



22 – 23 October 2024- AINIA conference center
Valencia, Spain

1

TECHNIQUES TO COMPENSATE FOR DECLINING WHEAT QUALITY

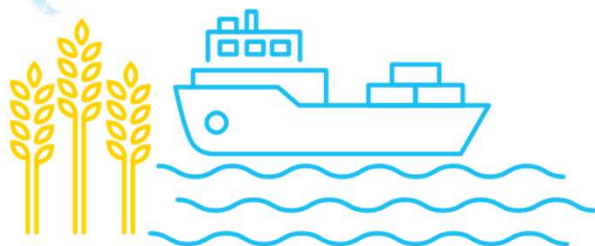
Novrani Bundhoo

October 22nd, 2024 | Valencia, Spain





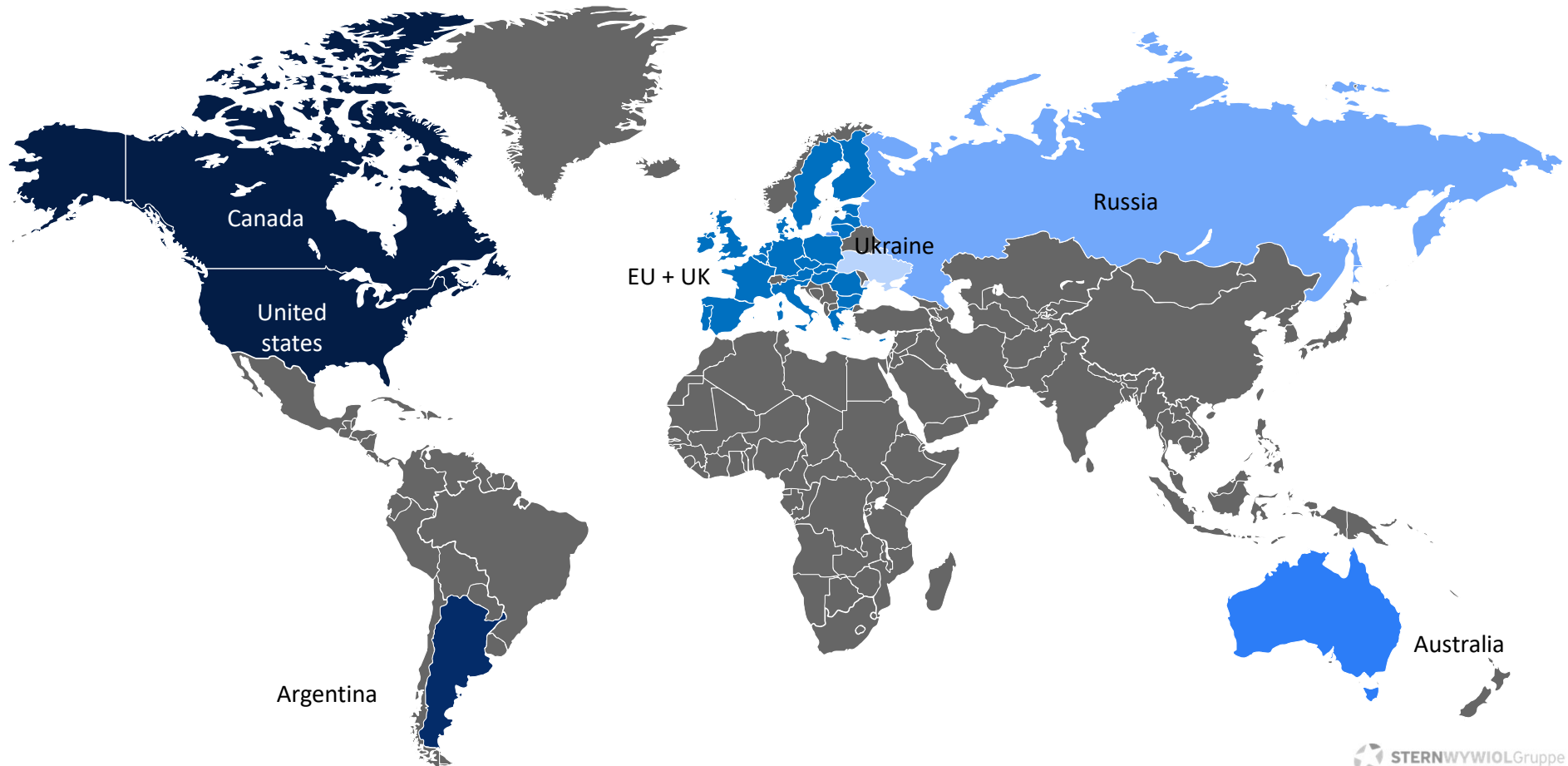
We speak the language of millers, bakers and pasta producers, working with them to develop solutions and contribute to fighting malnutrition.



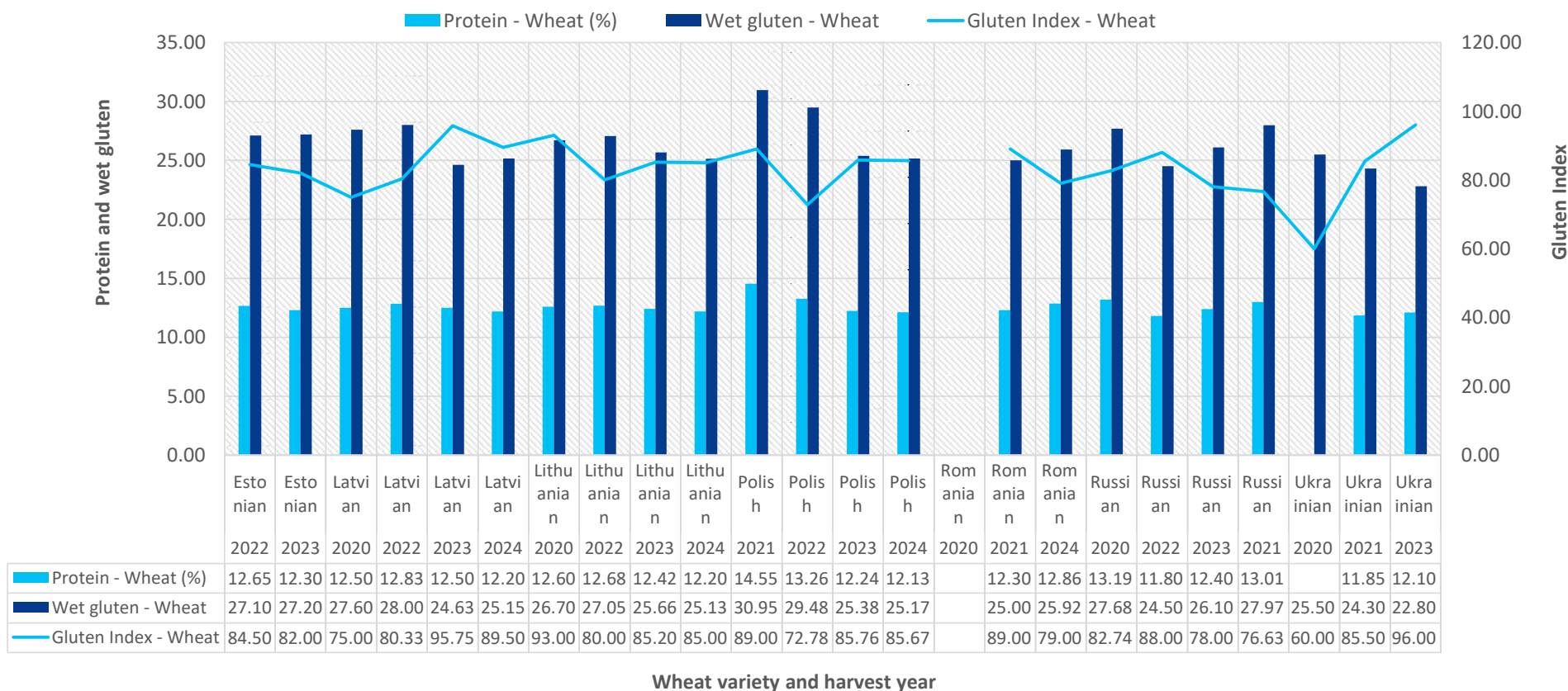
EVERY DAY, ALL OVER THE WORLD

Mühlenchemie GmbH & Co. KG (2024)

