra™ in High Fiber Tortillas

Ingredients	Products	Benefits
Whole Wheat Flour, Flaxseed, Cellulose	SEBake Fresh Ultra™	Prolongs Softness, Extends Shelf Life

Control 50ppm SEBake Ultra-Fresh™ 100ppm SEBake Ultra-Fresh™

SEBake Fresh Ultra™ - Improved Firmness & Rollability



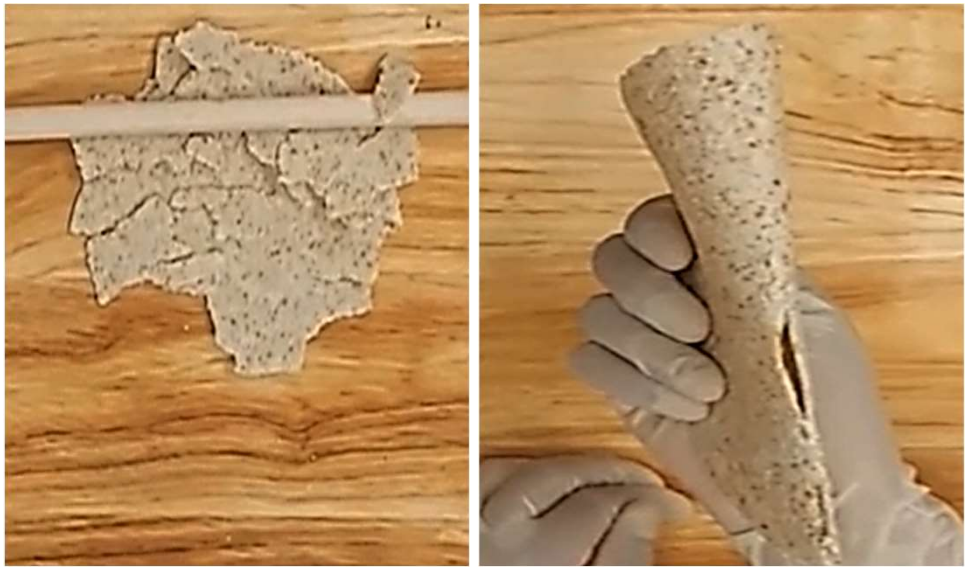


- Tortillas remain softer tortillas, longer
- Delays staling by enhancing softness & moisture retention
- 100ppm extends freshness & flexibility

- Tortillas remain flexible for 28 days
- Prevents staling & preserves rollability
- 50–100ppm maintains Day 1 flexibility throughout storage

SEBake Fresh Ultra™ - Improved Rollability

SEBake Fresh Ultra™



Control

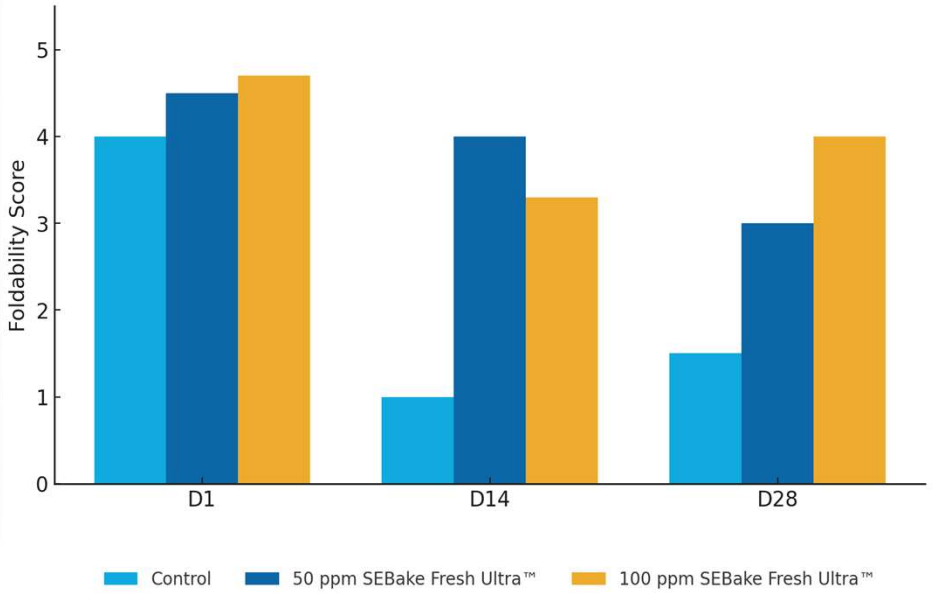
High-fiber tortillas on day 35 (8.6g fiber per 45g tortilla)

