



ENZYMES in TORTILLAS and FLAT BREADS

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Novozymes North America, Franklinton, NC

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Agenda

Introduction to Enzymes

Enzymes in FLOUR tortillas

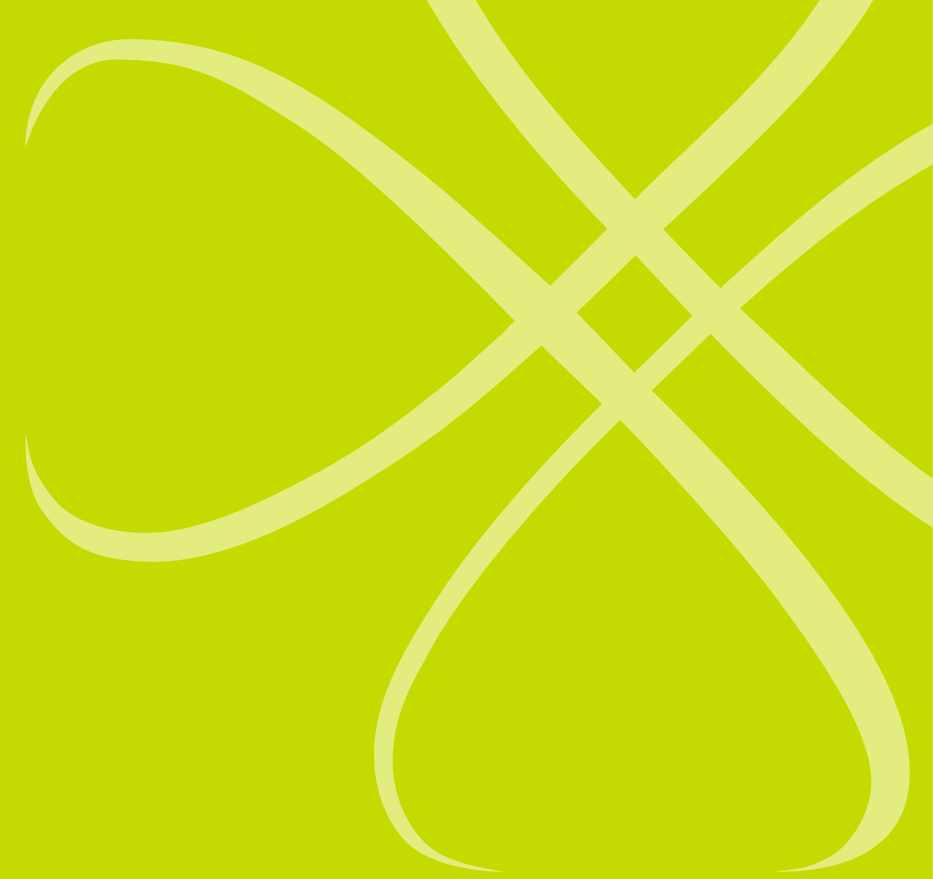
Enzymes in CORN tortillas

Enzymes in FLAT BREADS

Q&A

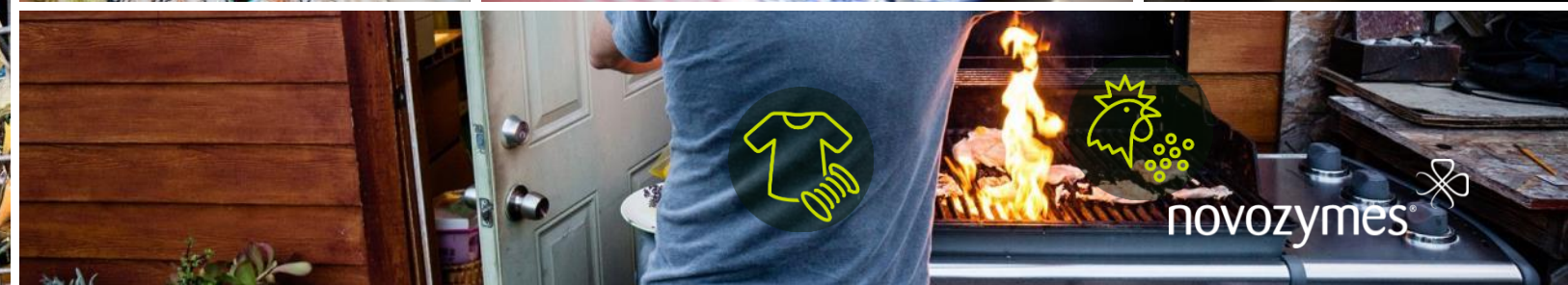
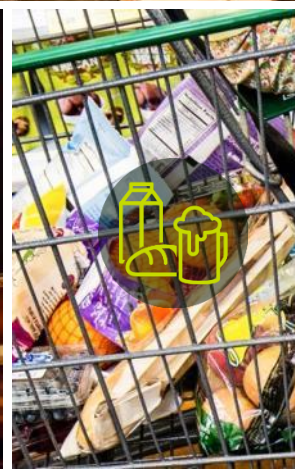
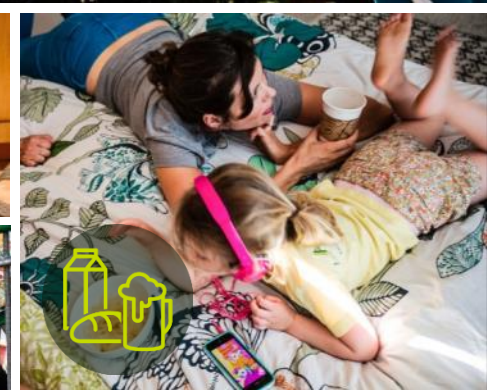
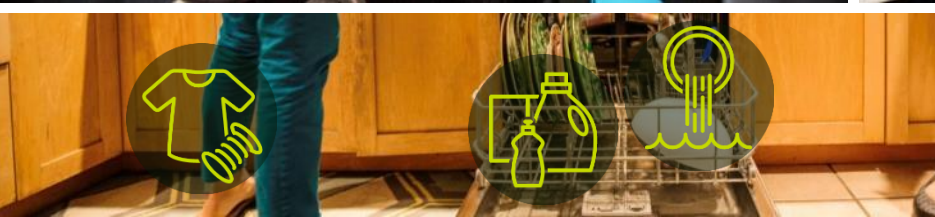
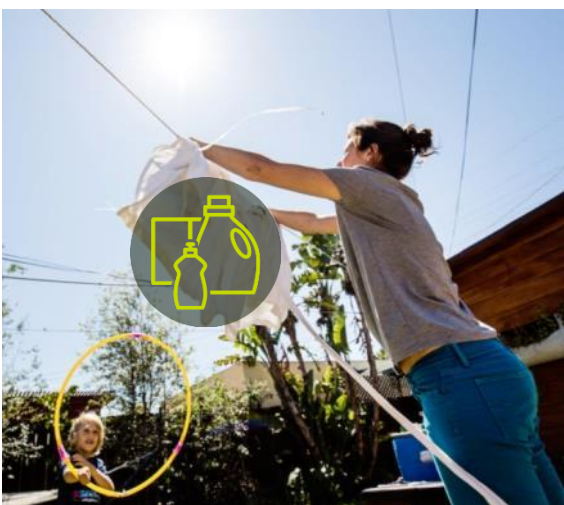


Introduction to Enzymes



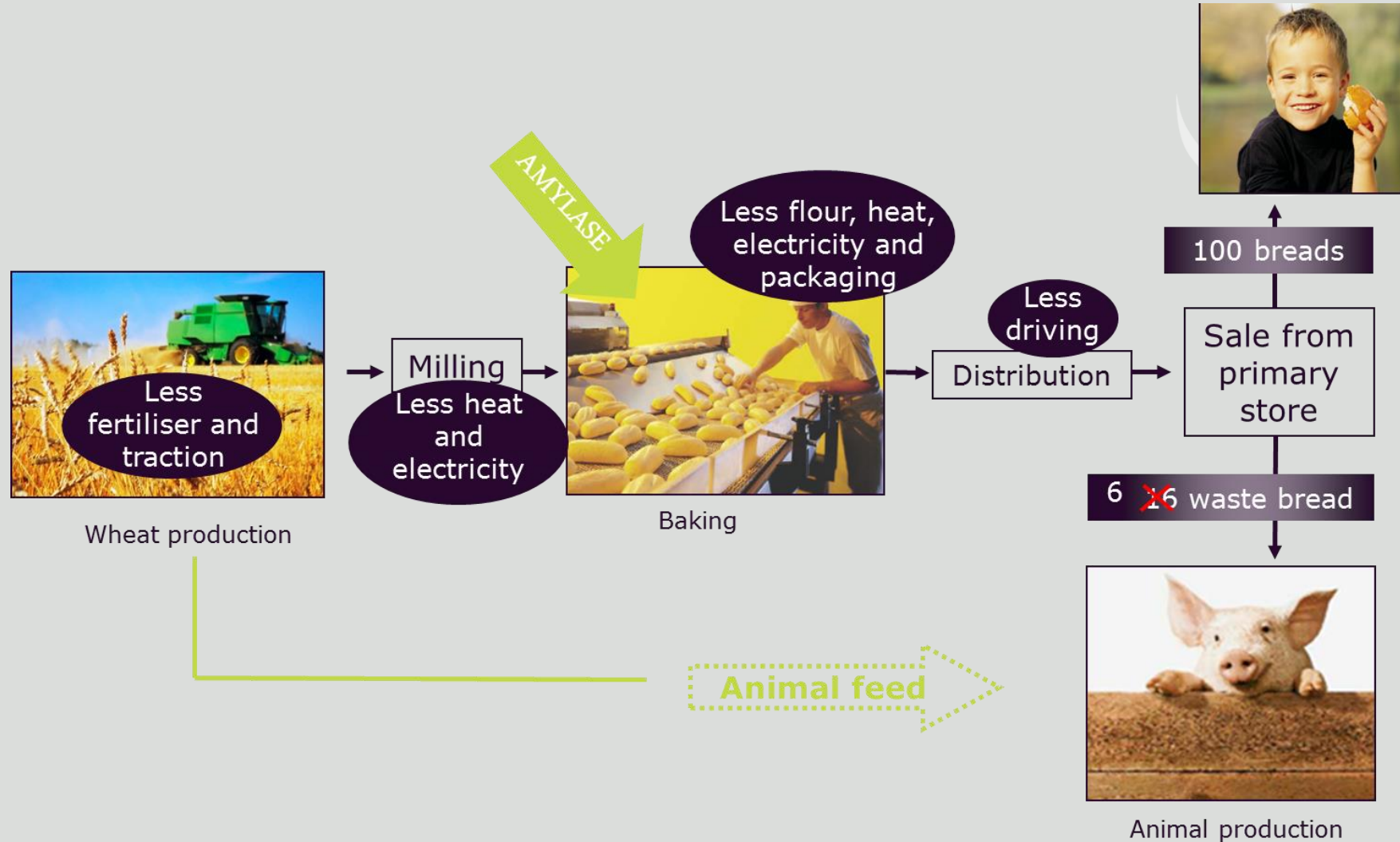
Where do the enzymes come from ?