Principal Export countries

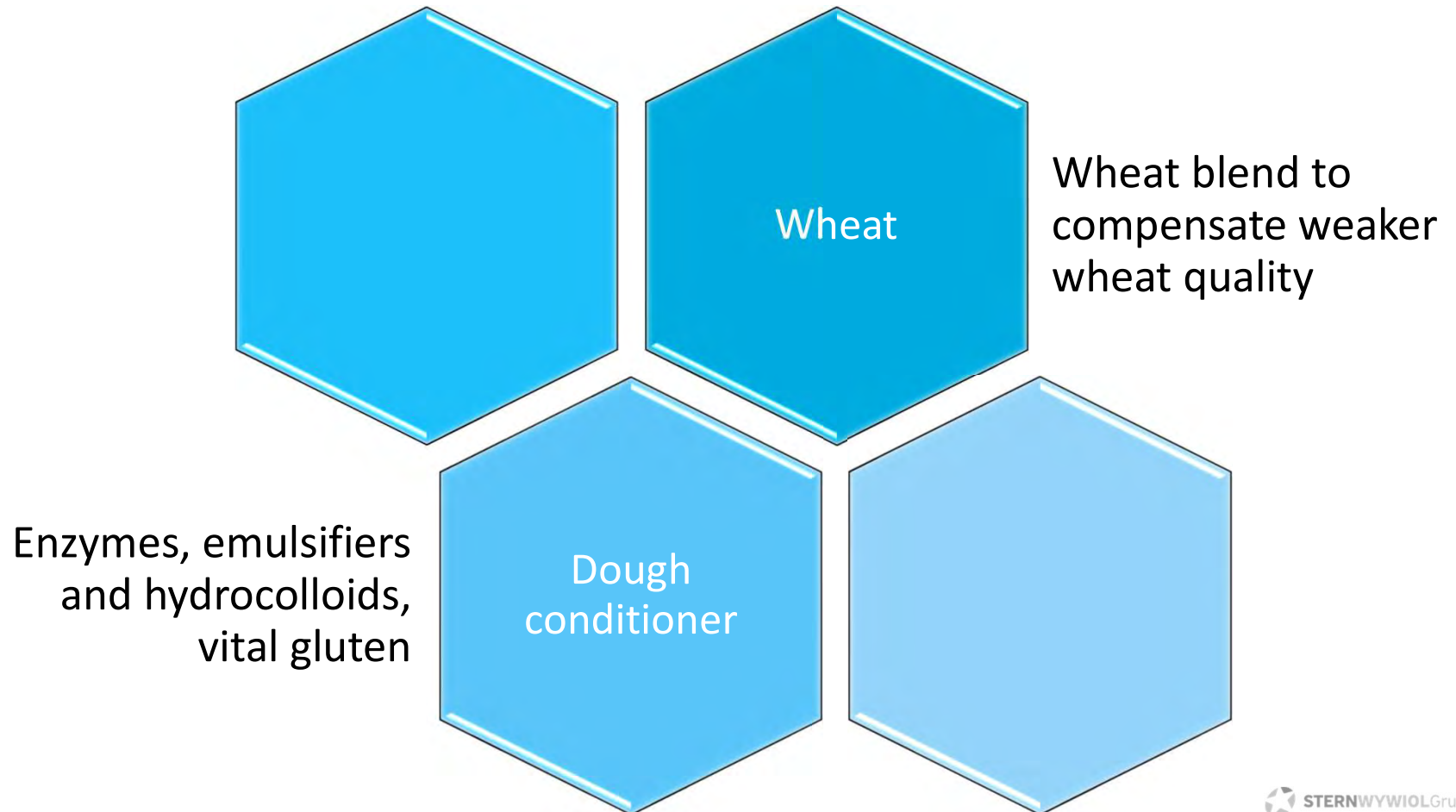


Wheat protein and gluten index of Black and Baltic sea wheat varieties



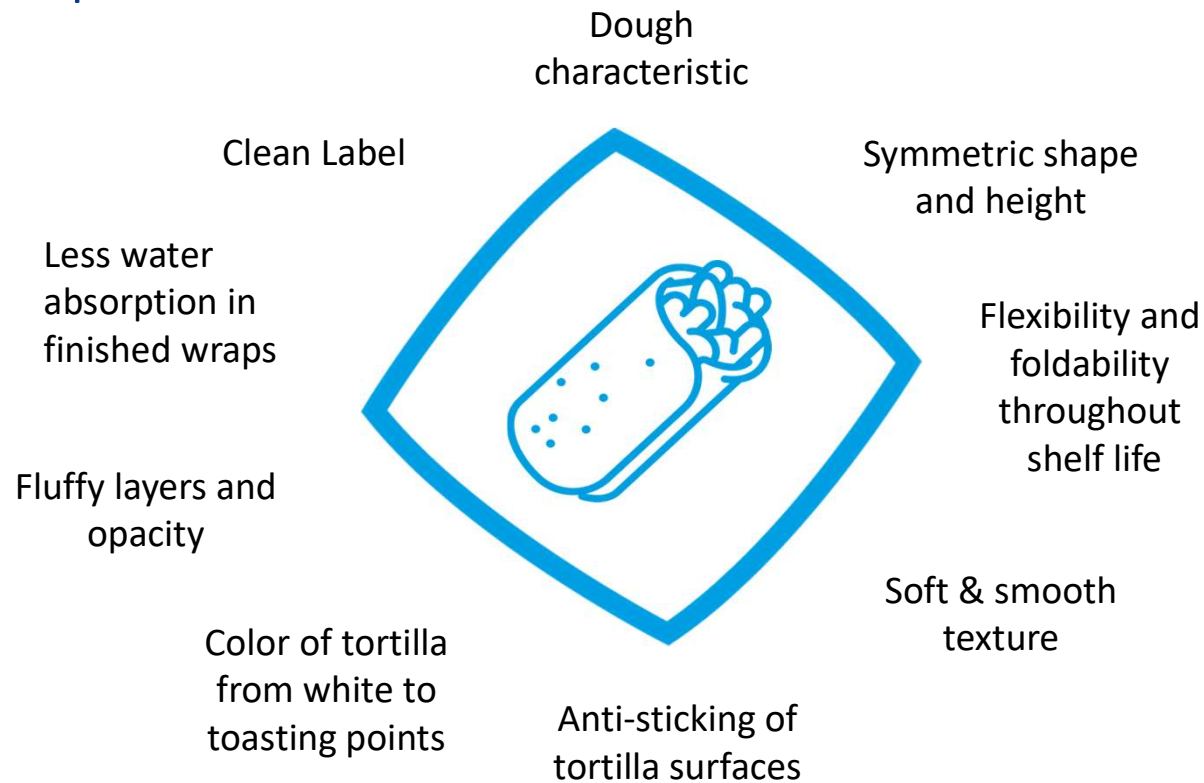
Wheat variety and harvest year

Techniques to overcome declining wheat quality

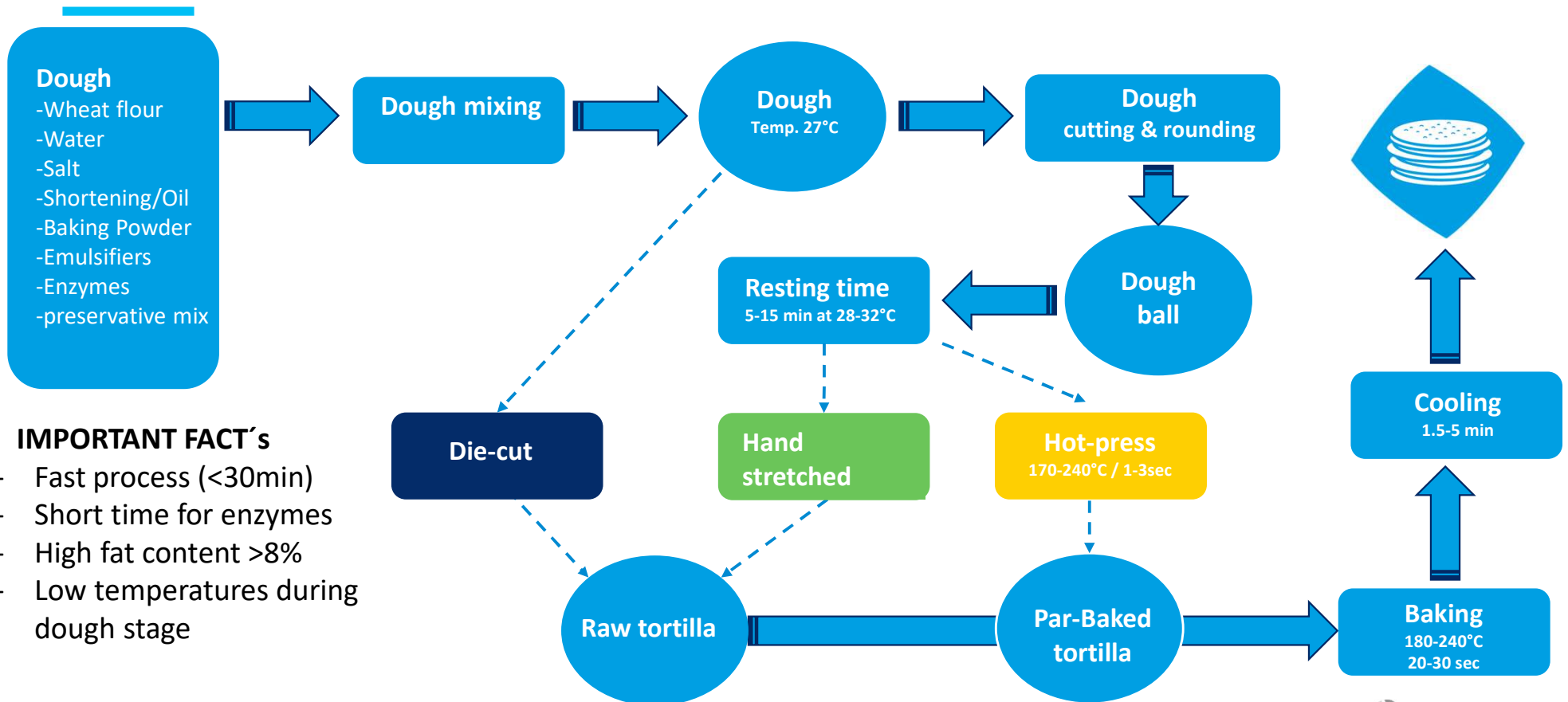


Desired characteristics of wheat tortilla

Customer's requests



3 way's of tortilla processing



IMPORTANT FACT's

- Fast process (<30min)
- Short time for enzymes
- High fat content >8%
- Low temperatures during dough stage



Flour quality
Main ingredient of tortilla

WHEAT AND FLOUR



Wheat flour provides structure to the tortilla. Wheat protein + Water

*Work = Gluten Development

Gluten is the elastic substance that retains gas produced during leavening:

- **CO₂ from Baking Powder**
- **Air incorporated during the mixing**
- **Water vapor**

The starch from wheat also plays an important role in providing structure and texture through the process of gelatinization.

Flour Quality Parameters *



Protein

- 10,5 – 12.5%

Wet Gluten

- 30 % or more

Water absorption

- 60-64

Falling No.

