

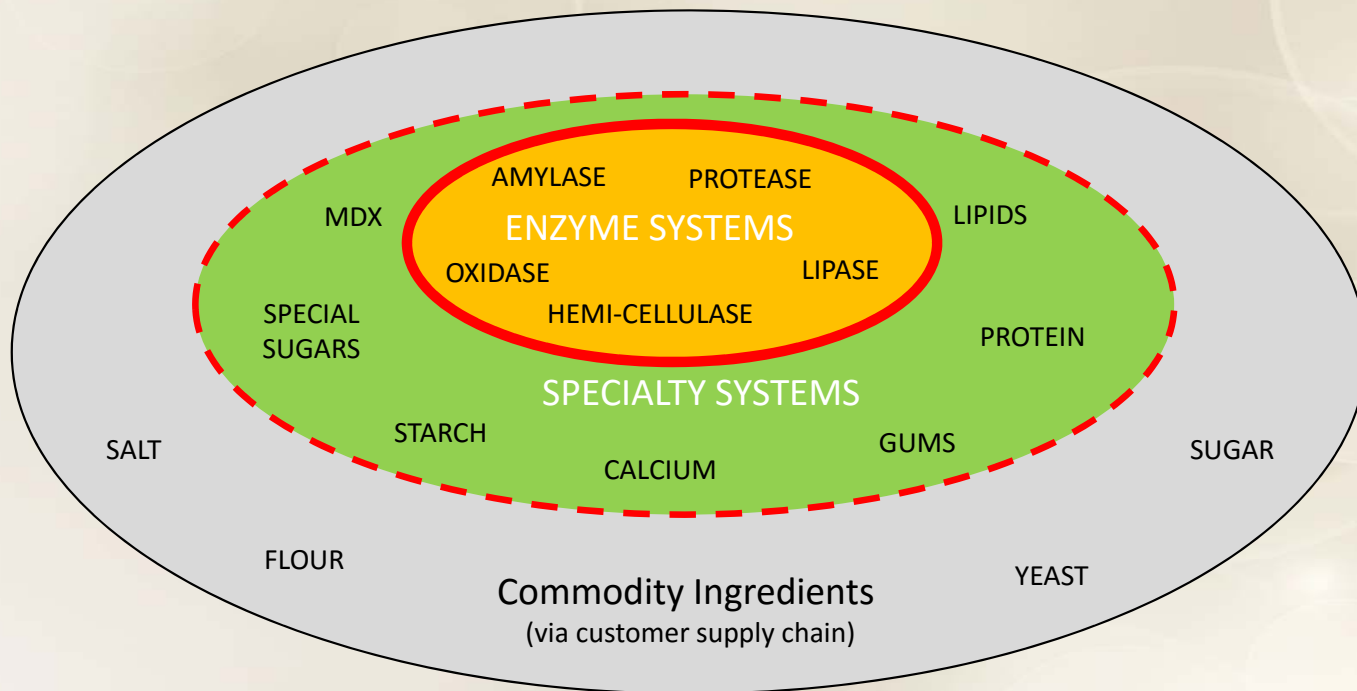
Formulating Clean Label Bakery Products

ACCENT Dough Conditioners
&
ENCORE Shelf Life Extenders

By DELAVAU FOOD PARTNERS

Clean Label Conference, March 28-29, 2016

Accent & Encore High Function Bakery Systems





Traditional Bakery Ingredients *Provide High Levels of Functionality*

- Azodicarbonamide – cross-links gluten to strengthen dough
- K Iodate – cross-links gluten
- K Bromate – cross-links gluten
- L-Cysteine – dough relaxation
- Ascorbic Acid – dough strengthening/ relaxation (when in excess)
- Sodium Steryl Lactylate – emulsification
- Mono-Glycerides – emulsification, retard retrogradation
- Propionate – mold inhibition
- Sorbate – mold inhibition
- Diacetyl tartaric acid ester of mono-glyceride – emulsification, retard retrogradation

