



# Usage and Benefits of Deactivated Yeast as an Alternative Reducing Agent in Industrial Baking

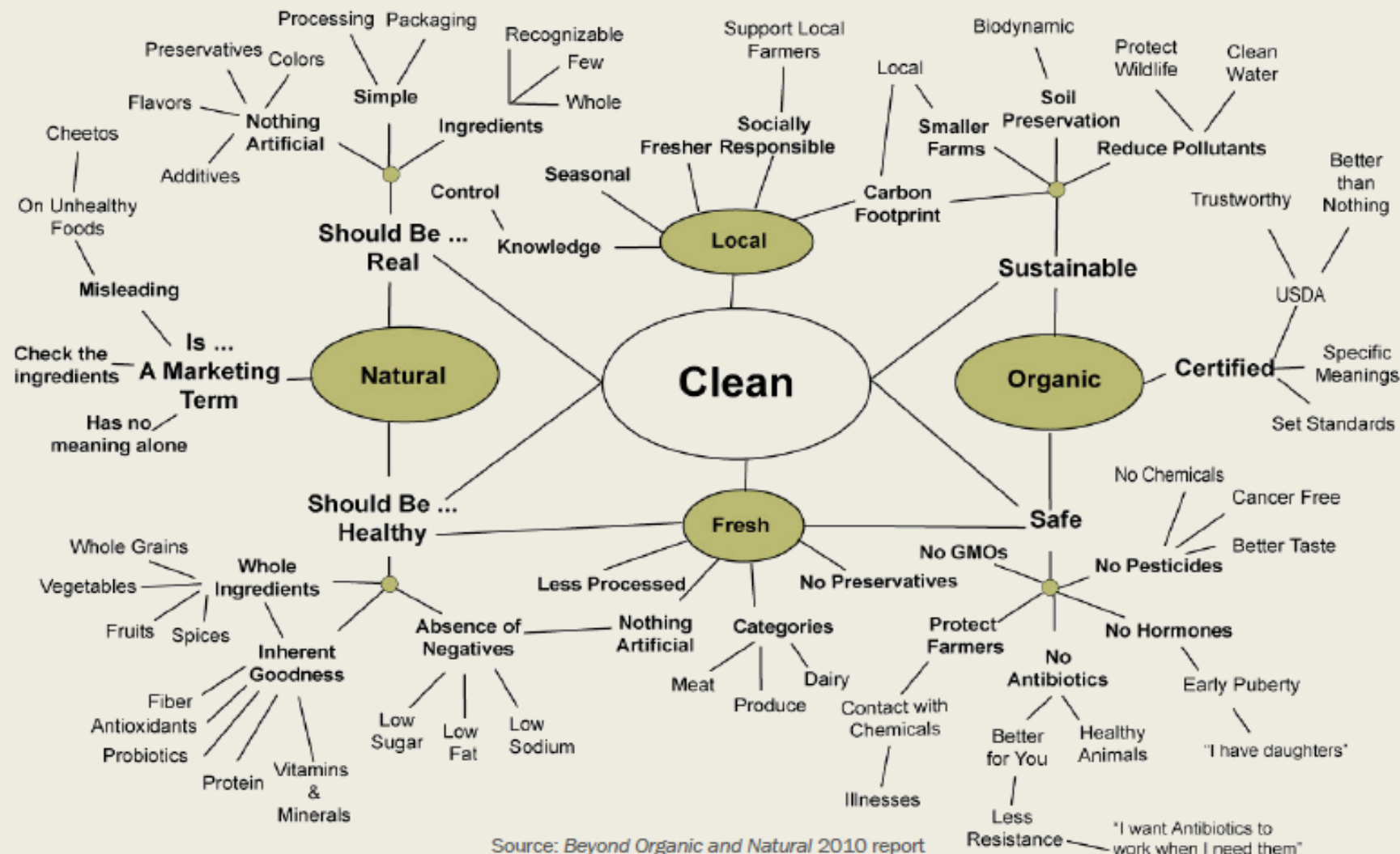
Sherrill Cropper, PhD  
Lesaffre Yeast Corporation – North America



North American Market:  
Consumers Want Clean Label

# BEYOND THE LABEL: WHAT CONSUMERS MEAN BY “CLEAN”

Clean encompasses a variety of attributes. Consumers seek more knowledge about the foods and beverages they purchase and look for products with a wide variety of specific attributes that ladder up to clean. Clean food encompasses a wide variety of attributes that consumers are seeking: clean production (organic, fair trade); clean processing (organic, natural); clean ingredient list (natural).



