

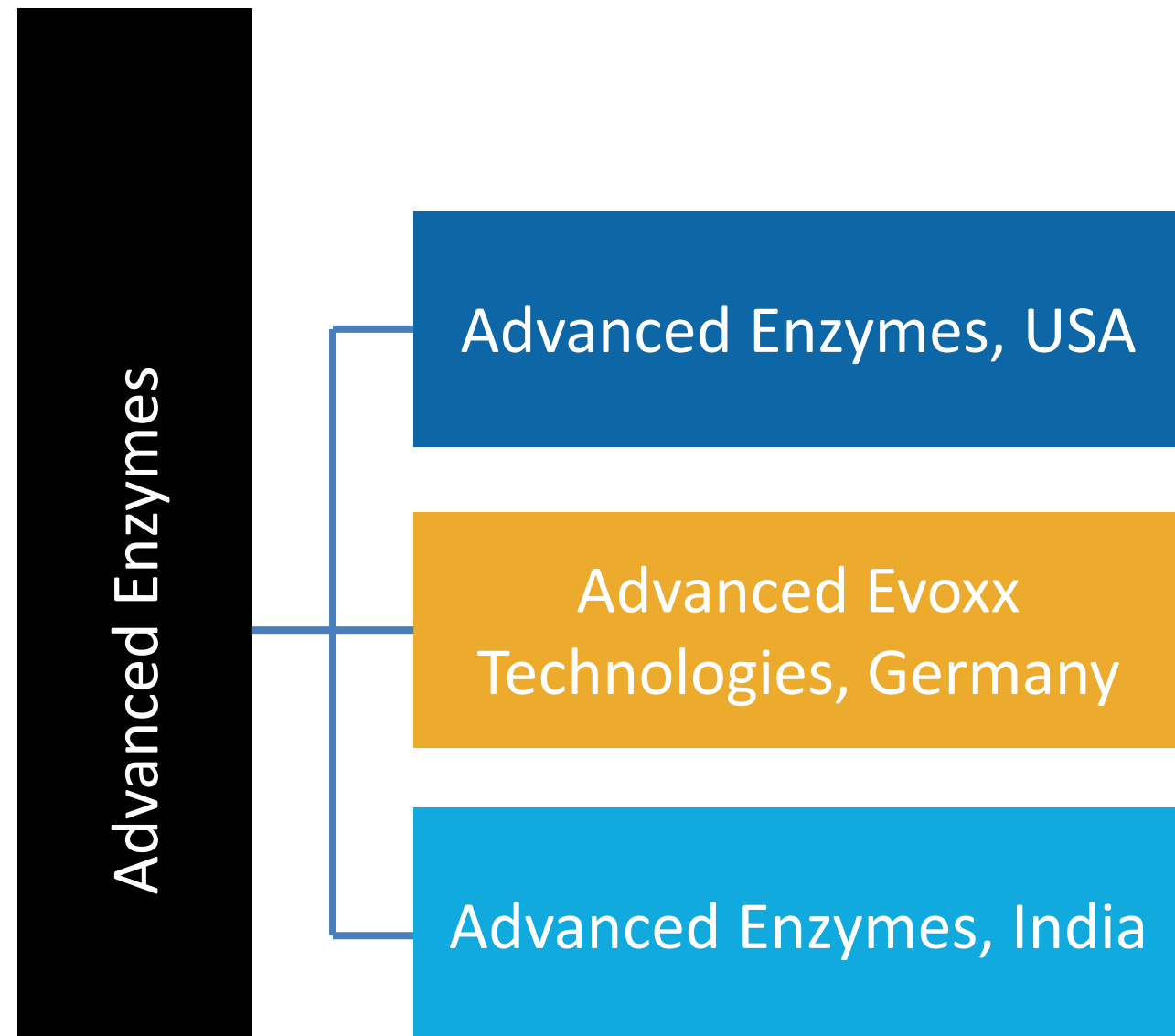


“Latest Developments in Enzymes for Tortillas”

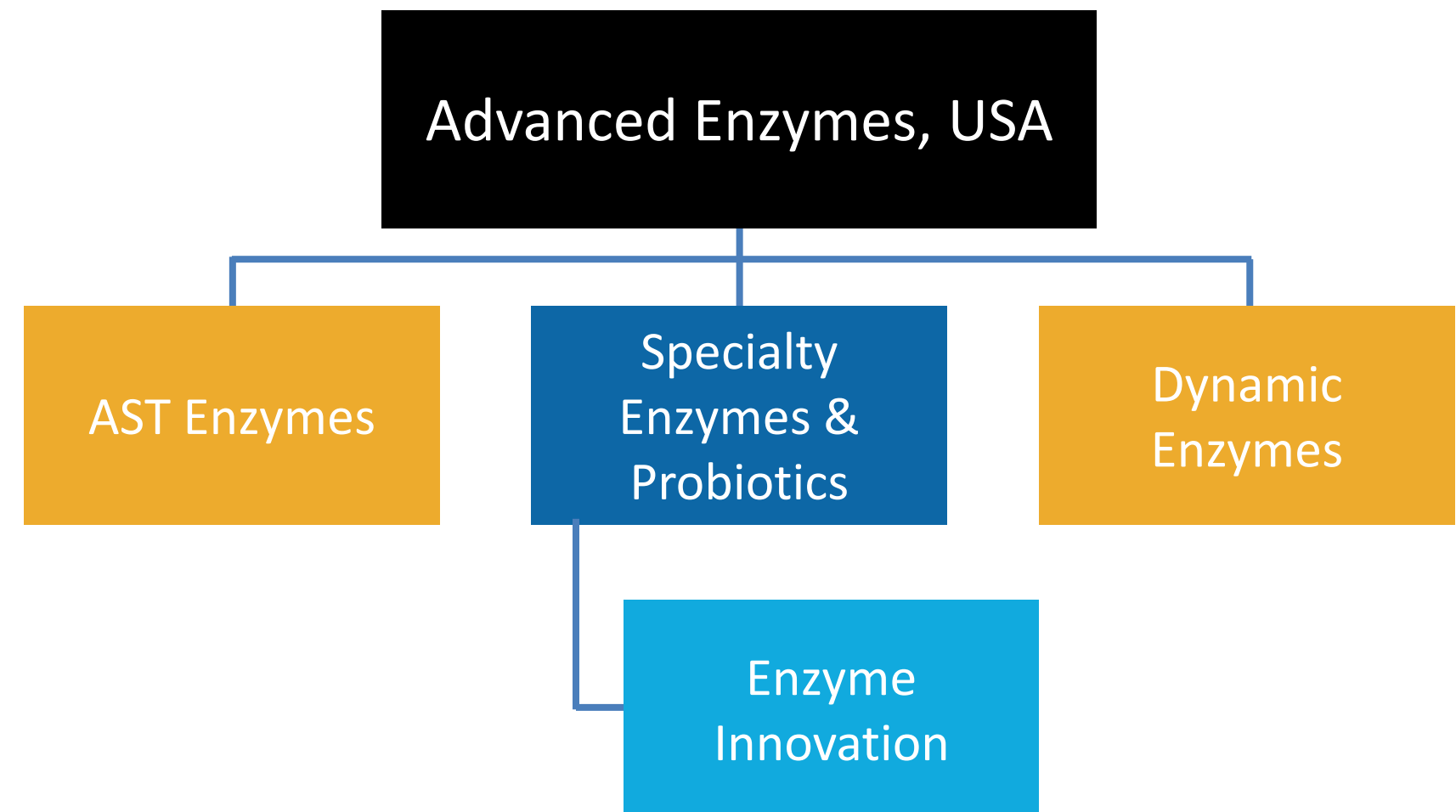
Prepared by: Sophia Leung, Malissa Keo, Dipak Roda