3 primary areas of functionality

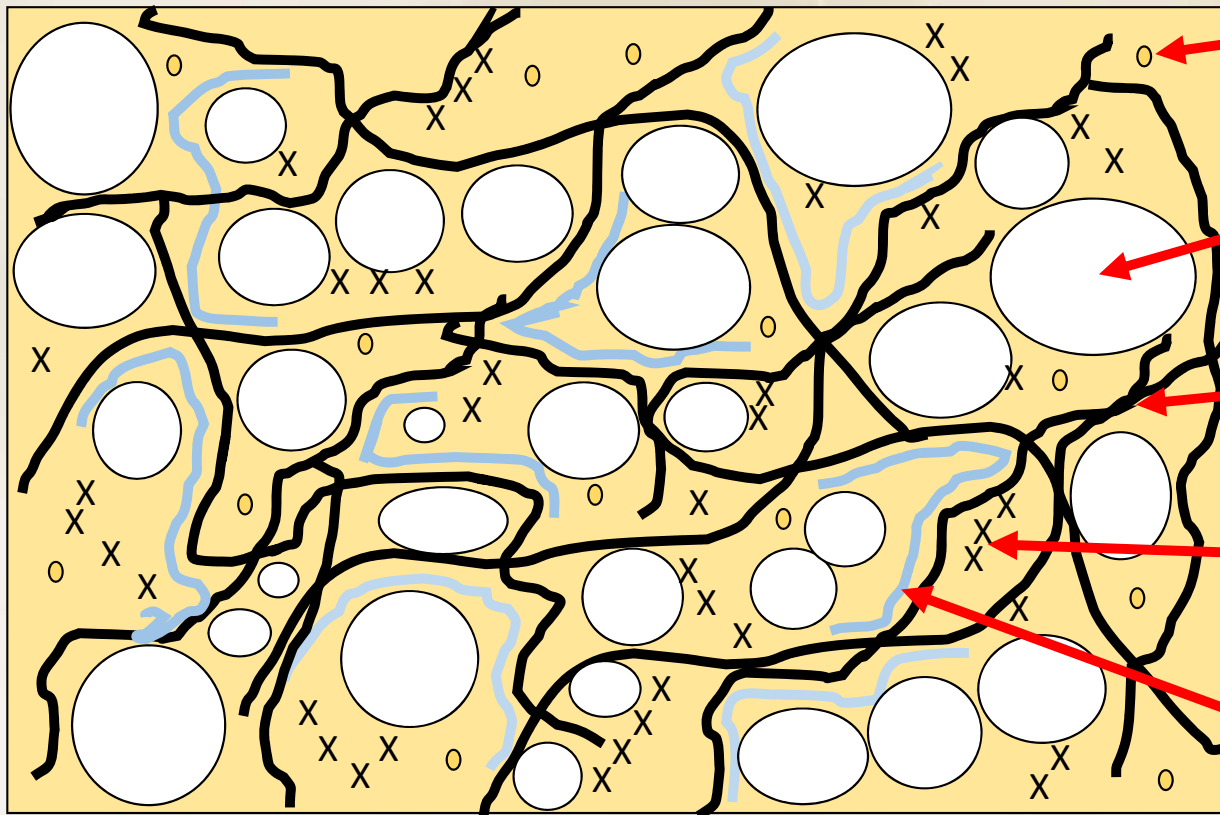
- 1) Gluten structure modification
- 2) Starch Structure modification
- 3) Air and Oil Droplet Stabilization (emulsification)

Traditional Bakery Ingredients *Segments of Functionality*

Gluten structure modification

- Oxidizers – strengthen network
 - ADA
 - K Iodate
 - K Bromate
 - Ascorbic acid
- Reducers – weaken network
 - L-Cysteine
 - Ascorbic Acid (In excess)