Source: *Beyond Organic and Natural 2010 report*

# Reducing Agent Options?

L-Cysteine

Protease

Bisulfite

(sodium metabisulfite or  
potassium metabisulfite)

Ascorbic Acid  
(when O<sub>2</sub> is  
removed)

Sorbic Acid

Fumaric Acid

Glutathione

Deactivated  
yeast

# What is Deactivated Yeast?

Baker's Yeast:  
Strain of  
*Saccharomyces  
cerevisiae*

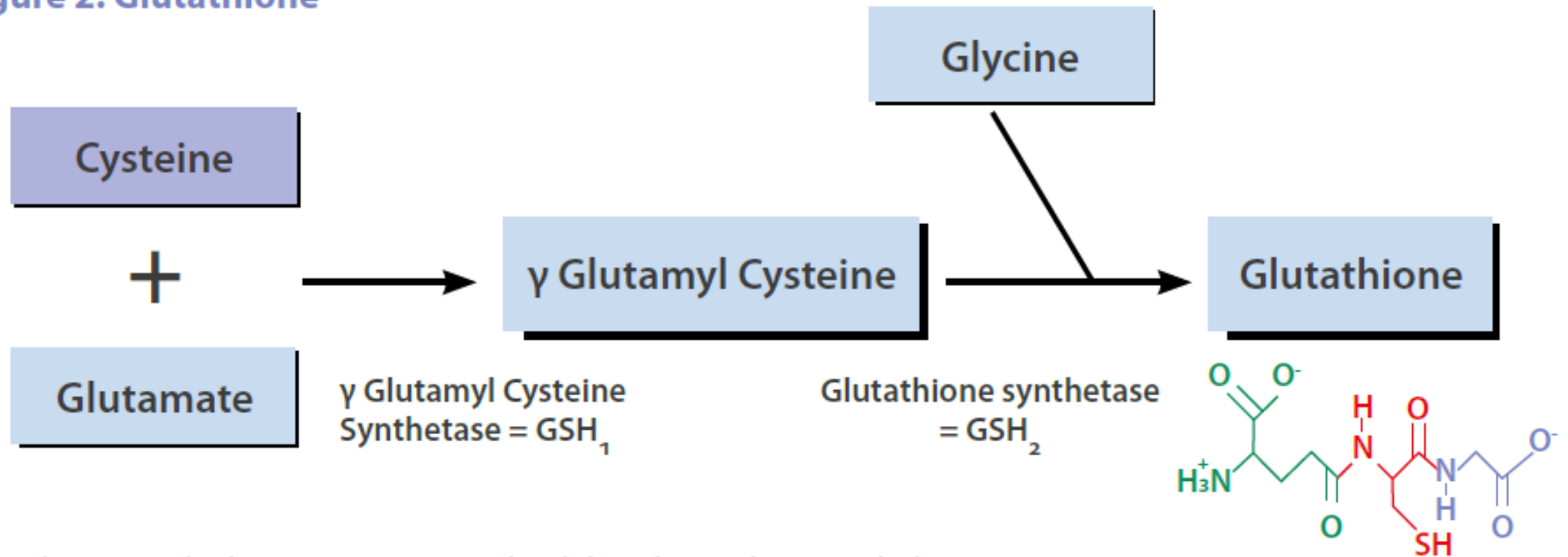
Heat Treated to  
Stop  
Fermentation  
Activity

