

A background image of a microscope with a hand adjusting a knob. The image is partially obscured by a white circular shape containing text.

Improvement of Tortilla Textural Shelf Life

Lan Ban, Ph.D.

The KEMIN logo, featuring the word "KEMIN" in a bold, white, sans-serif font with a stylized wave-like graphic above the letters "E" and "M".

KEMIN[®]

TODAY'S SPEAKERS

Lan Ban, Ph.D.

Director of Research & Development, Kemin Food Technologies

Based in Des Moines, Iowa, Dr. Ban is responsible for Research and Development of the Food Technologies division of Kemin Industries, a leading provider of shelf-life extension and food safety solutions.

Lan Ban received her Ph.D. in Bioorganic Chemistry from the University of Chicago. After a brief postdoctoral appointment at California Institute of Technology, she joined the research team in Kemin Food Technologies in 2012. Currently she holds the R&D director position for the North American region. Lan's research focuses on identification and developing functional ingredients for textural, oxidative and microbial shelf-life extensions in various food systems

KEMIN INDUSTRIES, INC.

Approximately **2,800 employees** worldwide

Manufacturing plants located in **15 countries**

Business operations in more than **90**

countries

More than **\$900M** annual revenue

More than **500 patents** and applications



Founded in 1961 by R.W. & Mary Nelson
Independently owned by the Nelson family

AGENDA

- Tortilla quality
- Minor ingredients
 - Emulsifiers
 - Enzymes
 - Gums

WHAT MAKES A TORTILLA PERFECT?

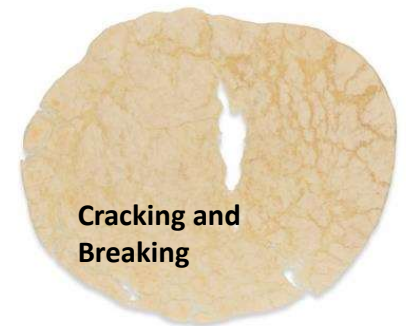
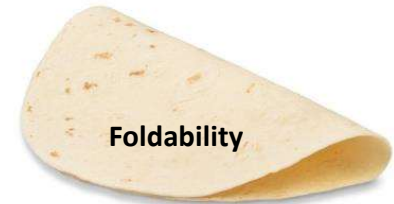
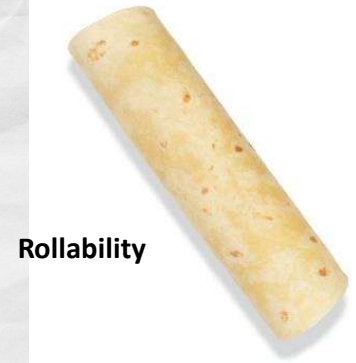
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KEMIN

PREFERRED TORTILLA CHARACTERISTICS

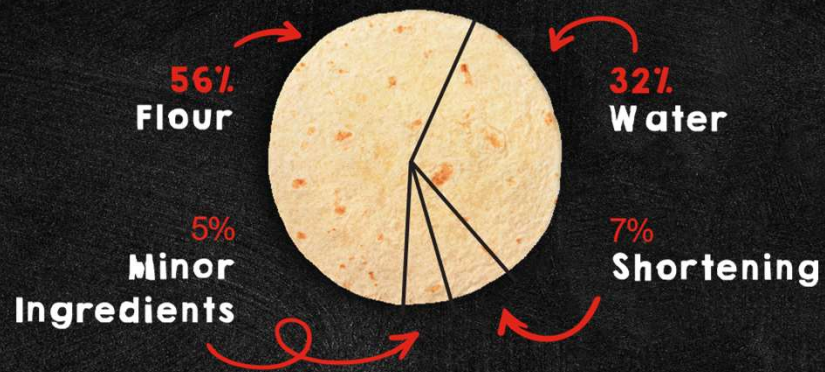
- Uniform round shape with evenly distributed blisters
- White with opacity or translucence
- Uniform edges with soft texture
- Excellent rollability and stretchability
- Good foldability
- Resistance to cracking or breaking
- No zippering or sticking
- Optimal shelf life (NO MOLD)



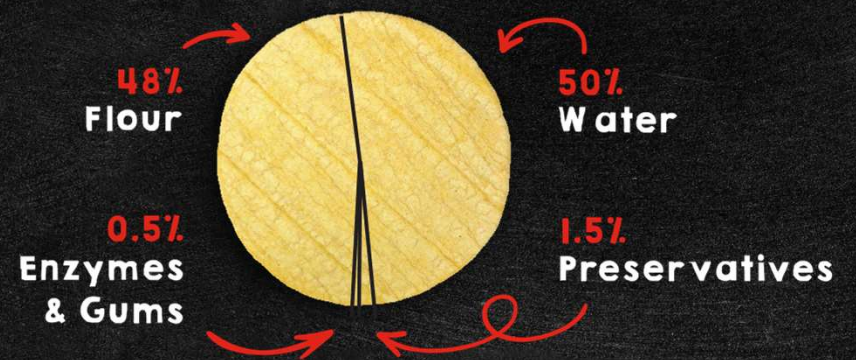


Sure...flour, water and shortening make up most of your tortillas, but what other ingredients help keep them trouble-free?

