



SOLVAIRA SPECIALTIES



*“Pointers, Indicators, and Measures of
Tortilla Quality”*

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Tortilla Quality

Consumers perspective:

- The definition of a good quality tortilla encompasses the ability to retain its flexibility, remain strong so there is no cracking or tearing, and of course, taste good. (Waniska et al 2004, Jondiko et al 2016).

Tortilla Producers perspective:

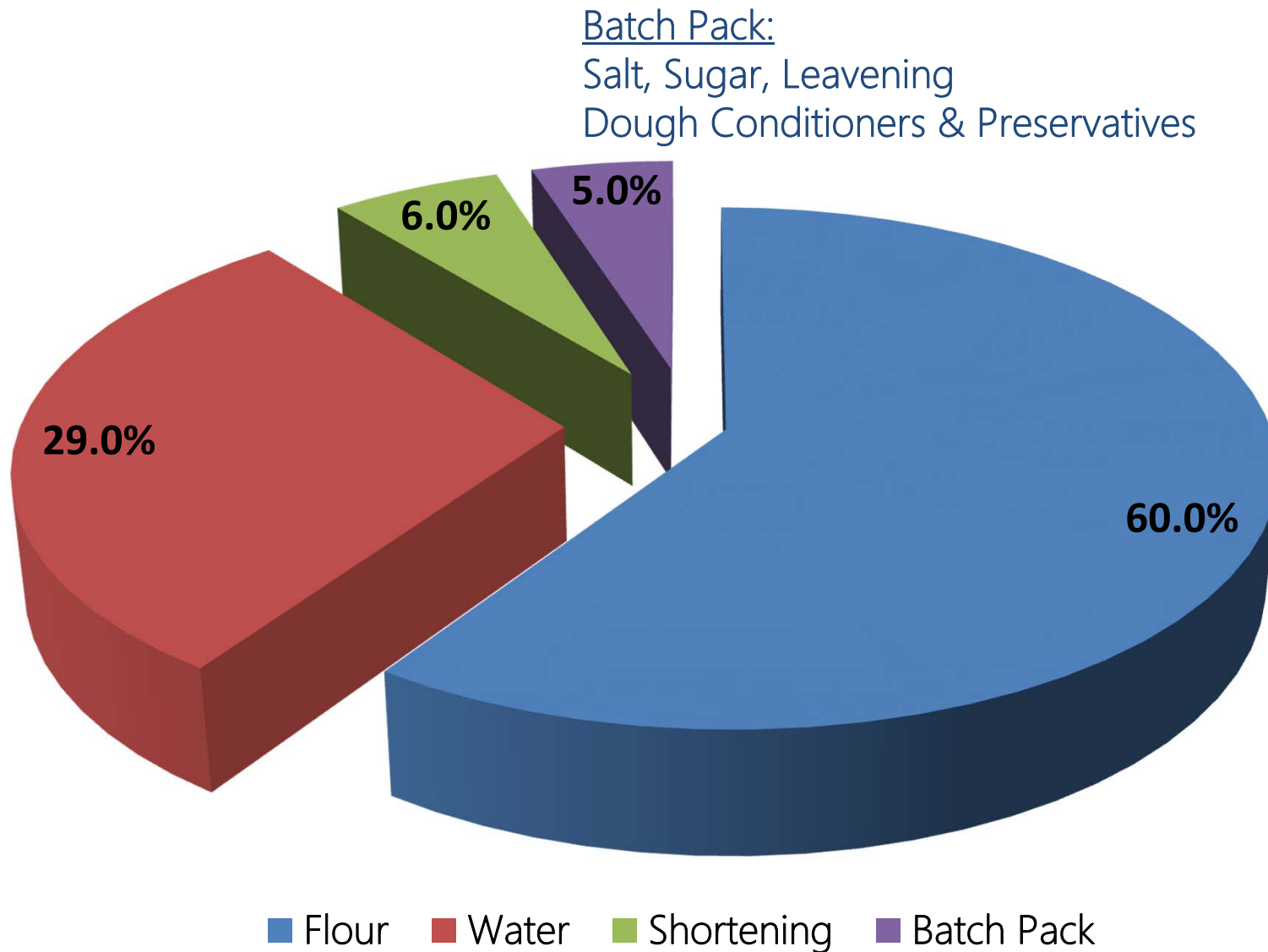
- Quality includes uniform shapes, toast marks, soft, fluffy, adequate shelf life for distribution and sales.