Releases  
Glutathione –  
Component  
Providing the  
Reducing  
Effect

# Glutathione (GSH): What is it?

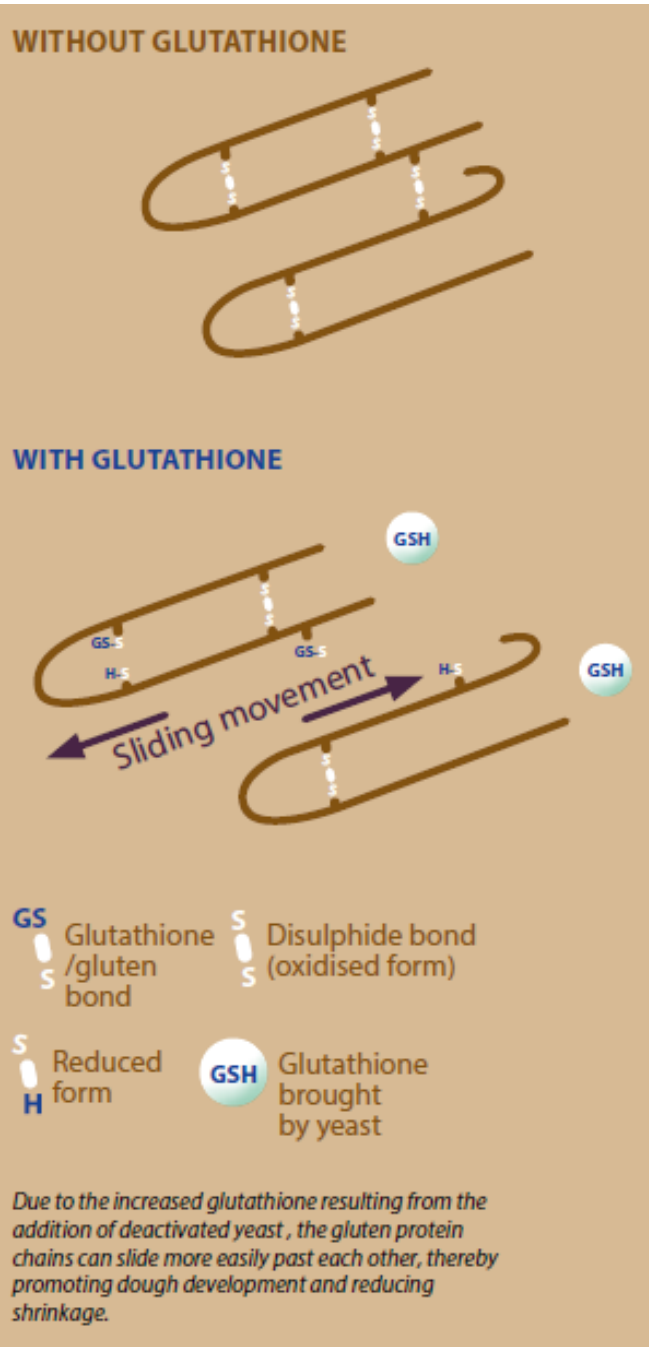
- Glutathione (GSH) is a tripeptide  
GLU-CYS-GLY
- Yeast is naturally rich in glutathione  
(GSH et GSSG)

