



مطاحن التاج  
CROWN FLOUR MILLS



QUALITY,  
CONSISTENCY,  
INNOVATION  
SINCE 1952



From modest beginnings in 1952, we've grown to be one of the leading flour mills in the region.

Our success has always been based on you, providing you with consistency of quality, strong expertise, and a commitment to innovation.

We meet not only the needs of the market but also your unique requirements, always delivered with a passion for service excellence.



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# Innovative enzymes technology for improving wheat flour

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**CROWN  
FLOUR  
MILLS**

**Prepared by:**

Makhoul Salim

**Powered by:**

Crown Flour Mills SAL



# PLAN

3

1

- Bread improvers objectives

2

- Types of flour correctors

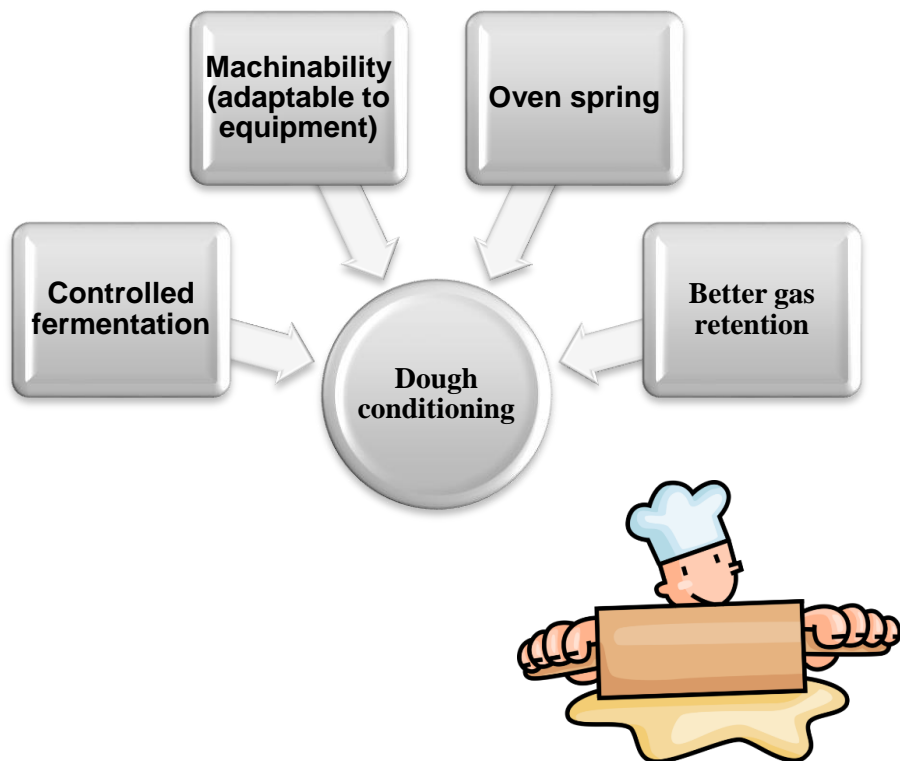
3

- How individual components react

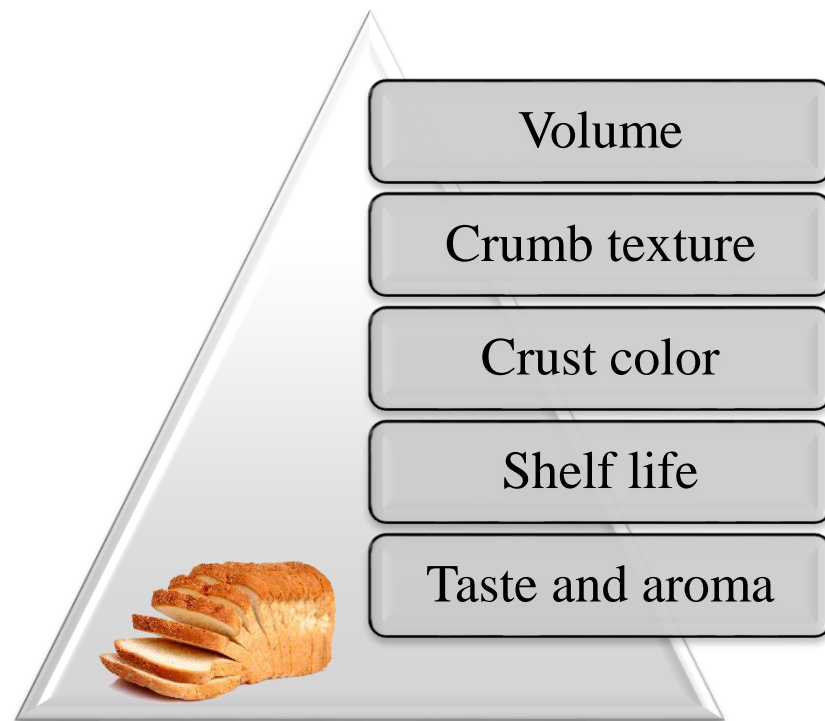
# Bread improvers objectives

4

## Dough conditioning



## Bread quality



# Bread improvers objectives

5



## How to use the improvers

In the mixer

At an average level of use from 0.5% to 1.5%  
(of the flour weight)

# PLAN

6

1

- Bread improvers objectives

2

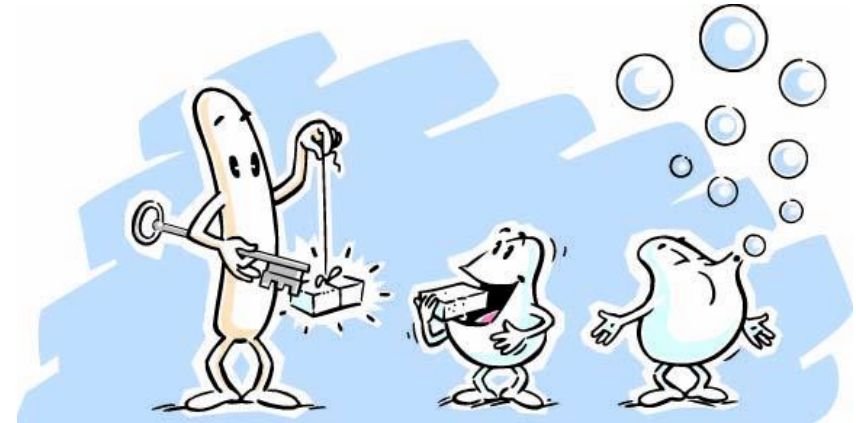
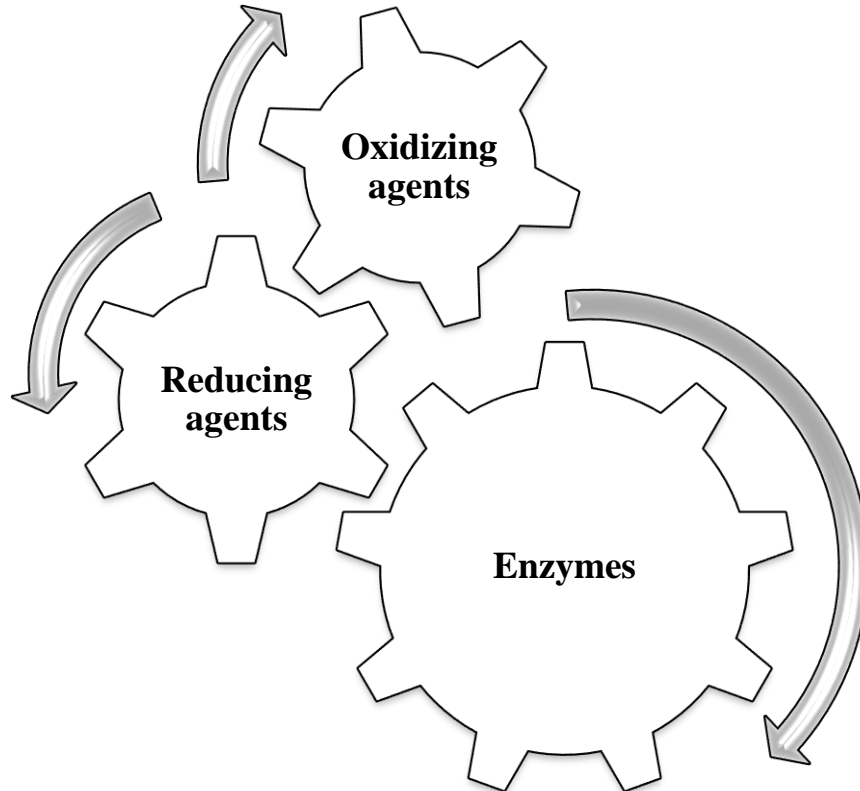
- Types of flour correctors

