Formulating the future tortilla market needs

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The Baking Industry: a modern industry, with modern challenges

Costs

Assortment

Flexible

Sustainable

Labor

Consistent

Changing consumer demands

Convenience

Health

Authenticity

Freshness

Taste

Natural

New market requests and trends

Reduced E-numbers, clean label product (max. 5 E numbers)

Reduced salt-sodium levels (1gr/100gr product salt)

Reduced fat level (5gr/100gr product)

Palm free products

Gumfree products (fibre replacement)

Min 3-6 months ambient shelflife, even more

SAPP elimination

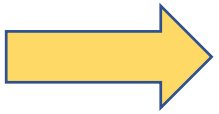
L-cystein elimination

Non-hydrogenated oils & fats

Non-requested raw material replacement & E-number reduction

Leavening system: SAPP elimination,	**replacement with different coated malic acids (15-35%)**
Hydrocolloid replacement	**with enzymes or fibers**
Dough relaxer replacement	**with enzymes**
Palm	**Palm free ingredient; Rapeseed-sunflower oil based**
Emulsifier non-palm based	**Special hardened non-hydro food acid coatings**
Non-palm based food acid coating Non-hydrogenated ingredients	

What type of enzymes can you use to replace E471, gums and dough relaxing chemicals?

Emulsifiers (E471)		**Lipase and Amylases**
Gums		**Amylases, Lipases, Xylanases**
Dough relaxing ingredients		**Proteases, Exopeptidase, hemicellulases,**

Emulsifier Replacement with Lipases

Substrates already present just waiting to be unlocked…

Composition of wheat flour

Components	%
Starch	65 – 70
Sugars	1 -2
Non-starch polysaccharides	1 - 3
Proteins	8 - 15
Lipids	**1.4 - 3**
Minerals	0.5
Water	12 - 15

- Triglycerides : 0.9 –1.2 %
- Phospholipids : 0.4 – 0.6 %
- Galactolipids : 0.4 – 0.6 %