Overall perspective:

- Quality = Quality raw material + Quality processing + Quality of personnel.



Tortilla Formula Composition

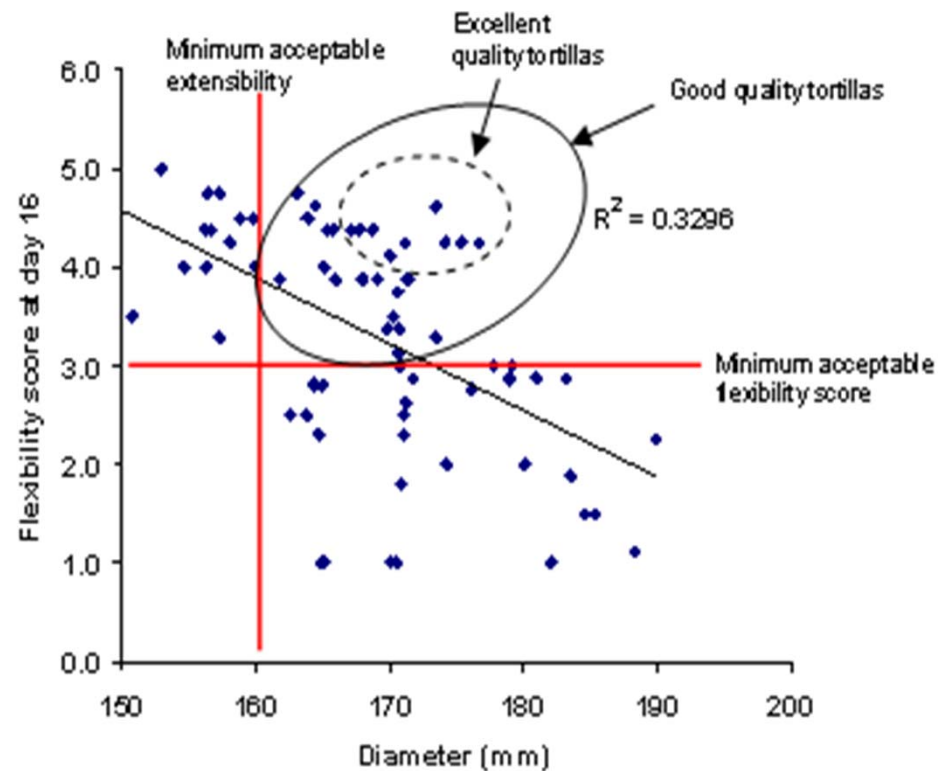


■ Flour ■ Water ■ Shortening ■ Batch Pack

Defining Quality

Tortillas must meet consumer expectations.

- Physical parameters (Soft, pliable).
- Good diameter, uniform, toast marks and long shelf life.



Flour: Starch Quality

- Good quality tortillas produced using wheat flour of intermediate protein and low level of starch damage