FLOUR TORTILLAS



CORN TORTILLAS

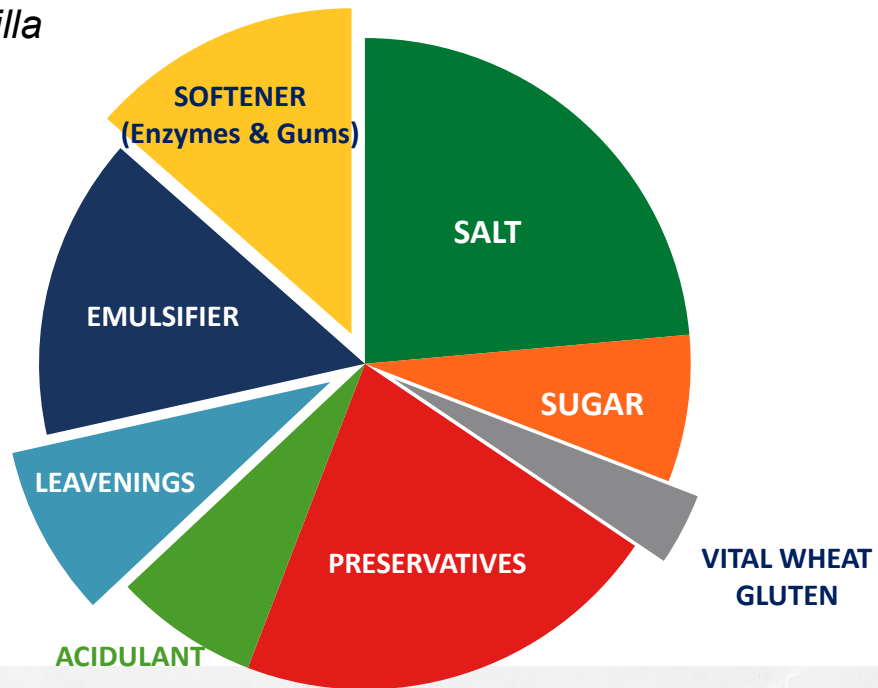


'MINOR'
INGREDIENTS
MAJOR IMPACT

This essential, complex
blend of ingredients makes a
major impact on the **overall**
quality and shelf life of your
tortillas.

MINOR INGREDIENTS: BATCH PACK

Typical in flour tortilla



INGREDIENT COMPONENT

WHAT IT IMPACTS

Tortilla softeners

→ Emulsifier

Leavenings

Acidulant

Preservatives

Salt

Sugar

Vital wheat gluten

→ Enzymes & gums

Extensibility, machinability & strength

Dough quality, reduced stickiness & staling

CO₂ control & appearance

pH control

Delay mold & yeast & bacteria growth

Taste & texture, shelf life

Taste, moisture migration

Structure

Improved texture life & slower staling

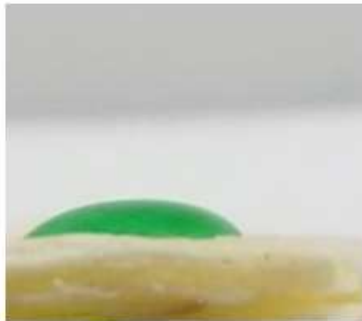
Emulsifier Examples & Functions as Anti-Stick

Synthetic Emulsifiers: Mono- and di-glycerides

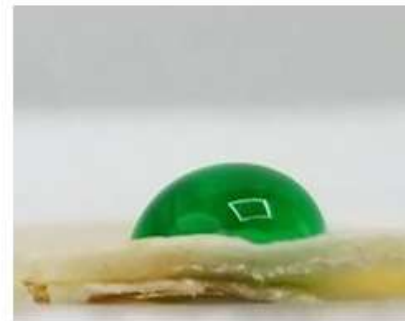
Clean-label: Lecithin, Enzyme modified lecithin, Phospholipase, etc.