An example:

Enzymes can increase efficiency, profit, and reduce waste



Enzymes are natural

Active **proteins**

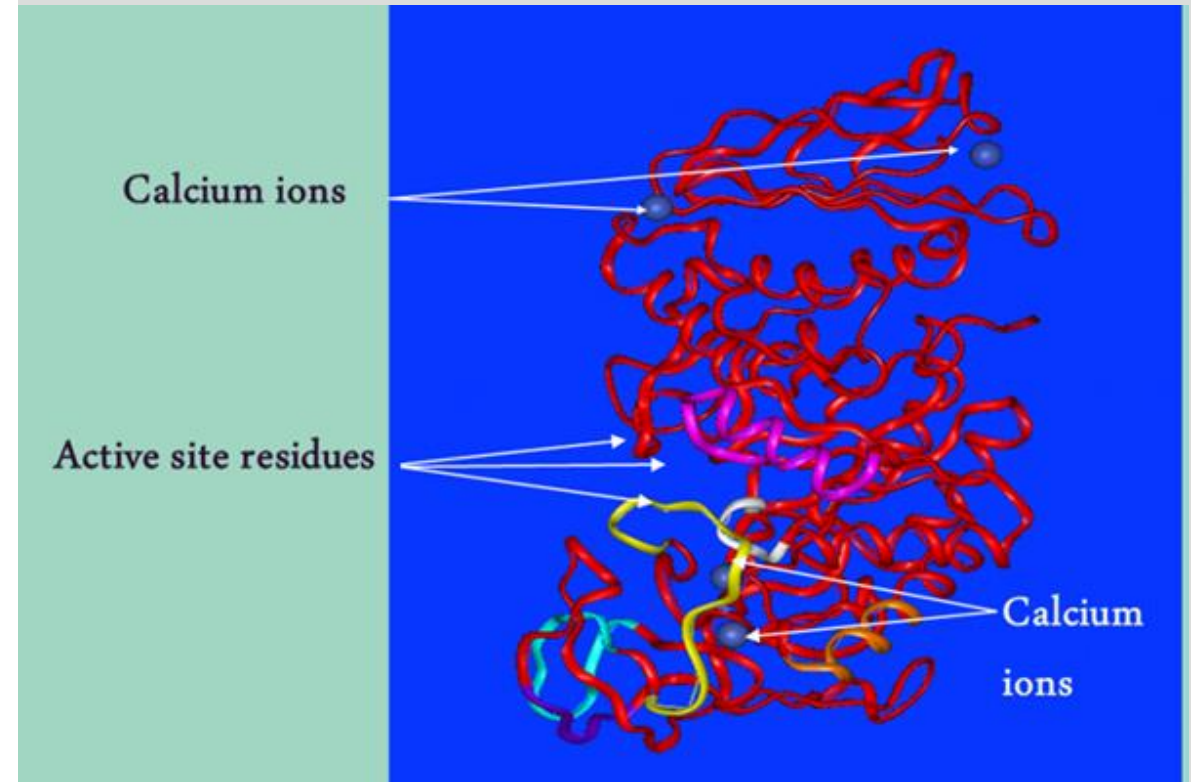
In all living organisms

- Plant
- Animal
- Microorganisms-fungal, bacterial

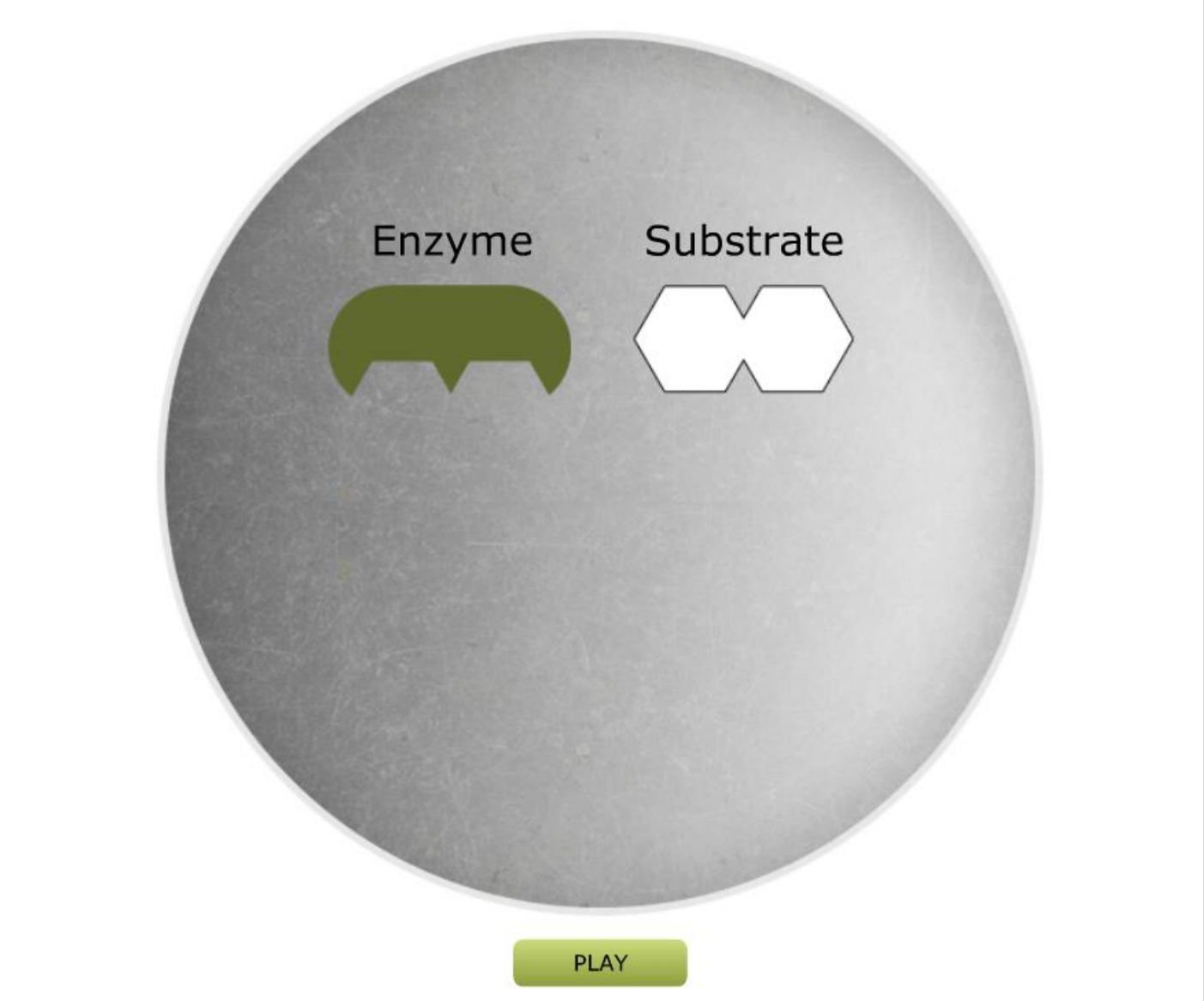
Specific

Works under mild conditions

Can replace/reduce chemicals



How enzymes work



Important process parameters for enzymes

pH

Temperature

Contact time

Water

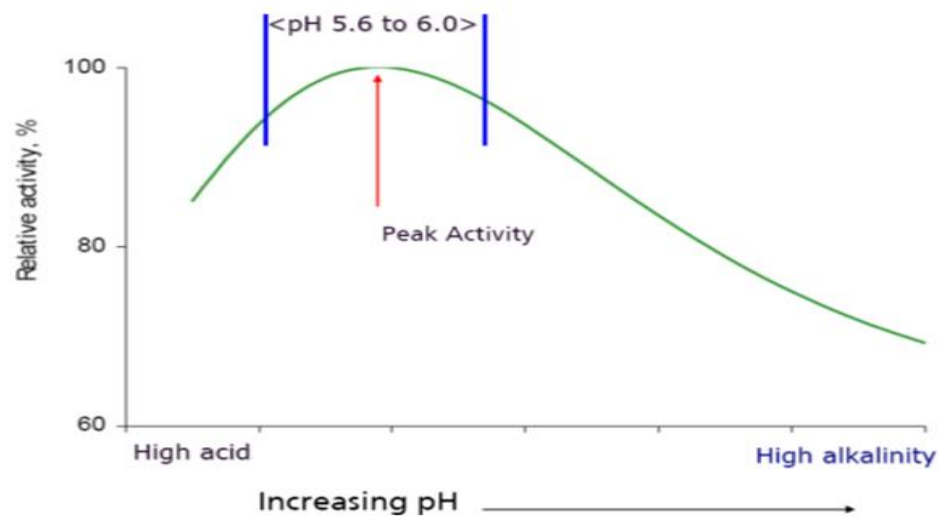