Micro-Structure of Gluten-based Baked Goods



Oil Droplets

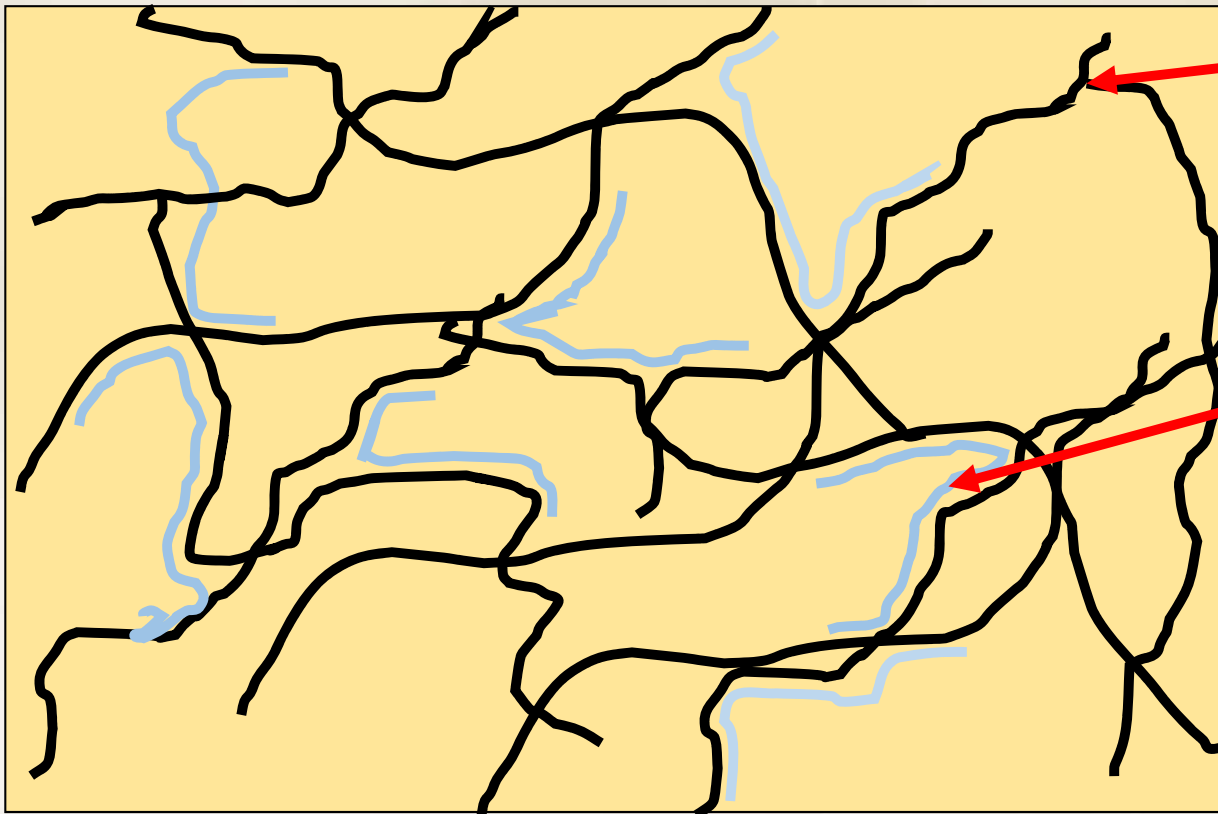
Air Cells

Gluten

Starch

Arabino-Xylans

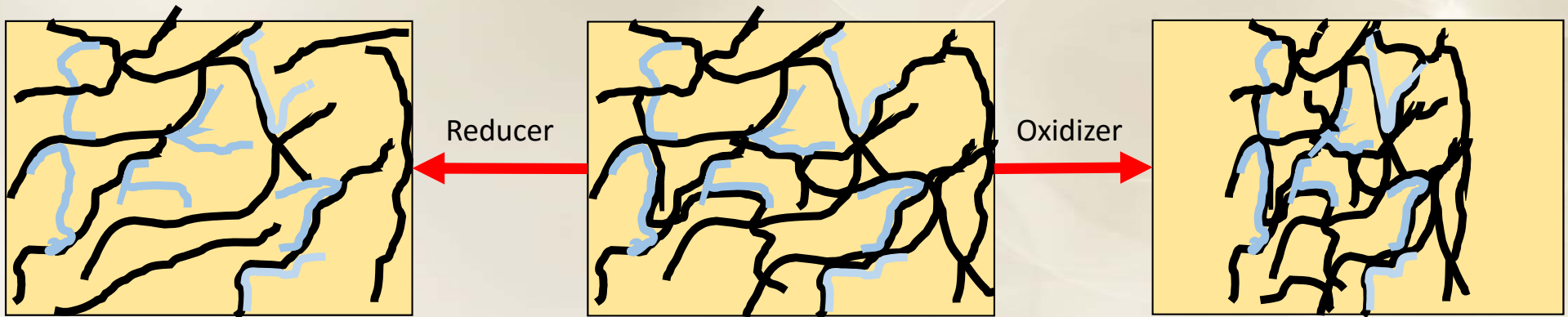
Structure / Function *Modification of Gluten Network*