3

- How individual components react

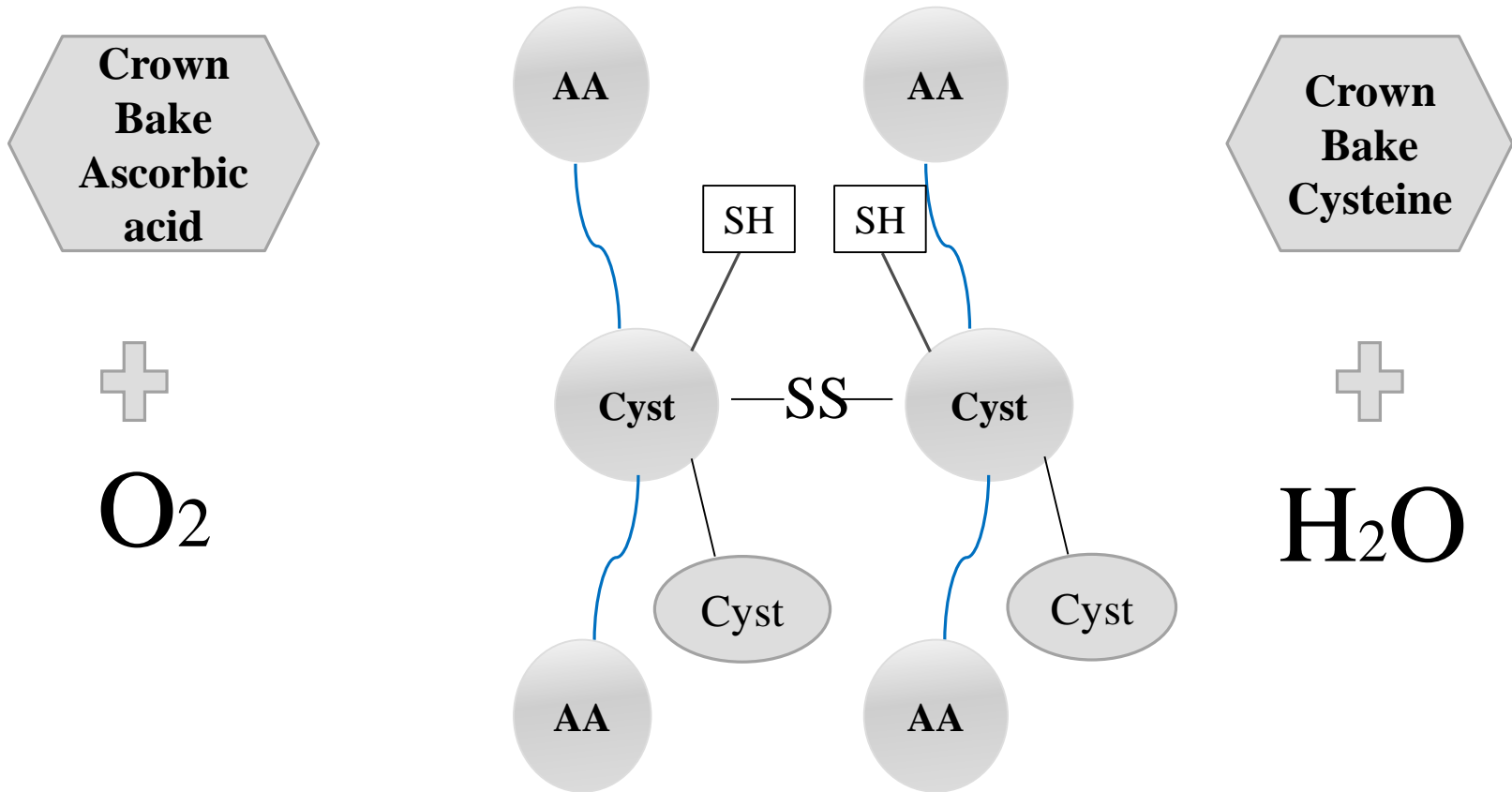
# Types of flour correctors

7



# Difference between oxidizing and reducing agents

8



# Type of enzymes

9

## Crown Bake ASE

- Active on wheat starch

## Crown Bake GXZ

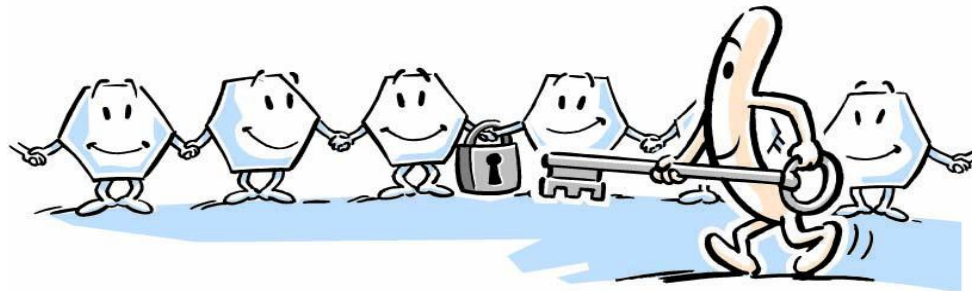
- Active on glucose

## Crown Bake PGS

- Active on fat

## Crown Bake HCX

- Active on hemicelluloses



# PLAN

10

1

