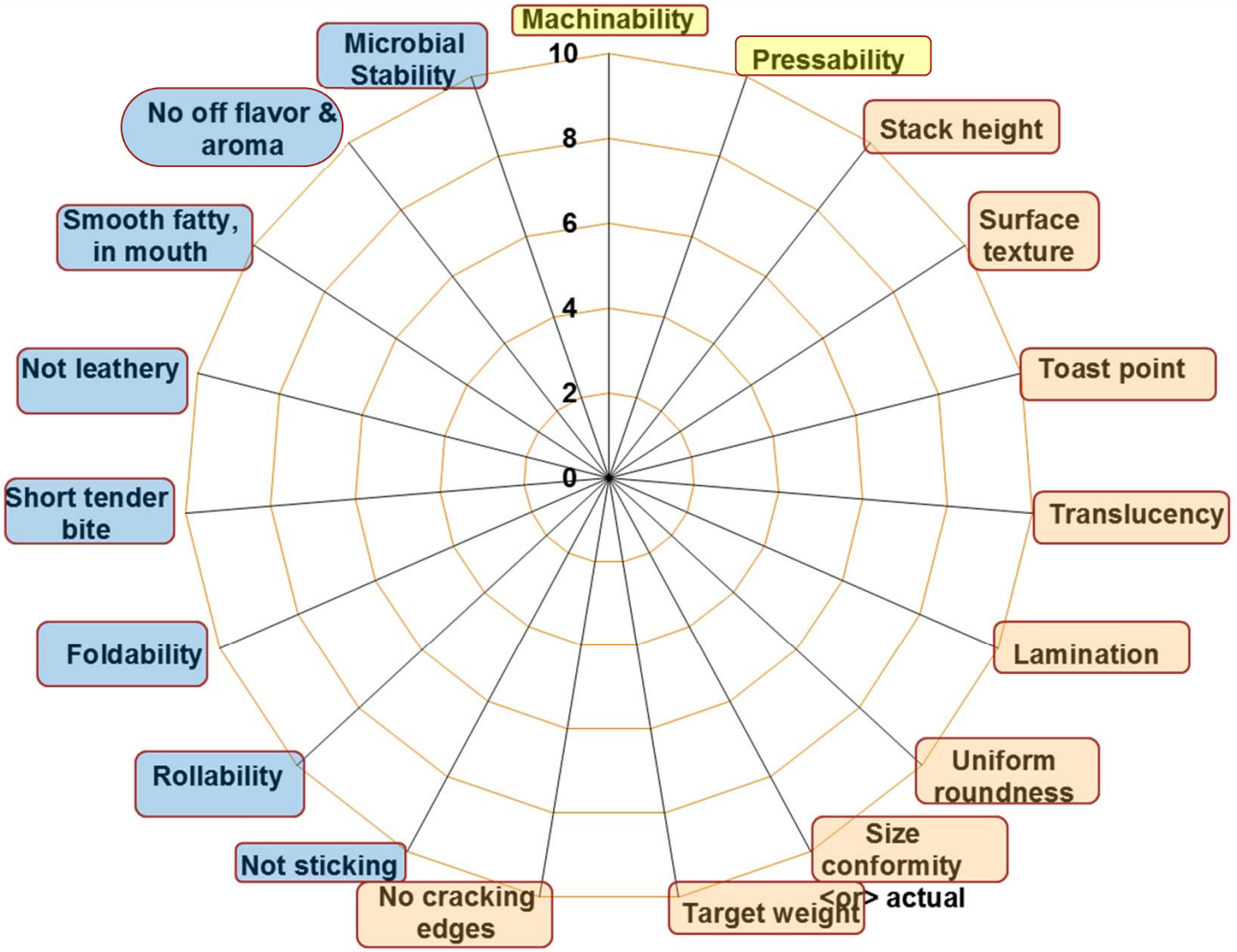
Barcelona 2017

TROUBLESHOOTING GUIDE FLOUR TORTILLAS

By Steve Bright

Tortilla Quality Evaluations



Troubleshooting Tortillas

- Sticking
- Edges
- Shapes
- Staling
  - Rollability / Foldability
  - Mouthfeel

Sticking – Package

- Sticking Defined:
  - Two or more tortillas that will not separate from each other without tearing or ripping after being packaged for any period of time.