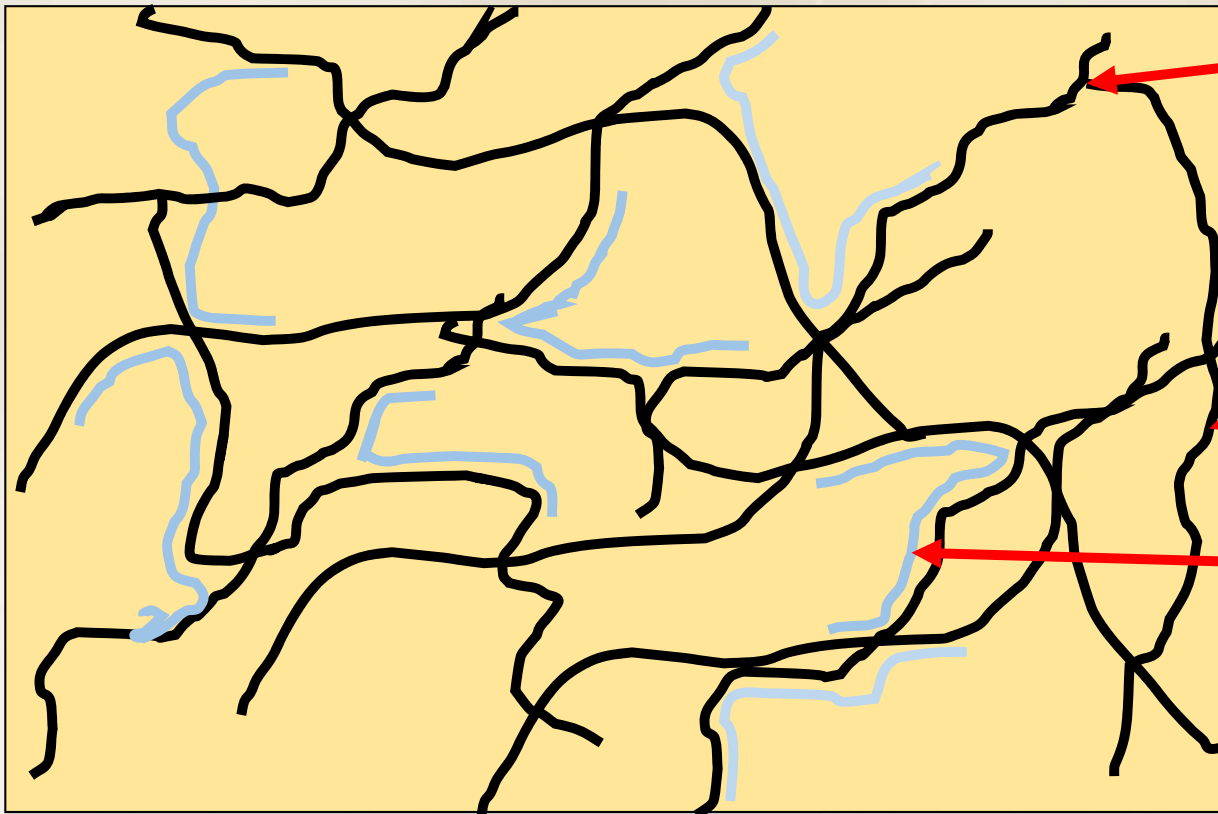
Gluten

Hemi-cellulose
(Arabino Xylans)

Structure / Function *Modification of Gluten Network*



Structure / Function *Clean label modification of Gluten Network*



GLUCOSE OXIDASES *create these connections*

PROTEINASES *chop up gluten*

XYLANASES *chop up Arabino xylans*

Case Study: Improving consistency with Accent 5450 (1) (2)