Figure 2. Glutathione

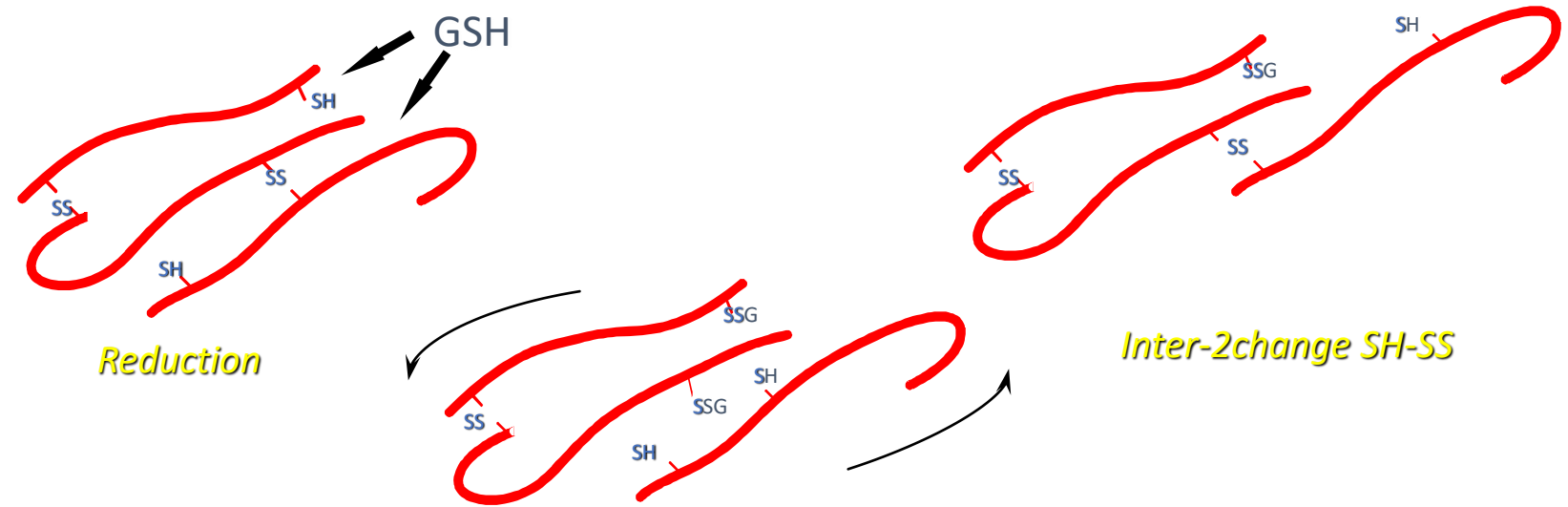


*Glutathione is a thiol-containing tripeptide: alpha-Glutamyl-cysteinyl-glycine.*

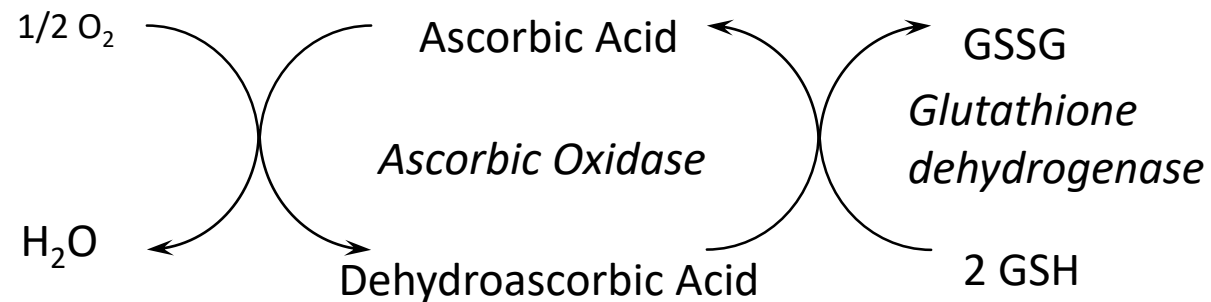
# How does Deactivated Yeast Work?