- Sticking can be caused by several factors
  - Process
  - Ingredients
  - Formulation.

Sticking - Process Related Causes

- Mixing – over mixed
  - Rare to see tortilla doughs over mixed
    - Physically / mechanically ruptures protein
    - Gluten releases water
    - Hot dough temperatures
- Under mixed
  - Under-hydrated
  - Poor gluten hydration / development
  - Less absorption

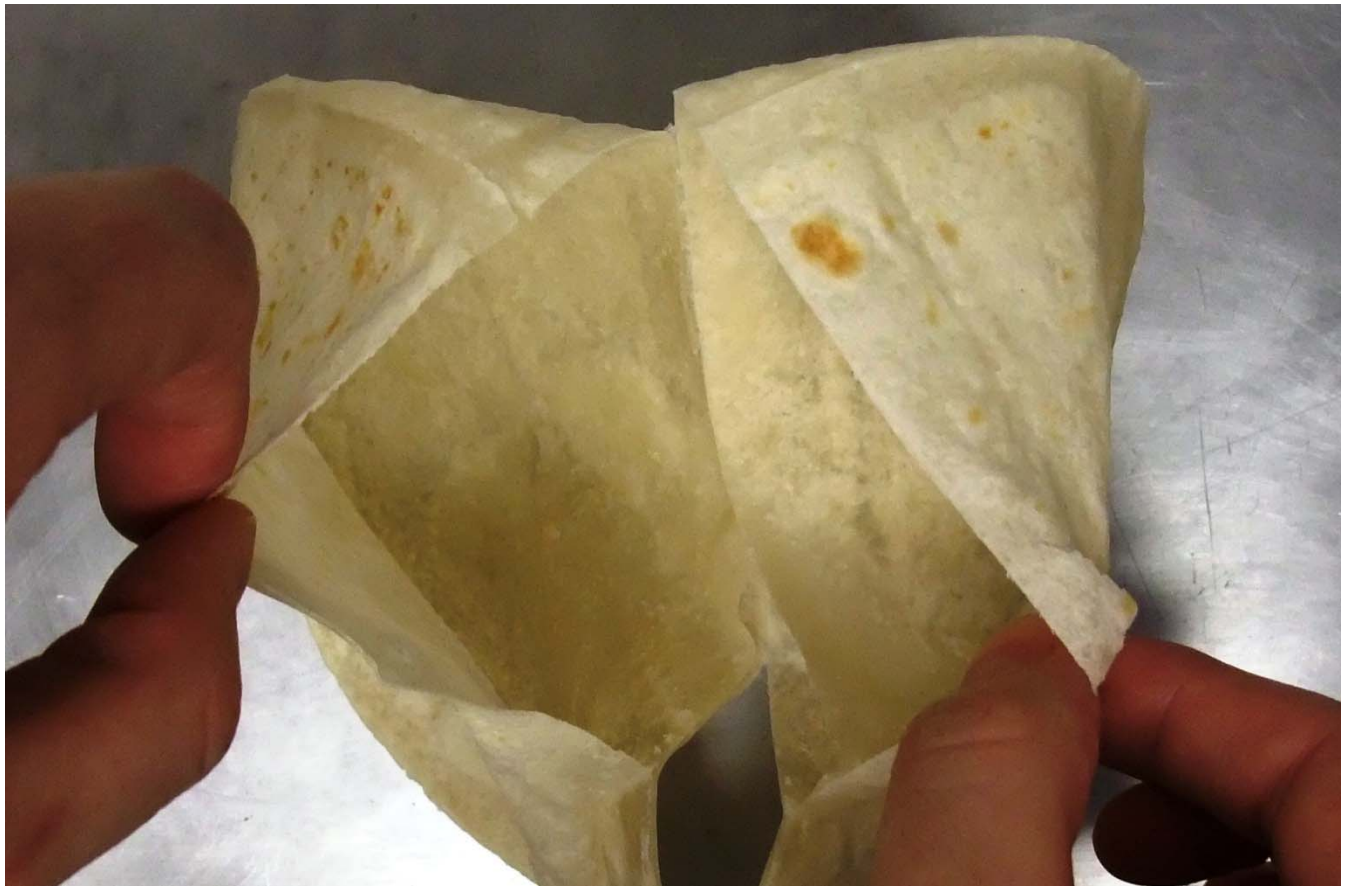
Sticking - Press Setup

- Dry, stiff doughs require increased pressure, dwell time and temperature to obtain correct sizes
  - ✗ gelatinizes (cooks) starch, sets structure
  - ✗ activates all leavening
  - creates top and bottom crust which entrains steam increasing the likelihood of pillowing (puffing)
- Ideal press settings
  - ✓ dwell time = ~1.3 seconds +/-0.2
  - ✓ pressure = ~ 1000 psi +/- 200