- Bread improvers objectives

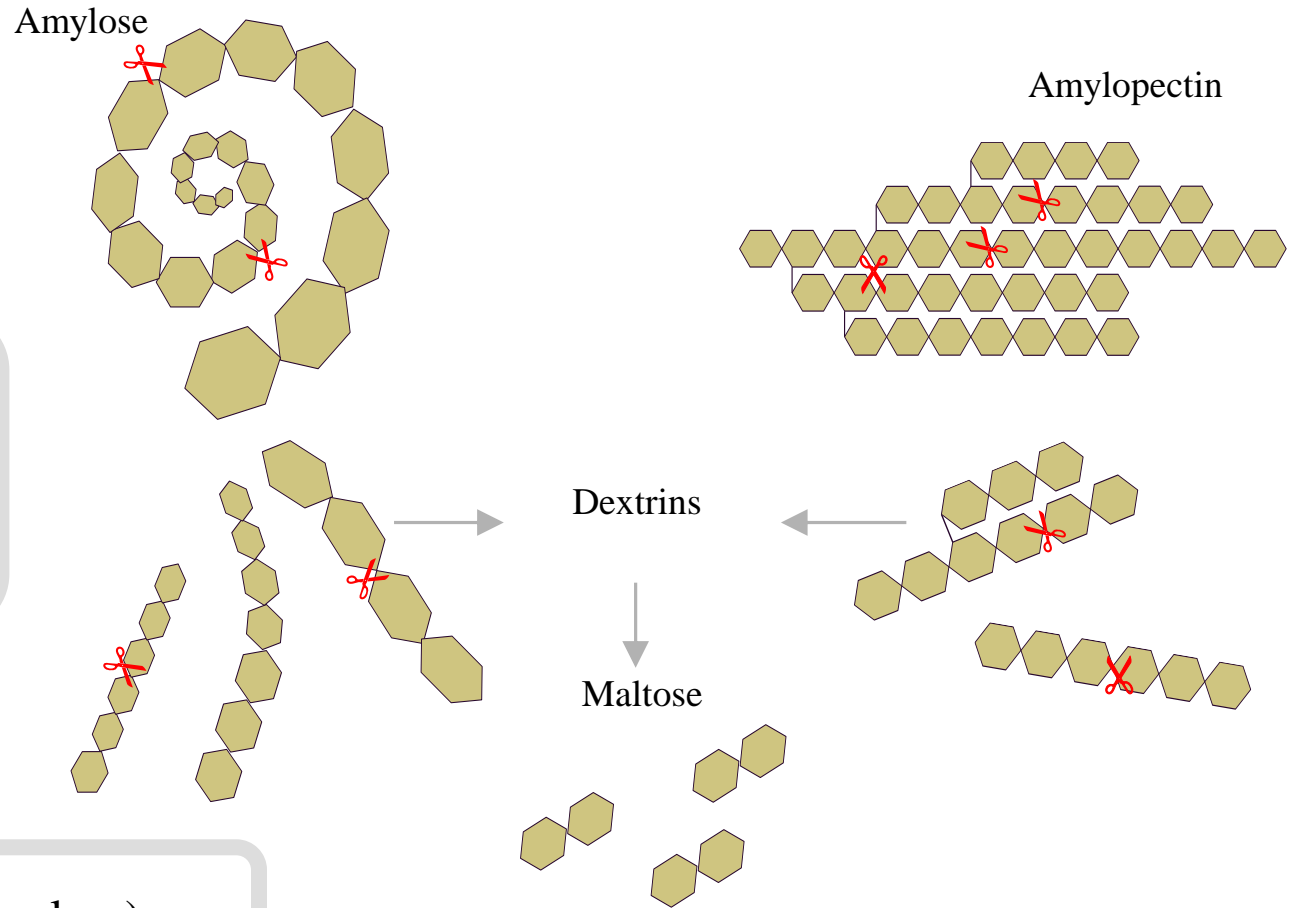
2

- Types of bread improvers

3

- How individual components react

# Crown Bake ASE – Wheat starch



Wheat starch (70-75%) consists of 25-28% amylose and 72-75% amylopectin

 = ASE (fungal amylase)

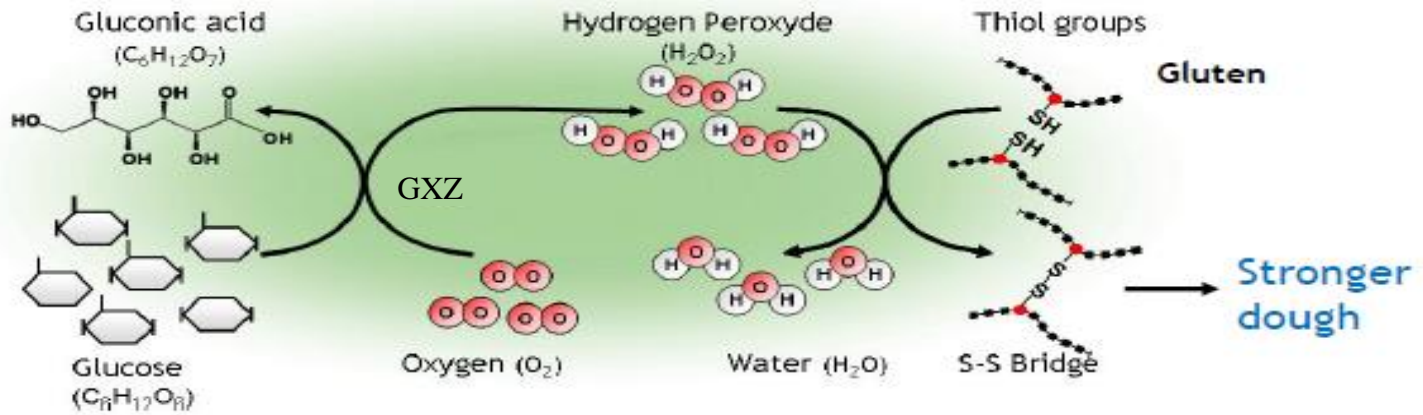
# Crown Bake ASE – Wheat starch

12

- Enhances dough fermentation and gas production
- Increases oven spring and loaf volume