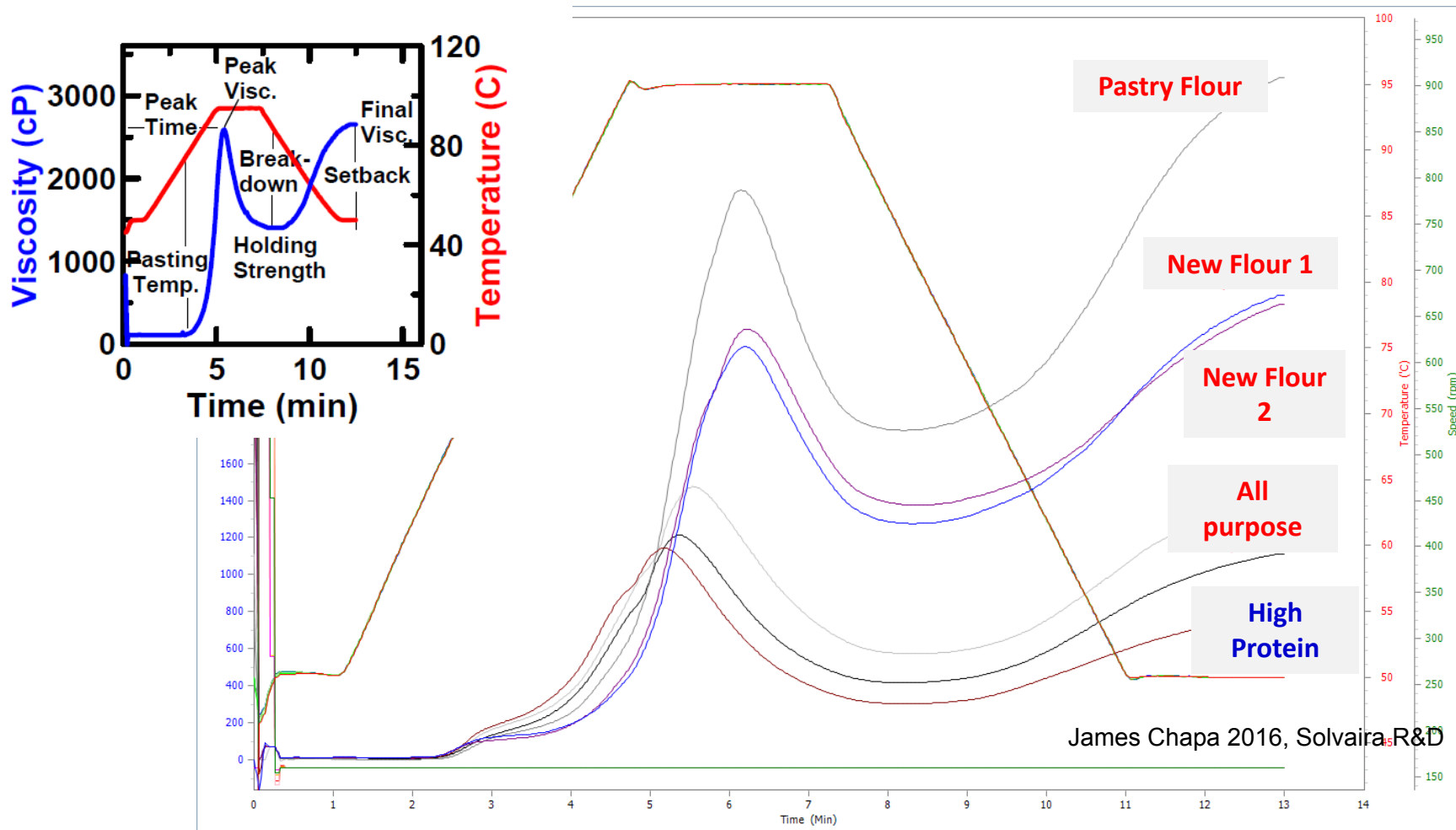
(Waniska et al 2004) .

Starch characteristics:

- Measured using rapid visco analyzer.
- Peak and final viscosity.
- Affect cooking conditions.
- Tortilla flexibility.
- Tortilla shelf stability.



New Flour Starch Quality



- Evaluate quality of new flour compare to standard.
- Starch is gelatinized causes rise in viscosity.
- Tortillas start sticking on each other.