  - ✓ temperature = ~375 / 400 +/- 25°F
  - ✓ New Mega Presses = < 325°F

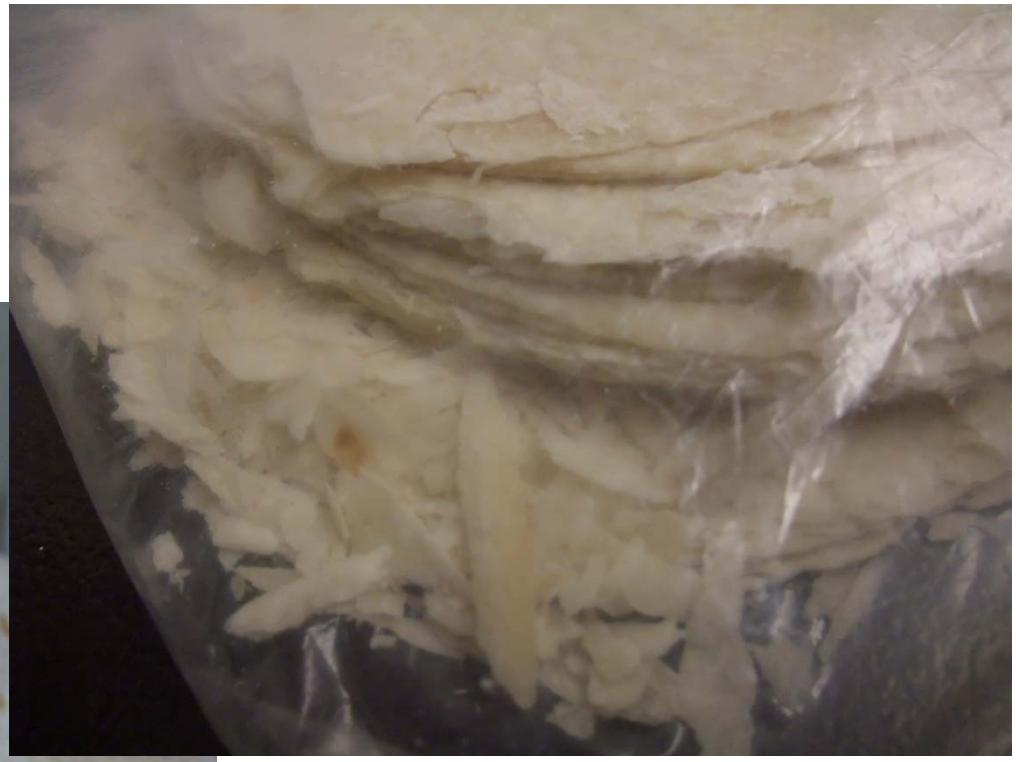
Sticking - Baking Profile

- Under baking
  - Excess residual moisture
  - Insufficient surface drying
- Over baking - creates pillowing or puffing
  - top -thin crust separates from thick -bottom crust
  - thin crust and blisters are weak
    - tear and flake

Over baking



Over baking + Zippering



Sticking
Cooling room

- Purpose of the cool down is to fully prepare the tortilla for packaging, transportation and storage

- Typical cooler conditions
  - cool and HUMID, 35 - 40°F @80%+RH
    - Room is cool and wet causing mist / dew / fog to condense back on the tortilla
- Cooler conditions must be adjusted to obtain:
  - Tortilla pack temperature +/- 10°F package room
  - Humidity < 60%RH – critical