Clean Label Sub Roll

BEFORE



AFTER

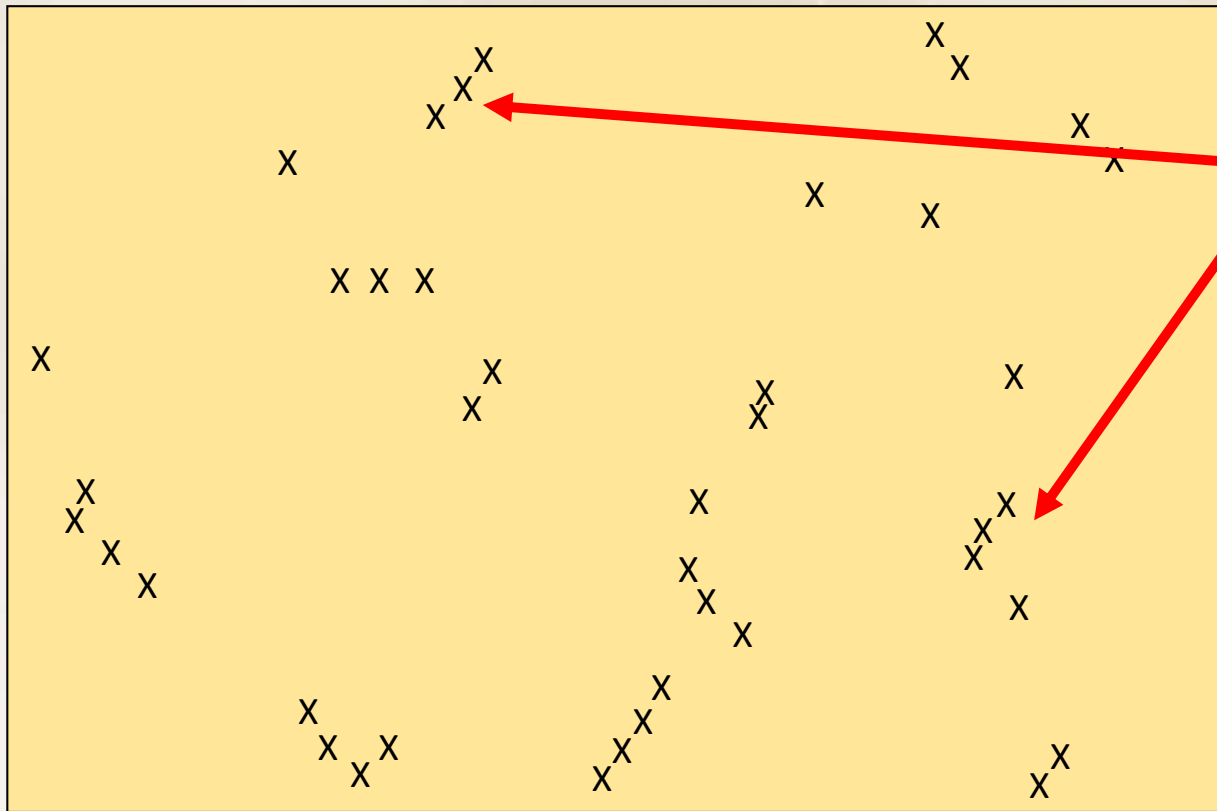


Starch structure modification

- SSL – retards retrogradation
- Mono-Glycerides – retards retrogradation
- DATEM – retards retrogradation