SEBake Fresh Ultra™ - Improved Foldability

Day 0

Day 14

Day 28

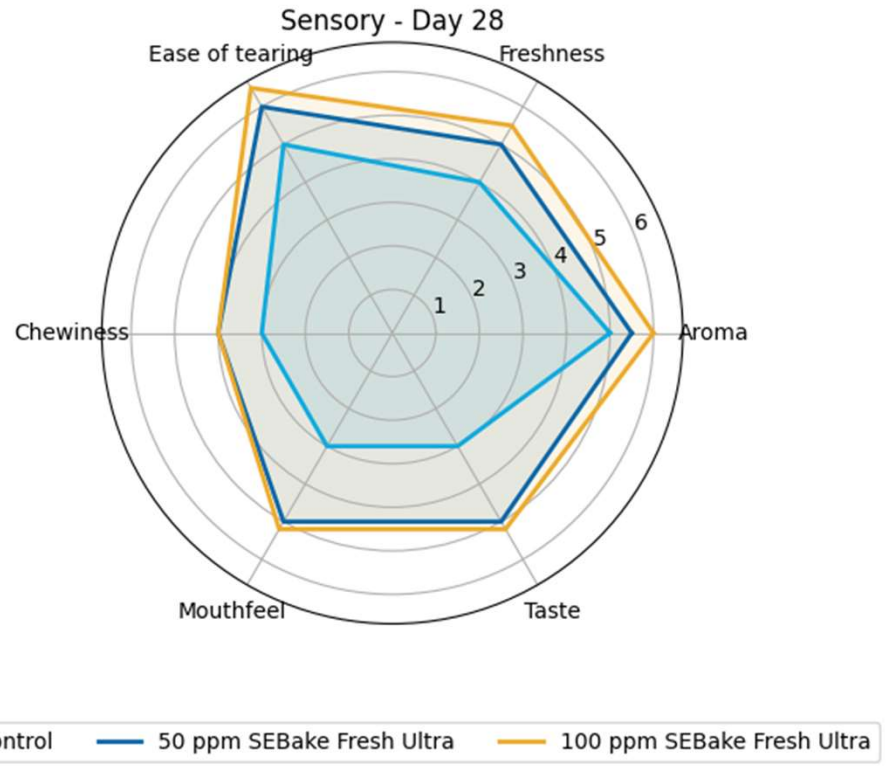


- After 28 days, tortillas are foldable & flexible with 100ppm SEBake Fresh Ultra™
- No cracks or brittleness

Sensory Evaluation

- Enzymes enhance tortilla freshness, taste & mouthfeel over 28 days
- Best sensory experience with 100ppm

Better sensory quality after 28 days of storage



SEBake PF ™

- Phospholipase-based enzyme
- Replaces emulsifiers
- Improves crumb whiteness
- Enhances dough functionality
- Supports overall product quality

SEBake PF™ + HealthSense Flour Tortillas

Control	50% HealthSense Flour*	50% HealthSense Flour* + 100ppm SEBake Fresh Ultra™	50% HealthSense Flour* + 100ppm SEBake Fresh Ultra™ + 20ppm SEBake PF