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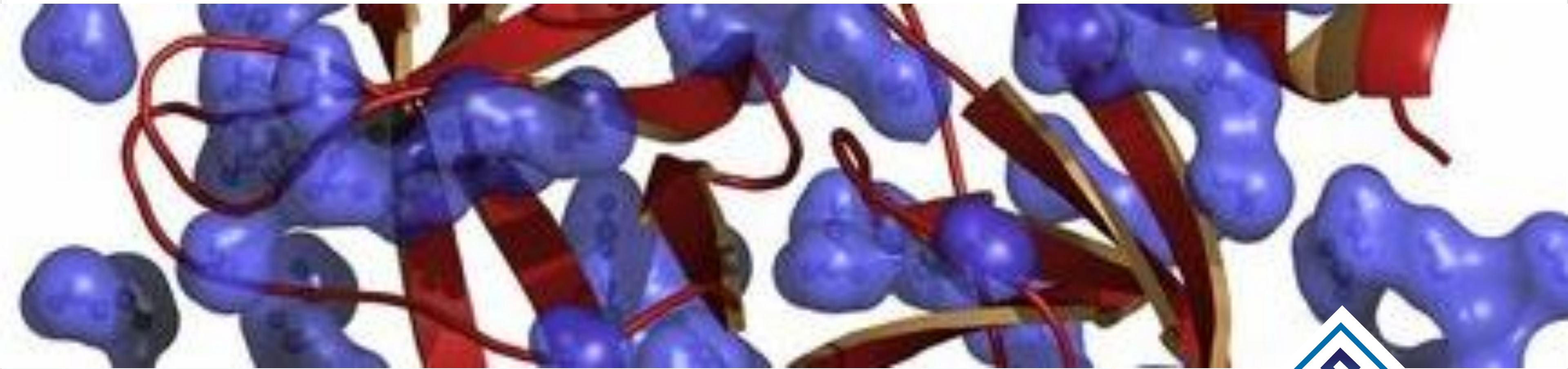
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- ◆ From Top 10 Global Enzymes & Probiotics Producers
- ◆ 60+ Years of Manufacturing Experience
- ◆ Line of 69+ Individual Enzymes & 15+ Probiotics
- ◆ Shelf-Stable, Thermo-Stable Probiotics
- ◆ 400+ Solutions to Improve Processes, Save Time & Reduce Costs
- ◆ Non-GMO, Organic & Gluten-Free Products Available



What are Enzymes?

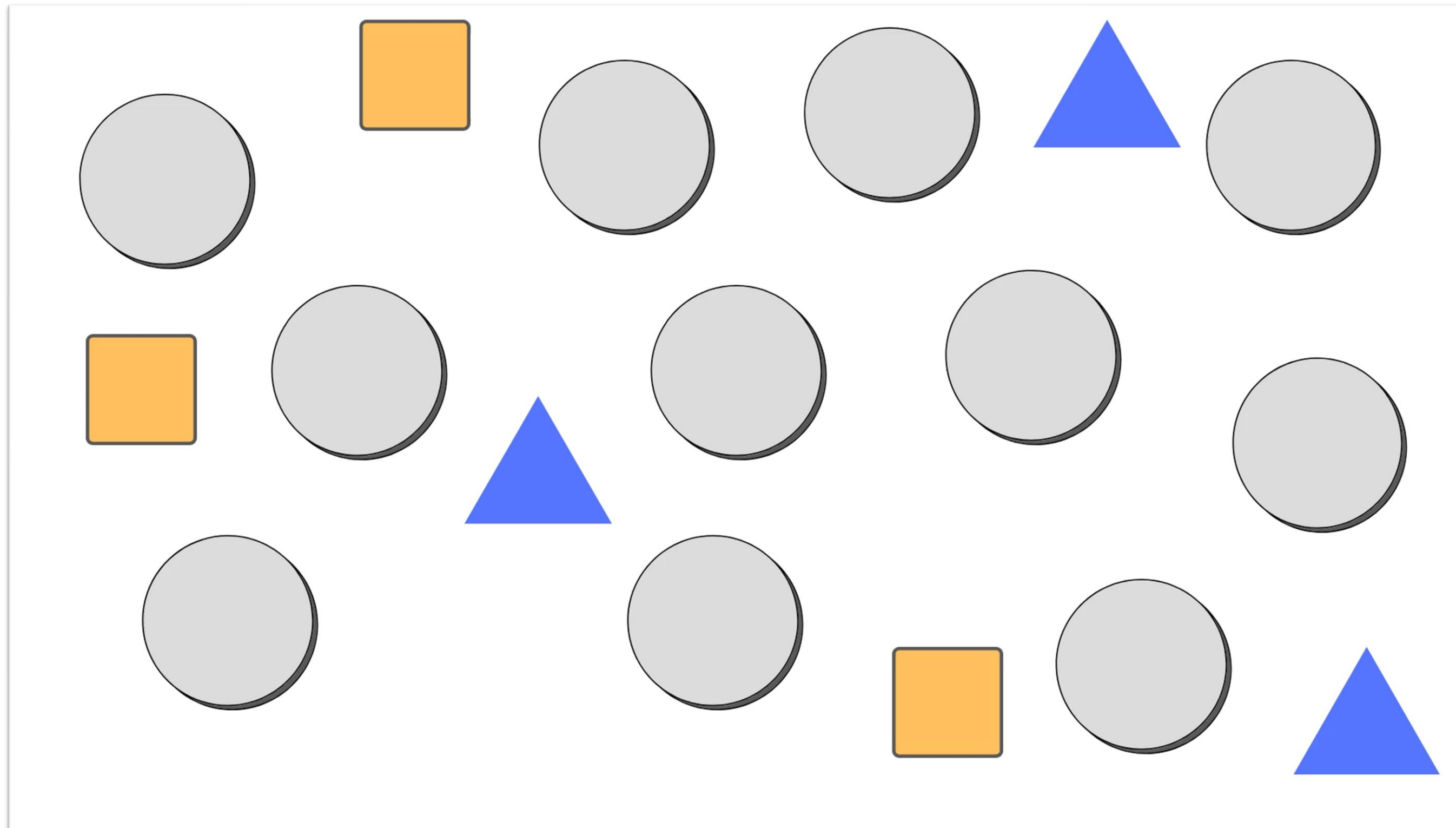
- ◆ Proteins
- ◆ Bio-Catalysts
- ◆ Eco-Friendly
- ◆ Biodegradable
- ◆ Specific
- ◆ “En Zyme” Greek word



Nomenclature of Enzymes

- ◆ Early days - arbitrary
- ◆ Nomenclature by E.C. in 1961
- ◆ Characterized by suffix “Äse”
- ◆ Named after the substrate on which enzyme is acting
- ◆ Grouping based on type of reaction being catalyzed