Sticking - Packaging

- Minimize temperature shifts after packaging
  - promotes moisture migration
    - 80°F packing into case
    - 50 -100°F warehouse temperature
    - 20 - 140°F truck shipping temperature winter / summer
    - 70°F grocery store temperature
    - 40°F consumer refrigeration
- Avoid excessive compression
  - over-packing
  - excessive weight

Sticking -Ingredient causes

- Flour - weak flour
  - poor gluten quality, although quantity may be available
  - translates to:
  - poor dough process tolerance
  - weak baked film formation
  - poor resistance to compression

- Strong Flour
  - enhances pillowing - better gas retention

Sticking - Reducing Agents

- L-Cysteine and sodium metbisulfite
  - greater extensibility in the dough
  - higher levels (>60ppm) lead to weak protein and crust resilience.
  - Increases the occurrence of sticking

- Obtain dough consistency through full mix development

Sticking –Fat – B

Type of fat being used is critical:

- Liquid oils remain liquid at room temperature
  - Increases surface adhesion on the tortilla
  - Liquid oils will always create zippering
  - Use <30% of normal levels if using oil

- Use higher melt point fats
  - higher solids at room temperature

Sugar and sticking

- Sugar is a tenderizer
- Sugar is hygroscopic
- As sugar increases, hygroscopicity increases
  - increases stickiness and tenderness.
  - Dextrose, glucose, fructose and lactose are hygroscopic

Sticking -Water

- Case Study
  - Tortilla plant ran water trials from 55% - 38%
    - Still had sticking at 38%
      - Its not the quantity of water that's the problem
  - Water is both a strengthener and a tenderizer
      - Hydrates protein
      - Hydrates Gums
      - Higher viscosity gums may continue to hydrate for 48 hours if insufficiently hydrated during mixing
  - Temperature is critical to rate of hydration
    - Cooler = cold, sticky, bucky dough
    - Warmer = Sticky, extensible doughs

Tortilla Troubleshooting

SIZE AND SHAPE

Tortilla Size and shapes

- Tortillas too small
  - Strong flour = elastic
  - Under mixed = elastic
  - Under hydrated = dry, elastic
  - Cold dough = elastic
  - Under scaling = insufficient mass / pressure
  - Excessive floor time after mixing / dough frequency
    - 3 doughs per hour is the minimum rate
    - fresh dough every 20 minutes
  - = / > than 30 minutes per dough will cause the last part of the dough to become dry
  - Poor press set up
  - Oven shrinkage
    - Protein elasticity, insufficient press energy imparted to dough

Sizes
Large

- Overly extensible dough
  - Flour quality
  - Protein quantity / quality
  - Over mixing
  - Hot dough*
  - High levels reducing agents
  - Press – too severe
    - Excessive dwell time, pressure
  - High fat levels >12%
  - Over hydration
  - Over scaling

Edges

- Brittle, flaky
  - Curling of the dough out of the press into the oven
    - Cupping caused by large temperature differential between top and bottom plates >25°F
    - Typically top plate hotter than bottom
      - Facilitates release
      - Facilitates transfer
  - Curled edges expose more surface area to heat
    - Creating toasted edges leading to dry, brittle flaky edges

Edges

- Lacing
  - Caused by excessive cooking, structure of the dough is set prior to obtaining the desired size
  - Dough is cooked in the press, protein and starch are denatured preventing further mobility, before it gets to the final size
    - Elastic dough
    - Under hydrated
    - Under mixed
    - Low reducing agents

Troubleshooting

CONSUMER –ORGANOLEPTIC

Rollability / Foldability

- Staling
  - Starch retrogradation
- Over baking
  - Damaging starch protein
- Lean Formula
  - Lower fat, sugar, gums and emulsifiers