Enzyme dosage

Substrate

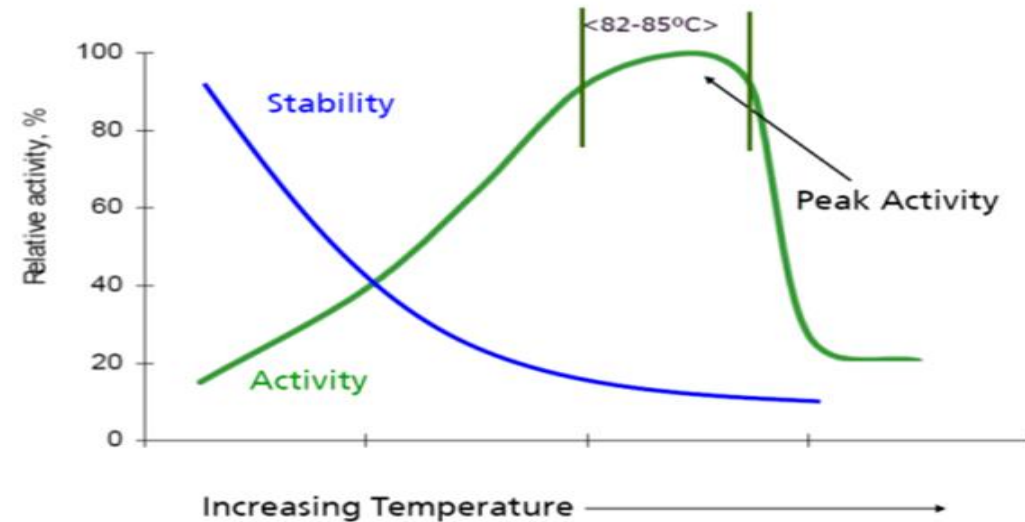
Stabilizers

Inhibitors

Oxygen



pH effect



Temperature effect

Enzymes maintains tortilla freshness

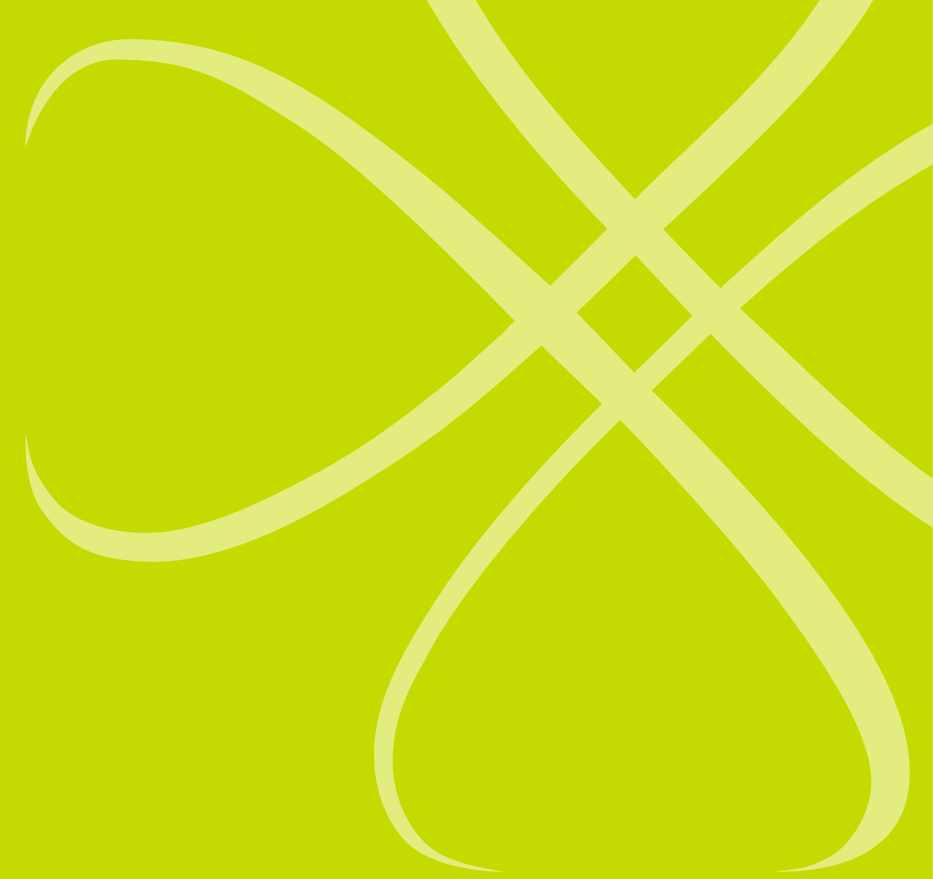
Stale tortillas/flat breads are firm and they crack when folded, become unacceptable to consumers

Enzymes can;

- Extend shelf-life
- Improve dough handling and machinability
- Enhance mixing tolerance
- Can replace/reduce chemicals