- Fine and even crumb structure
- Improves crust colour
- Food for the yeast (better gas production)



# Crown Bake GXZ - Glucose



**GXZ acts on water and glucose**

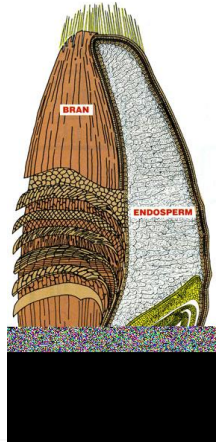
**Formation of  $H_2O_2$**

**$H_2O_2$  improve the formation of disulfide bridges**

**Better gluten network**

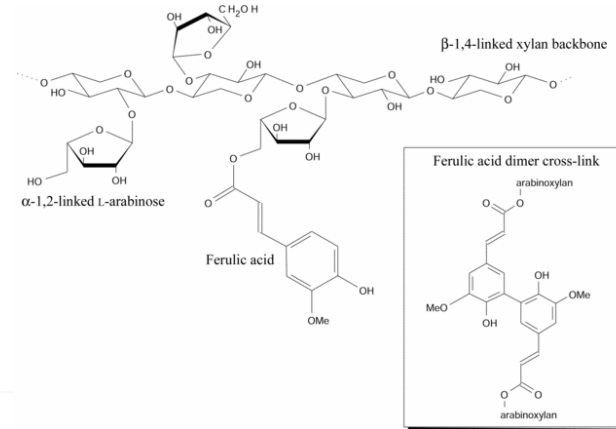
**Stronger dough for long fermentation periods**