Starch Based Micro-Structure

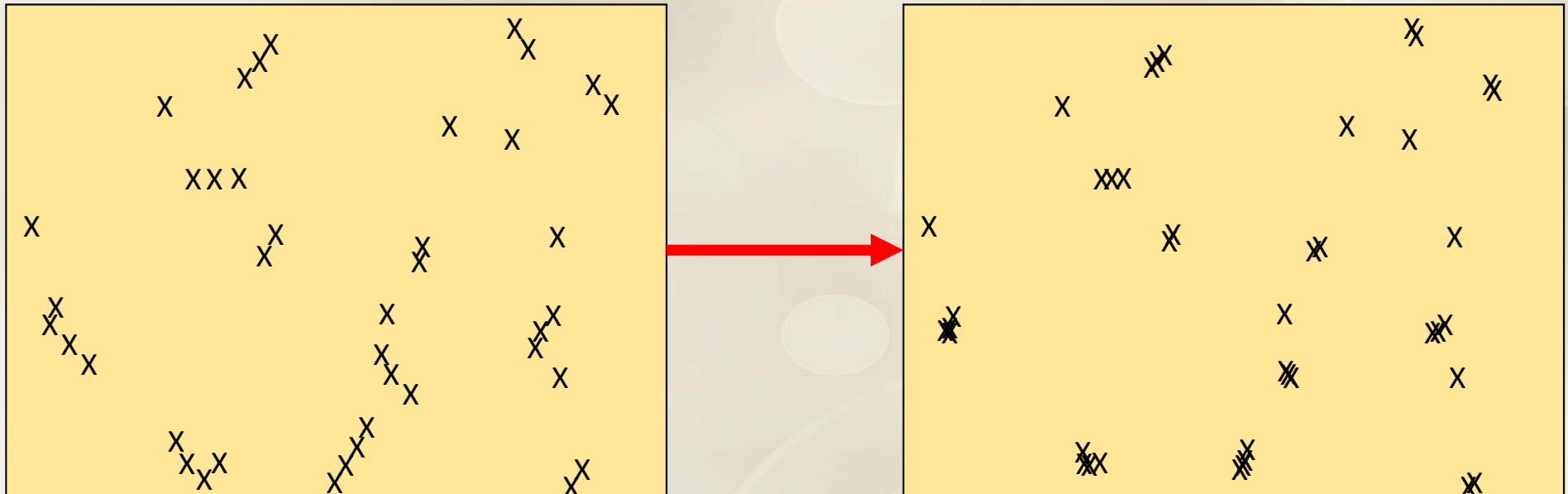
Starch Network



Starches composed of amylose and amylo-pectin; contribute to structure

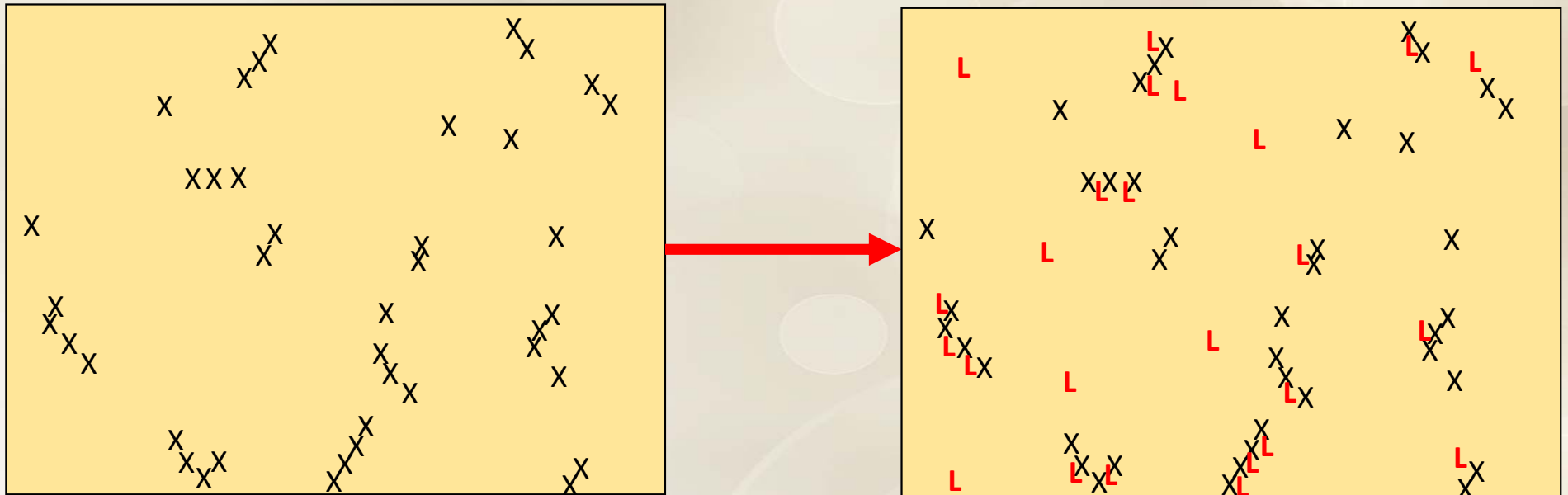