Enzymes in FLOUR tortillas





FLOUR tortillas

Short baking time

Stale fast

Maintenance of flexibility is important

Shortenings, emulsifiers, vital gluten, dough relaxers are critical

Consumers desire less ingredients
Clean label is vital

Enzymes used in FLOUR tortillas

Fresh keeping

Maintenance of softness, flexibility and moistness of tortillas up to six months

Ingredient reduction/replacement

L-cystein/SMS

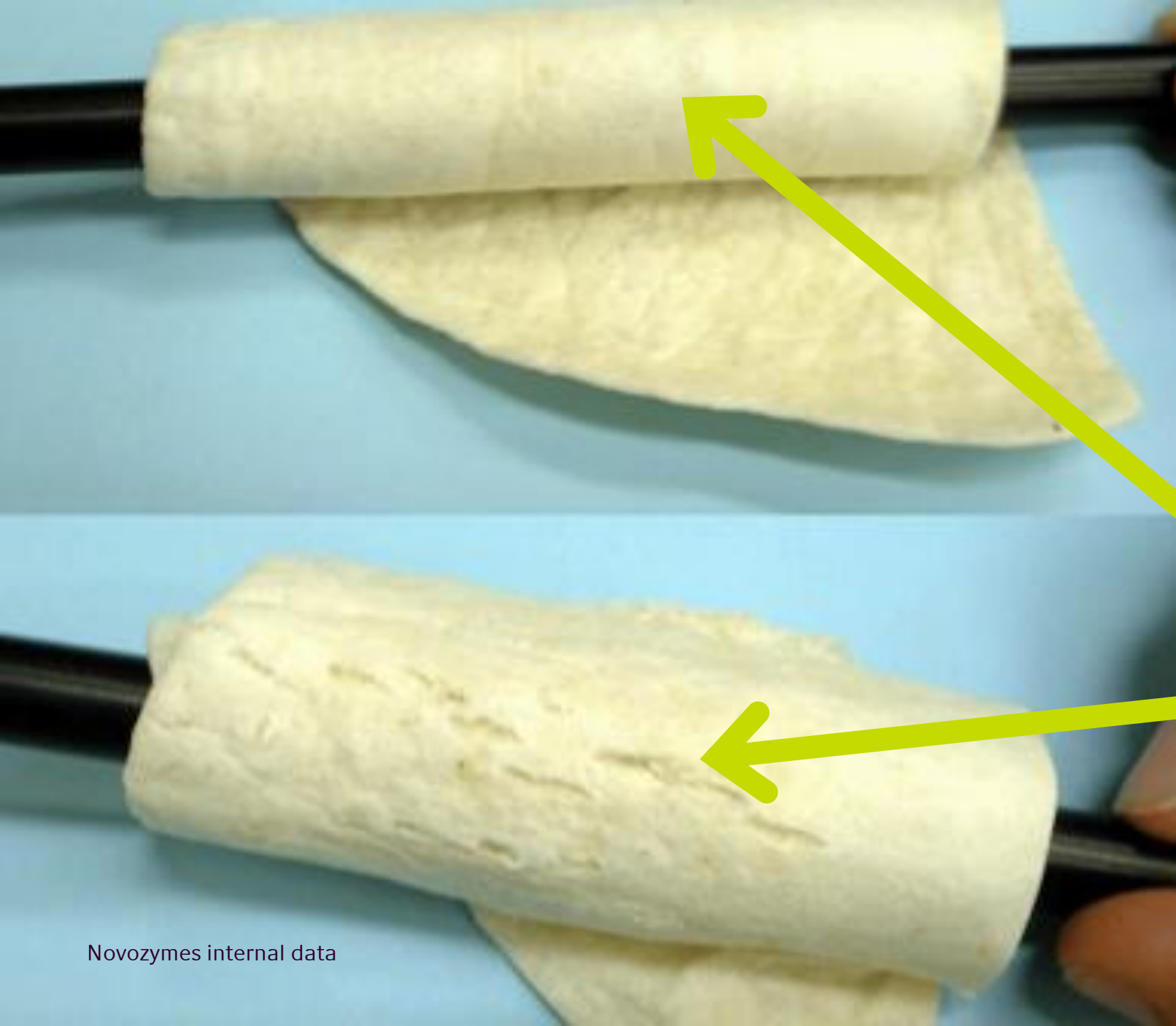
Gums

Emulsifiers

Vital gluten

Enzymes

Alpha-amylase



FLOUR tortillas

Six weeks-old tortillas

With enzymes:
Flexible, no cracking

Without enzymes:
Undesirable cracks

Novozymes NEW enzyme maintains the flexibility for FIVE-months

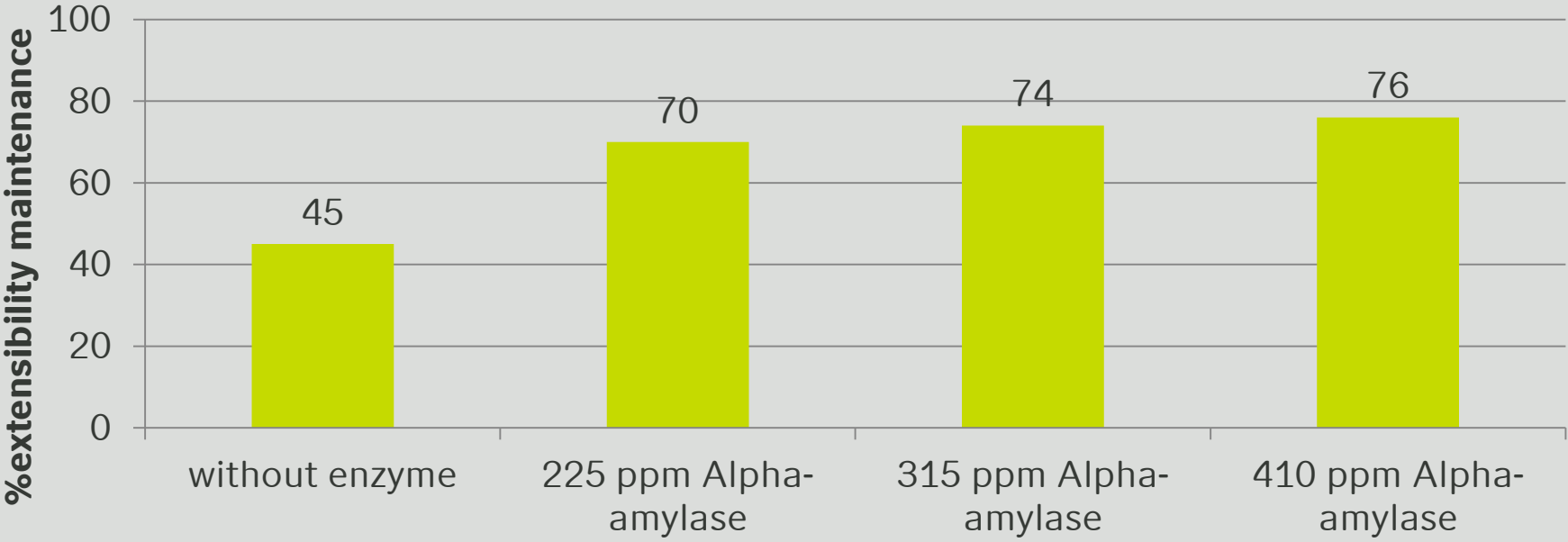


No enzyme

Alpha-amylase

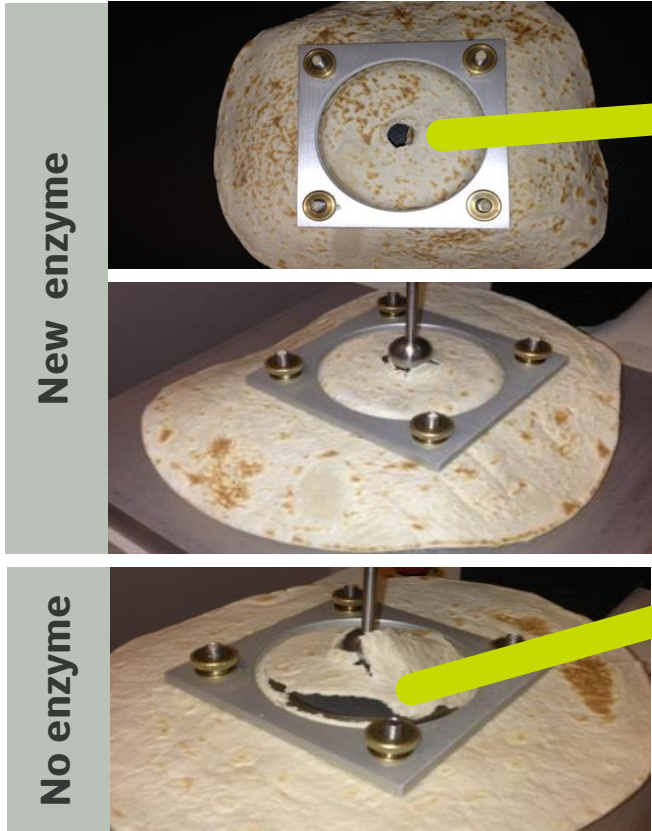
Novozymes NEW ALPHA-AMYLASE -INCREASING dosages INCREASES extensibility

Four week-old flour tortillas
% maintained mechanical extensibility compared to freshly
baked



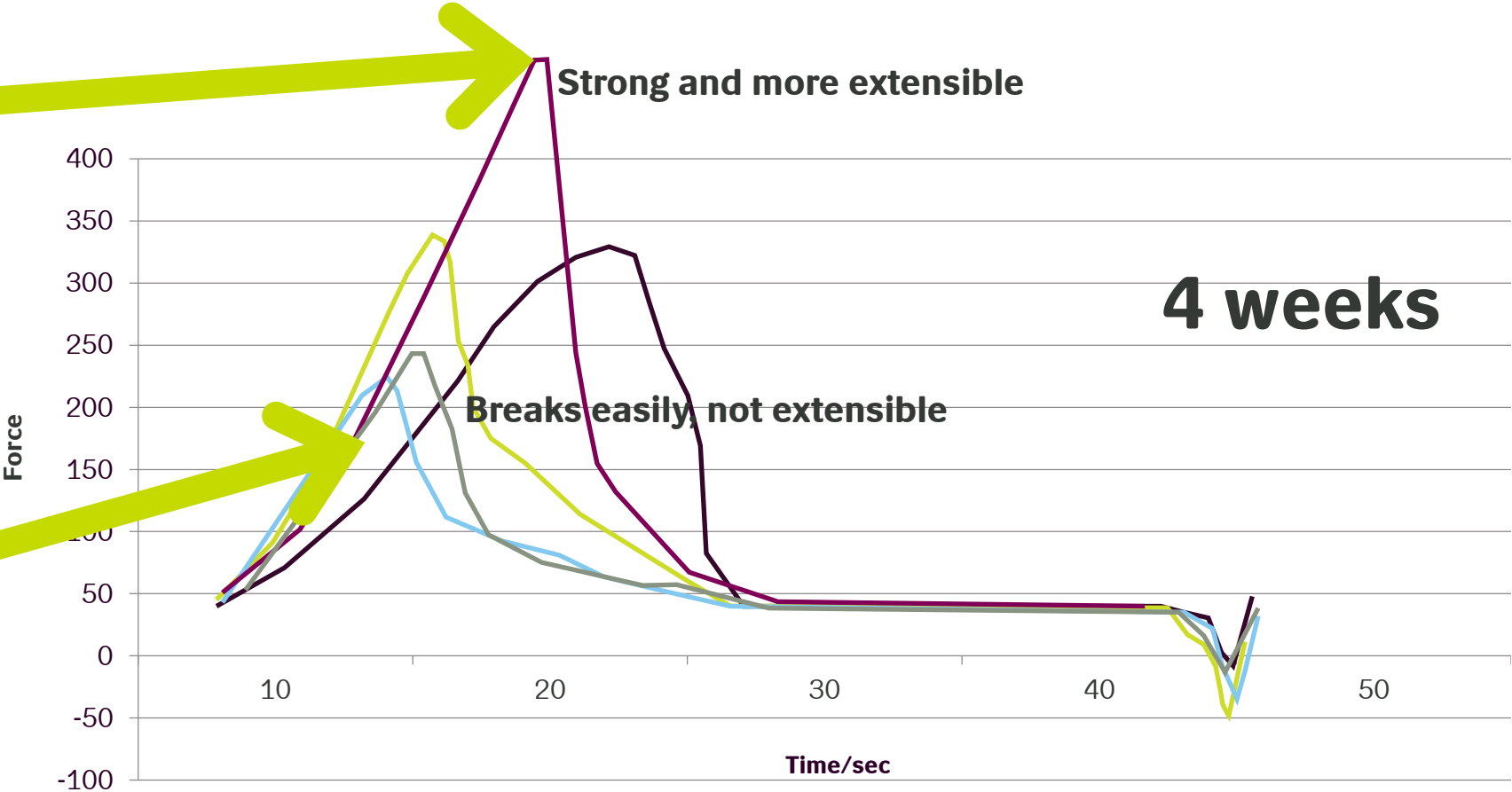
4 weeks

Novozymes NEW enzyme makes tortillas STRONGER and MORE EXTENSIBLE at four week-storage

