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FUNCTION & PROPERTIES OF TORTILLA INGREDIENTS

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Function & Properties of Tortilla Ingredients

1. Structure Builders
    1. Flour
    2. Gluten
    3. Gums
2. Tenderizers
    1. Fat / Shortening
    2. Gums
    3. Water
3. Shelf Life Extenders
    1. Enzymes
    2. Emulsifiers
    3. Gums
4. Processing Aids
    1. Enzymes
    2. Reducing agents
    3. Oxidizing agents
5. Nutritional
    1. Fiber
    2. Protein
    3. Pre / probiotics

Baseline Formula

Ingredients	Formula
Flour	100
Water	50
Shortening	10
Baking Powder	2
Salt	2
Sugar	1
Emulsifier	0.5
Calcium Propionate	0.5
Sorbic Acid	0.3
Fumaric Acid	0.2
Guar Gum	0.2
Xanthan Gum	0.2
Glycerin	5
Inullin	5
Fiber	5
Vital Wheat Gluten	2

Structure Builders

1. Primary Structure Builders
    1. Flour
    2. Gluten
    3. Gums
2. Secondary Structure Builders
    1. Fiber
    2. Xanthan

Ingredients	Formula
Flour	100
Water	50
Shortening	10
Baking Powder	2
Salt	2
Sugar	1
Emulsifier	0.5
Calcium Propionate	0.5
Sorbic Acid	0.3
Fumaric Acid	0.2
Guar Gum	0.2
Xanthan Gum	0.2
Glycerin	5
Inulin	5
Fiber	5
Vital Wheat Gluten	2

Tenderizers

1. Primary Tenderizers
    1. Fat / Shortening
    2. Emulsifiers
    3. Sugar
    4. Gums
    5. Water
    6. Enzymes
2. Secondary Tenderizers
    1. Glycerin = Humectant
    2. Baking Powder = Leavening
    3. Fibers = Absorption

Ingredients	Formula
Flour	100
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Sorbic Acid	0.3
Fumaric Acid	0.2
Guar Gum	0.2
Xanthan Gum	0.2
Glycerin	5
Inulin	5
Fiber	5
Vital Wheat Gluten	2

Shelf Life Extenders

1. Shelf Life Extenders
    1. Enzymes
    2. Sorbic Acid
    3. Calcium Propionate
    4. Fumaric
    5. Emulsifiers
2. Secondary Shelf Life Extenders
    1. Gums