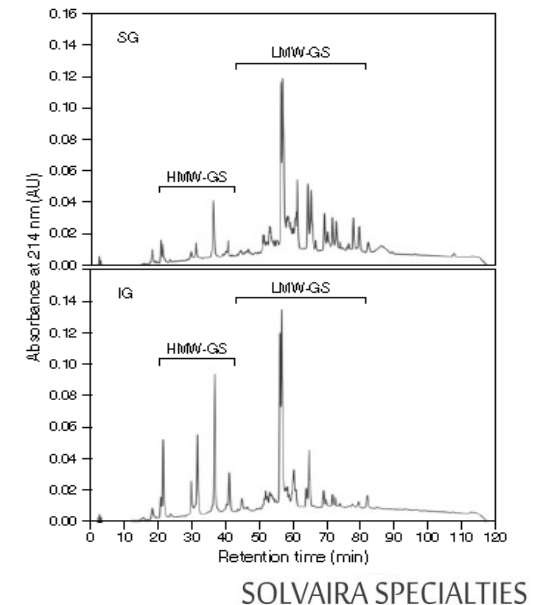
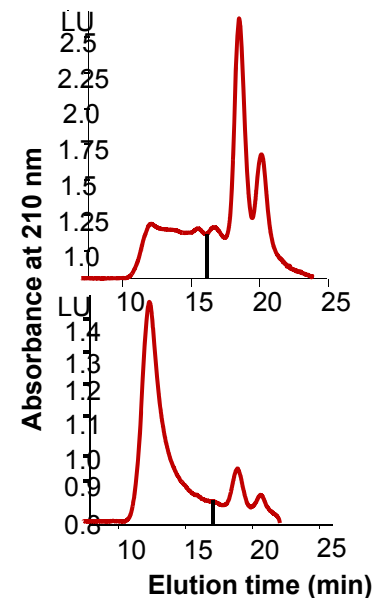
Protein Quality vs Quality

Protein Content

- Good quality can be produced using wheat flour of intermediate protein content (Waniska et al 2004).

Protein content is not an adequate indicator of tortilla quality

- Protein content can not simultaneously predict both diameter and rollability
- Look at protein fractions?



Flour protein fraction and tortilla quality

- Wheat protein fractions in gluten play a significant role in tortilla making (Jondiko et al. 2012)
- Variation of flour protein molecules can improve tortilla quality.
- Tortilla diameter can be predicted using a protein molecule content and dough rheological properties
- Tortilla softness depends on the ratio of the gluten protein molecules

Parameter	Range
Glutenin: Gliadin Ratio	0.5 – 0.9
Mono & Polymeric proteins	12 – 65
HMW & LMW – GS	0.3 -0.6