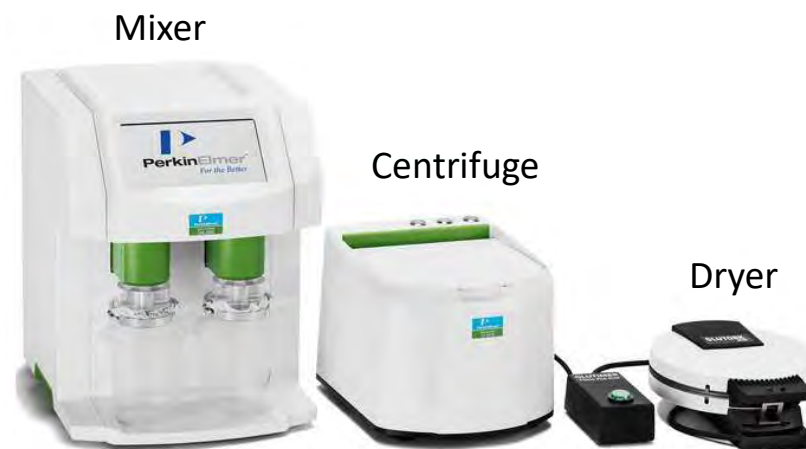
- 300 – 350 s

Ash Content

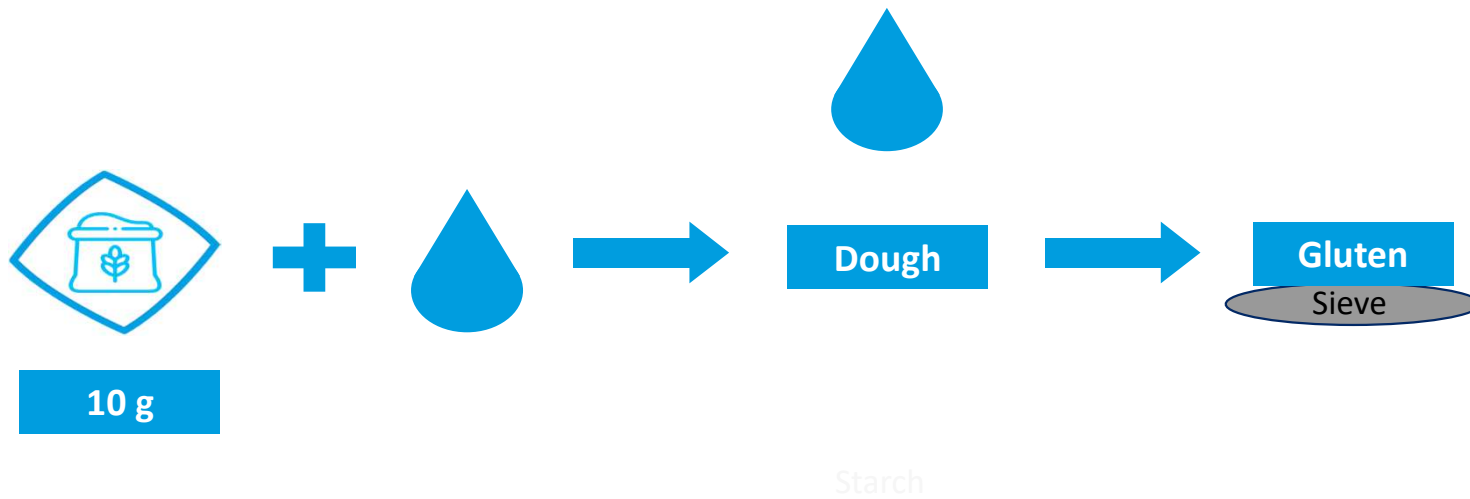
- 0.45 – 0.6%

*** Typical Range**

Gluten Index

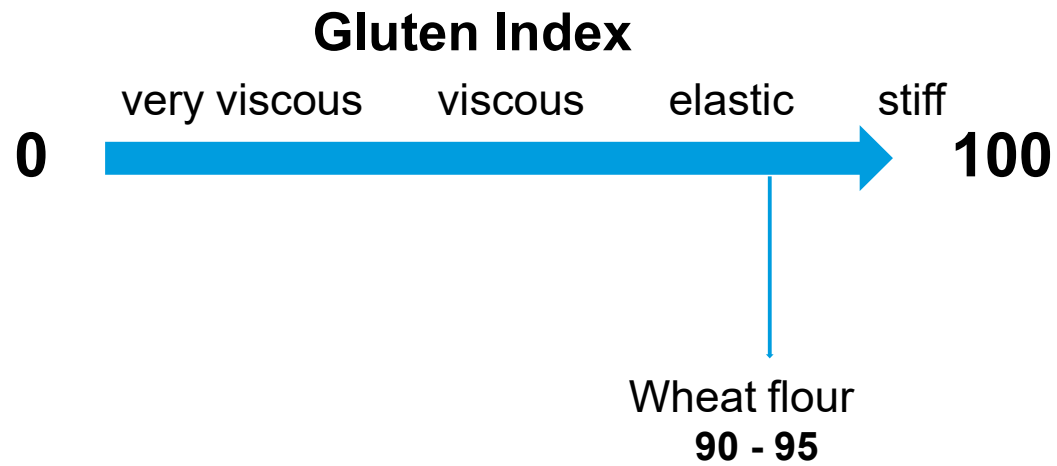


Principle Gluten Index



Interpreting the curve

Gluten Index



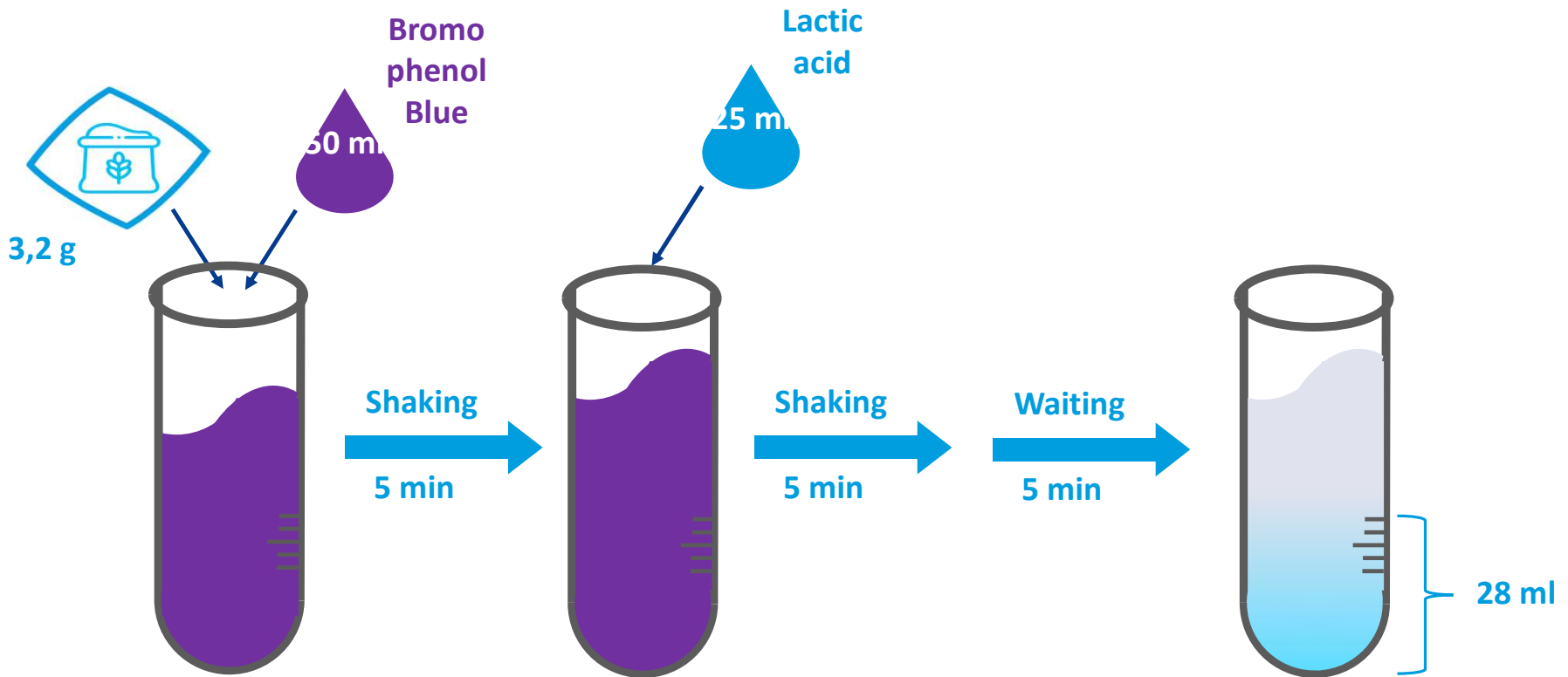
Sedimentation

Influencing factors

- Gluten quantity
- Gluten quality



Principle Sedimentation



Interpreting the value Sedimentation