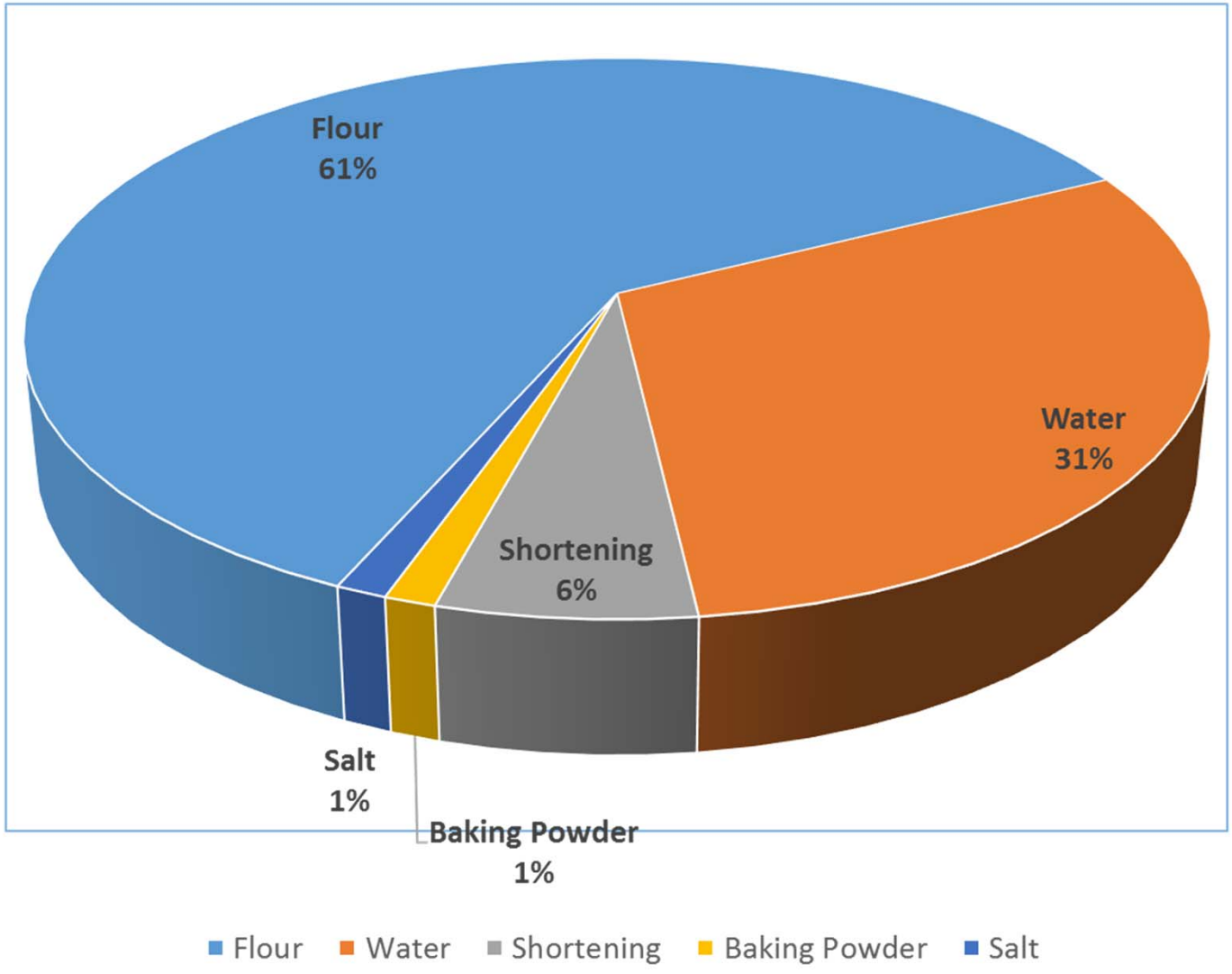
Ingredients	Formula
Flour	100
Water	50
Shortening	10
Baking Powder	2
Salt	2
Sugar	1
Emulsifier	0.5
Calcium Propionate	0.5
Sorbic Acid	0.3
Fumaric Acid	0.2
Guar Gum	0.2
Xanthan Gum	0.2
Glycerin	5
Inulin	5
Fiber	5
Vital Wheat Gluten	2
Enzymes	0.01