From a scientific standpoint, emulsifier could increase contact angle on tortilla surface

Higher height



No emulsifiers



With emulsifiers

Less of tortilla

Green colored water droplet on tortilla surface after 8 weeks of stacked storage

Emulsifier Examples & Function as Anti-Stick

Stickiness of food service style
tortillas after stacking and
storage



Loose



Zippering



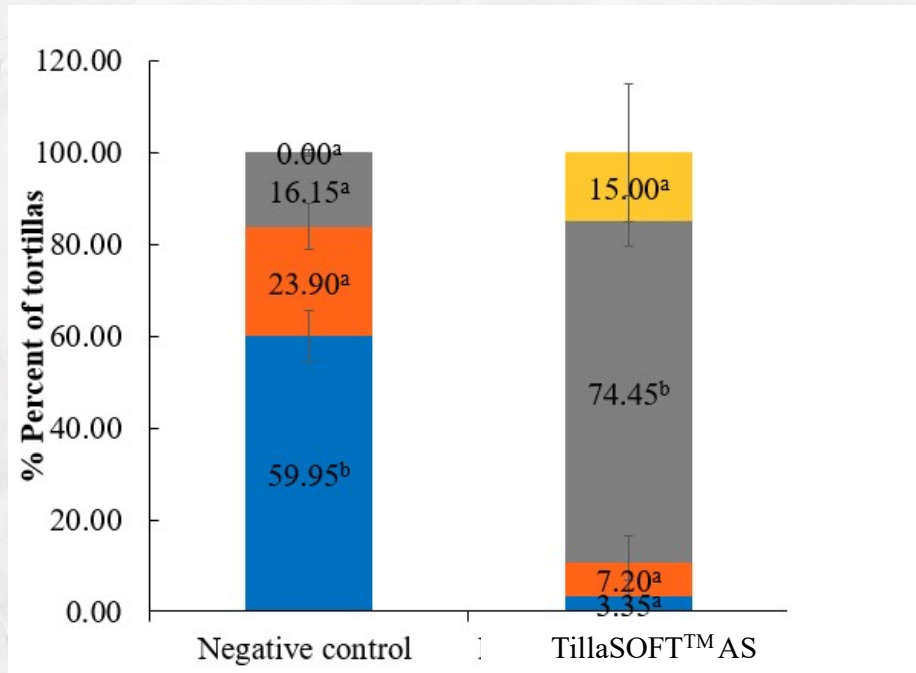
Peeling



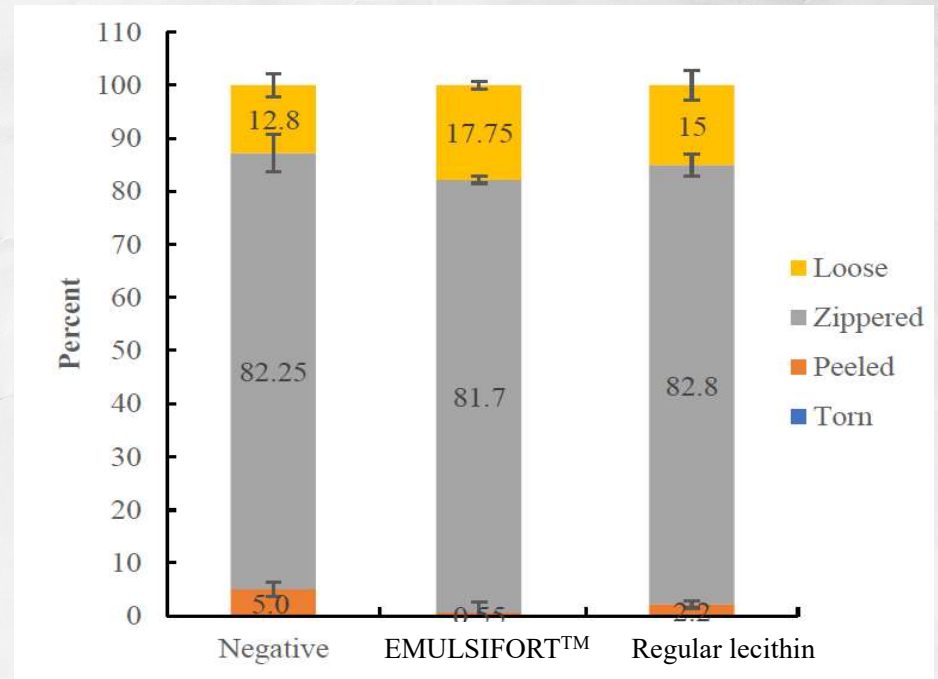
Tearing

Emulsifier Examples & Functions as Anti-Stick

Synthetic emulsifiers blend
FSS tortilla after 8 weeks stacking



Clean label emulsifiers blend
Clean label FSS tortilla after 52 days stacking



Enzyme Examples & Function as Anti-Staling

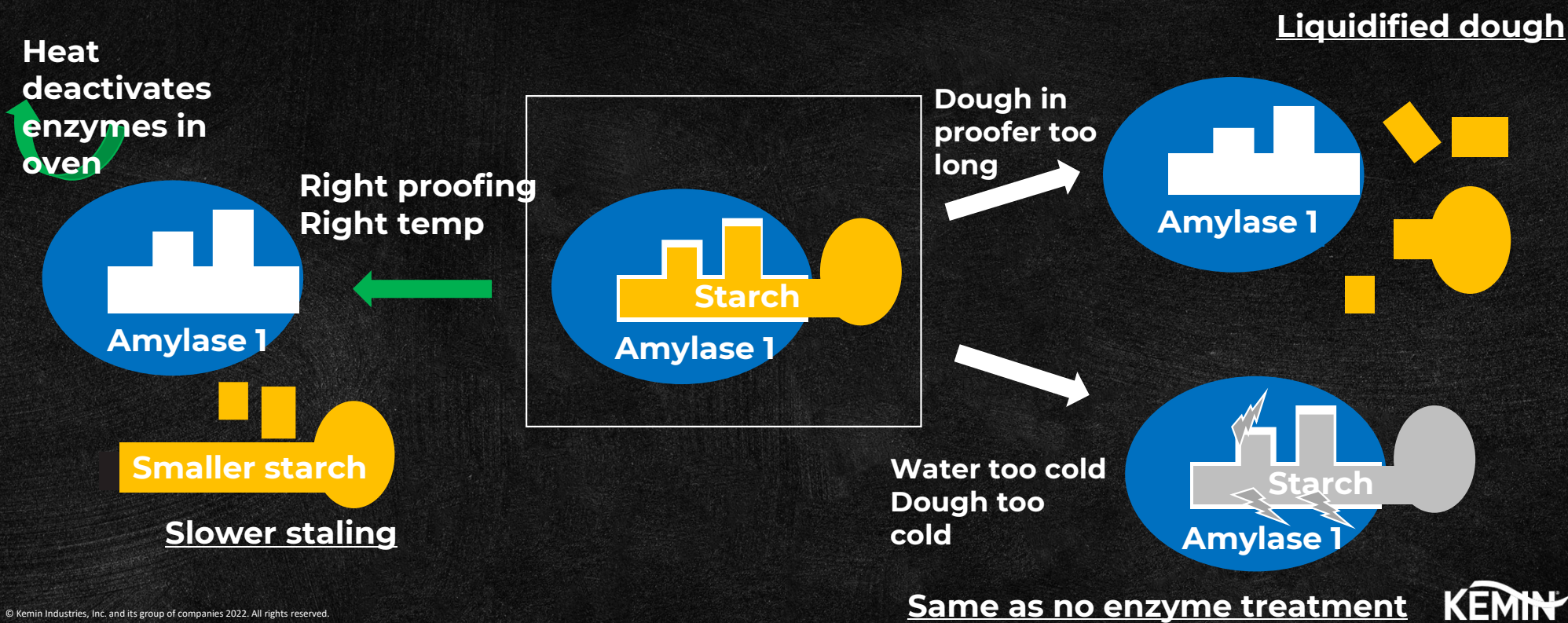
- Staling makes tortillas easier to break and lose strength and stretchiness
- Some enzymes such as bacterial alpha amylase and G4 amylase delay staling
- Carefully designed blend of enzymes and gums better slows down staling to help extend textural shelf life

FSS tortilla without enzymes & with Kemin TillaSOFT™ TS 1903 after 5 weeks ambient storage



Enzymes Examples and Function as Anti-Staling

Enzymes are like locks. powerful, but can be tricky to use.



A Case Study of Enzyme/Gum Development

Optimization is often required for different types of tortilla that combine the proper number of enzymes and gums



Objective – corn tortilla with flexibility

Method – seven combinations of various amylases and gums were screened with a quick 2-day evaluation system

Results – two blends that showed best performance went to validation at large scale

A Case Study of Enzyme/Gum Development

**TillaZyme™ C
Enzymes & CMC**



Control



**Optimization of
synergistic
ingredients—
along with strong
technical
support.**

CONVENIENT SOLUTIONS

- ➔ Easily fulfill demand for more varieties
- ➔ Overcome ingredient & innovation complexities
- ➔ Keep functionality up-to-date
- ➔ Reduce inventory & labor costs

QUESTIONS?