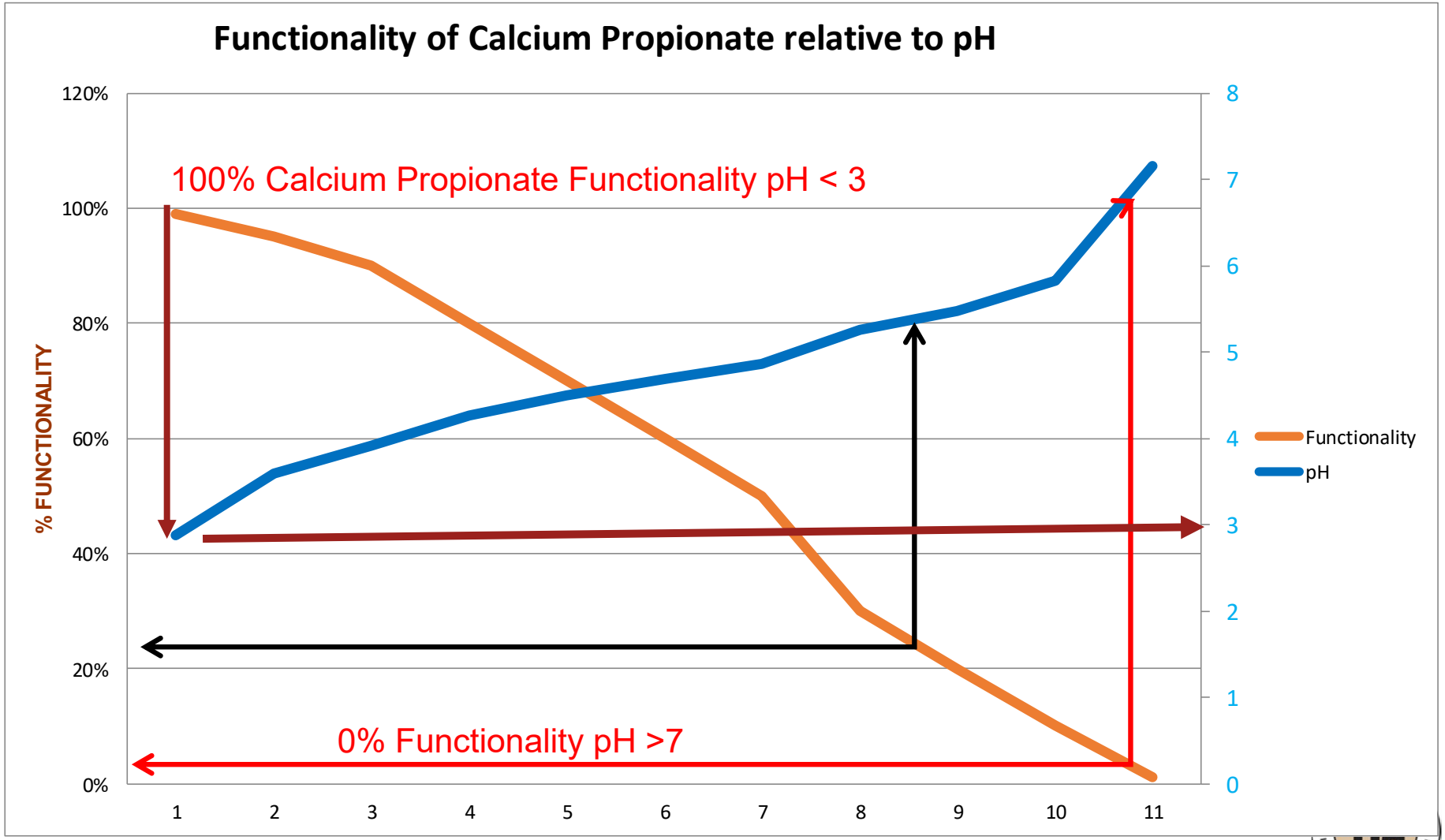
Mouthfeel, bite

- ✓Short tender bite
  - Established by formula and process
    - Lamination
      - From leavening
      - Not over pressed –pressure, dwell time, temperature
  - X Leathery, tough bite
    - High translucency
      - Insufficient leavening
      - Hot press
      - Extended press dwell times

Microbial Stability

- Balance between:
  - Shelf life expectations
  - pH
  - Preservatives
  - Homogenized ingredients

Microbial stability



Analysis for Tortillas