Farinograph

Mixing behaviour

Water absorption

Dough development time

Stability

Softening



Principle Farinograph

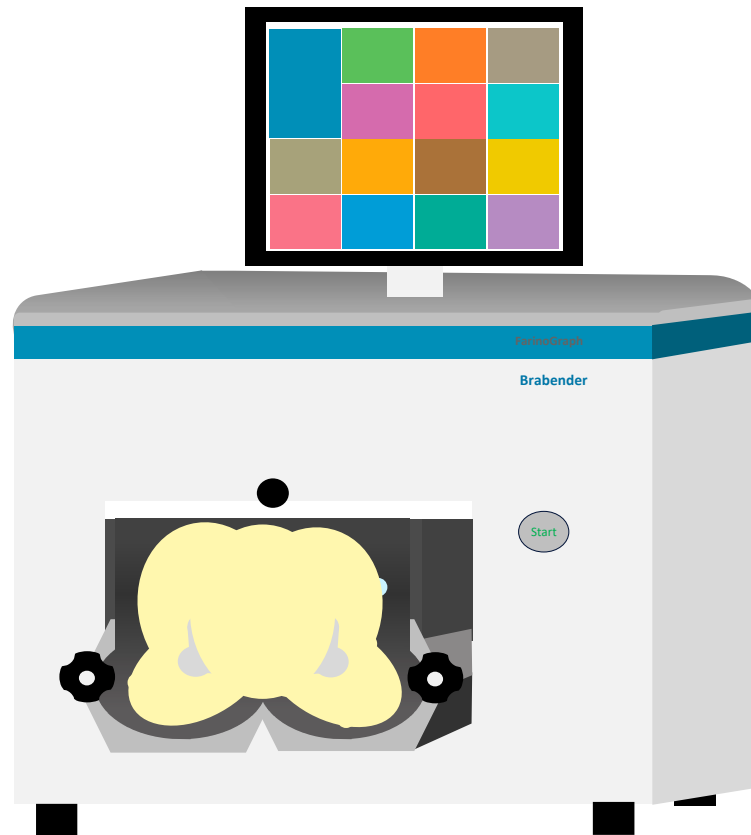


300 g

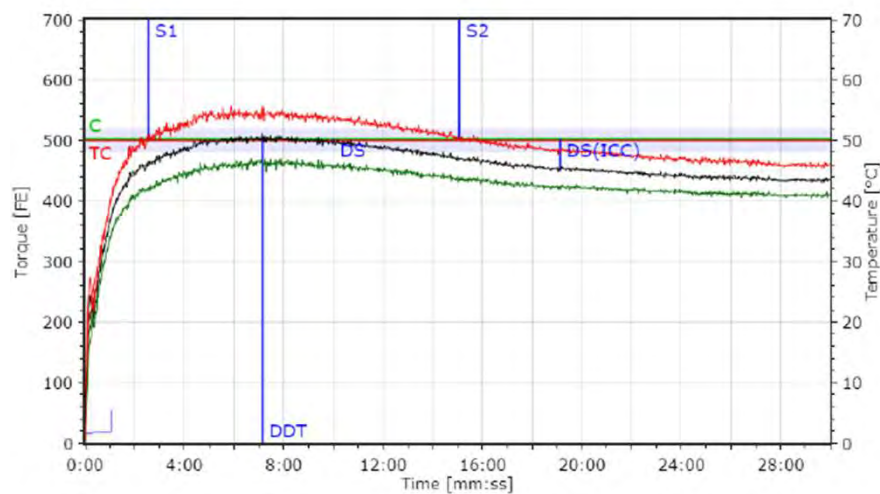


**Optimum
consistency**

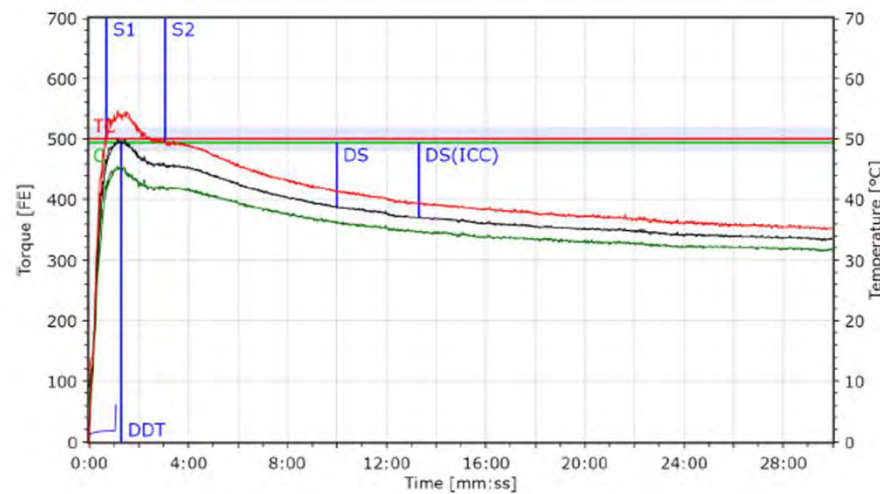
Farinograph



Interpreting the curve Farinograph



CWRS



CESRW

MVAG – Micro-Visco Amylograph

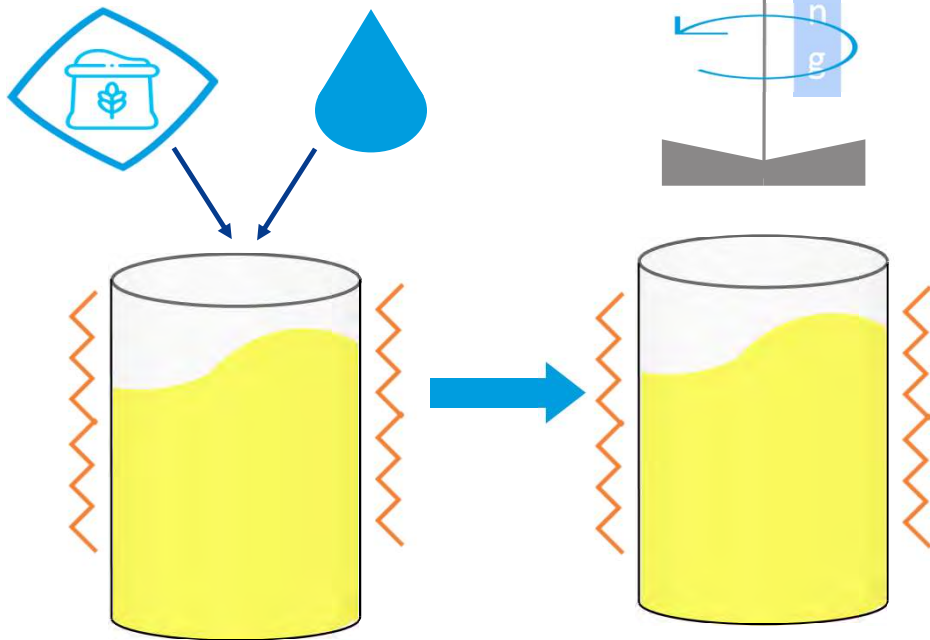
Flour suspension

Heating and cooling