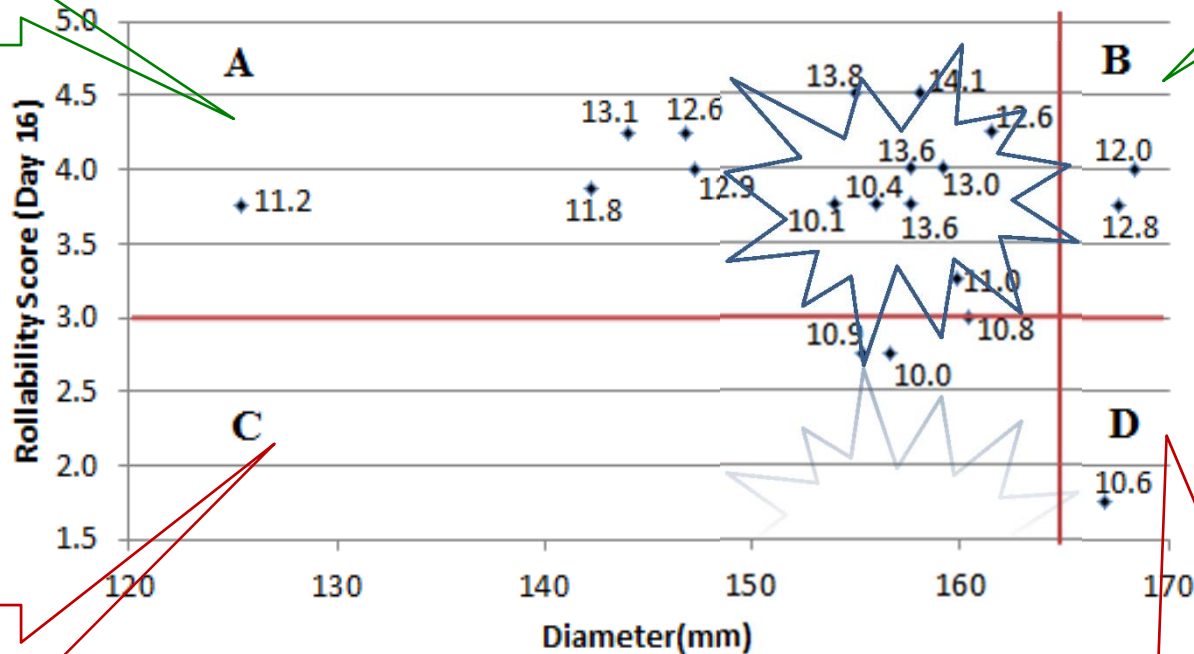


Total Protein content and Functionality

Relationship of tortilla diameter, flexibility & flour protein

Good Flexibility
Small diameter

Acceptable
Diameter
Flexibility

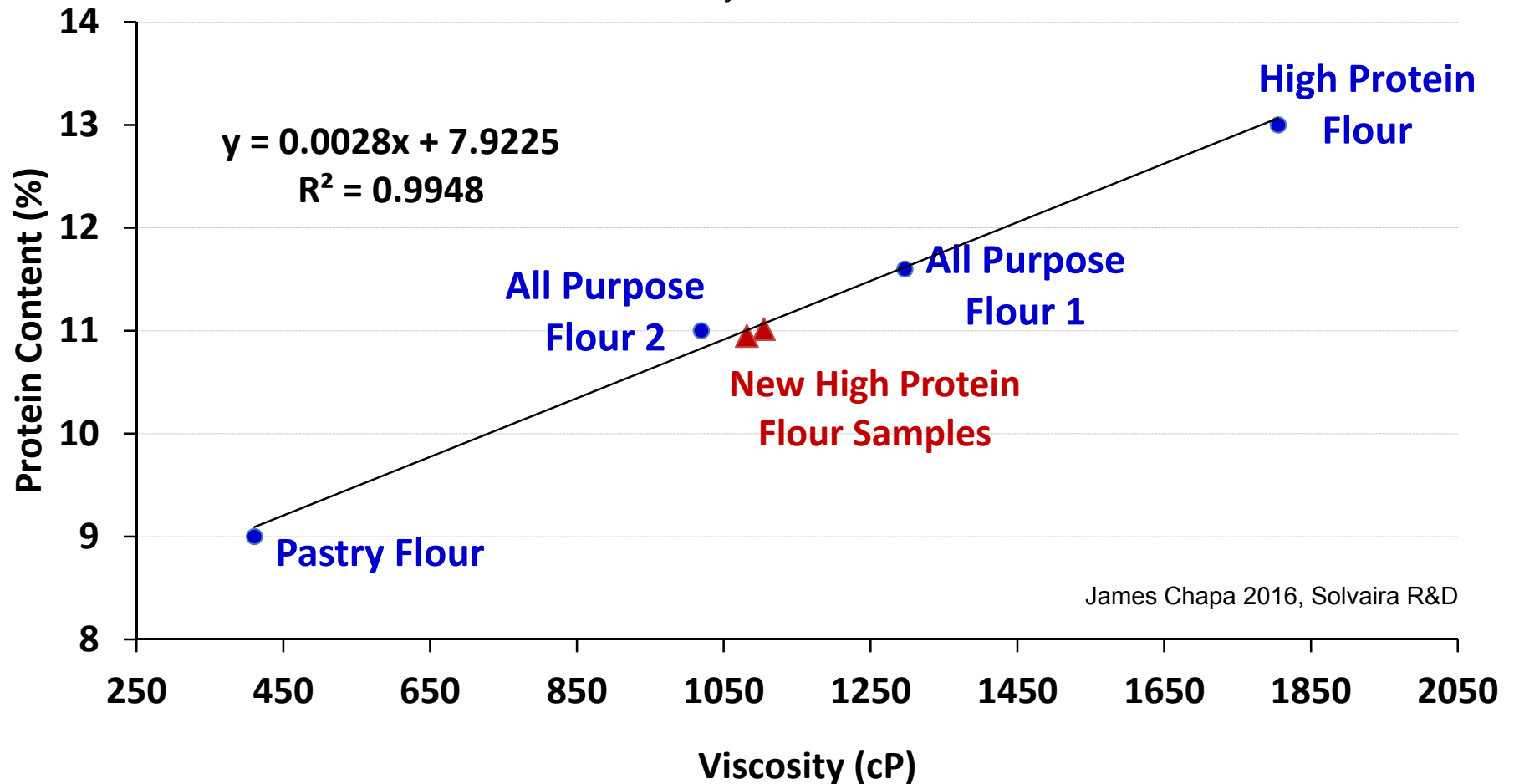


Not