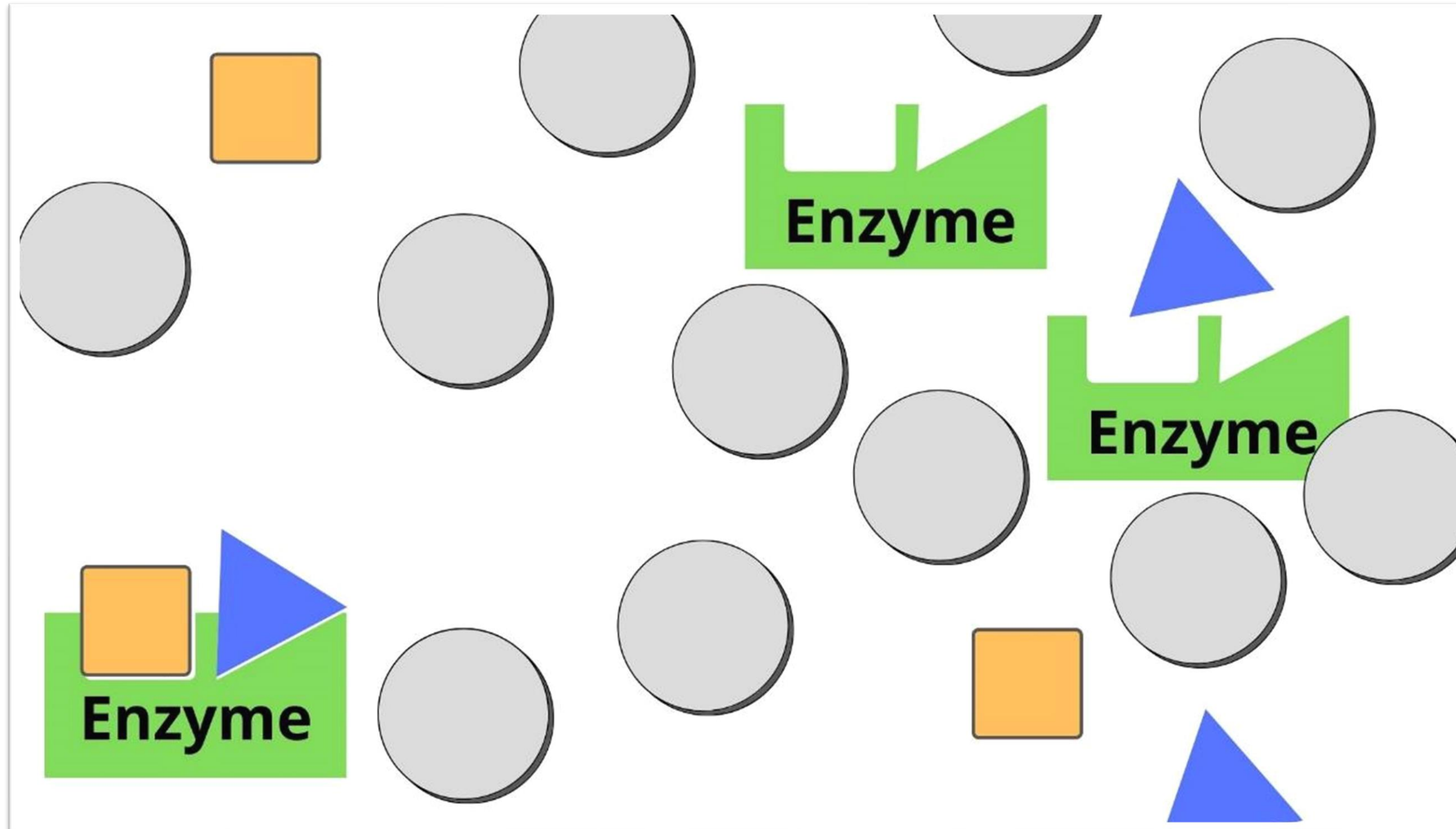
Reaction without Enzyme



Reaction rate may be very slow



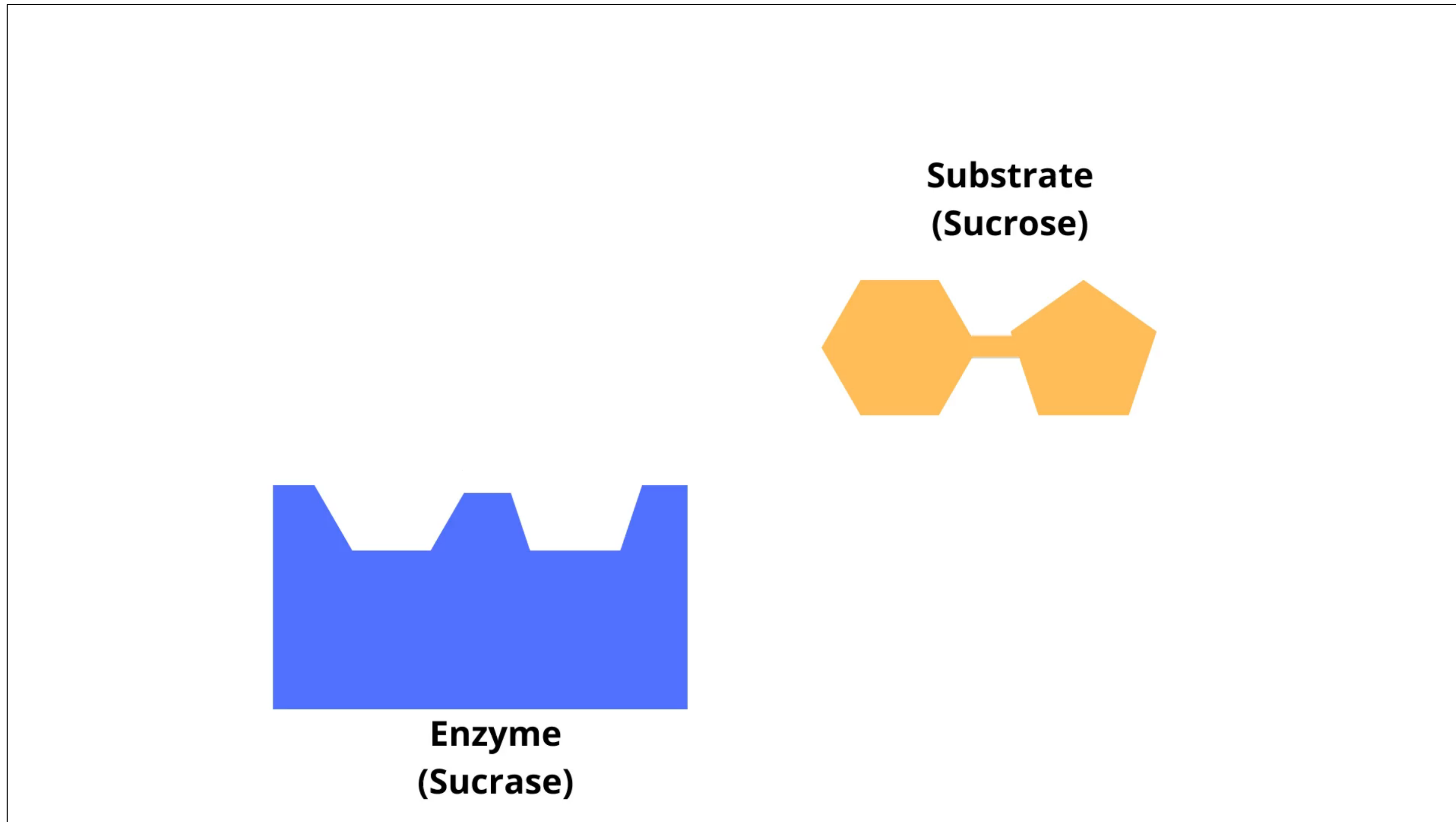
Reaction with Enzyme



Enzymes speed up reactions



Mode of Action



Factors - Enzymes

- ◆ Time
- ◆ Temperature
- ◆ pH
- ◆ Source
- ◆ Solutes – i.e., salt, sugar, calcium
- ◆ Cofactors
- ◆ Substrate Concentration
- ◆ Enzyme Concentration

Baking & Milling Solutions

Products	Generic Enzymes	Benefits
SEBake Fresh Ultra	New Gen Maltogenic Amylase	Prolonged Softness, Extend Shelf Life
SEBake Fresh 1.5P SEBake Fresh 10P	Maltogenic Amylase	Prolonged Softness, Extend Shelf Life
SEBake Fresh	Multienzyme Blend	Prolonged Softness, Extend Shelf Life
SEBake FX Ultra	Hemicellulase / Xylanase	Smooth Dough Handling, Increase Volume Flour Correction
SEBake PF	Phospholipase	Emulsifier Replacement, Improve Whiteness
SEBAmyl X100P SEBAmyl X5P	Fungal Amylase	Increase Volume, Softness
SEBake L80	Lipase	Dough Strengthening, Improve Machinability, Increase Volume