## 1- DIRECT ACTION ON GLUTEN



## 2 - ENZYMATIC REDUCTION OF DEHYDROASCORBIC ACID



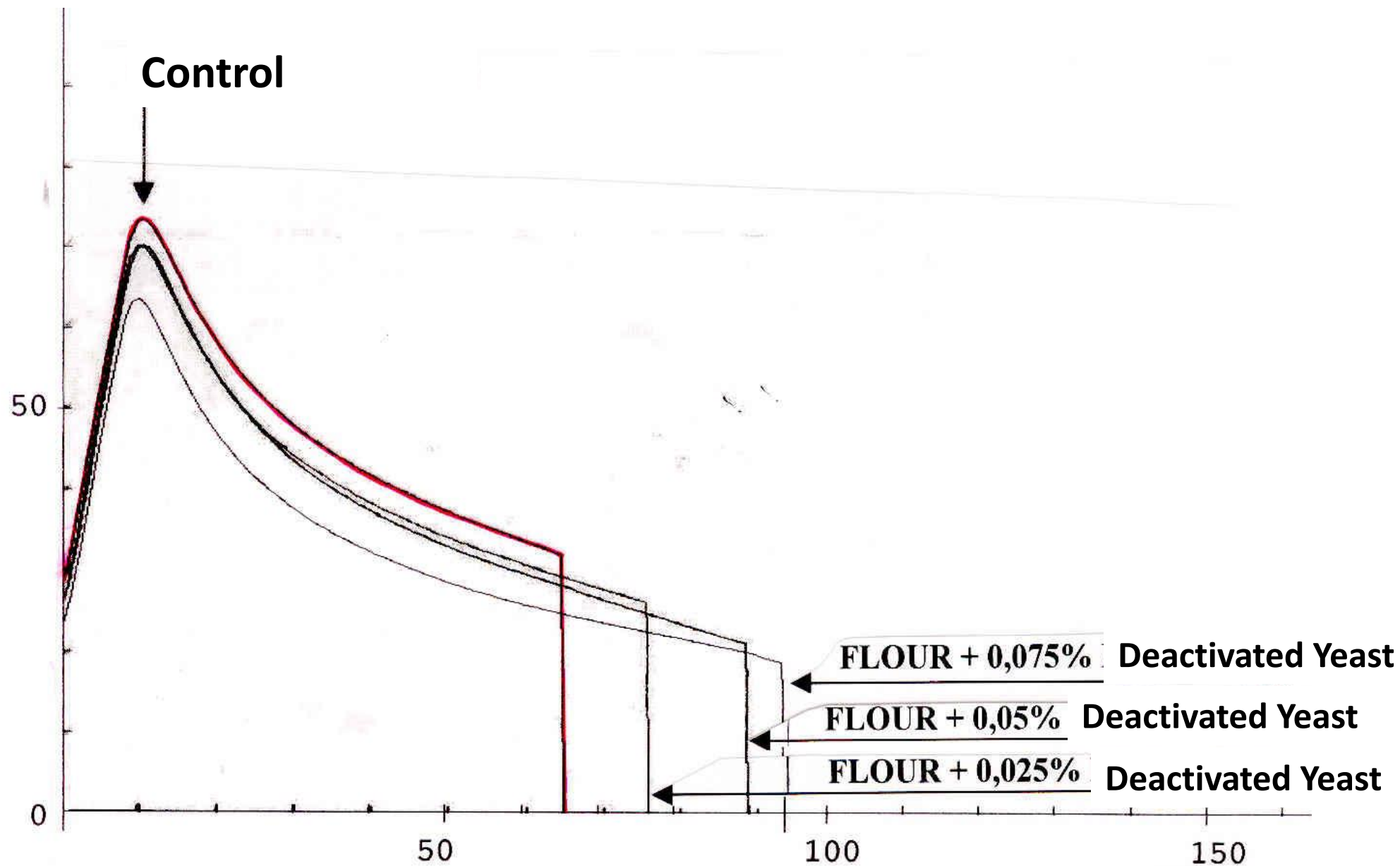
# Measurement of Performance

- Performance determined by NRP (Natural Reducing Power)
- The reducing power is measured by iodometric method
  - a method based on the oxidation of yeast reducing substances (mainly groups of sulfhydryl's (-SH)) of the cysteine and reduced glutathione
- The results are expressed in:
  - equivalent ppm of monochlorohydrate of L-cysteine needed to obtain 1% of deactivated yeast, in comparison with the flour.
- As an example 1% of DY is equivalent to 40 ppm – 200 ppm of L-cysteine.
  - Depends on the strain
  - Typically usage ranges from 0.10%-1.0%