# Crown Bake HCX - Hemicellulose



**Longitudinal section of wheat grain**

## Molecular structure of arabinoxylan



### Main wheat kernel components:

Starch	65-70%
Proteins	10-12%
Non-starch polysaccharides (NSP)	2-3%
Lipids	1.5-2%

### Arabinoxylan in wheat flour

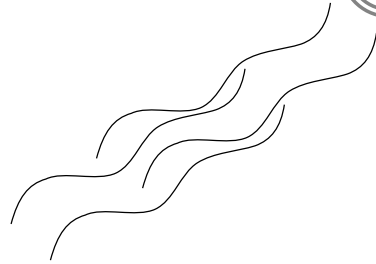
- AX makes up 85% of the endosperm NSP
- 25-30% is water extractable (WE)
- 70-75% is water un-extractable (WU)

# Crown Bake HCX - Hemicellulose

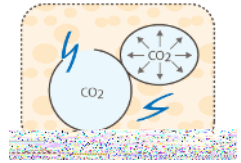
15

Extend of AX degradation

WU-AX

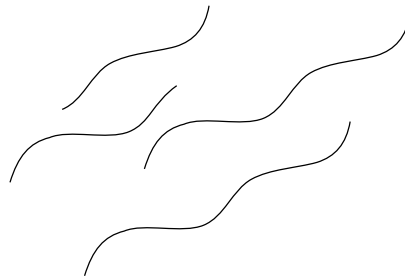


- Gas cell perforation
- Coalescence and decreased gas retention
- Lower stability of dough foam
- Lower loaf volumes with coarser crumb

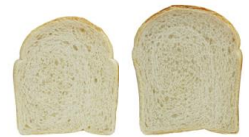


Gas cell  
Dough matrix  
WU-EX

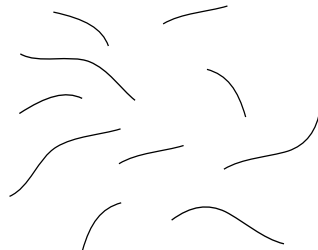
HMW  
WE-AX



- Increase in viscosity
- Redistribution of previously bound water
- Better dough foam stability and gas retention
- Crumb structure homogeneity and increase in loaf volume



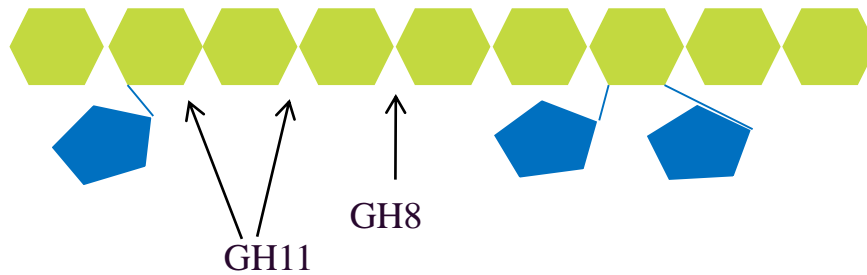
LMW  
WE-AX



- Drop in dough viscosity
- Too excessive water release
- Risk of too soft and sticky dough
- Poor machinability

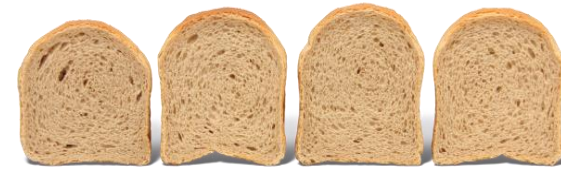


# Crown Bake HCX - Hemicellulose



GH8 is very active and is only cleaving between un-substituted xylose, resulting in a large amount of AX oligomers and a small amount of free xylose

GH11 is slower and is cleaving next to un-substituted and mono-substituted xylose, resulting in large amount of free xylose.