Processing Aids

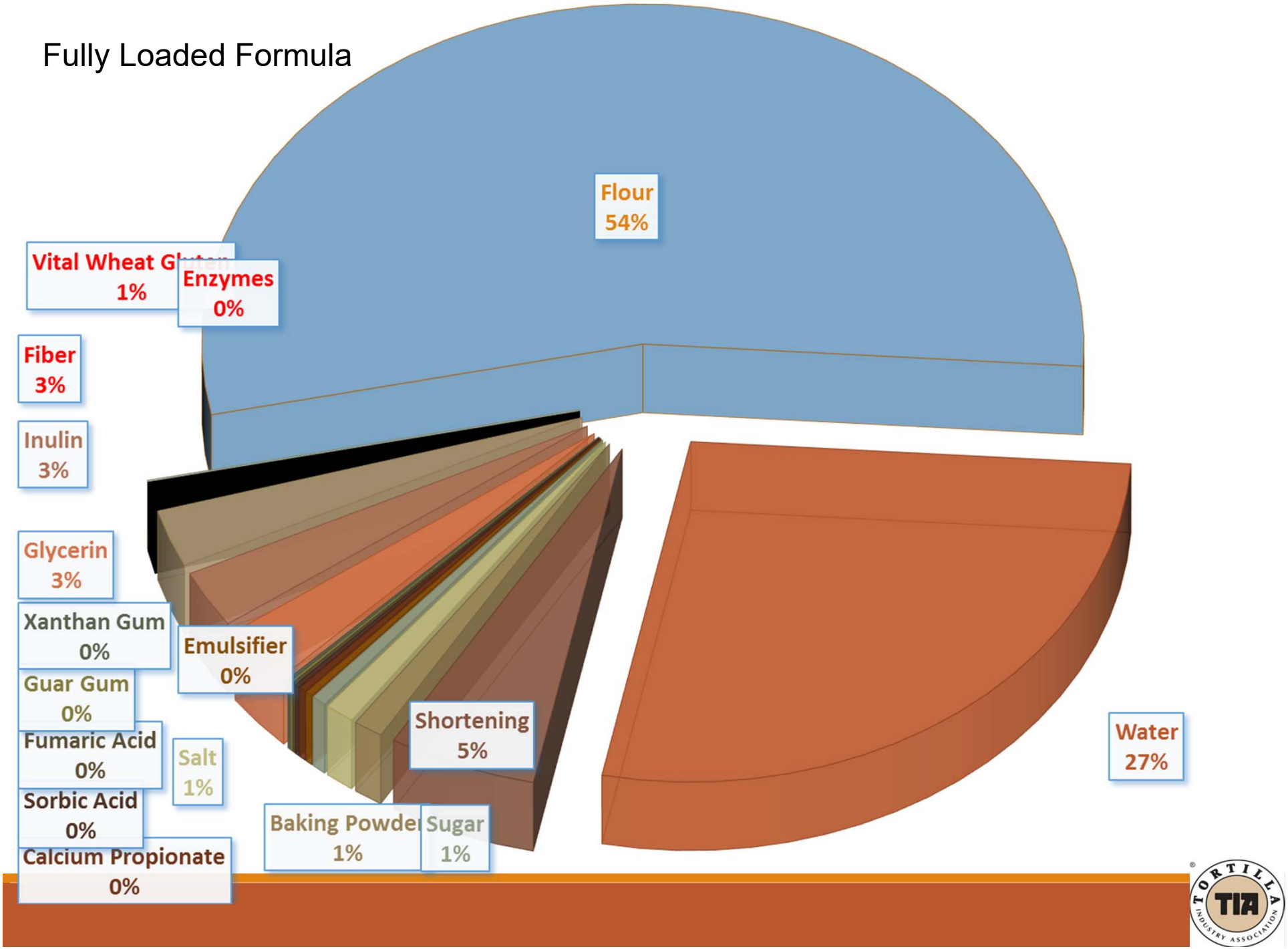
1. Processing Aids
    1. Enzymes
    2. Reducing agents
    3. Inactive Yeast
    4. Oxidizing agents