Acceptable:
Falling apart
and sticking

Not Acceptable:
Very weak, sticky
dough, brittle tortillas

Gluten Acid Test

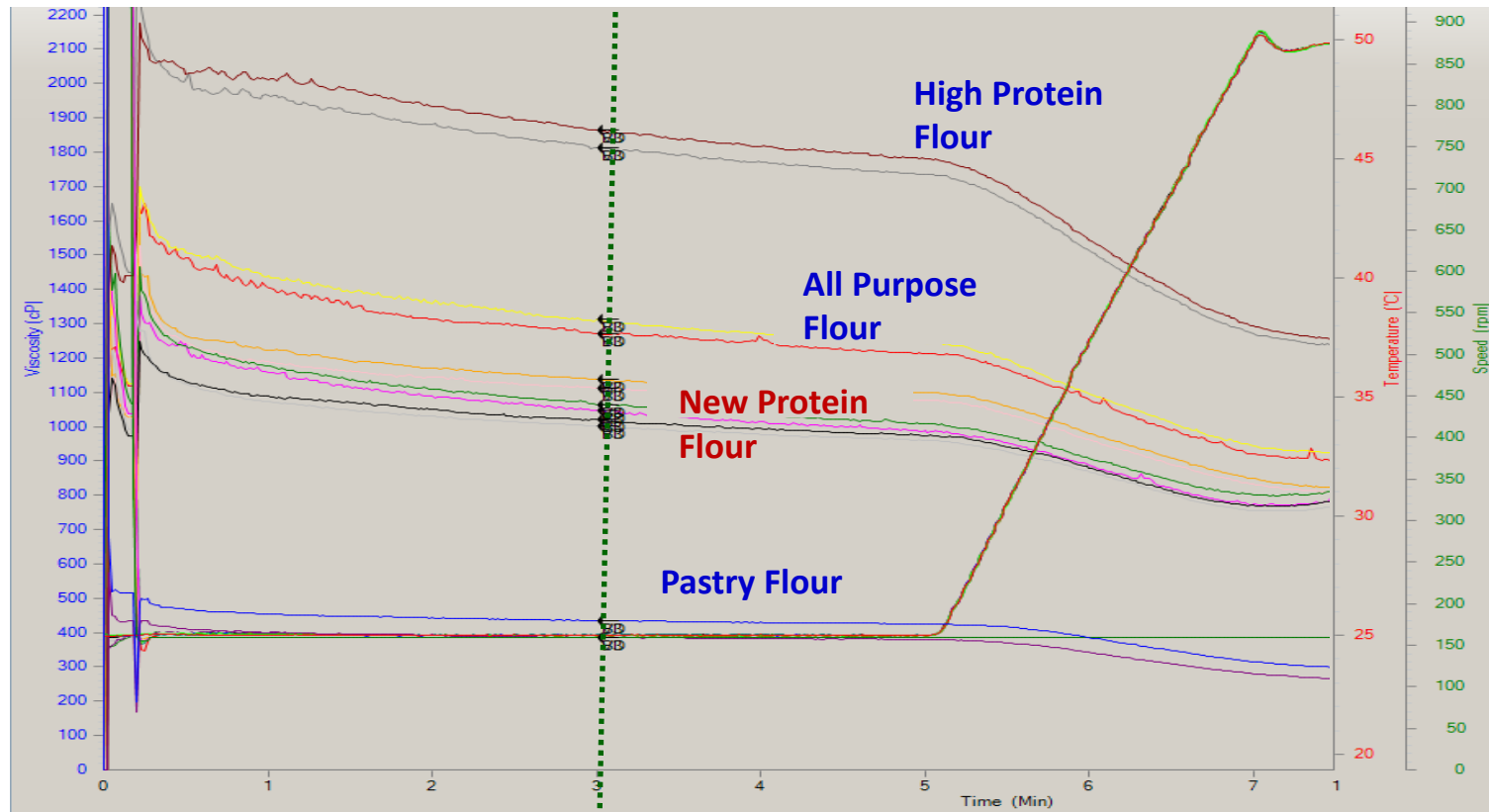
Correlation Between Protein Content and Viscosity at 3 minutes Measured in the Wheat Gluten Acid Tests