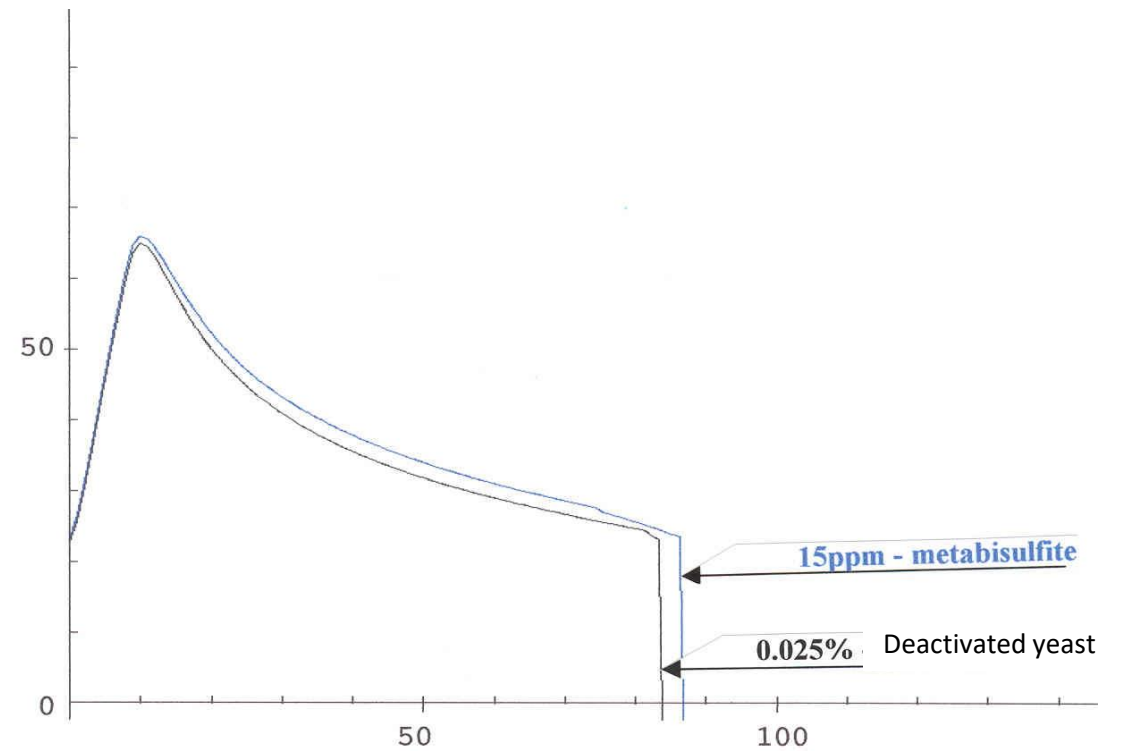
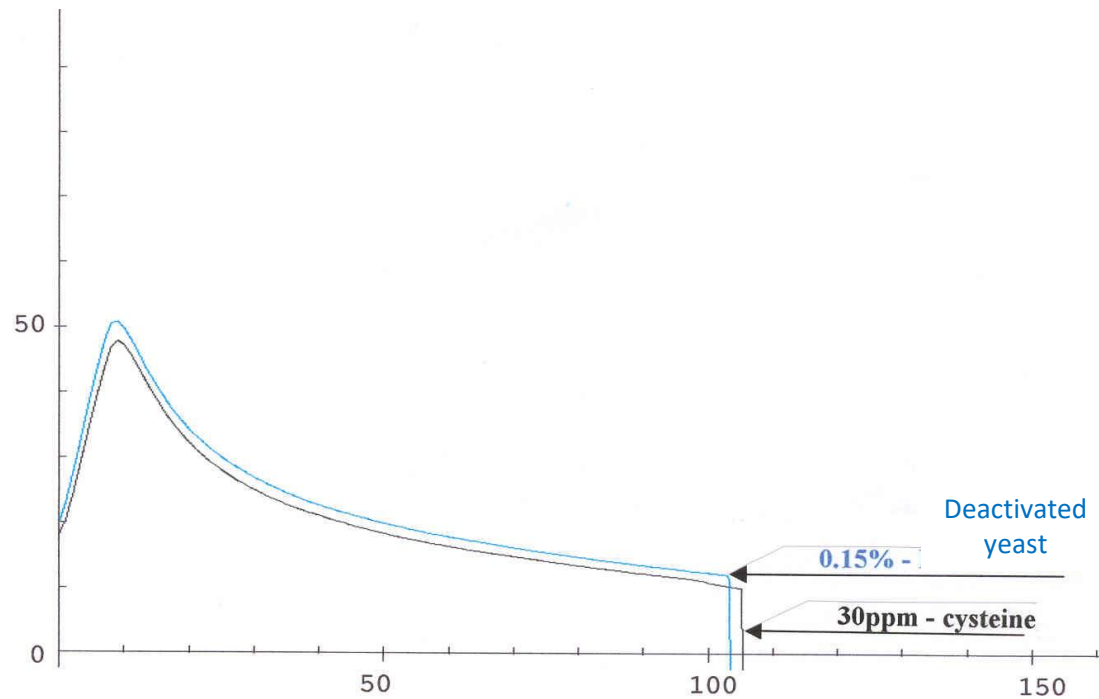
# Production of Deactivated Yeast