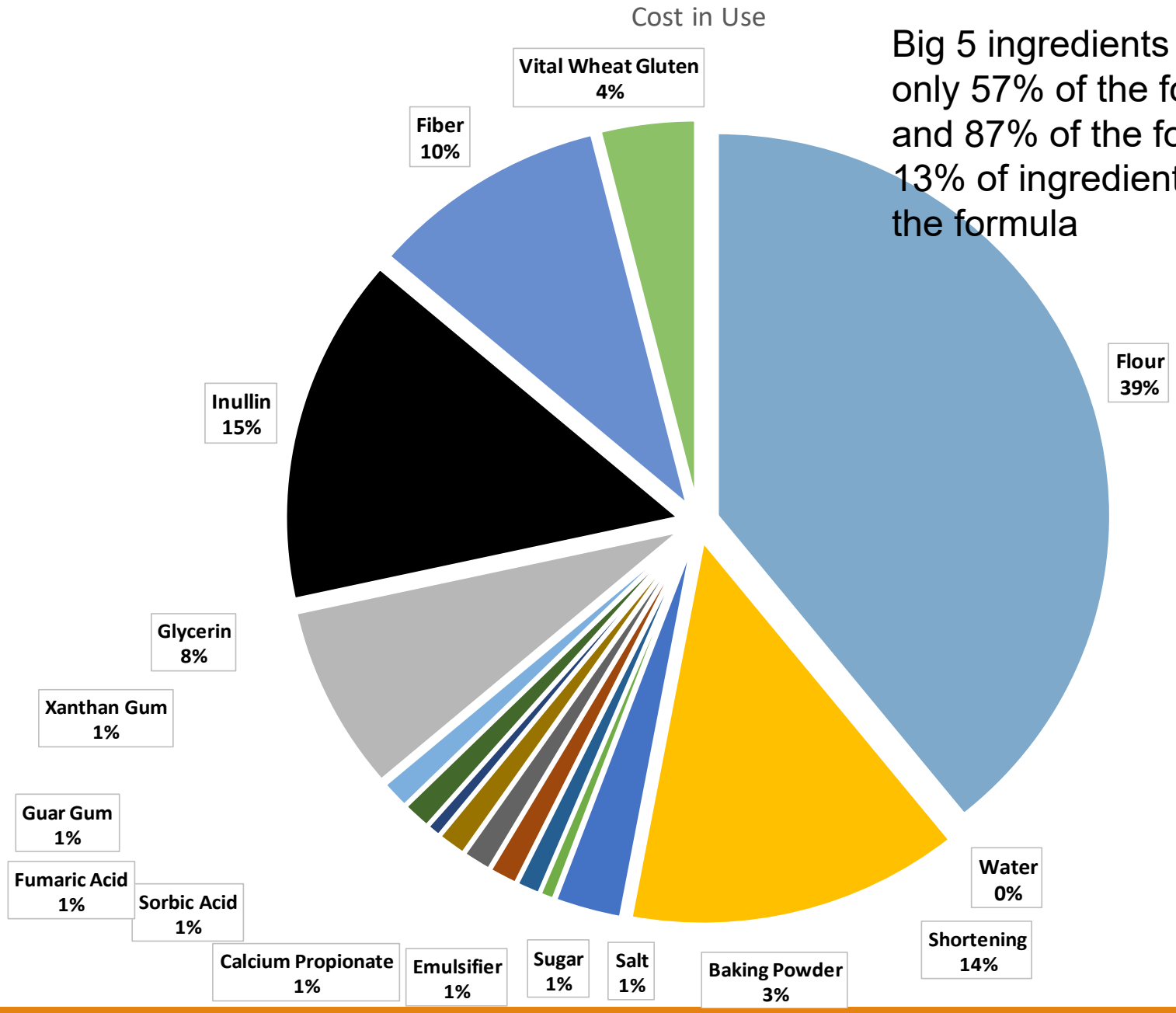
Ingredients	Formula
Flour	100
Water	50
Shortening	10
Baking Powder	2
Salt	2
Sugar	1
Emulsifier	0.5
Calcium Propionate	0.5
Sorbic Acid	0.3
Fumaric Acid	0.2
Guar Gum	0.2
Xanthan Gum	0.2
Glycerin	5
Inulin	5
Fiber	5
Vital Wheat Gluten	2
Enzymes	0.01
L-Cysteine / SMS / Yeast	.005
ADA / Ascorbic Acid	.002

Basic Tortilla Formula



Fully Loaded Formula





Big 5 ingredients account for only 57% of the formula cost and 87% of the formula weight. 13% of ingredients cost 43% of the formula

Formulating a Tortilla

What are customers expectations?

1. What is the End Use?
    1. Retail
    2. Food Service
    3. Ingredient
2. Characteristics
    1. Fluffy
    2. Translucent
    3. Natural
    4. Organic
    5. Elastic / stretchy
3. What is the shelf life
    1. How is the tortilla stored?
    2. Frozen
    3. Ambient
    4. Refrigerated

Retail

Shelf Life 30 to 90 days

1. Mission Soft / Fluffy
    1. Increased leavening
    2. Increased scale weight

Goldilocks Principal for Micro Ingredients

High Quality Tortilla

Low Quality Tortilla

Low use rate

Perfect use rate

High use rate

Ingredient use rate

Each micro ingredient has its perfect use rate

Based on:

- Major ingredients
  - Flour, water
- Processing
- Equipment
  - Mixer, type, time
  - Divider / Rounder / Press / Oven
- Formulation
  - Low fat
  - Low sodium

BUT – the use rate is constantly evolving

Micro Ingredients

Baking Powder

Gluten

Gum

Emulsifier

Enzymes

Baking Powder - exception to the rule

Use rate variation give specific desired results:

High use rates
- Thick, opaque
- Gordita type tortilla

Intermediate use rate
- Traditional table tortilla
- Slight translucency

Low Use Rate
- Thin, translucent “Mexico style”

- Intermediate Use Rate
  - Medium thick tortilla Slight translucency
- High Use Rate
  - Thick “Gordita” Like, Soft - Fluffy