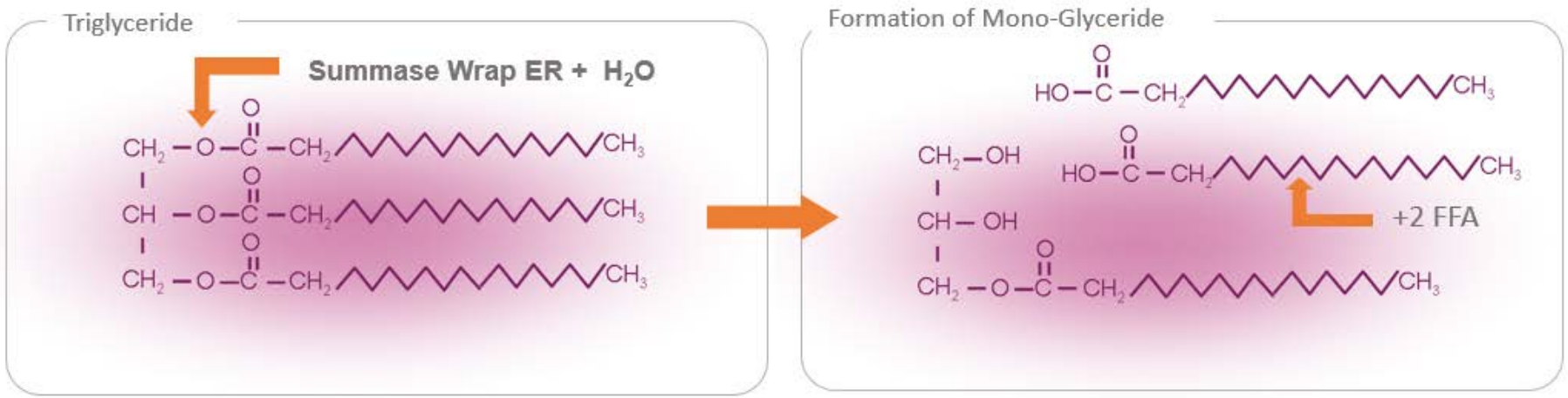
Wheat flour lipids

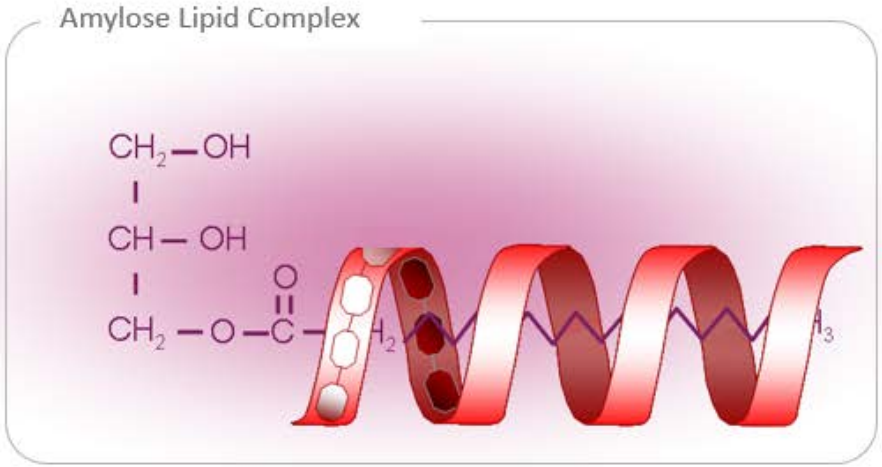
Lipid	Nonstarch	Starch	Total	
Sterol ester (SE)	72	18	90	
Triglyceride (TG)	674	35	709	
Diglyceride (DG)	86	6	92	Non Polar Lipids
Free fatty acid (FFA)	110	19	129	
Esterified monogalactosyl diglyceride (EMGDG) and monoglyceride (MG)	66	7	73	
Esterified steryl glycoside (ESG)	71	6	77	
Monogalactosyl diglyceride (MGDG)	87	6	93	
Monogalactosyl monoglyceride (MGMG)	23	7	30	
Digalactosyl diglyceride (DGDG)	214	12	226	
Digalactosyl monoglyceride (DGMG)	58	25	83	
N-acyl phosphatidyl ethanolamine (APE)	72	-	72	
N-acyl lysophosphatidyl ethanolamine (ALPE)	34	-	34	Polar Lipids
Phosphatidyl ethanolamine (PE) and phosphatidylglycerol (PG)	13	6	19	
Lysophosphatidyl ethanolamine (LPE) and lysophosphatidyl glycerol (LPG)	10	59	69	
Phosphatidyl choline (PC)	66	38	104	
Lysophosphatidyl choline (LPC)	36	657	693	
Phosphatidyl serine (PS), lysophosphatidyl serine (LPS), phosphatidyl myoinositol (PI), and lysophosphatidyl myoinositol (LPI)	11	24	35	
Total lipids	1703	925	2628	Mg per 100 g flour

Eliasson AC, Larsson K. Physicochemical behaviour of the components of wheat flour. In: *Cereals in breadmaking. A molecular colloidal approach.* Marcel Dekker Inc., New York (1993) p. 31-160.