Retrogradation



Principle MVAG

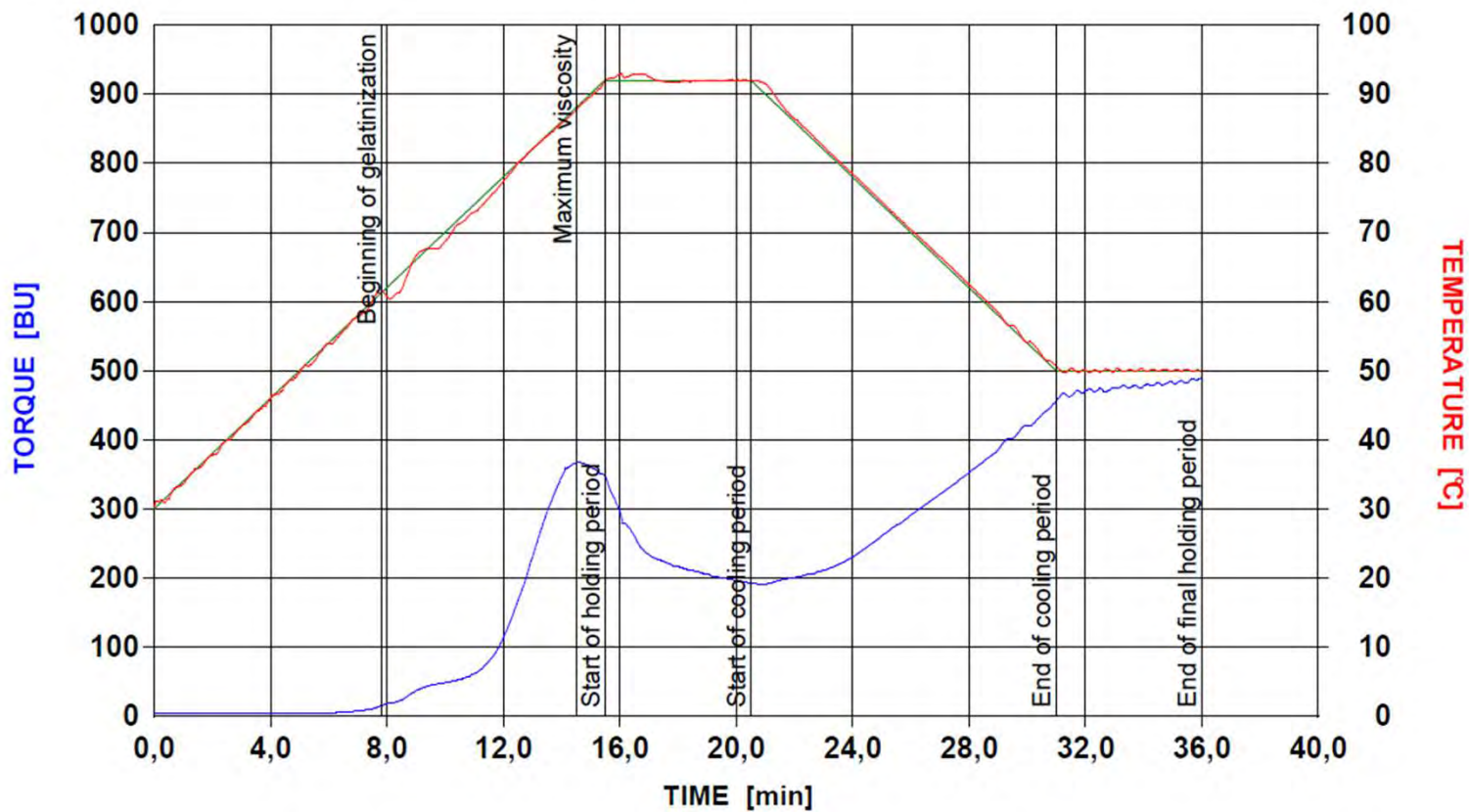


**Measured
Temperature
Resistance
Time**

Curve

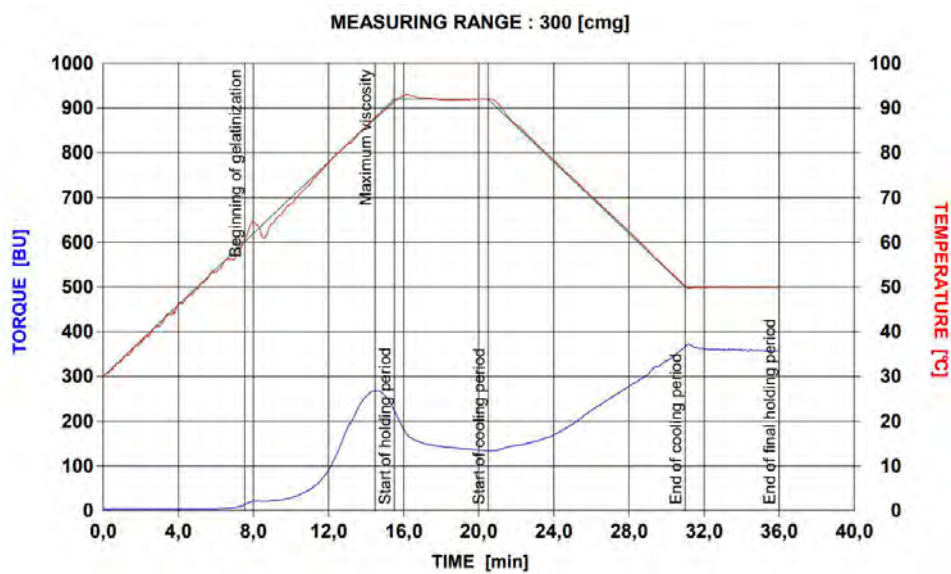
Interpreting the curve

MVAG

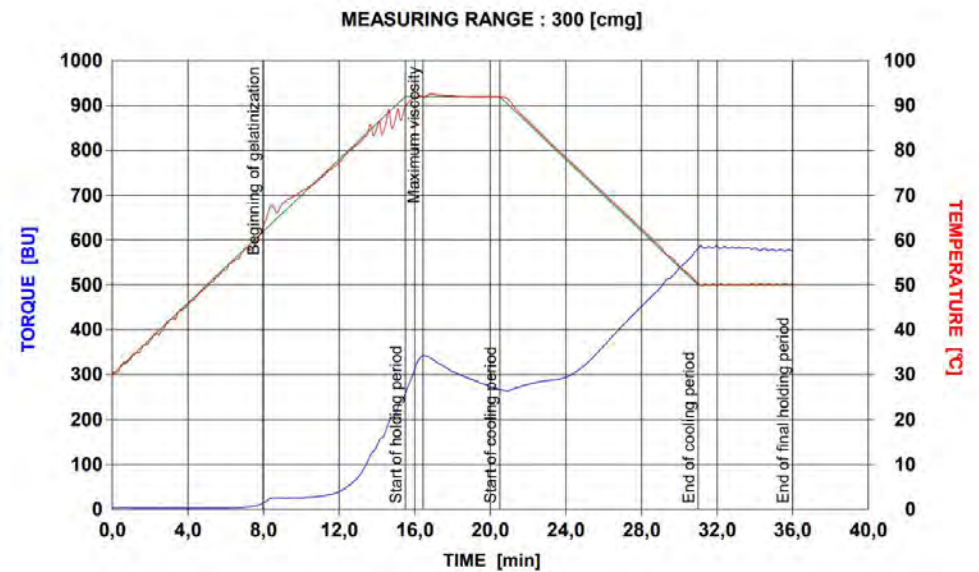


Influencing the curve

MVAG



Untreated



300 ppm Lipase

Mixolab



Principle Mixolab



80 g



Optimum
consistency

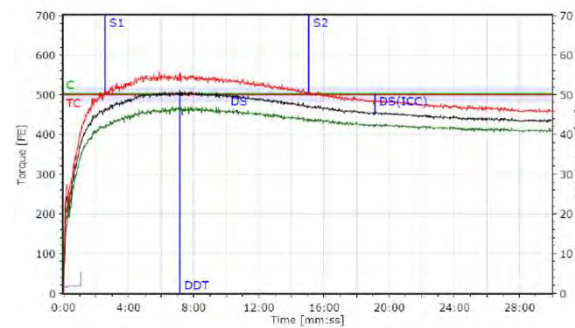
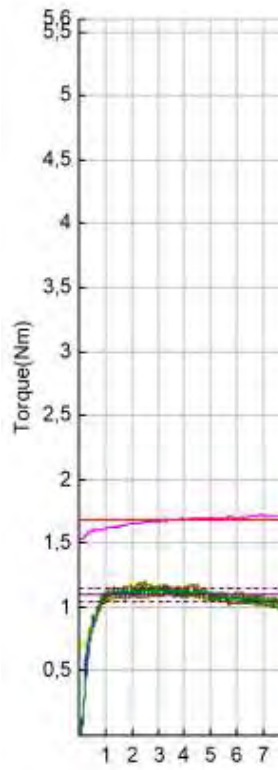
Principle