- Liquid yeast (standard or with a high reducing power)
- Heat treated
  - Pasteurization step
  - Inhibits the yeast's ability to undergo fermentation and create CO<sub>2</sub> gasses
  - Glutathione is released
- Drying
  - The deactivated yeast is stabilized in powder form (95% dry matter)





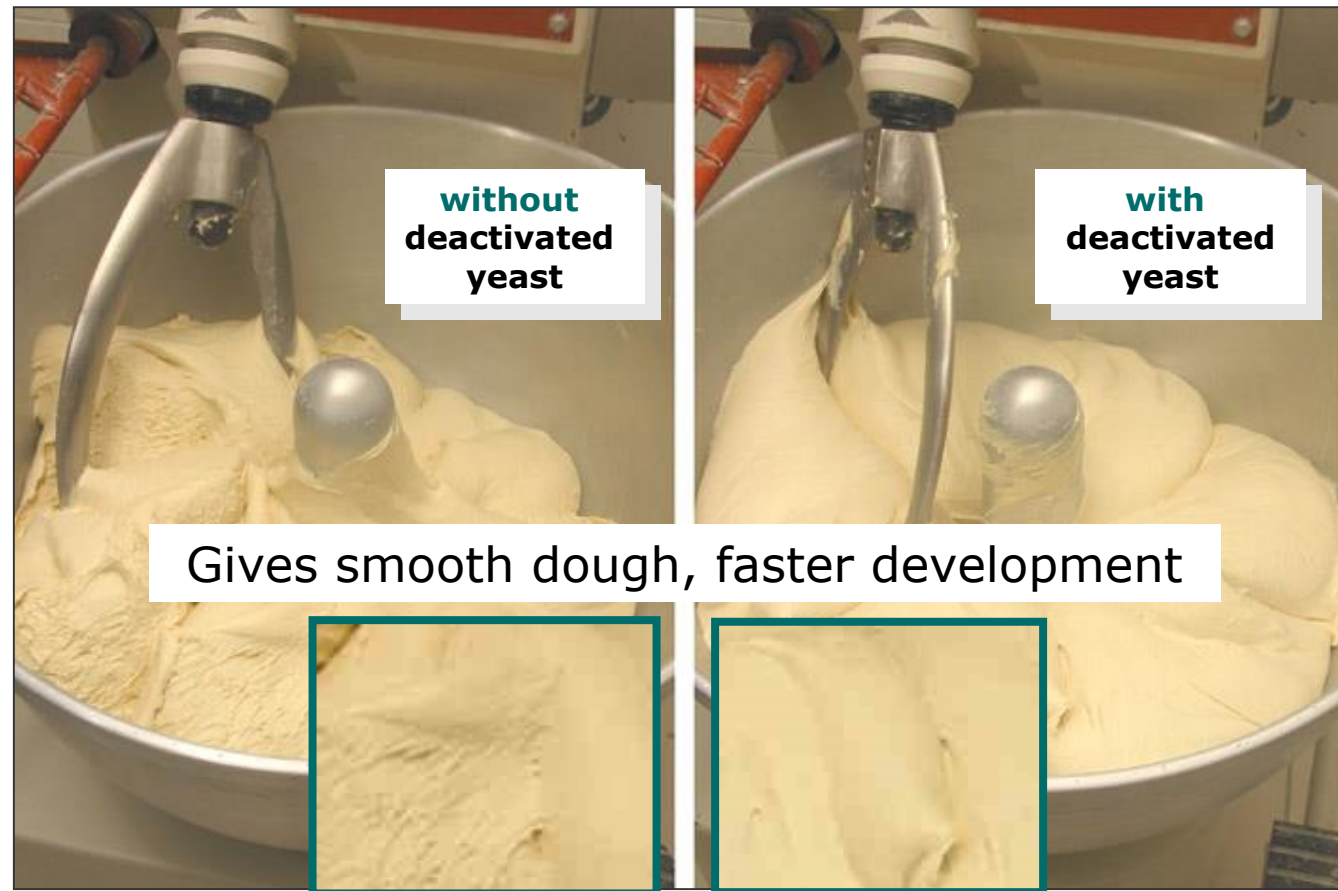
Alveograph measurements of different levels of deactivated yeast compared to a Control (no DY)