Quattro Enzyme Solutions

Working mechanism of lipases towards crumb softening



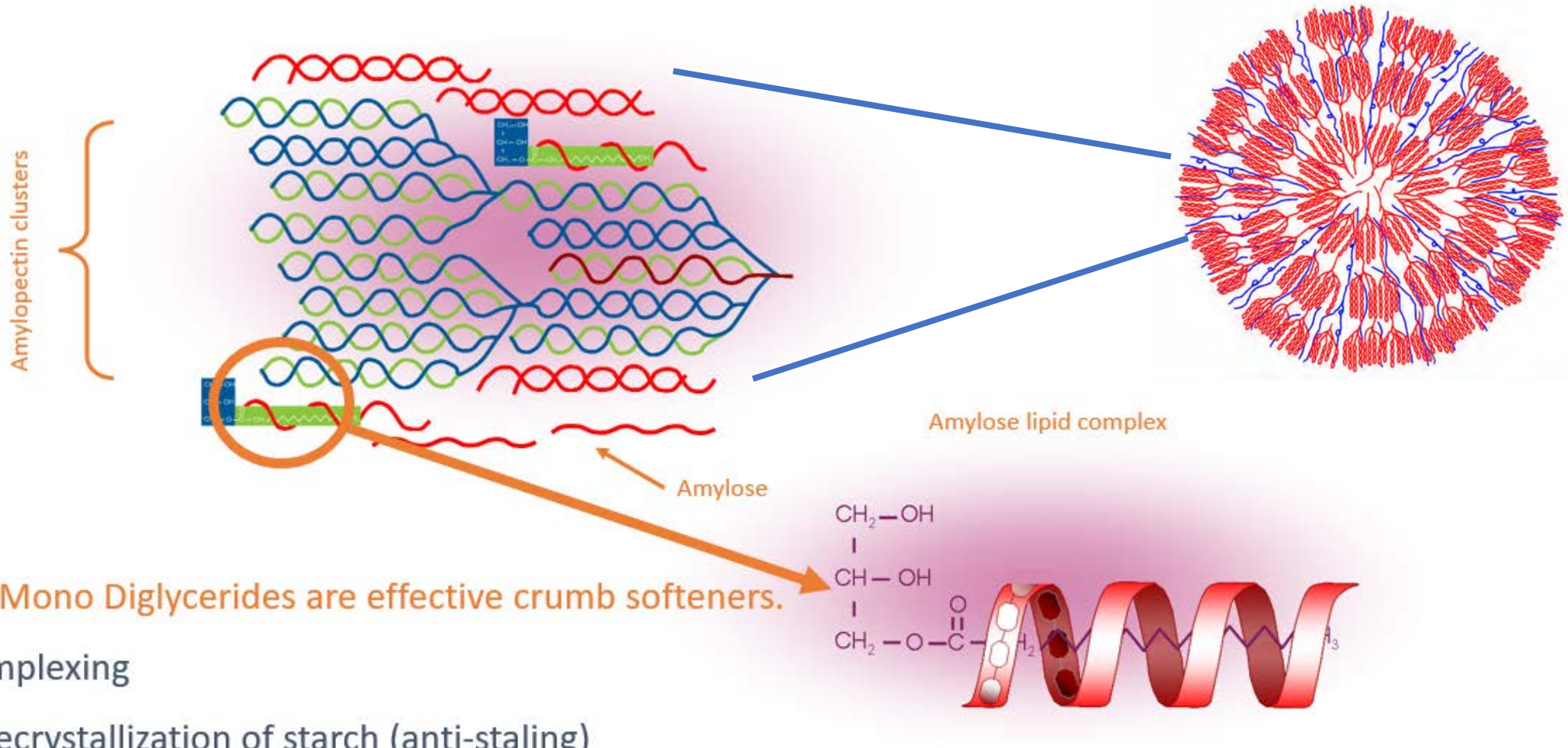


Mono-glycerides are crumb softening emulsifiers

- Starch complexing
- Reduces recrystallization of starch (anti staling)

Quattro Enzyme Solutions

The mechanism of crumb softeners



CSL, SSL and Mono Diglycerides are effective crumb softeners.