Mixolab

1. Mixing
2. Heating
3. Cooling



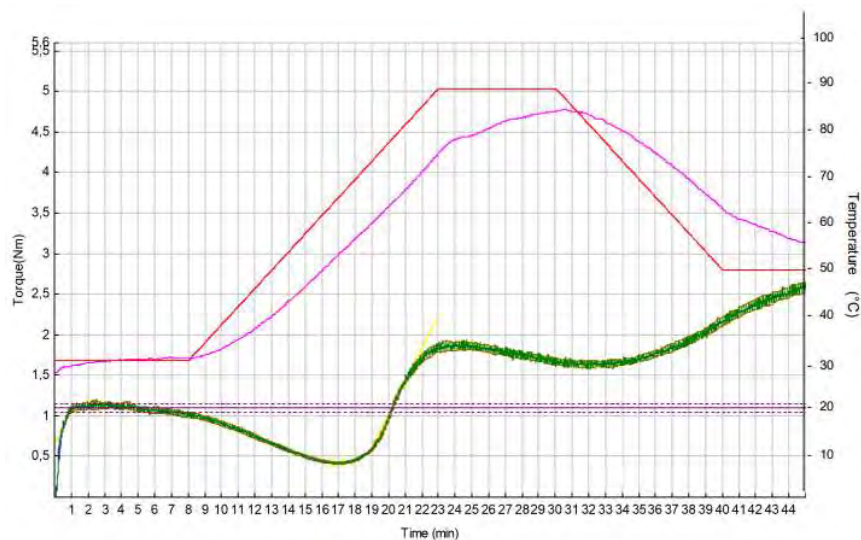
Interpreting the curve Mixolab



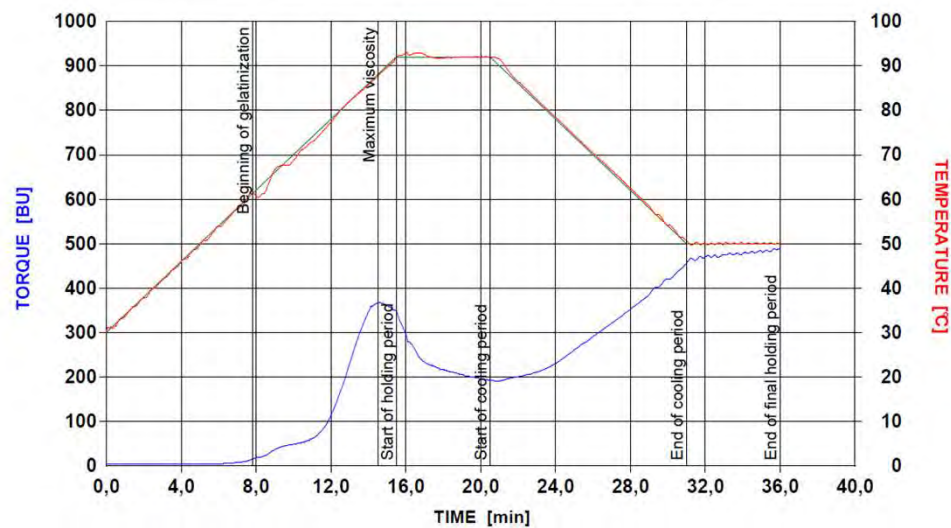
Interpreting the curve

Mixolab

Mixolab

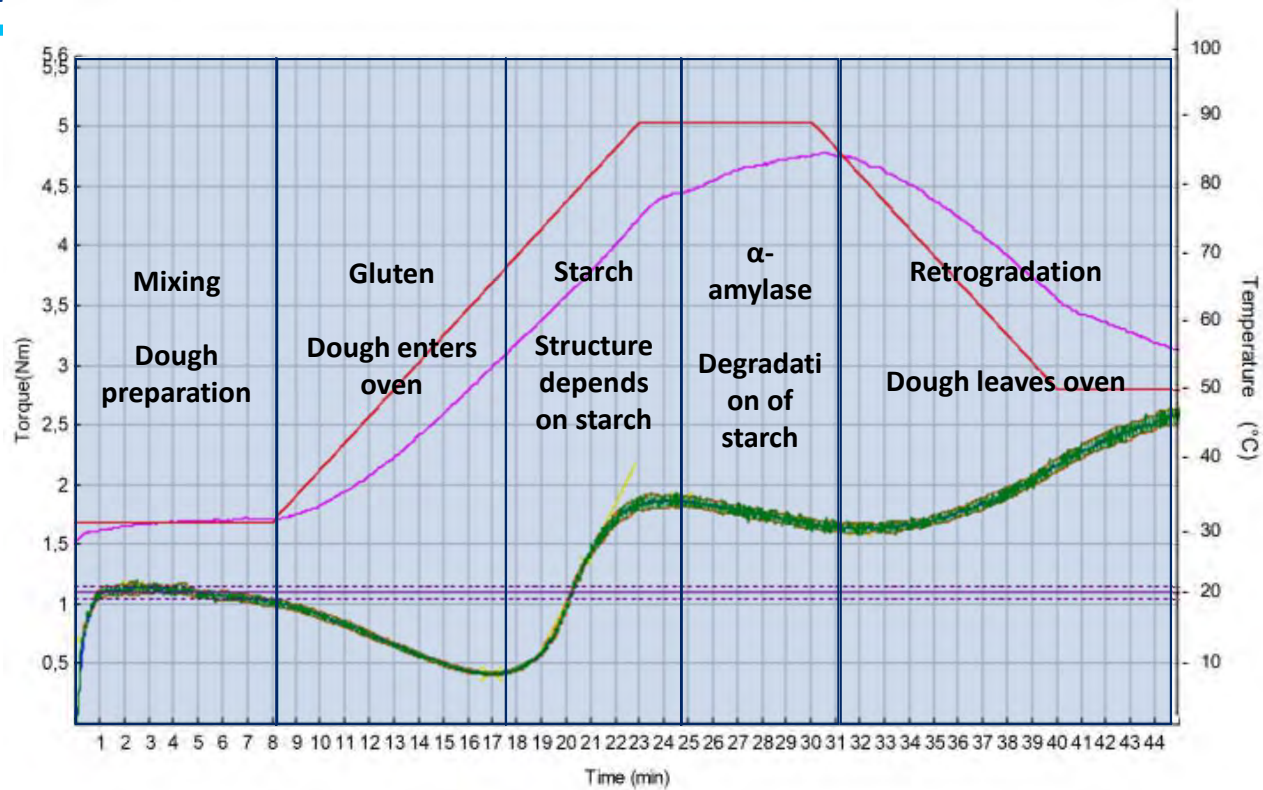


MVAG

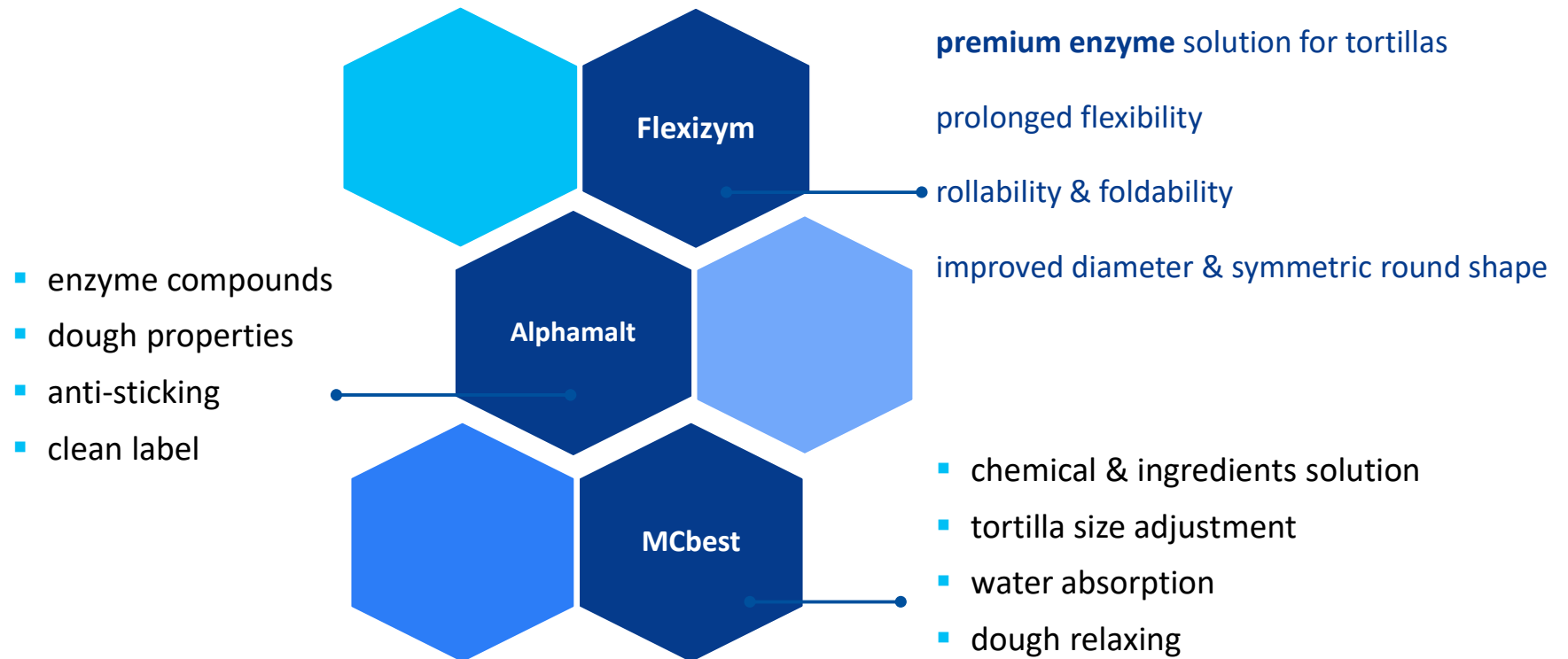


Interpreting the curve

Mixolab



MC tortilla brand names



Enzymes for tortilla

Alpha-amylase: Alphamalt A Range

- Flavour and colour formation
- Dough handling properties / extensibility: release of water from starch ► gluten softening
- Duration of softness (shelf-life) ► rollability

Hemicellulase: HC Range

- Releases water from the pentosans
 - Softening of the pentosan-gluten network; thus, increasing extensibility
 - Formability of the dough; gluten crosslinking with pentosans

Maltogenic alpha-amylase

- Prolongs shelf-life more efficiently than standard alpha-amylase
- Does not affect processing properties, bread structure or appearance
- Responds to market requirements

Glucose oxidase: Gloxy Range

- Brighten tortillas ► depend largely on flour properties (pigments)
- Prevents stickiness

Lipase: EFX Range

- Bleaching of dough

Protease: Alphamalt Pro Range

- Useful in case of very short gluten structures
- Weakens the interaction of the protein chains, not their strength