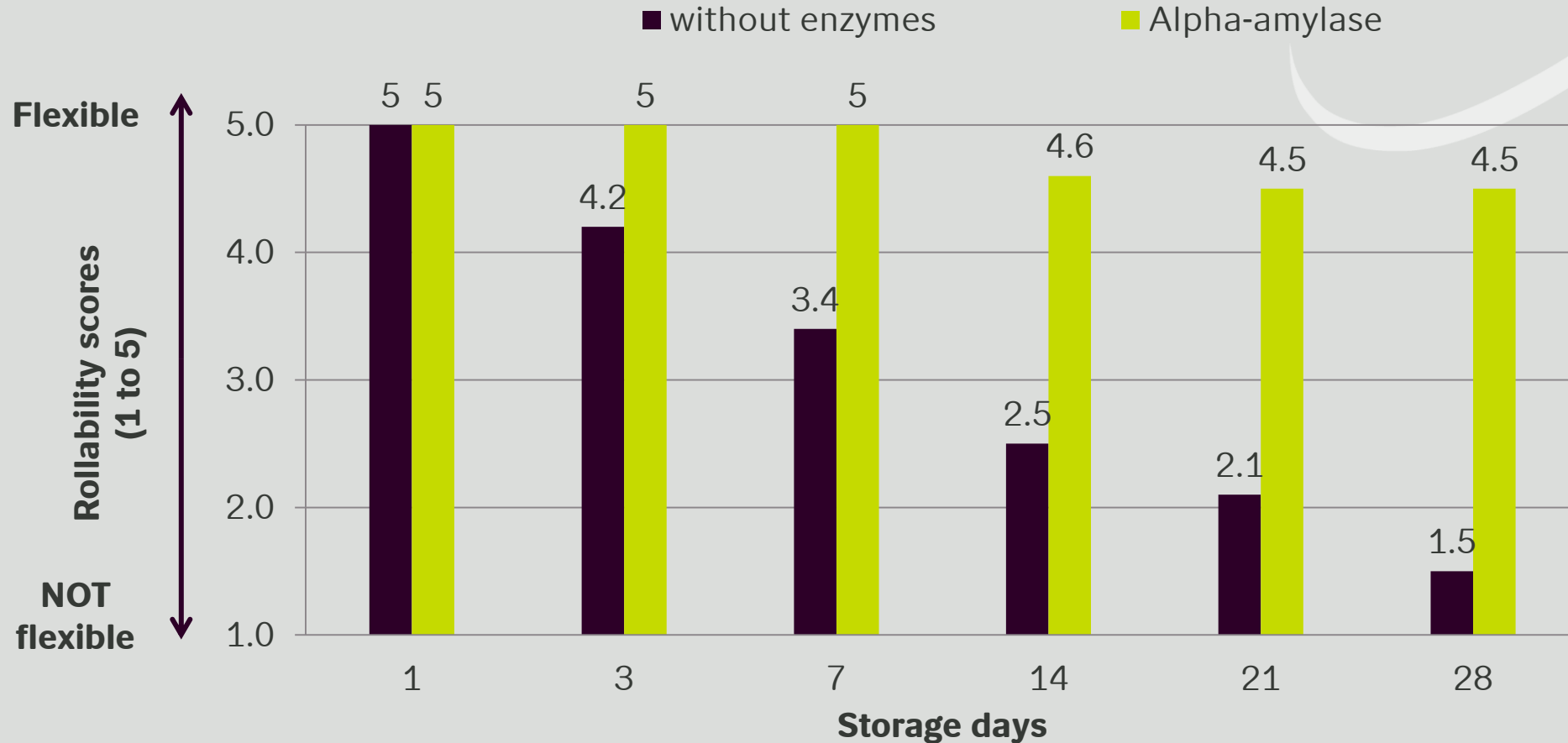


Equipment: TA.XT2-Tortilla Burst Rig

Novozymes internal data



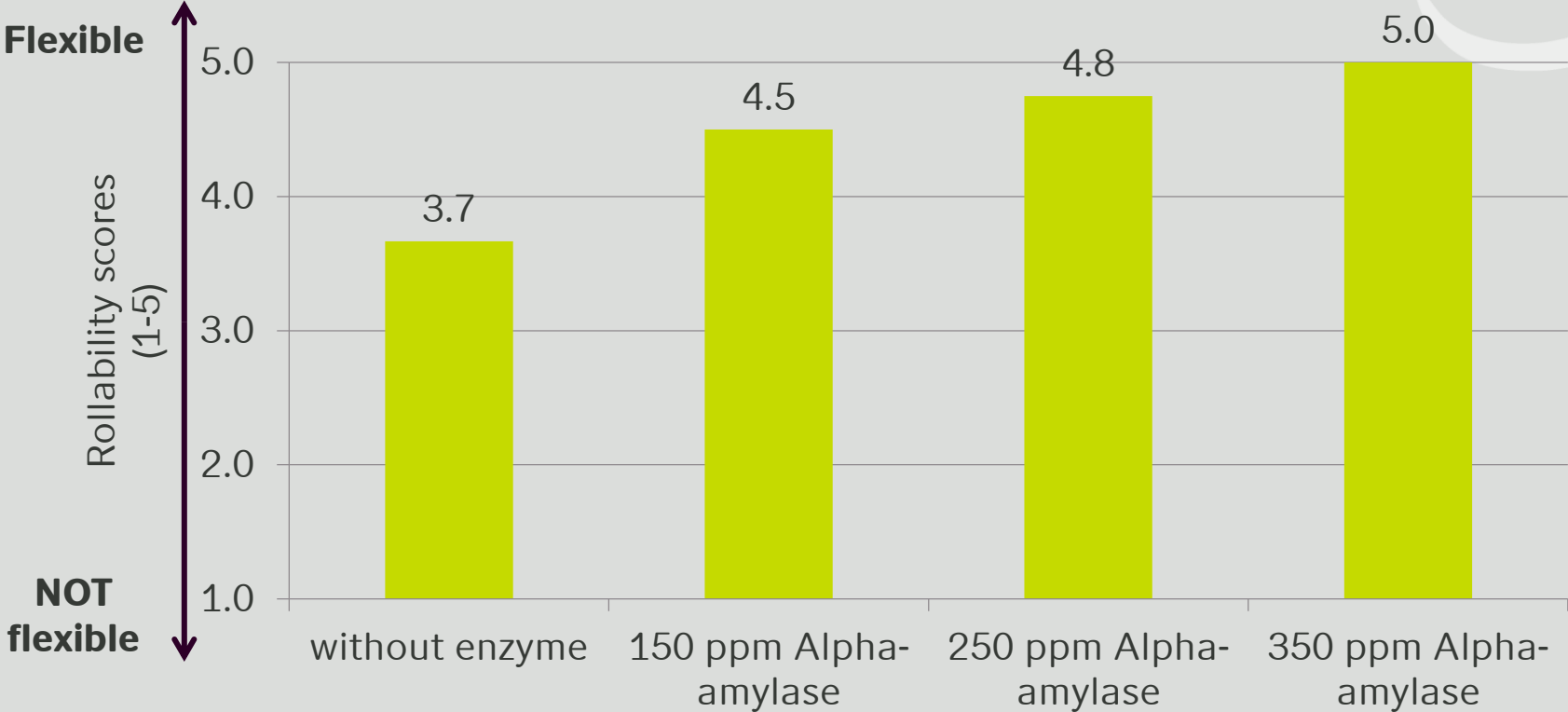
Alpha-amylase maintains high rollability scores during four-week storage



4 weeks

A study by Texas A&M University. Determining the Role of Starch in Flour Tortilla Staling Using α -Amylase
J. Novie Alviola and Ralph D. Waniska. Cereal Chemistry. May/June 2008, Volume 85, Number 3

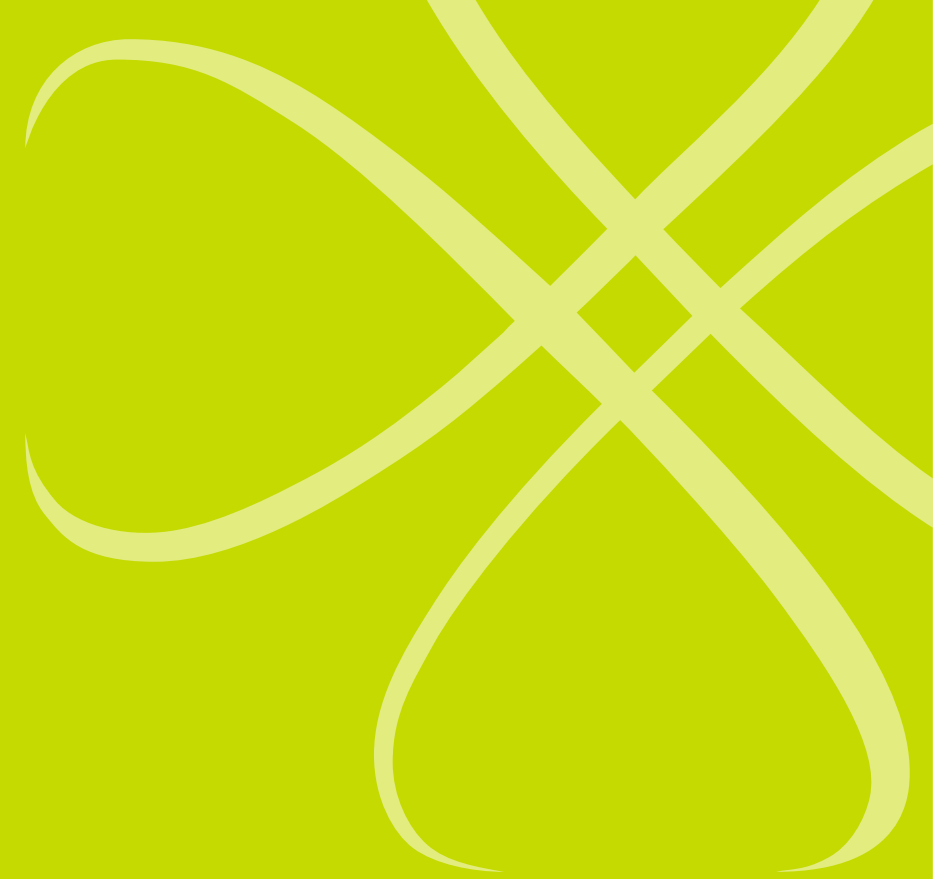
Four-week old tortillas INCREASING dosages INCREASES FLEXIBILITY