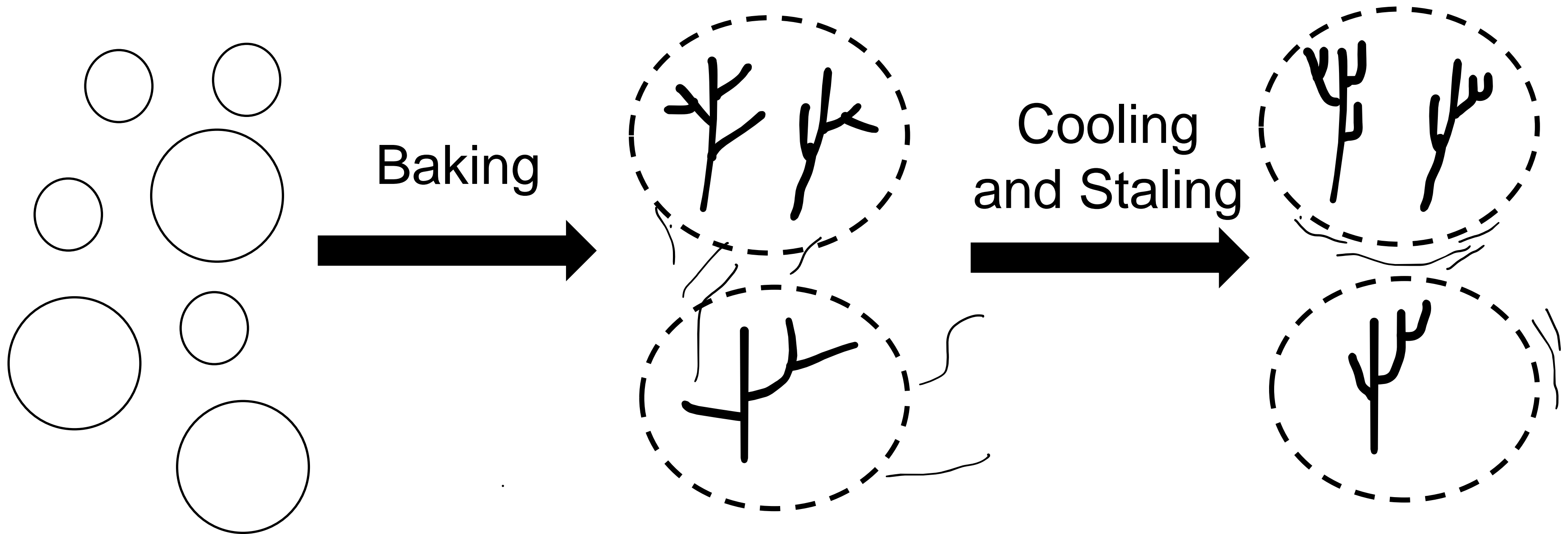


Baking & Milling Solutions

Products	Generic Enzymes	Benefits
SEBake GO Eco	Glucose oxidase	Increase Dough Strength & Flour Stability Replacement for Potassium Bromate
SEBake GA 400	Glucoamylase	Replace Sugars Increase Volume
SEBake CLX	Cellulase	Increase Volume in High Fibre Bread / Rye Bread
SEBake NP	Protease	Increase Dough Extensibility (reduce P/L) Gluten Correction in Sweet Biscuits
SEBake Crisp Plus	Protease & Xylanase	Gluten Correction / Batter Viscosity Reduction
SEBake PP	Papain	Gluten Correction in Fermented Biscuits, Cookies
SEBake EG6	Phospholipase	Egg Reduction in Cakes

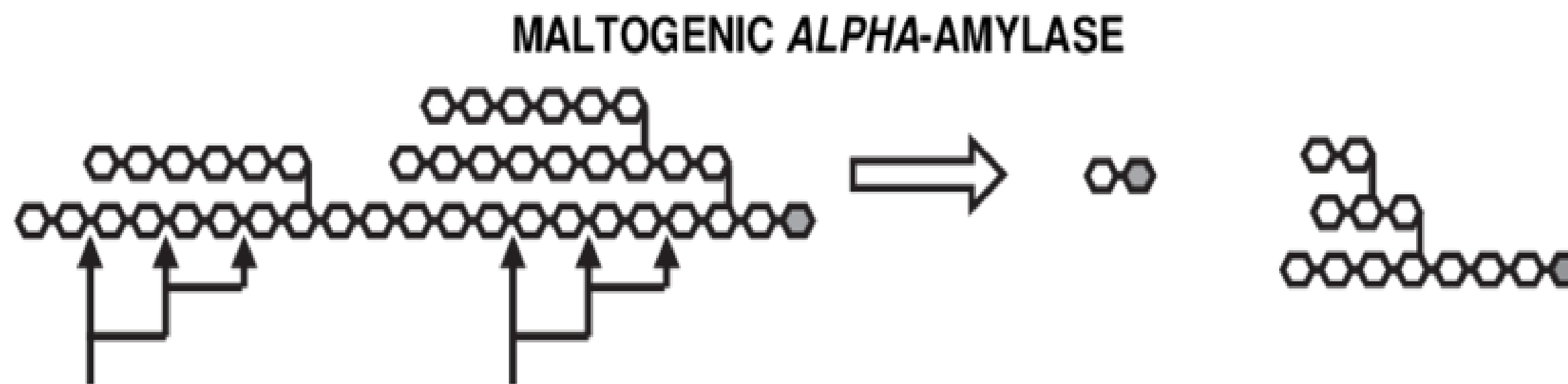


Understanding Staling



Maltogenic Amylase

- **Benefits**
 - Extends shelf life by delaying staling
 - Prolongs softness and maintains elasticity/ resilience
 - Helps produce softer, superior quality baked goods
- **Function** - Hydrolyzes maltotriose to maltose and glucose
- **EI Products** - SEBake Fresh Ultra, SEBake Fresh 10P, SEBake Fresh 1.5P



Maltogenic Amylase - SEBake Fresh Ultra

Product	Effect
Corn Tortillas	Extended softness, rollability, and foldability for 35 days
Flour Tortillas	Extended softness, rollability, and foldability for 42 days
Sandwich Bread	Prolonged softness, springiness, and foldability by 30 days
Gluten Free Bread	Prolonged springiness and softness by 7 days
Conchas	Extended softness by 12 days





CORN TORTILLAS - DAY 35

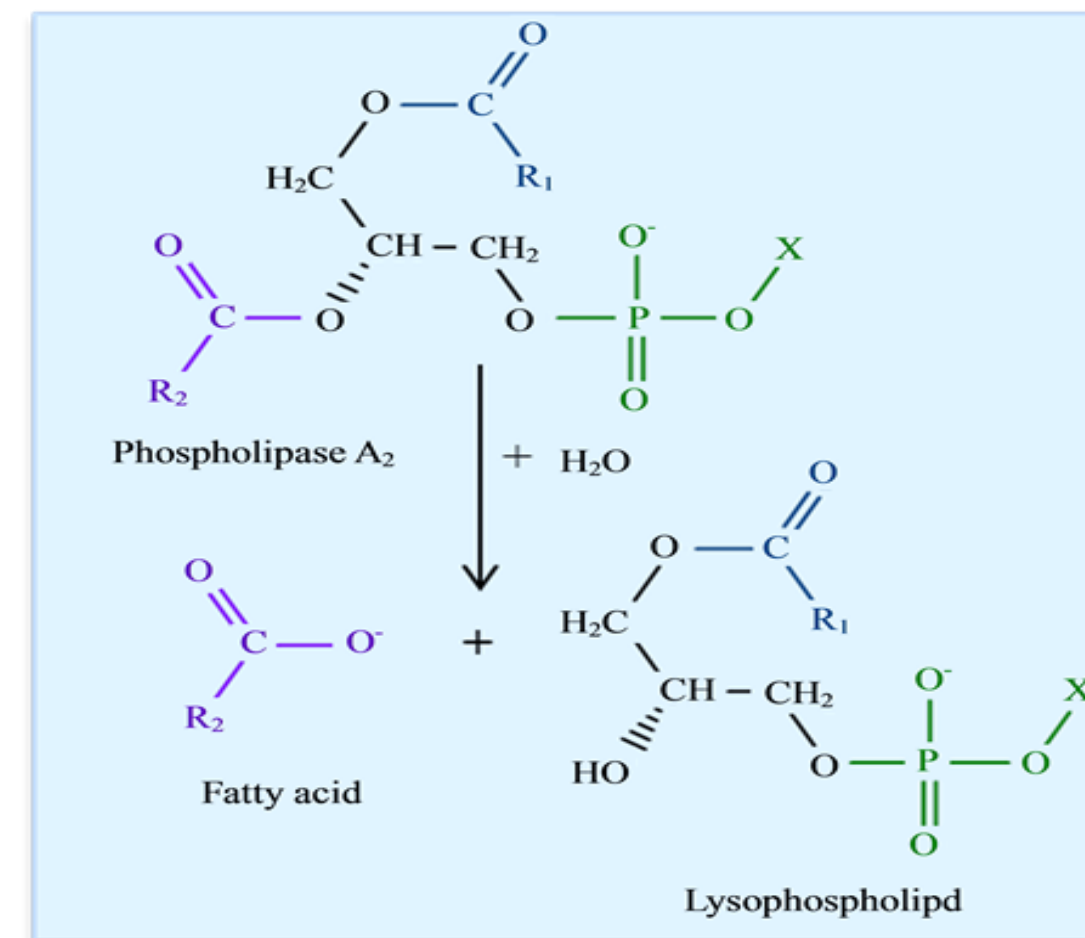
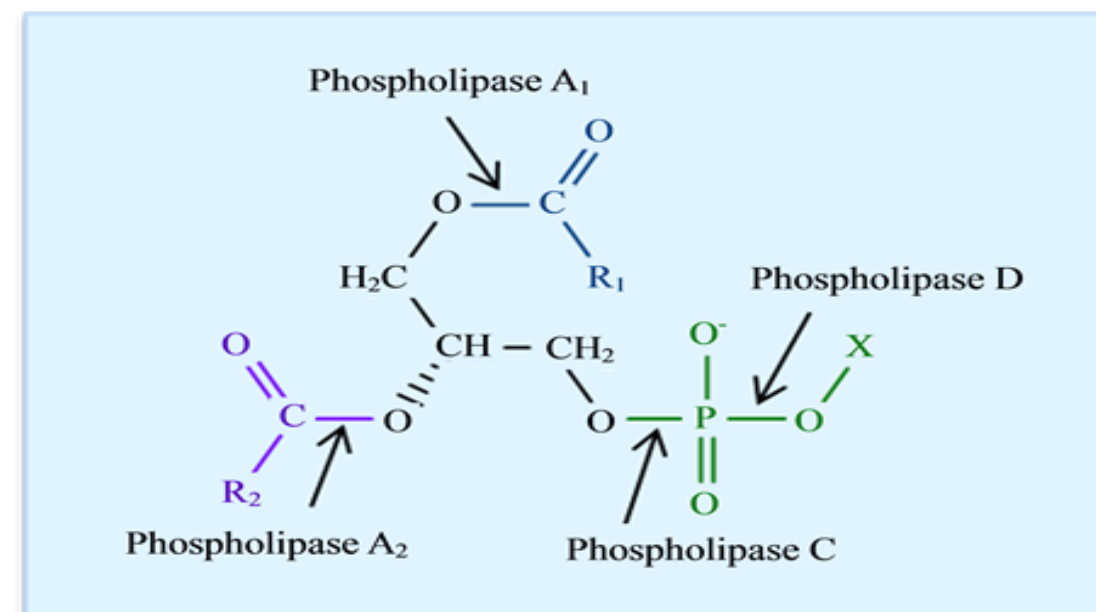
MADE WITH SEBAKE FRESH ULTRA