Gluten

Gluten is added if there is insufficient functional protein in the flour

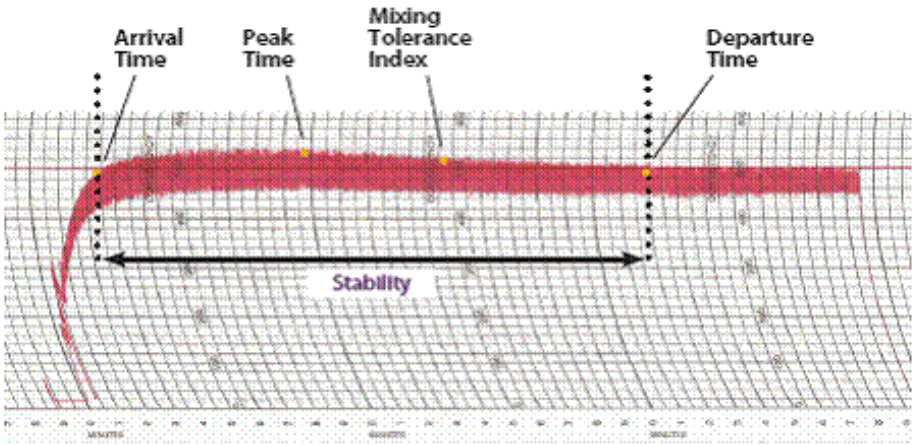
- flour protein % is not an ideal indicator of gluten functionality

Insufficient gluten (in flour and added as an ingredient)

- Thinner tortillas, less gas retention
- Severe sticking
- Fragile tortillas, poor shelf stability. No elasticity in the finished tortilla
- Poor shapes in the press, excessive sizes

Over use of Gluten

- Small sizes
- Tough, elastic tortillas
- Cost



Strong Gluten Flour

Gums

Added for shelf life extension and anti-sticking

- Many types of gums available
  - Guar, Cellulose, Xanthan

Under use of gums

- Less shelf life
  - Poor rollability and foldability, sticking in package

Over use of gums

- Cost
- Drier, elastic doughs (need to increase water)
- Smaller shapes
- Overuse of certain gums increases sticking

Utilize the synergies of gums

- Two different gums at lower levels can perform better than a single gum used at high levels

Emulsifiers

Added for shelf life extension and anti-sticking

- Many types of emulsifiers available
  - Monoglycerides, SSL, DATEM, Lecithin

Under use of emulsifiers

- Less shelf life
  - Poor rollability and foldability
  - Increased sticking

Over use of emulsifiers

- Cost
- Drier but pliable dough (need to increase water)
- Smaller shapes if using DATEM or SSL
  - Emulsifiers are tolerant to overdosing

Preservative / Shelf Life Extenders

PRESERVATIVES - Low use rate

- Short shelf life
- Moldy tortillas

PRESERVATIVES - High use rate

- Strong flavor
- Cost

Other methods for shelf life extension

Water Activity (Aw) < 0.85

- Glycerin replaces water

O2- Nitrogen Flushing < 5% O2

Oxygen scavengers

Preservatives

Calcium Propionate

Potassium Sorbate

Acid (Fumaric, * Citric, *Malic, *Adipic, *Tartaric)

- *Affects Baking Powder
- Ecapsulation

Cultured Wheat, Whey, Corn Sugars

- Organically produced calcium propionate
  - 75 Days Ambient
- Europe and Canada Preservatives are limited in use per regulations, in the US they are considered GMP's.
- Rely on multi pronged approach

Enzymes

Added for:

- Shelf life extension
- Dough conditioning
- Enhance browning

Literally hundreds of enzymes available

Overdosing enzymes

- Increase sticking in package
- Some enzymes can liquefy a dough while others can make doughs highly elastic

Great care needed when choosing enzymes

- ppm use rate, very easy to overuse

Reducing agents

Used to aid pressing the dough to a desired size

- L-Cysteine
- Sodium metabisulfite
- Inactive yeast

Low use rates (ppm) cost effective.

Under use

- Small sizes
- Brittle, rough edges
- Laced edges
- $$$ Cost in rejects

Overuse

- Large tortilla
- Flips, folds in the press and oven
- Sticking of tortillas
- $$$ Cost in rejects

Compounding effect
“More is not always better”

Micro ingredients are typically overused

Several micro ingredient types are used in tortillas

While there are synergies when used at normal rates, there can be severe and disruptive effects when used at high rates.

Always go back to your basic recipe / formula during every wheat crop change

- Typically micro-ingredients added from the previous year are not removed.