Rye bread

Control 20ppm 30ppm 40ppm



White bread

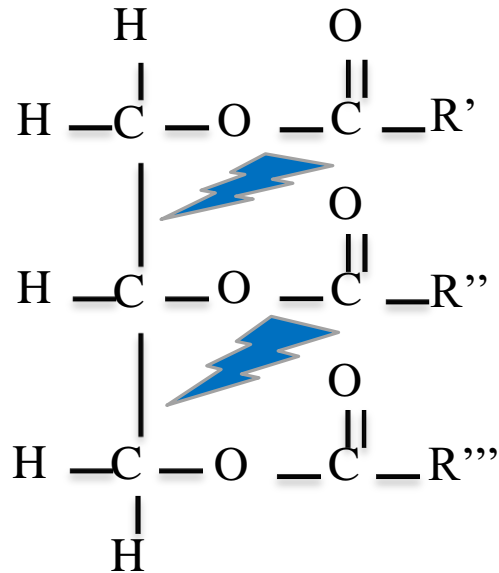
Control 20ppm 30ppm 40ppm

**Crown Bake HCX**, catalyzes those hemicelluloses and improve gluten functions which result the following

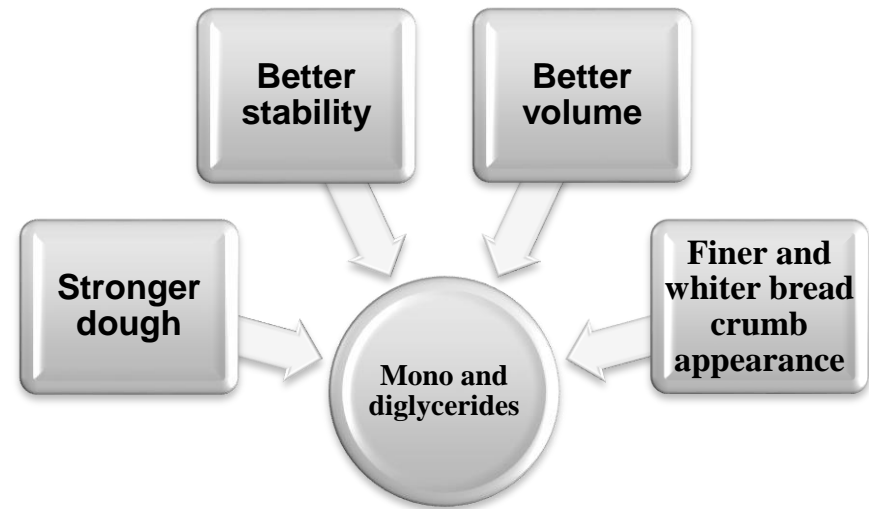
- Superior volume of baked goods
- Improves bread appearance and texture
- Dry, stable dough
- High tolerance towards process variations

# Crown Bake PGS – Fat

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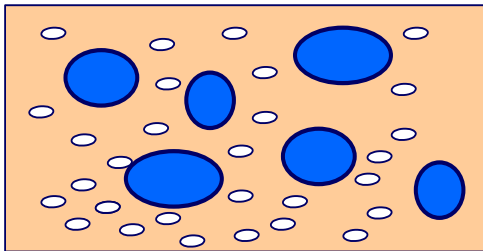
- Reduces triglycerides into mono and di glycerides.
- The mono and diglycerides act like emulsifiers



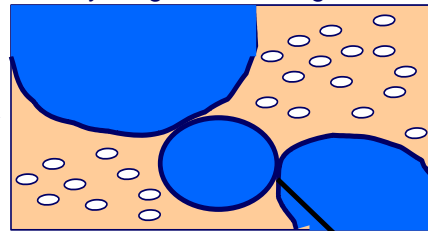
# Crown Bake PGS – Fat

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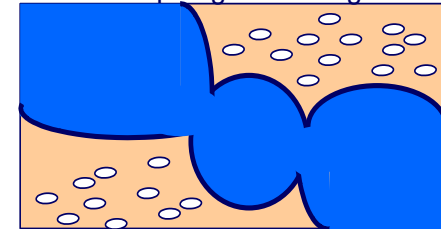
Early stages of fermentation