- Starch complexing
- Reduces recrystallization of starch (anti-staling)

Quattro Enzyme Solutions

Flexibility improvement using safe enzyme solutions

- It is well-known that amylases and xylanases can assist to improve the flexibility (roll-ability) and moistness sensation, this way prolonging the Tortilla's shelf-life.
- However, it is good to watch the negative effects that can result in;
  - Fluctuations in process time and temperature, having an effect on enzyme activity (head to tail effect).
  - Usage of re-work in your dough, which results in an increased amount of pre-gelatinized starch present in your dough, which will be more accessible for amylases, leading to dough stickiness.
  - Residual enzyme activity in your final product; most enzymes will be inactivated in the oven, however, some of the more heat-stable bacterial amylases might survive the heat treatment in the oven, leading to stickiness of your tortillas during storage.
- The next generation: Maltogenic amylase, combined with 3 synergistically acting enzymes overcomes the above mentioned issues, resulting in superior performance on freshness without the risk of stickiness at both dough level as well as on tortilla level during storage.

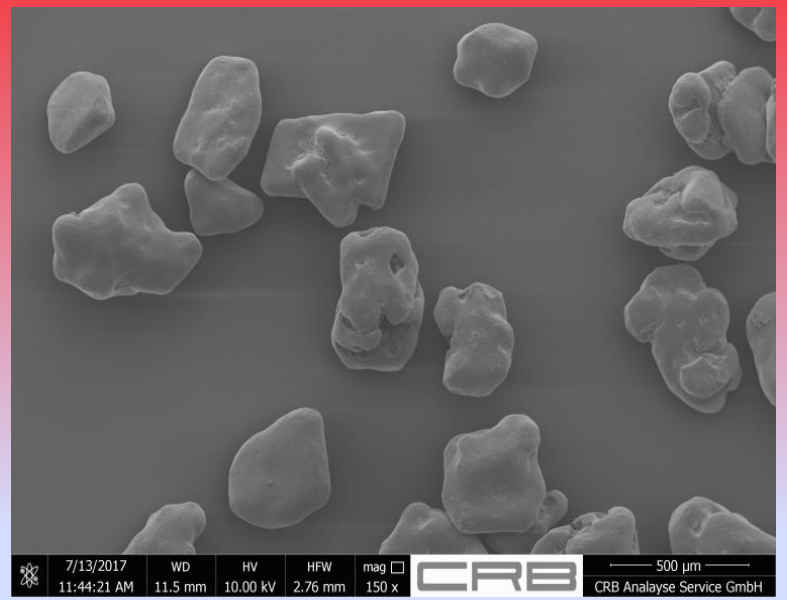
Dough relaxation with enzymes

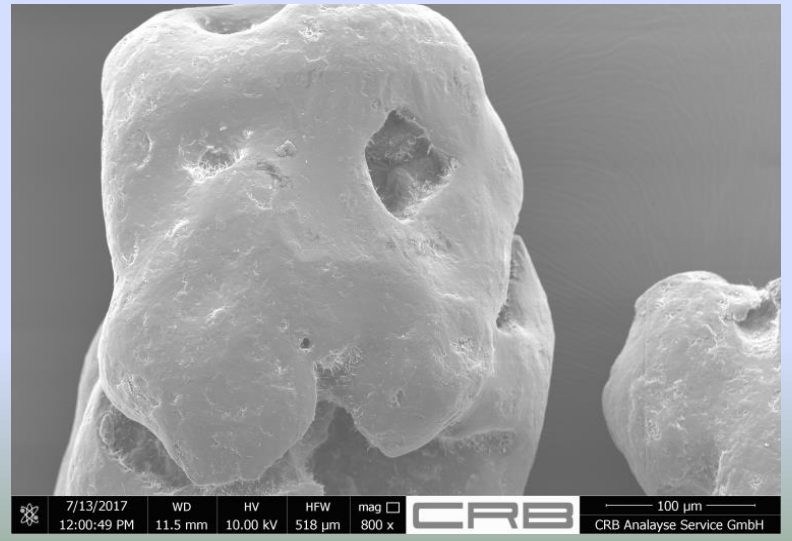
- **Relaxation with chemicals**
  - -L-cystein
  - -SMS (sodium metabisulfite)sulfites and SO2 being left in the final product, which may produce allergy or respiratory problems
  - -Glutathione (Inactive Yeast)
- **Relaxation with enzymes**
  - -Proteases,
  - -Exopeptidase,
  - -Hemicellulases
  - Consistance flour quality and SOP system necessary for efficient production