MADE WITH NO ENZYMES



Phospholipase

- **Benefits**
 - Whiter & finer crumb structure, increase volume
 - Replaces emulsifiers like DATEM, SSL
 - Can prolong softness in tortillas
 - Egg reduction
- **Function** - Hydrolyzes natural phospholipids to lyso-phospholipids
- **Examples** - SEBake PF, SEBake EG6



Corn Tortillas

SEBake Fresh Ultra + SEBake PF

Control

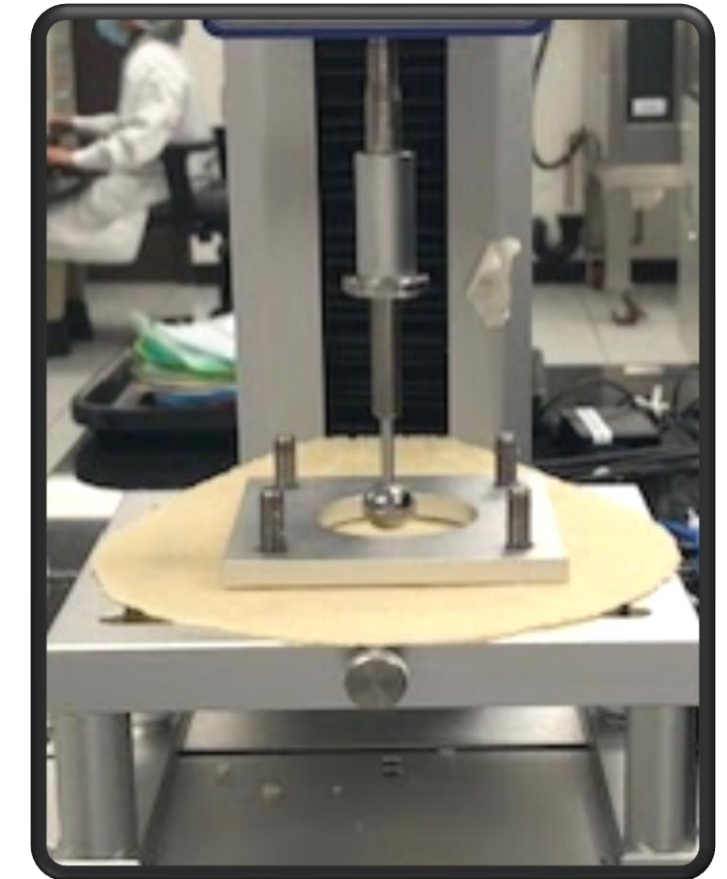
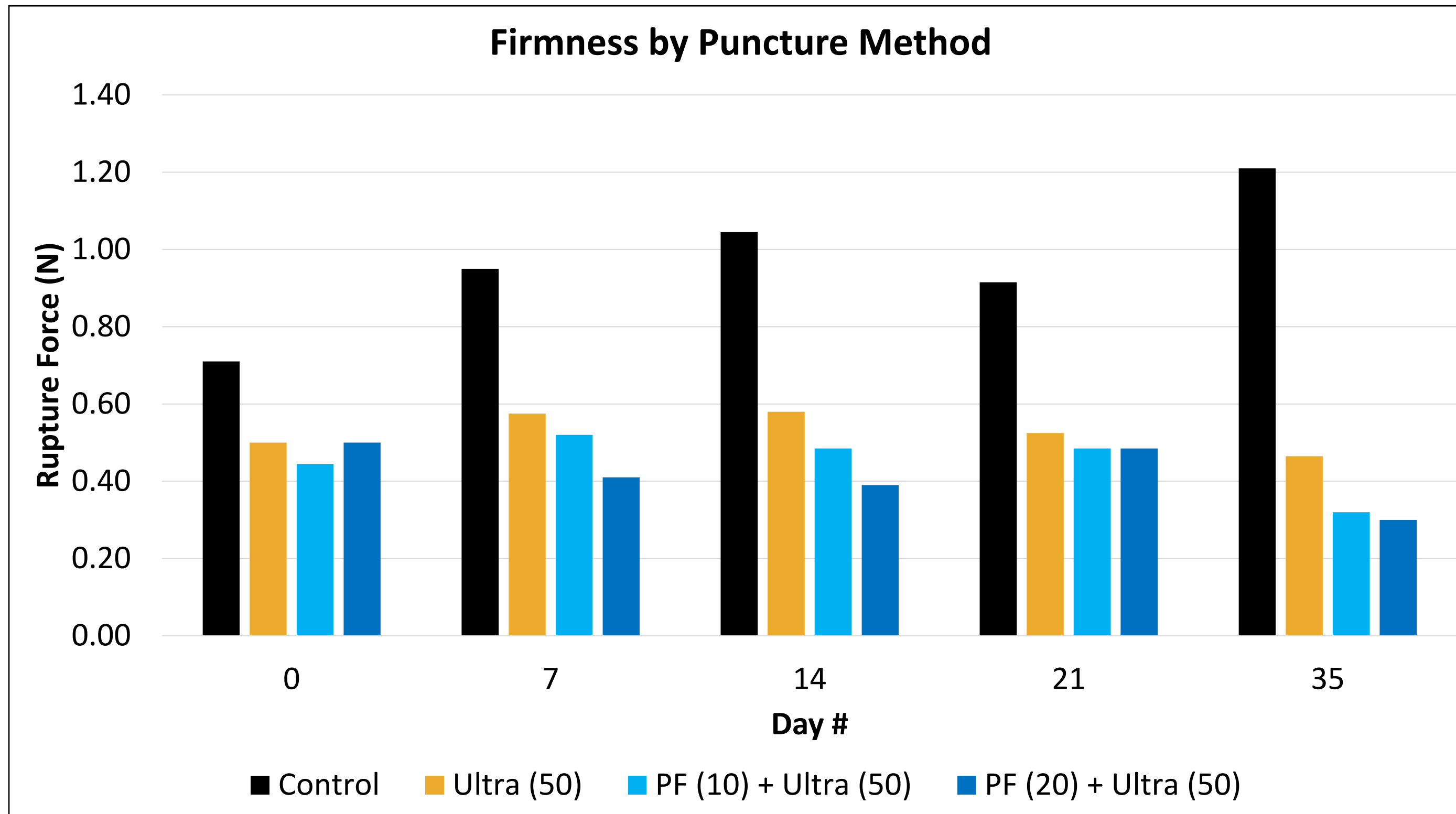
SEBake Fresh Ultra (50)