4 weeks

Novozymes internal data

Enzymes in CORN tortillas





CORN tortillas

Short baking time

Stale faster than flour tortillas

Maintenance of flexibility is important

Gums are critical

Consumers desire STRONG and FLEXIBLE tortillas



Enzymes used in CORN tortillas

Fresh keeping

Maintenance of softness and flexibility of tortillas

Reduction of masa stickiness

Processing ease

Enzymes

Alpha-amylase

Lipase

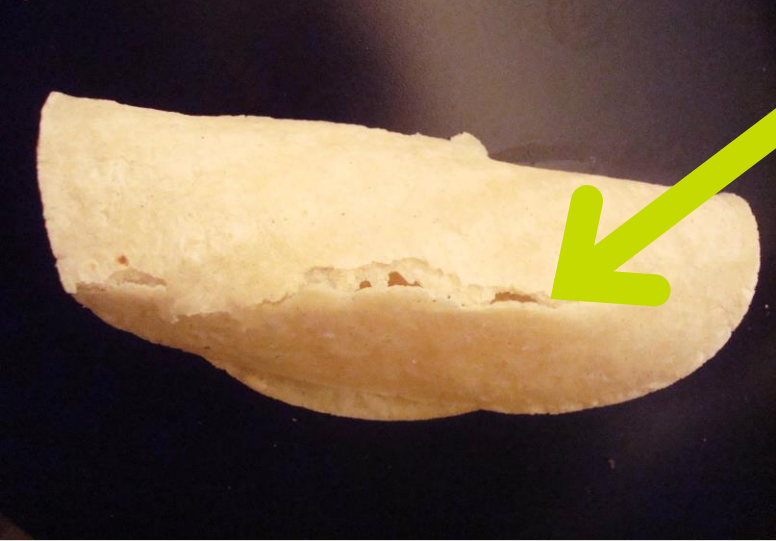


CORN tortillas

Ten day-old tortillas

With enzymes: Flexible, no cracking

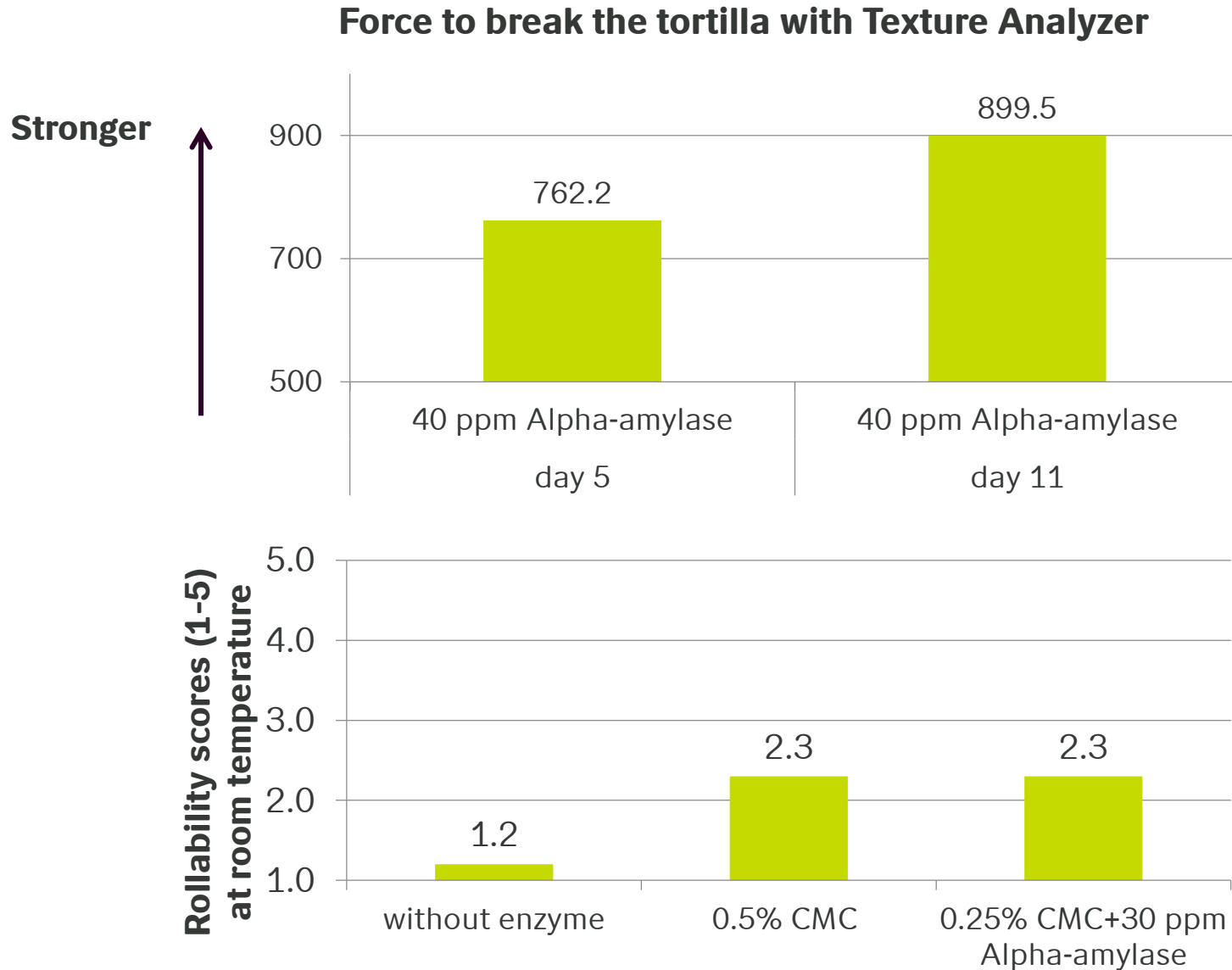
Without enzymes: undesirable cracks



Two-week old corn tortillas

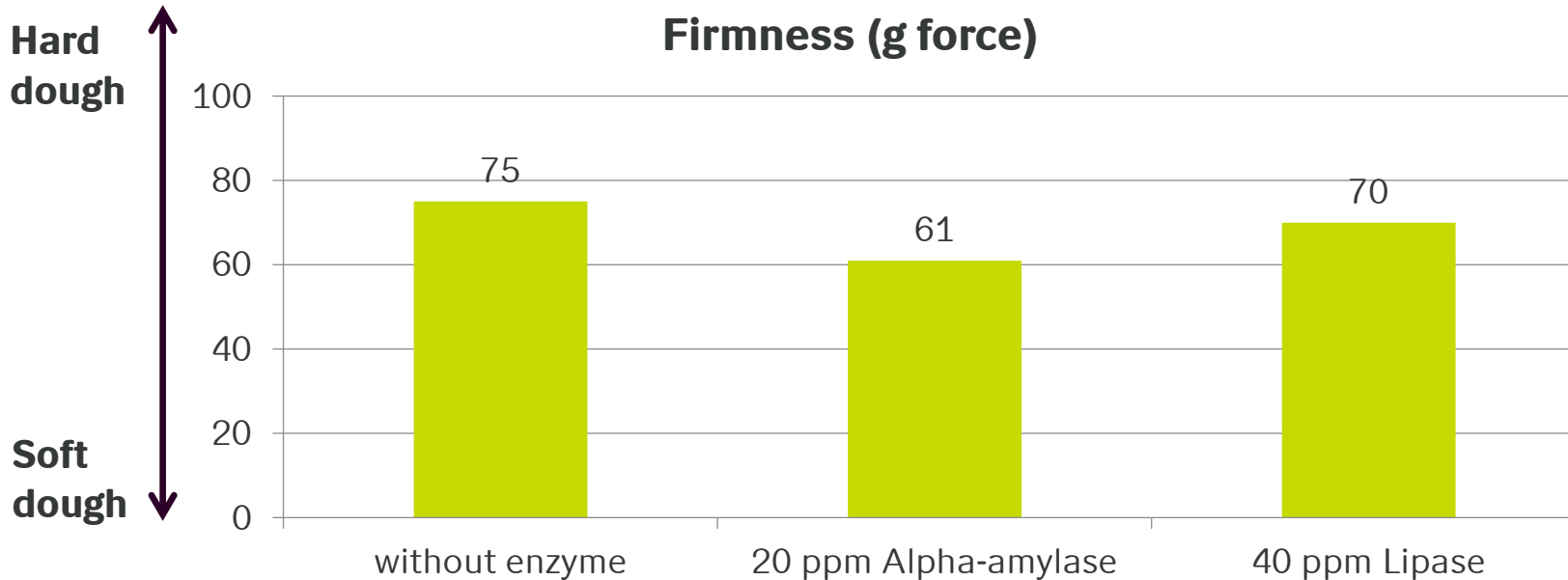
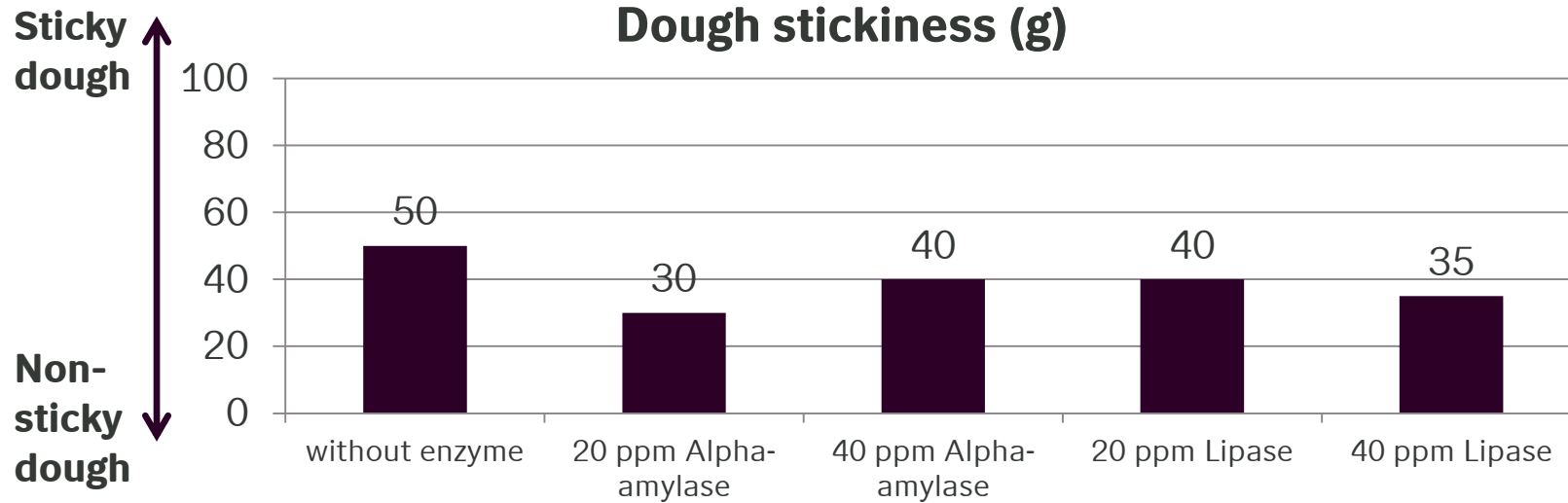
Maltogenic amylase improves corn tortilla strength during storage