Advanced stages of fermentation to early stages of baking

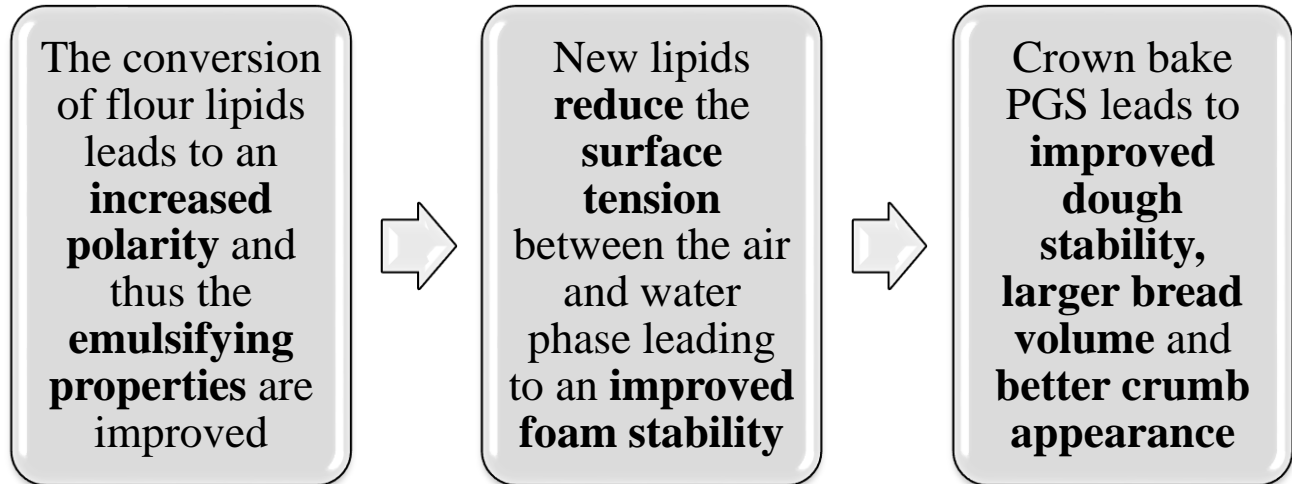


End of oven spring or baking



↓ Liquid lamellae –

## Gas cell stabilization during bread making



CLEAN  
LABEL  
WITH PGS

# Crown Bake PGS – Fat

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Control

0.3% DATEM

6ppm PGS

*Procedure with relative long mixing and fermentation time*

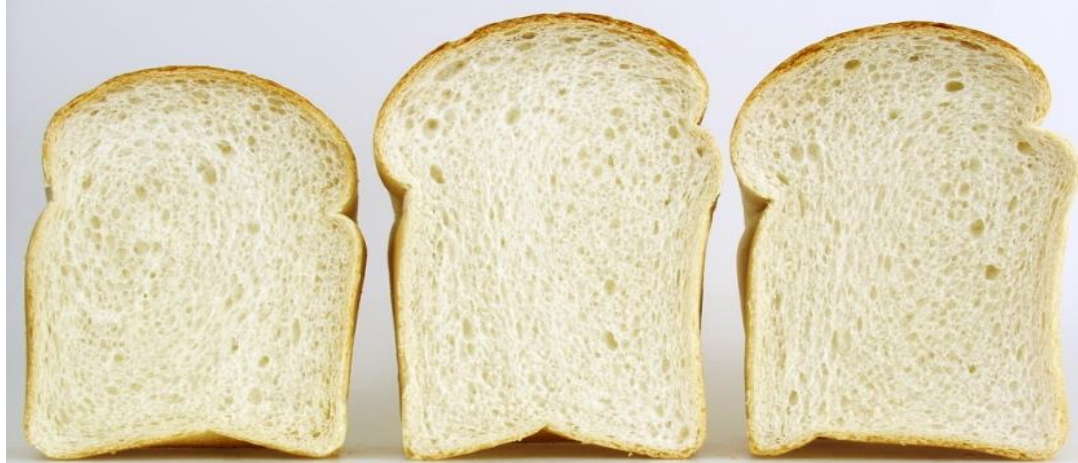
*In all: 4ppm Crown bake ASE+30 ppm Crown Bake HCX+ 60 ppm ascorbic acid*

**The addition of 0.3% DATEM or 6ppm PGS resulted in a volume increase of 30% compared to the control**

CLEAN  
LABEL  
WITH PGS

# Crown Bake PGS – Fat

20



Control

0.3% DATEM

30ppm PGS

*In all: 4ppm ASE+ 36 ppm HCX+ 60 ppm ascorbic acid*

**In a straight dough process 30 ppm PGS resulted in equal volume, bloom and crumb structure compared to 0.3% DATEM**

# Conclusion

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Combination of different enzymes



Control

5 ppm ASE  
+ 30 ppm  
HCX

5 ppm ASE +  
30 ppm HCX  
+ 10 ppm  
GXZ +10  
ppm PGS

**Better :**

- **volume**
- **crumb texture**
- **crust color**

THANK YOU