**SEBake Fresh Ultra (50) +
SEBake PF (10)**

**SEBake Fresh Ultra (50) +
SEBake PF (20)**



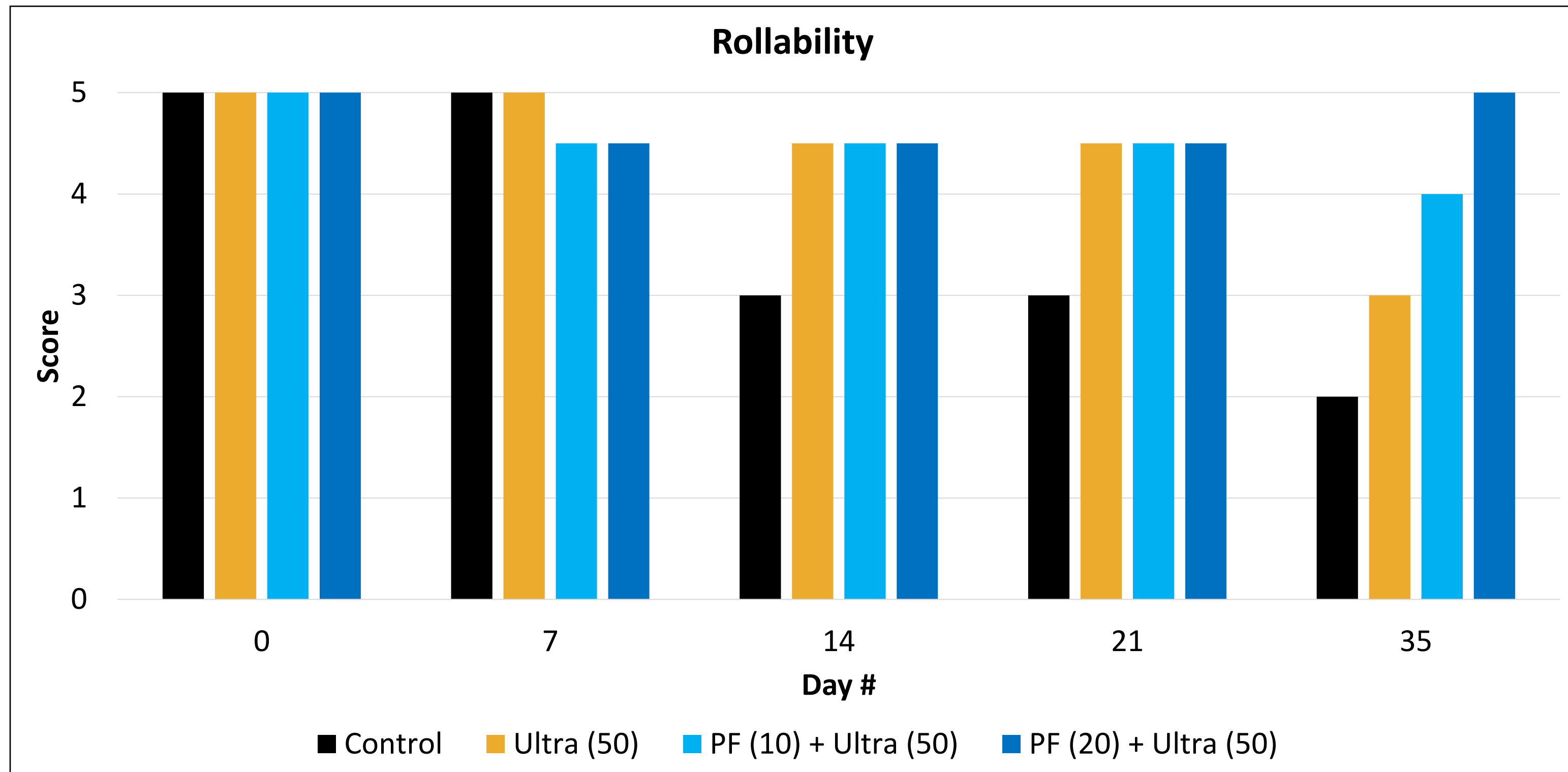
Corn Tortillas – Firmness



Tortillas with SEBake Fresh Ultra and SEBake PF were 61-75% softer than control on Day 35



Corn Tortillas - Rollability



Tortillas with SEBake Fresh Ultra rolled better than control on Day 35



High Amylose Flour and Enzymes



Control

**50% HealthSense
Flour**

**50% HealthSense Flour +
100ppm SEBake Fresh Ultra**

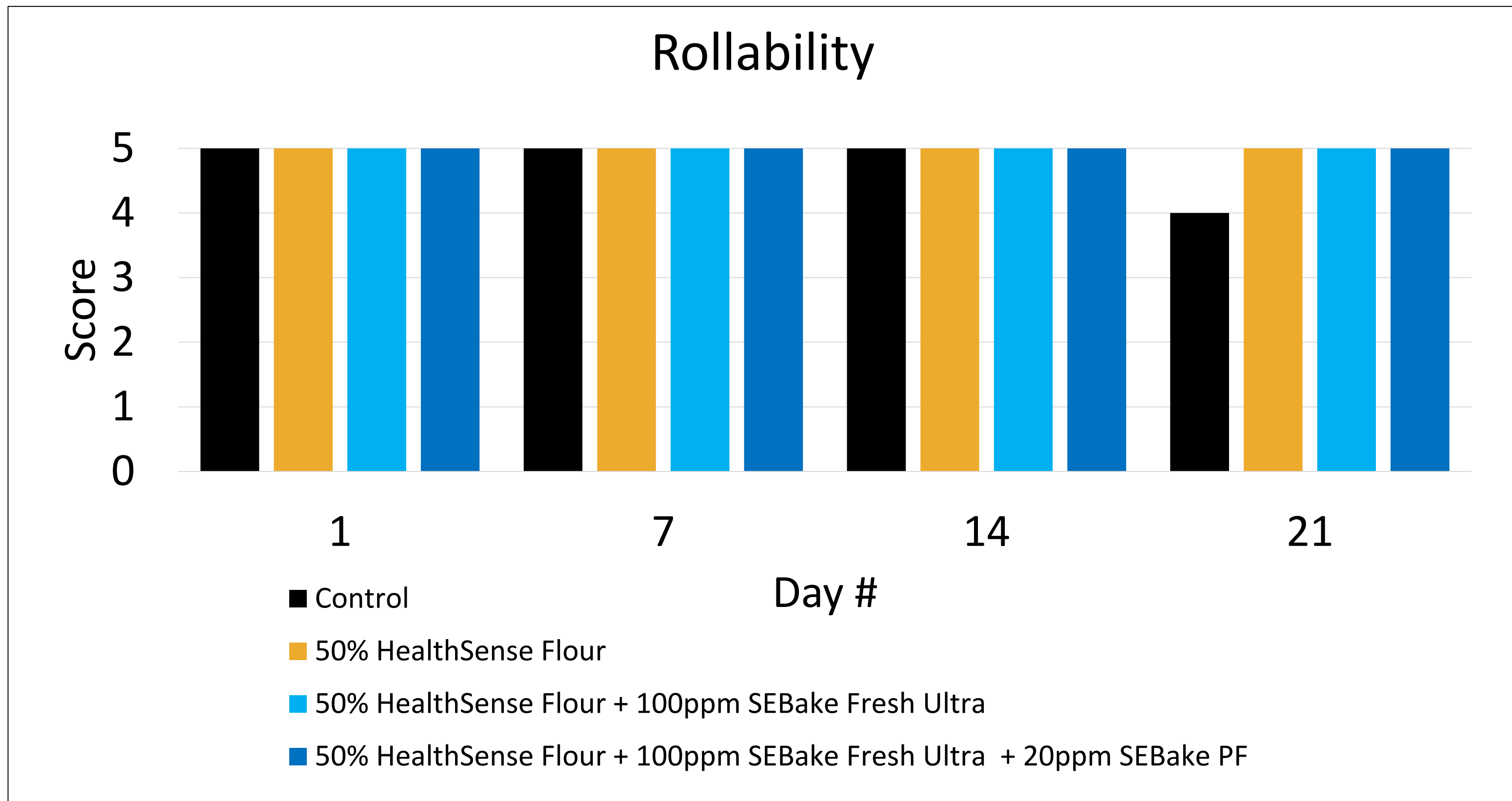
**50% HealthSense Flour +
100ppm SEBake Fresh Ultra +
20ppm SEBake PF**