Maltogenic amylase help to decrease the CMC in the formula



Masa dough

Less sticky and softer corn masa obtained with an Alpha-amylase and a Lipase



Enzymes in FLAT BREADS





FLAT BREADS

Difficult to retain softness even for one day

Quickly becomes stale and chewy

No technology offers longer freshness

Reheating of frozen flat bread results in a very dry and elastic bread

Maintenance of softness is important
Enzymes can help to retain the softness

Enzymes used in FLAT BREADS

Fresh keeping

Maintenance of softness and flexibility of flat breads

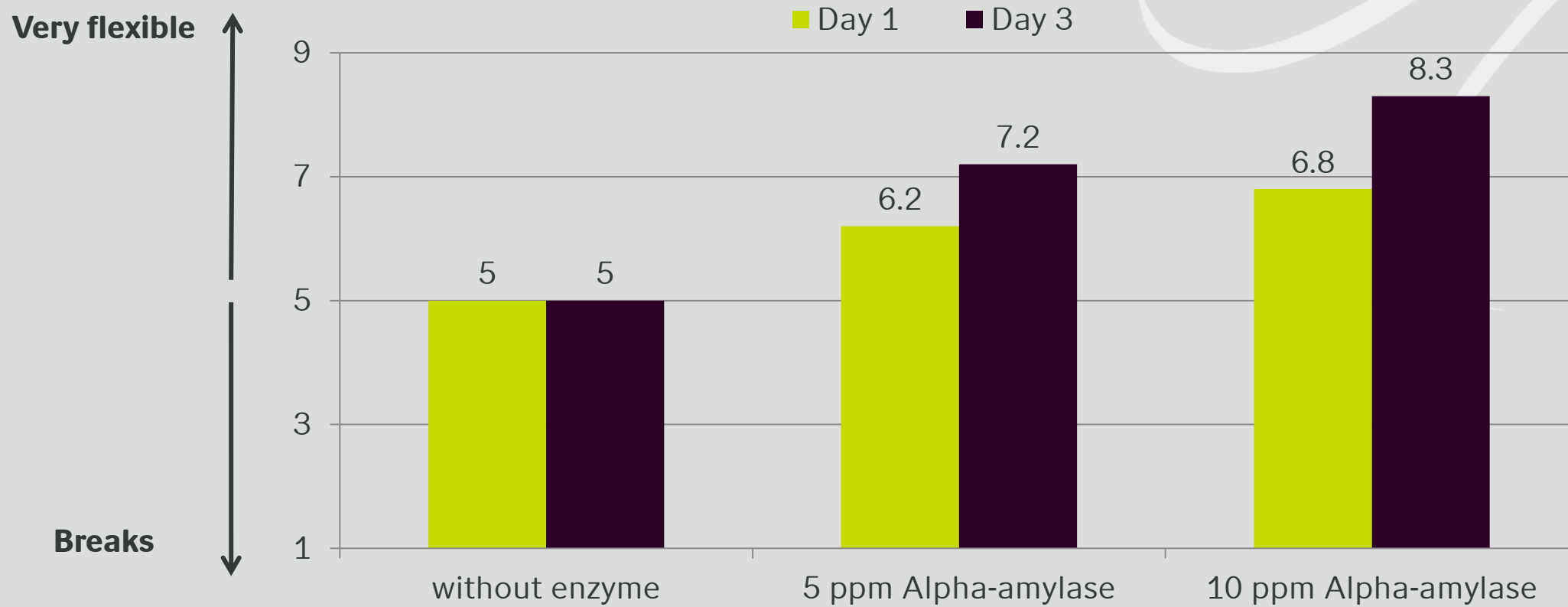
Bacterial alpha-amylase
Lipases

Enzymes

Alpha-amylase

Lipases

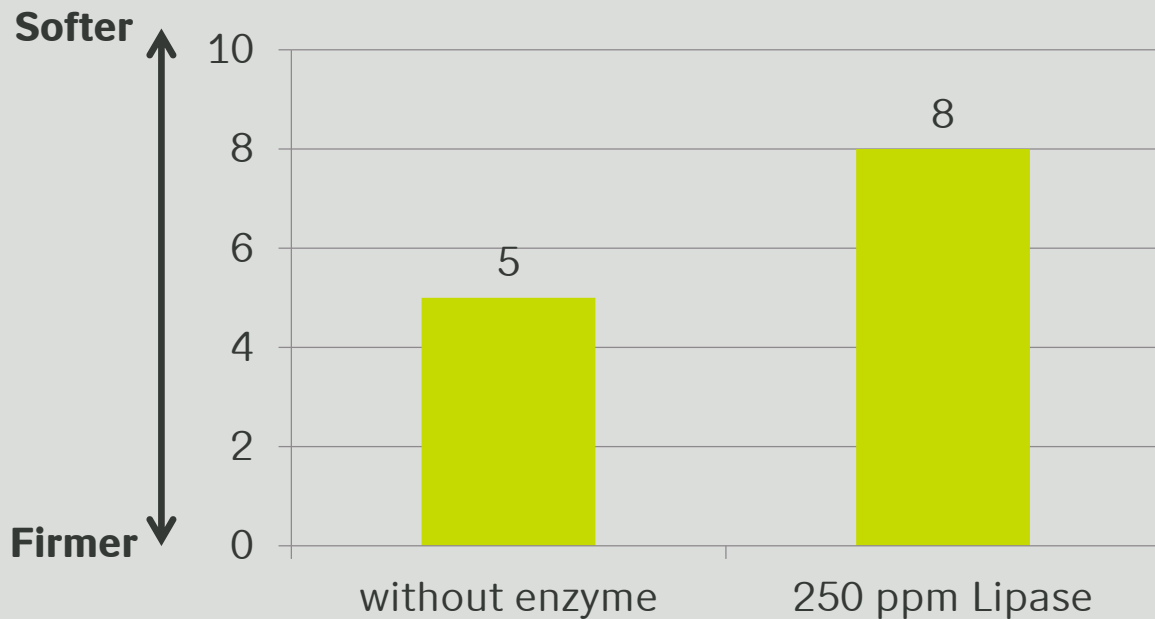
Alpha-amylase maintains and improves flat bread softness for three days



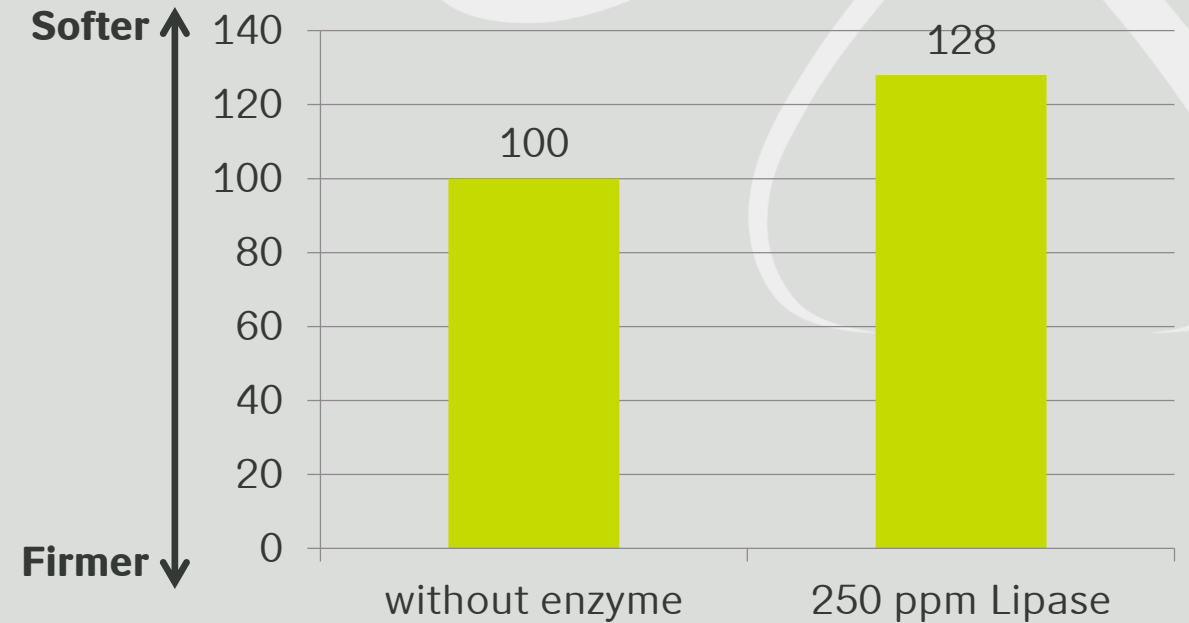
A Lipase makes softer Naan dough; softer final product at four-hour after baking