***HealthSense Flour contains 32% fiber**

Foldability

Foldability – Day 24

Control

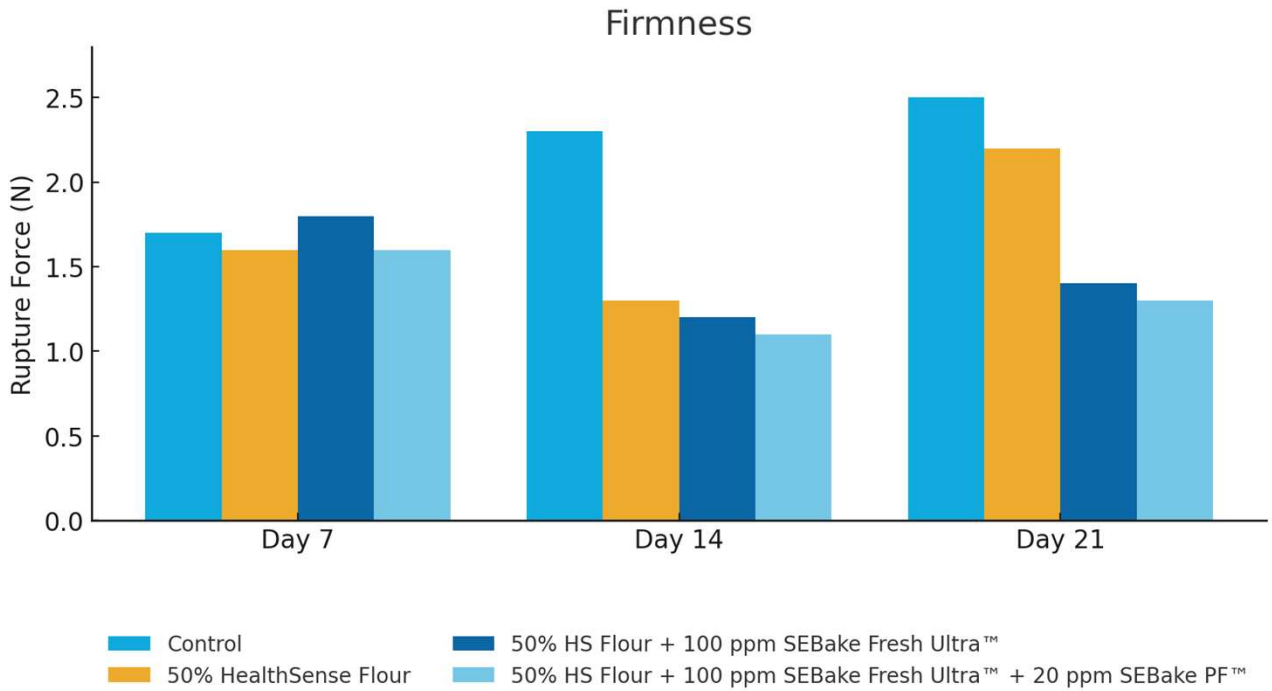
50% HealthSense Flour*

50% HealthSense Flour* +
100 ppm SEBake Fresh Ultra ™

50% HealthSense Flour* +
100 ppm SEBake Fresh Ultra ™ + 20ppm SEBake PF ™

*HealthSense Flour contains 32% fiber

Improved Firmness



- HealthSense Flour firms faster
- Added enzymes (SEBake Fresh Ultra™ + SEBake PF ™) keep products soft & delay staling
- Best softness = HS + SEBake Fresh Ultra™ (+ SEBake PF ™)

Summary

Healthy Tortillas	Our Solution	Benefits
Fiber	SEBake CLX™	Improves dough handling, softens fiber
	SEBake FX Ultra™	Improves dough handling, softens fiber
	SEBake PF™	Improves dough handling, softens fiber
Protein	SEBake PP™	Increases dough extensibility
	SEBake NP™	Relaxes dough
Probiotics	SEB LBSC™	Improves gut health
Shortening Reduction	SEBake LO™	Helps reduce shortening up to 33%
Softness & Shelf-life	SEBake Fresh Ultra™	Prolongs softness & freshness, improves rollability & resilience

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