Alphamalt Gloxy TGO (0110783) Anti-sticking of tortilla

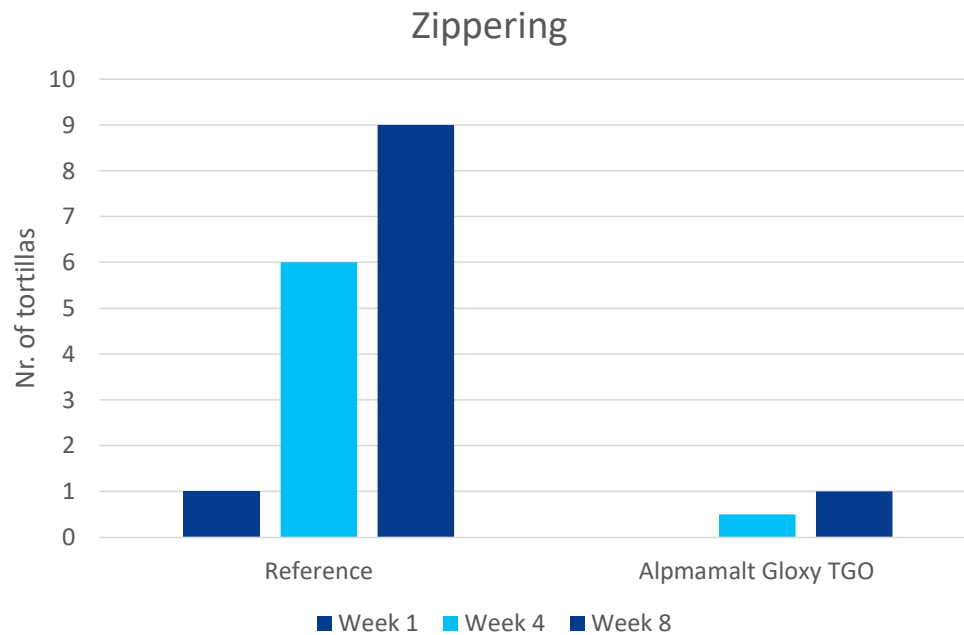
Control

Alphamalt Gloxy TGO 50ppm



Alphamalt Gloxy TGO (0110783)

Anti-sticking of tortilla



Trials are tested with 10kg weight on the tortilla packages over the storage time



*Tortilla **without** Alphamalt Gloxy TGO*

MC Tortilla toolbox overview

Product	Source	Dosage ppm	DOUGH		TORTILLA				
			Extensibility	Elasticity	Softness	Diameter	Flexibility/rollability	Fresh keeping	Anti-sticking
Flexizym Plus	Maltogenic Amylase	200-800	○○○○	○○○○	●●●○	○○○○	●●●○	●●●●	○○○○
Flexizym HD	Fungal Hemicellulase	20-50	●●○○	●○○○	●○○○	●○○○	●○○○	●○○○	●○○○
Flexizym HDX	Bacterial Hemicellulase	20-50	●●●○	●●○○	●○○○	●●○○	●●○○	●○○○	○○○○
Alphamalt Gloxy TGO	Glucose Oxidase	10-100	○○○○	●●●○	○○○○	○○○○	○○○○	○○○○	●●●○
Alphamalt EFX Tera	Lipase / Phospholipase	5-30	●○○○	●○○○	●●○○	○○○○	●●○○	●●○○	●●○○
Alphamalt Pro	Fungal Protease	100-300	●●●○	○○○○	○○○○	●●●○	○○○○	○○○○	○○○○
EMCERelax 400	Inactivated Yeast	200-600	●●●○	●●○○	●○○○	●●●○	○○○○	○○○○	○○○○
EMCErise SD	Baking powder	0.3-4.0%	○○○○	●○○○	●●○○	○○○○	●○○○	●●○○	○○○○
EMCEbest WA Range	Ingredients	0.3-1.0%	○○○○	●●○○	●○○○	●●○○	●○○○	●●○○	●●○○

MC Tortilla toolbox overview

Strong flour recommendation > 11% Protein / > 90 GI

Product	Source	Dosage ppm	DOUGH		TORTILLA				
			Extensibility	Elasticity	Softness	Diameter	Flexibility/rollability	Fresh keeping	Anti-sticking
Flexizym Plus	Maltogenic Amylase	200-800	○○○○	○○○○	●●●○	○○○○	●●●○	●●●●	○○○○
Flexizym HD	Fungal Hemicellulase	20-50	●●○○	●○○○	●○○○	●○○○	●○○○	●○○○	●○○○
Flexizym HDX	Bacterial Hemicellulase	20-50	●●●○	●●○○	●○○○	●●○○	●●○○	●○○○	○○○○
Alphamalt Gloxy TGO	Glucose Oxidase	10-100	○○○○	●●●○	○○○○	○○○○	○○○○	○○○○	●●●○
Alphamalt EFX Tera	Lipase / Phospholipase	5-30	●○○○	●○○○	●●○○	○○○○	●●○○	●●○○	●●○○
Alphamalt Pro	Fungal Protease	100-300	●●●○	○○○○	○○○○	●●●○	○○○○	○○○○	○○○○
EMCERelax 400	Inactivated Yeast	200-600	●●●○	●●○○	●○○○	●●●○	○○○○	○○○○	○○○○
EMCErise SD	Baking powder	0.3-4.0%	○○○○	●○○○	●●○○	○○○○	●○○○	●●○○	○○○○
EMCEbest WA Range	Ingredients	0.3-1.0%	○○○○	●●○○	●○○○	●●○○	●○○○	●●○○	●●○○

MC Tortilla toolbox overview

Weak/soft flour recommendation < 11% Protein / < 90 GI

Product	Source	Dosage ppm	DOUGH		TORTILLA				
			Extensibility	Elasticity	Softness	Diameter	Flexibility/rollability	Fresh keeping	Anti-sticking
Flexizym Plus	Maltogenic Amylase	200-800	○○○○	○○○○	●●●○	○○○○	●●●○	●●●●	○○○○
Flexizym HD	Fungal Hemicellulase	20-50	●●○○	●○○○	●○○○	●○○○	●○○○	●○○○	●○○○
Flexizym HDX	Bacterial Hemicellulase	20-50	●●●○	●●○○	●○○○	●●○○	●●○○	●○○○	○○○○
Alphamalt Gloxy TGO	Glucose Oxidase	10-100	○○○○	●●●○	○○○○	○○○○	○○○○	○○○○	●●●○
Alphamalt EFX Tera	Lipase / Phospholipase	5-30	●○○○	●○○○	●●○○	○○○○	●●○○	●●○○	●●○○
Alphamalt Pro	Fungal Protease	100-300	●●●○	○○○○	○○○○	●●●○	○○○○	○○○○	○○○○
EMCERelax 400	Inactivated Yeast	200-600	●●●○	●●○○	●○○○	●●●○	○○○○	○○○○	○○○○
EMCErise SD	Baking powder	0.3-4.0%	○○○○	●○○○	●●○○	○○○○	●○○○	●●○○	○○○○
EMCEbest WA Range	Ingredients	0.3-1.0%	○○○○	●●○○	●○○○	●●○○	●○○○	●●○○	●●○○

Conclusions

Enzymes in tortilla processing...

- ... improve the processing properties of the dough
- ... can be used in different processing way
- ... can be used to strengthen or soften the dough
- ... improve the appearance and the eating properties
- ... prolong the duration of softness and foldability

Emulsifiers

Improvers		
Type		Effect
Emulsifier	Mono-Diglycerides, SSL, DATEM	Dough tolerance, Extensibility, Machinability Moisture retention, Reduced staling

**Water and Fat
Distribution**

**Dough
machinability**

**Structure of
the dough**

Dough handling

**Reduction of fat
content**

**Gum
Reduction**

**Glycerol
Reduction**

Hydrocolloids

Improvers		
Type		Effect
Gums	Guar Gum, Xanthan Gum, Acacia Gum	Machinability, Moisture retention

Guar Gum

Thickening

Agent/Binder

Improves texture/structure in the dough

Maintains integrity of the dough

Xanthan gum

Thickening and binding agent

Water Activity Management

Crumb Structure

Ideal for refrigerated products

Rubbery texture

Acacia Gum

Thickener and binder

Improves texture

Maintains product shelf life properties

Conclusion

- Wheat quality keeps fluctuating over years
- New wheat variety on the market due to unavailability of the usual wheat crops
- Understanding the wheat, good quality control and baking help to make the right flour for the right application without affecting finished products quality
- Enzymes are very helpful and it is not an expensive tool
- It is not difficult to compensate for declining wheat quality, we just need to understand the wheat and flour quality and the application's requirements

Understanding flour

For good quality products

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Feeding the World – with Excellent Flour