Coated encapsulated acids

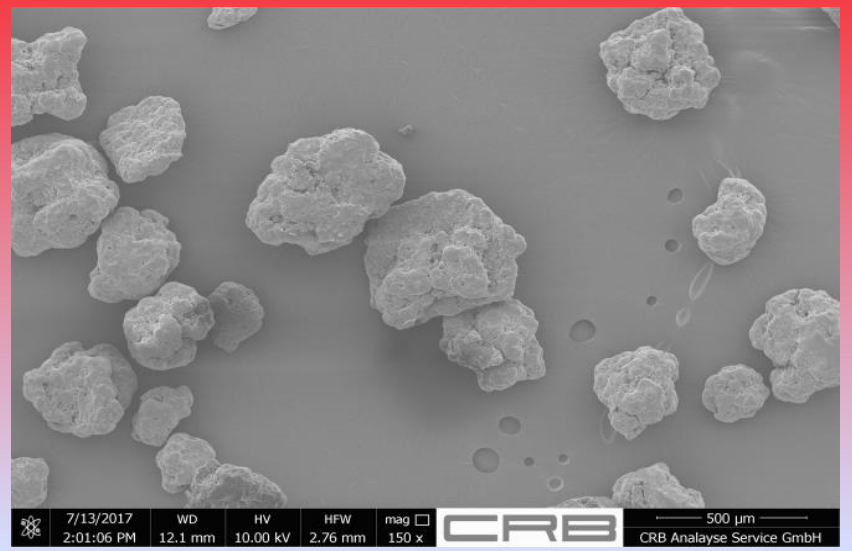
- Replacing SAPP (no metal aftertaste)
- Reducing number of E-numbers
- Oragnic product (with organic certificates)
- Palm or other oil-fat coating
- Available in
  - Non Palm
  - Non Hydro
  - Non Dust
  - Natural Waxes
- Less sour fluctuations
- Several different release and coating types

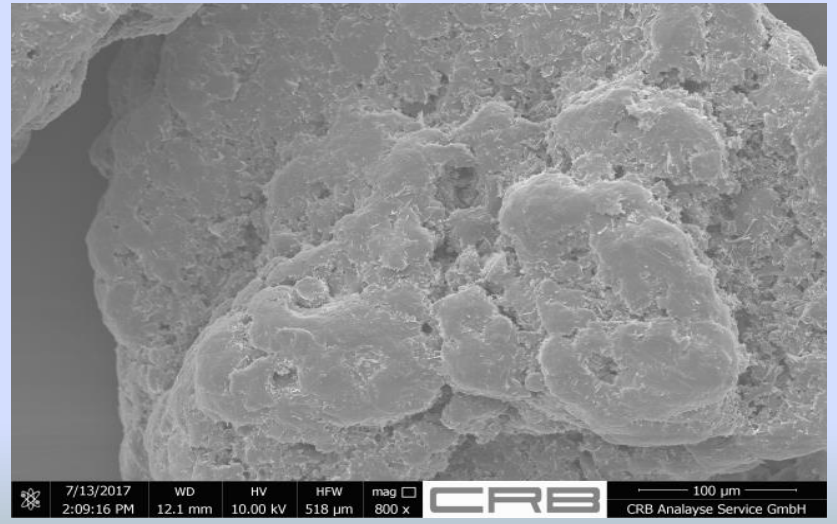
30% Hydroganeted palm coating





30% E471 coating





THANK YOU FOR YOUR ATTENTION


time for questions