Structure / Function

Starch retrogradation contributes to staling



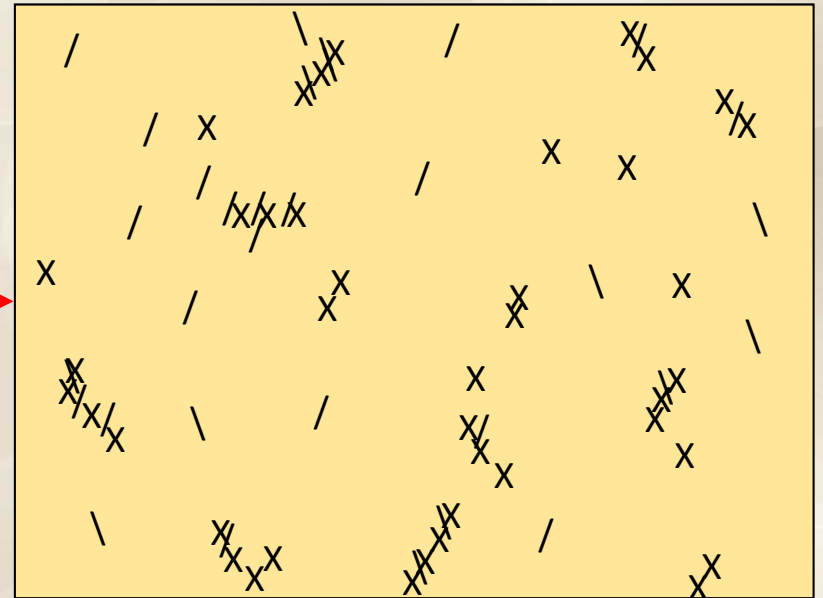
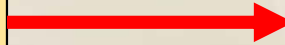
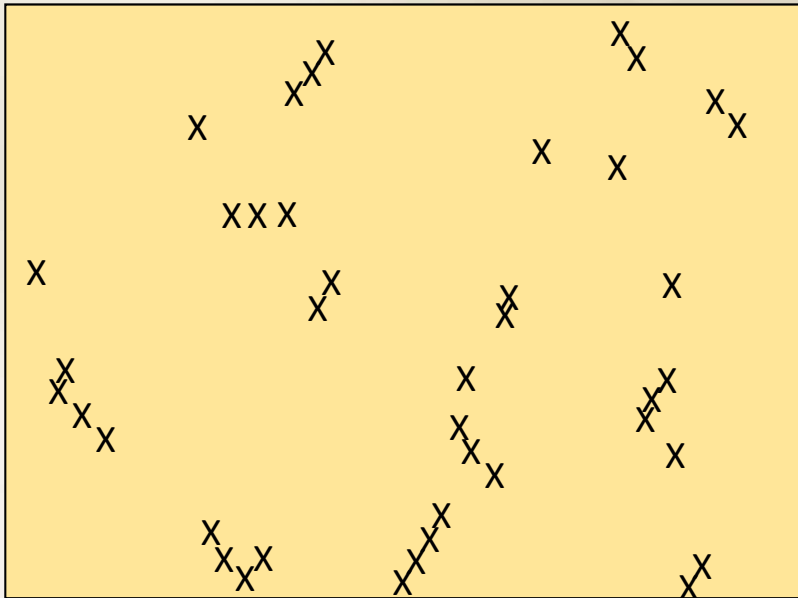
Structure / Function