Naan dough softness

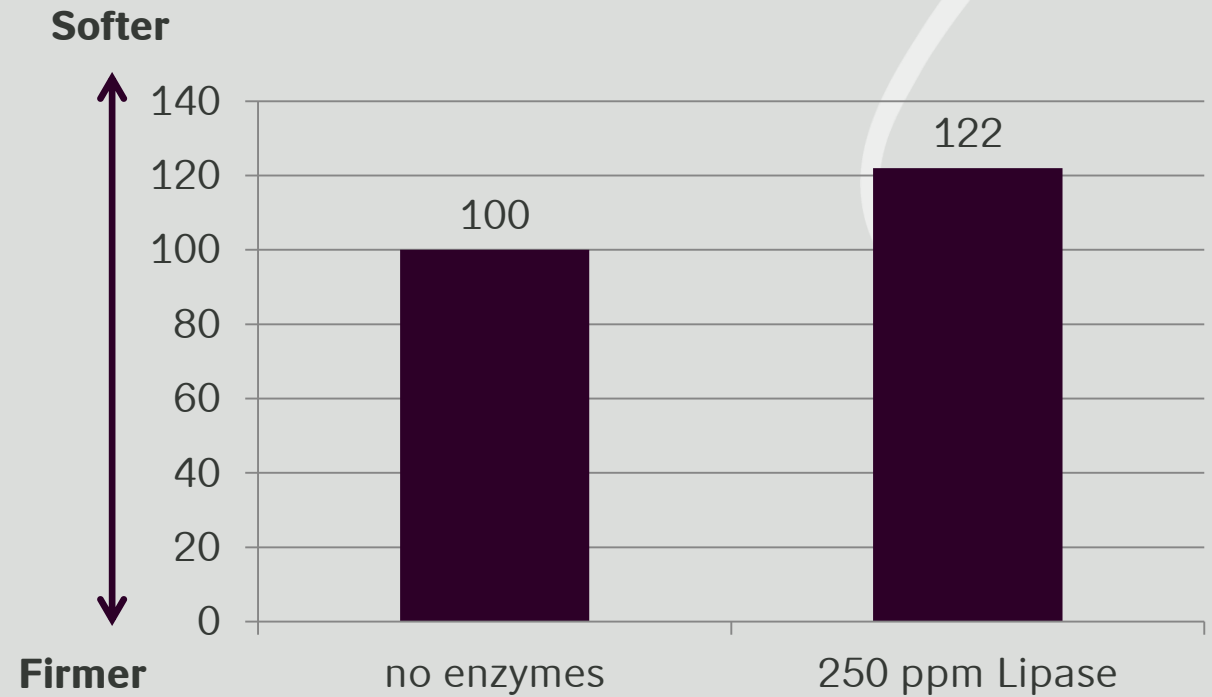
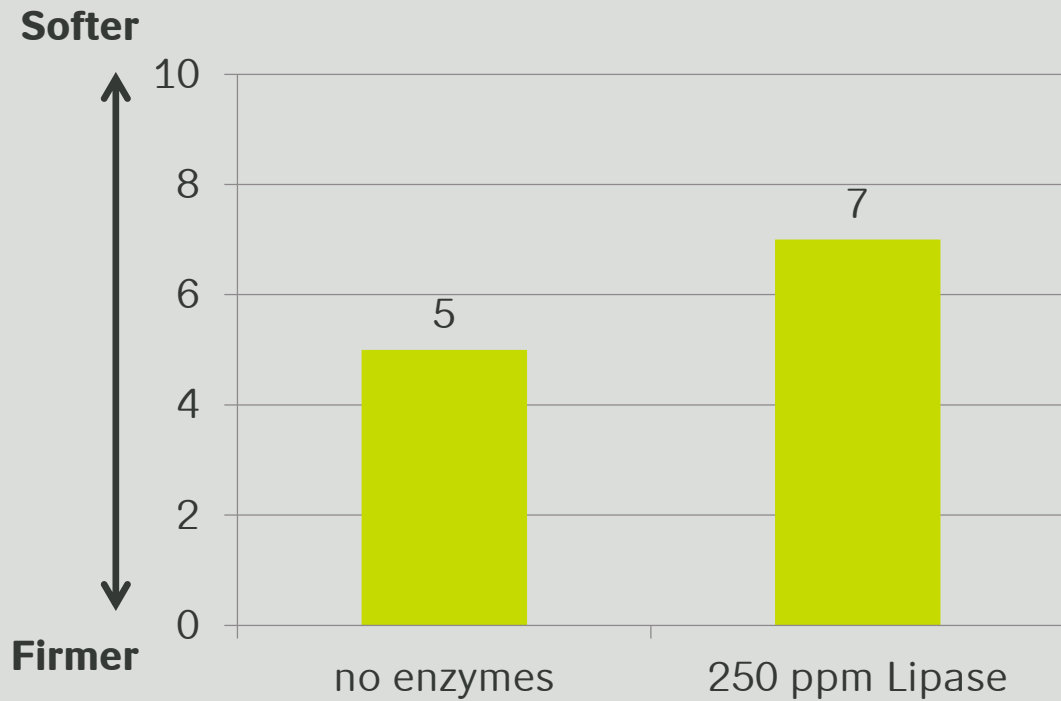


Naan instrumental softness (% softness compare to without enzyme)

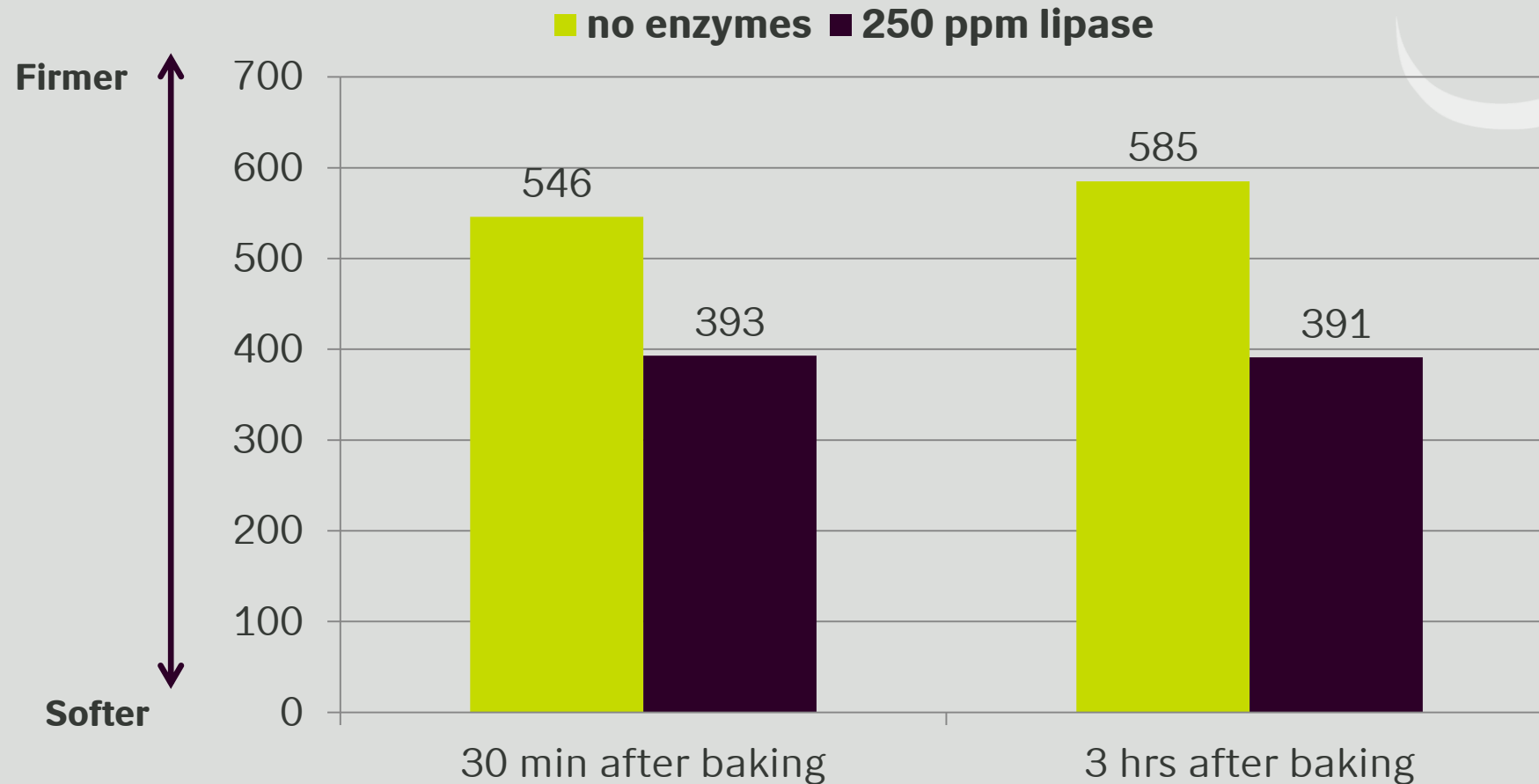


FROZEN Naan

-A lipase gives 22% more mechanical and sensorial softness compared to those without enzymes after 40 days of storage under frozen condition at -20 °C



Chapatti made with a Lipase showed excellent dough property and better softness



Novozymes internal data

Enzymes are natural

Enzymes can

Maintain freshly baked quality of tortillas/flat breads

Improve dough handling and machinability

Enhance mixing tolerance

Replace/reduce chemicals





A good source for enzymes and tortillas

Chapter 10

Enzymes: Extending Shelf Life and Eating Quality of Tortillas

Dilek Lemlioglu Austin

Summary

Industrial Enzymes Used in Baking Operations

Enzymes Used in Tortillas

Enzymes in Wheat Flour Tortillas

Enzymes in Corn Tortillas

THANK YOU!

<http://www.aaccnet.org/publications/store/pages/27885.aspx>

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