James Chapa 2016, Solvaira R&D

- New High protein flour 13% total protein has only 11% functional protein
- Can result in tortilla quality defects
- Evaluate the functionality of new flour when received

Gluten Quality: Viscosity & Temperature

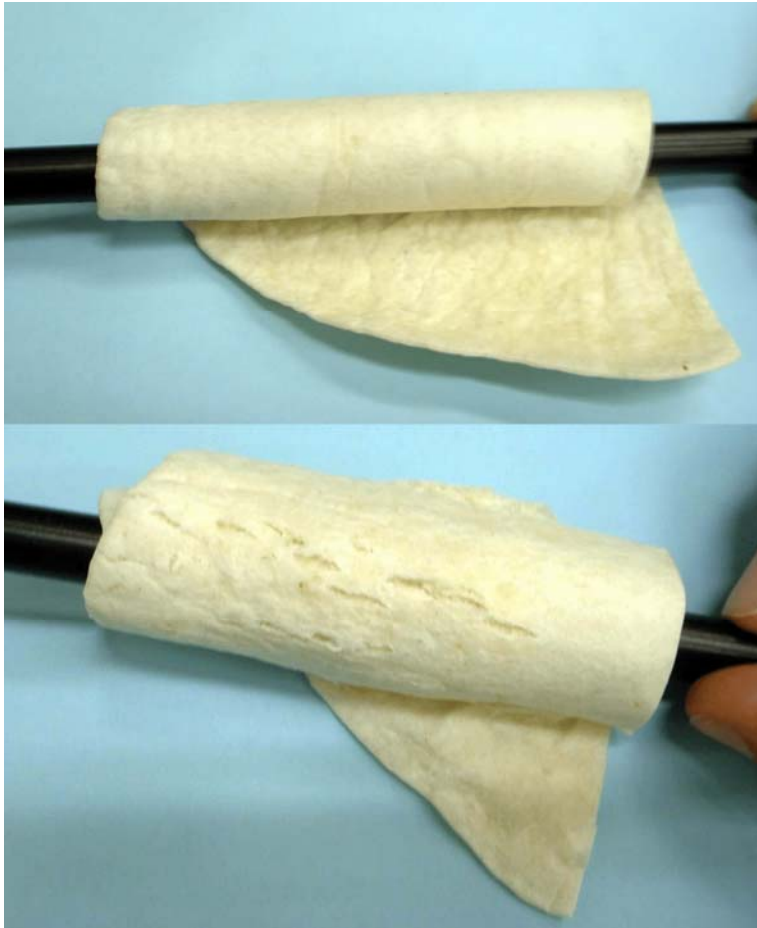


James Chapa 2016, Solvaira R&D

Quality variation:

- ✓ Higher viscosity means higher gluten quality
- ✓ Tortilla Sticking
- ✓ Oven temperature adjustment