***HealthSense Flour – contains 32% fiber**



High Amylose Flour and Enzymes



The test tortillas rated better in rollability than the control tortillas on Day 21



High Amylose Flour and Enzymes

Rollability – Day 24



Control



50% HealthSense Flour



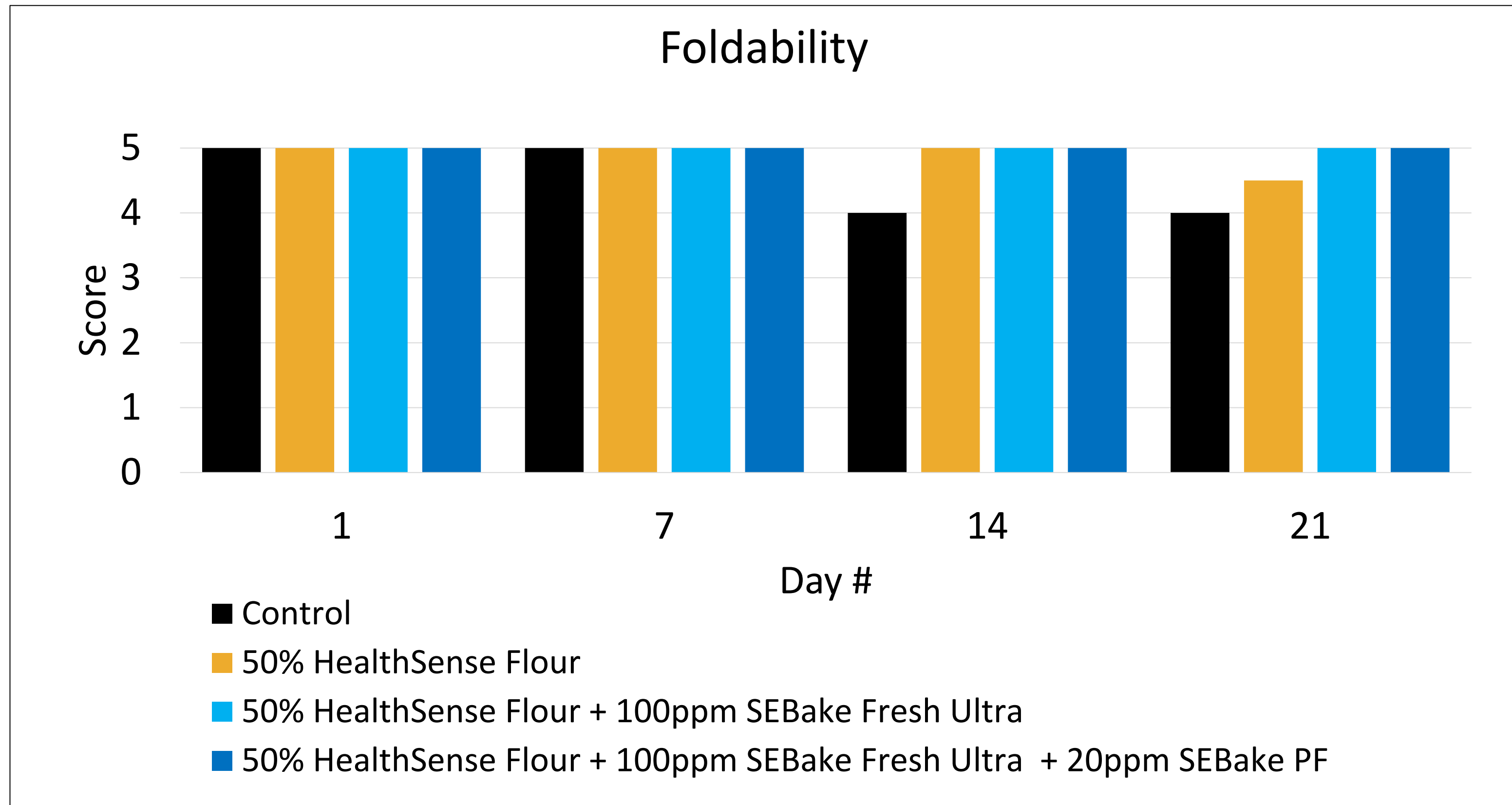
*50% HealthSense Flour +
100ppm SEBake Fresh Ultra*



*50% HealthSense Flour +
100ppm SEBake Fresh Ultra +
20ppm SEBake PF*



High Amylose Flour and Enzymes



The test tortillas rated better in foldability than the control tortillas on Day 21



High Amylose Flour and Enzymes

Foldability – Day 24



Control



50% HealthSense Flour



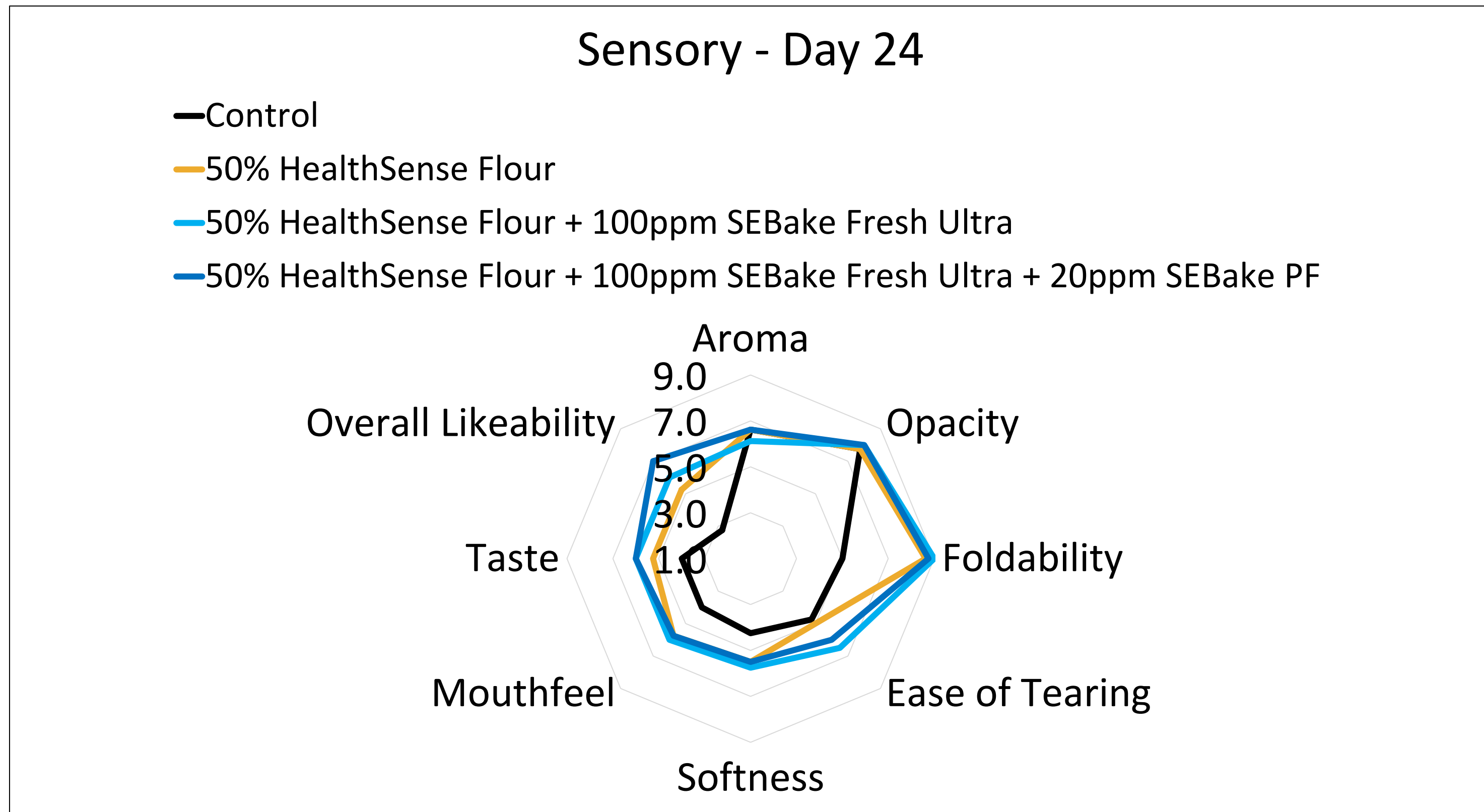
***50% HealthSense Flour +
100ppm SEBake Fresh Ultra***