Emulsifiers interfere with retrogradation

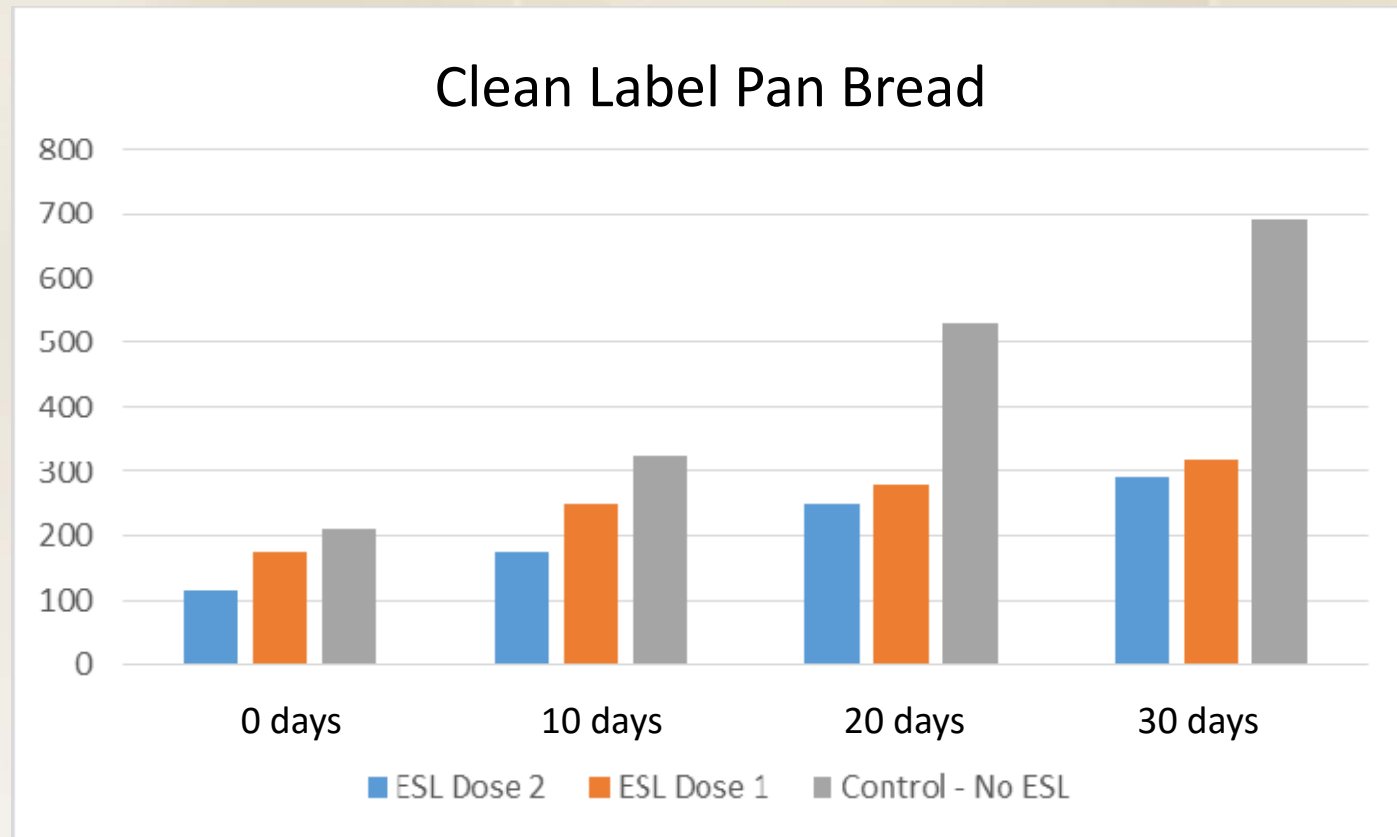


Structure / Function

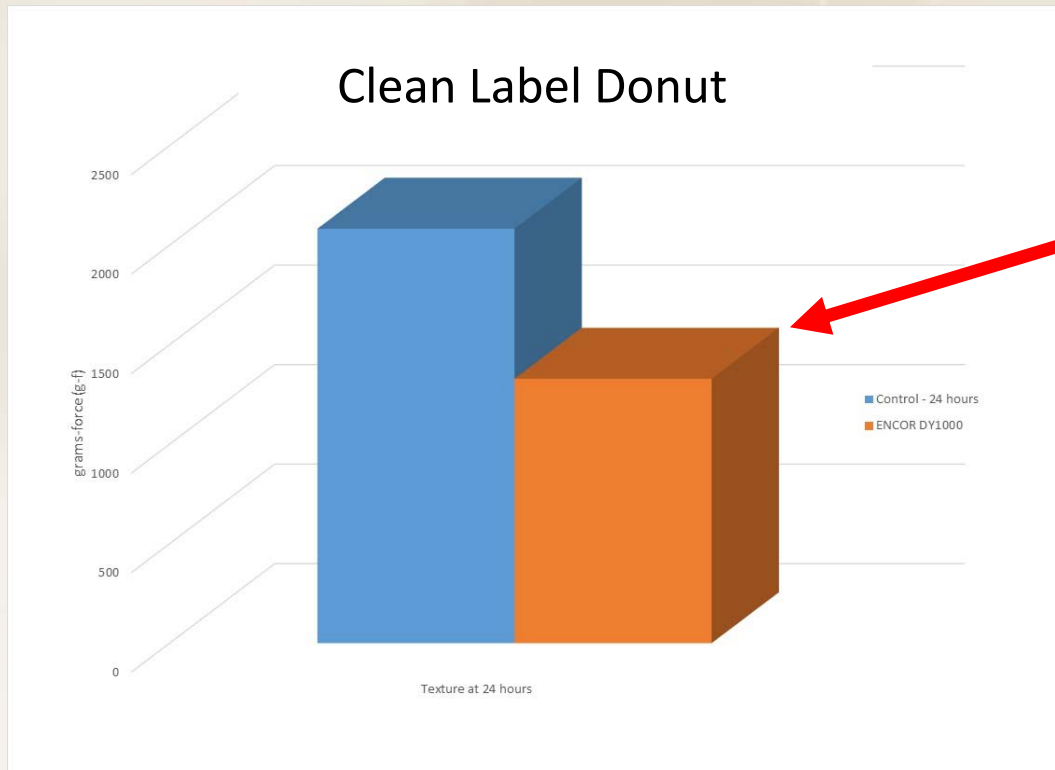
Clean label Amylase enzymes create starch fragments that interfere with retrogradation



CASE STUDY: Improving Shelf Life with Encore 6200



Case Study: Improving shelf-life with Encore DY1000



~36% softer after 24 hour at ambient conditions.



Traditional Bakery Ingredients *Segments of Functionality*

- In each area of functionality – gluten structure, starch structure, and droplet stabilization,
- Enzymes generate the same functional effect, although by different structural mechanisms
- And thus, can replace traditional (non-clean label) ingredients
- ACCENT and ENCORE products are built around this technology

Clean Label Formulation Process

Define Basic Formula Requirements & Key Product Attributes



Characterize Process – time, temperature, shear, wait



Design Prototype System – enzyme, starch, sugars, etc



Perform Initial Lab Evaluation in Application



Optimize Ingredient System – enzyme type & level, starch type & level, etc.



Validate Application in Lab



Scale-Up Validation



Optimize Final System



Delavau Bakery R&D Center, Piscataway, NJ

- New, state-of-art, 15,000 sq. ft. **Food Innovation Center** fully equipped to provide applications, technical service, product development and analytical testing





Delavau Food Partners

What we do & How we work

- Off-the shelf products – ACCENT & ENCORE clean label dough conditioners
- Problem solving
 - Clean label formulating
 - ACCENT
 - ENCORE
 - ESL formulating
 - HARMONY
 - Cost optimization
 - ACCENT
 - Nutrition / fortification
 - Calcium fortification
 - Sodium reduction
- Customized products that are optimized for your process