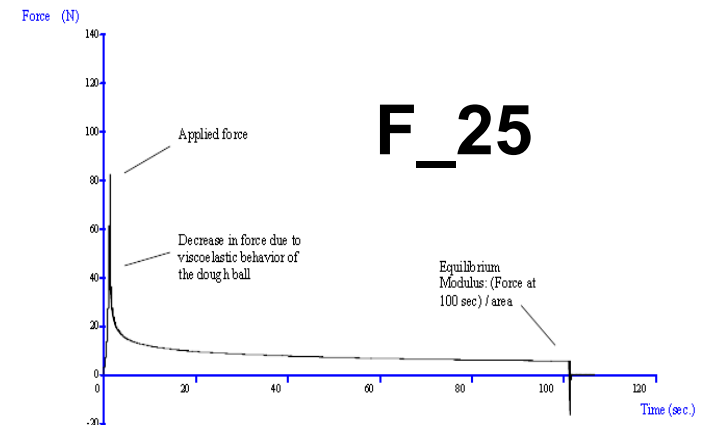
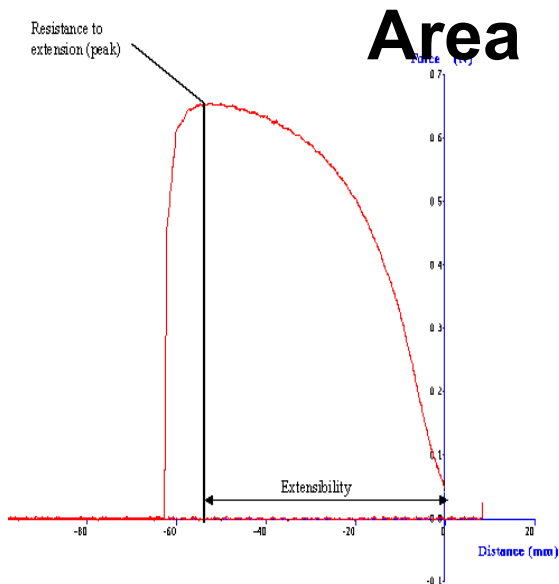
Functional Protein Content & Flexibility



Intermediate Functional Protein
Content
(10.5 % – 12.0%)

Low Functional Protein
Content
(8.0 – 10.5%)

Predicting Flour Functionality for Tortillas



- 1) Prediction value ≥ 0 : Suitable flour for quality tortilla
- 2) Prediction value ≤ 0 : Unsuitable for good tortilla

Good Rollability and Diameter =

$$-10.15 - 0.19 * \text{Weight} + 10.58 \text{Glu:GliRatio} - 0.05 * \text{IPP} - 0.22 * \text{Area} + 1.4 * \text{F}_{25} + 0.36 * \text{F}_{100} + 0.02 * \text{CompForce};$$



Water Quality



- The second largest component of tortillas.
- Optimum tortilla moisture content: 29 – 32% affects:
 - Tortilla Texture
 - Shelf-life
 - Excess water create steam and weakens tortilla structure
- Monitor microbial counts on water used.
- Water temperature of used to make dough.
- Water pH:
 - Depending source water can be treated to adjust pH hence measure pH regularly
 - Measure conductivity to determine hardness



Shortening/ Fat Quality

An important component of tortillas

- Type used:
 - liquid oil
 - Solid shortening
- Affect tortilla texture:
 - Slow staling
 - Interact with flour components – starch & protein
- Improves dough machinability & reduce stickiness
- Provide desired flavor in tortillas
- Prevents & reduces tortilla sticking during storage



Functional Ingredients



Raw Material Quality:

- ✓ Test for pH, CO₂, Sodium, moisture
- ✓ Microbial loads
- ✓ Particle Size distribution
- ✓ Purity tests
- ✓ Bake tests for functionality
- ✓ Sticking test
- ✓ Flexibility, & Accelerated Shelf life

Processing and storage conditions

- Temperature reduction after baking, during packaging, in transportation and in storage.
- Monitor and document parameters:
 - Dough mixing
 - Dividing & rounding
 - Pressing method – hand stretch, hot press or die cut
 - Oven
 - Cooling
 - Packaging



Other aspects of shelf stability

- pH: Ideal between 5.2 – 5.8 flour tortillas.
- Preservatives: Sorbates and propionate effective at low pH where as Parabens at high pH (Questions around safety of Parabens).
- Microbial load: Establish & monitor COA limits for all suppliers.



Days at 28°C	Control ^a		Experimental ^b	
	Odor	Mold	Odor	Mold
0	Normal	None	Normal	None
1	Normal	None	Normal	None
2	Normal	None	Normal	None

Conclusion

The recipe to deliver good quality tortillas

- ✓ Quality of Flour.
- ✓ Quality of Water.
- ✓ Quality of Shortening/ Oil
- ✓ Quality of functional ingredients.
- ✓ Quality of personnel: qualification, training & continuous improvement.
- ✓ Consistent documentation and monitoring of data.