***50% HealthSense Flour +
100ppm SEBake Fresh Ultra +
20ppm SEBake PF***



High Amylose Flour and Enzymes



Test tortillas performed better in mouthfeel, ease of tearing, foldability, taste, and overall likeability than the Control



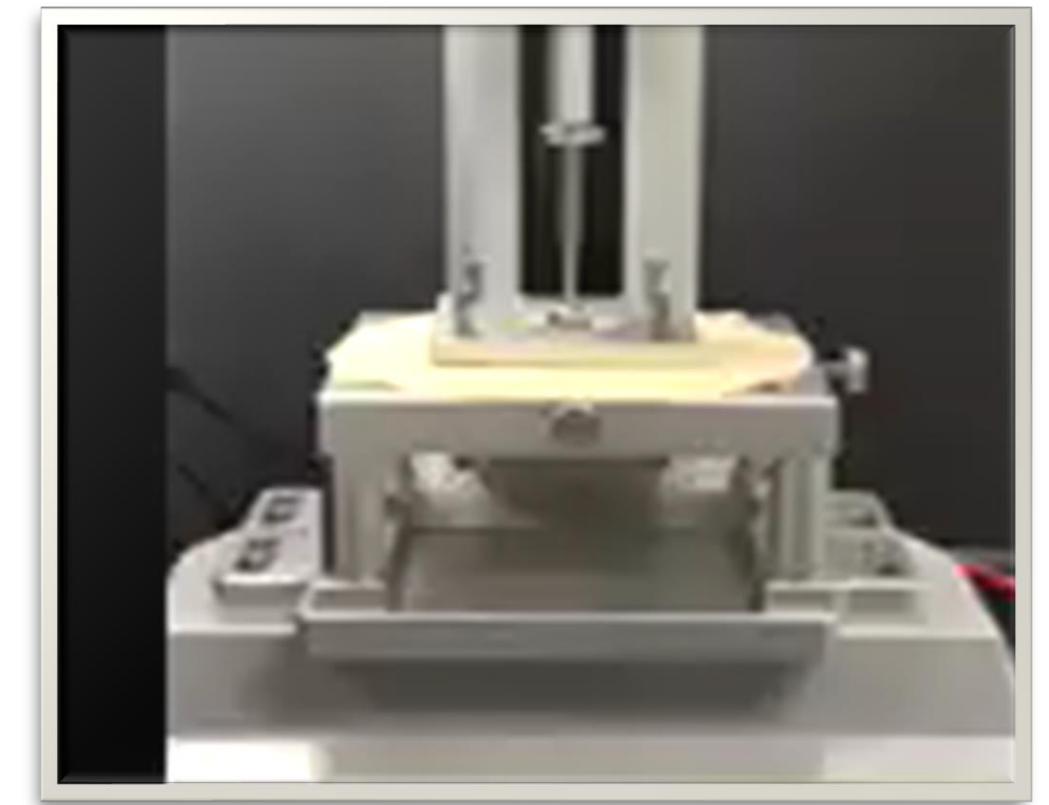
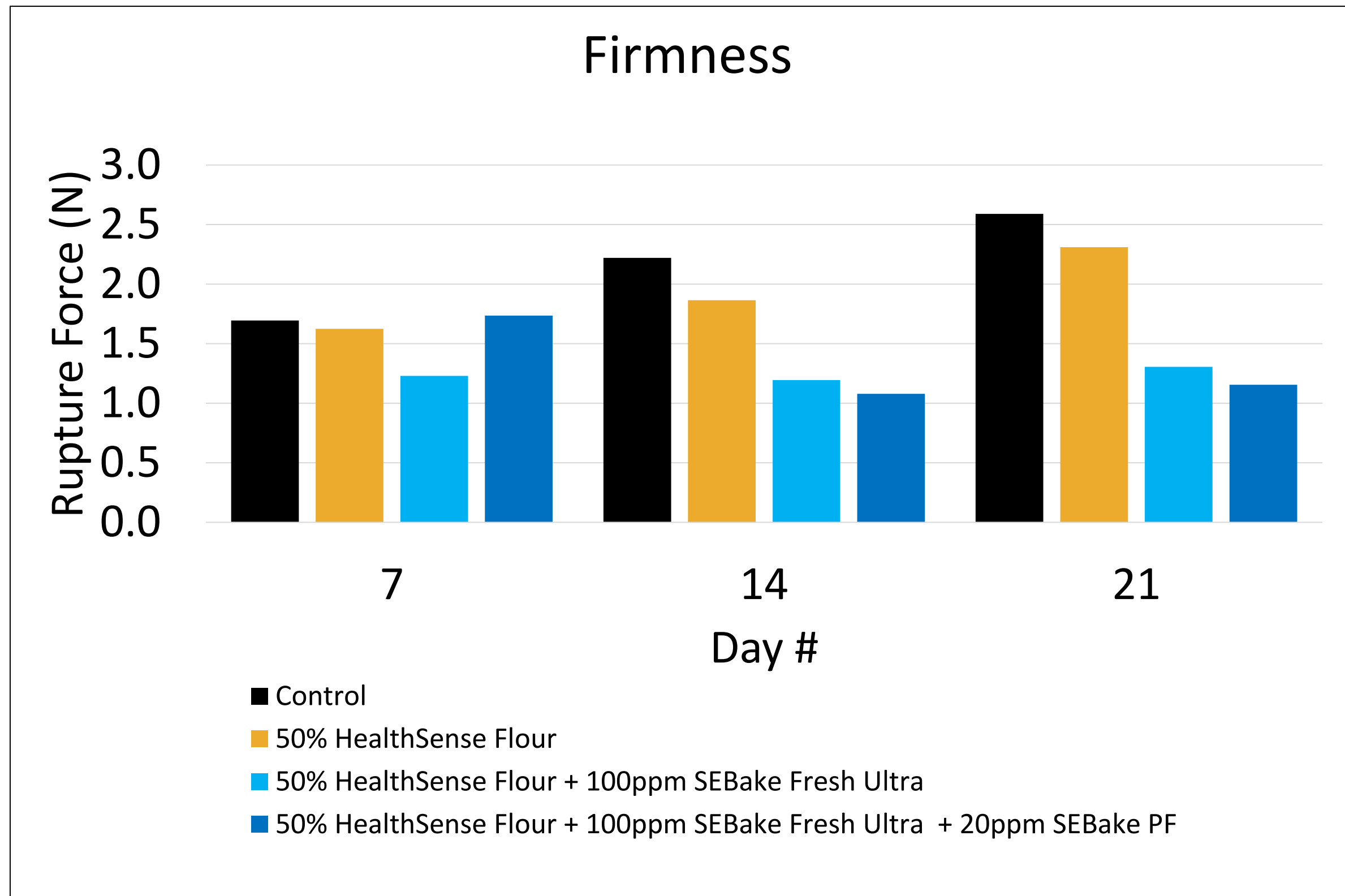
High Amylose Flour and Enzymes

Attribute	Control	50% HealthSense Flour	50% HealthSense Flour + 100ppm SEBake Fresh Ultra	50% HealthSense Flour + 100ppm SEBake Fresh Ultra 20ppm SEBake PF
Aroma	6.6	6.6	6.1	6.6
Opacity	7.8	7.8	8.0	8.0
Foldability	5.0	8.6	9.0	8.8
Ease of Tearing	4.8	5.0	6.5	6.0
Softness	4.3	5.5	5.8	5.5
Mouthfeel	4.0	5.8	6.0	5.8
Taste	4.0	5.3	6.0	6.0
Overall Likeability	2.8	5.3	6.0	7.0

HealthSense Flour, SEBake Fresh Ultra, and SEBake PF improved the overall likeability of the tortillas



High Amylose Flour and Enzymes



Tortillas with 50% HealthSense Flour with SEBake Fresh Ultra and SEBake Fresh Ultra + SEBake PF were 49-55% softer than control tortillas on Day 21



Summary

- ◆ SEBake Fresh Ultra, and SEBake PF can be used to extend the shelf life of tortillas by prolonging softness, rollability, and foldability of tortillas
- ◆ Combination of HealthSense Flour (High Amylose Flour), SEBake Fresh Ultra, and SEBake PF extended the softness and flexibility of flour tortillas



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