Micro-Ingredients Summary

Extremely useful and necessary tools

Typically overused to compensate for deficiencies

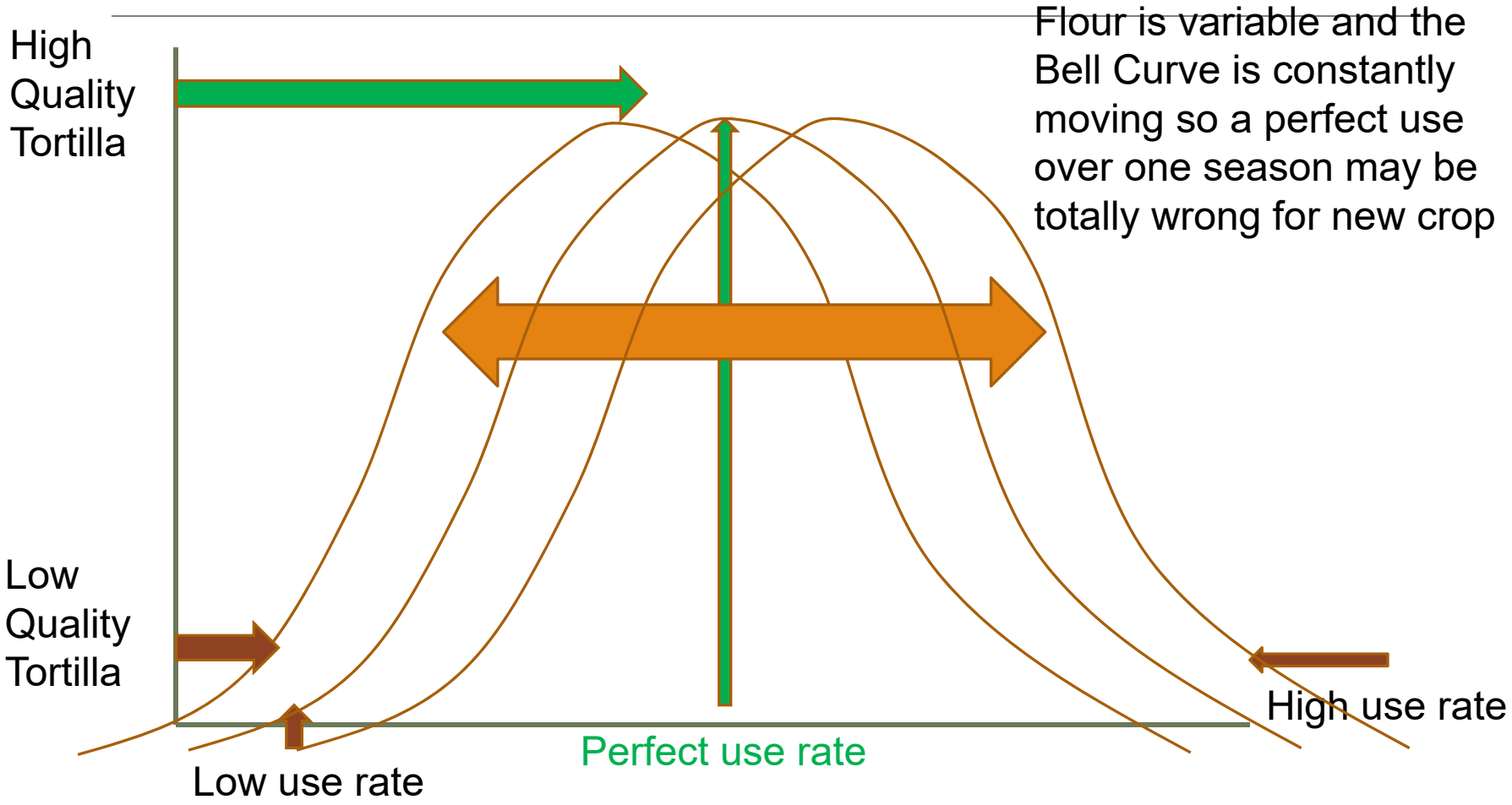
- Process, ingredients (flour)

Formulators should continually determine the correct dose of each micro-ingredient

If you don't need it, don't add it

- Preservatives in same day use tortillas
- Gluten added to high quality, strong flour doughs
- Reducing agents where plant has soft water

The Only Constant in Baking is Variability



If you guess you may not live happily ever after….

Goldilocks
by ~TeeLamb