Alveograph measurements of Deactivated Yeast vs. L-Cysteine and Sodium Metabisulfite

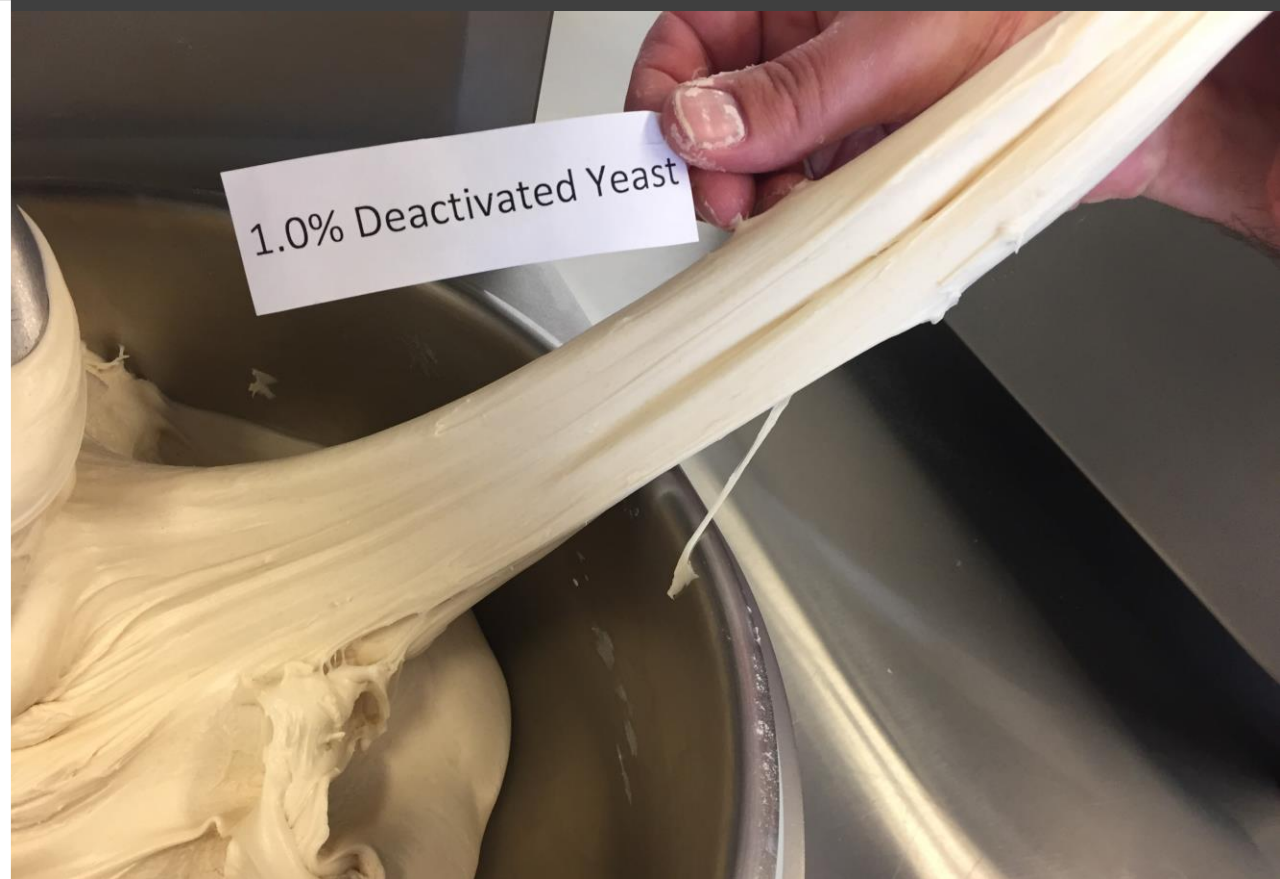
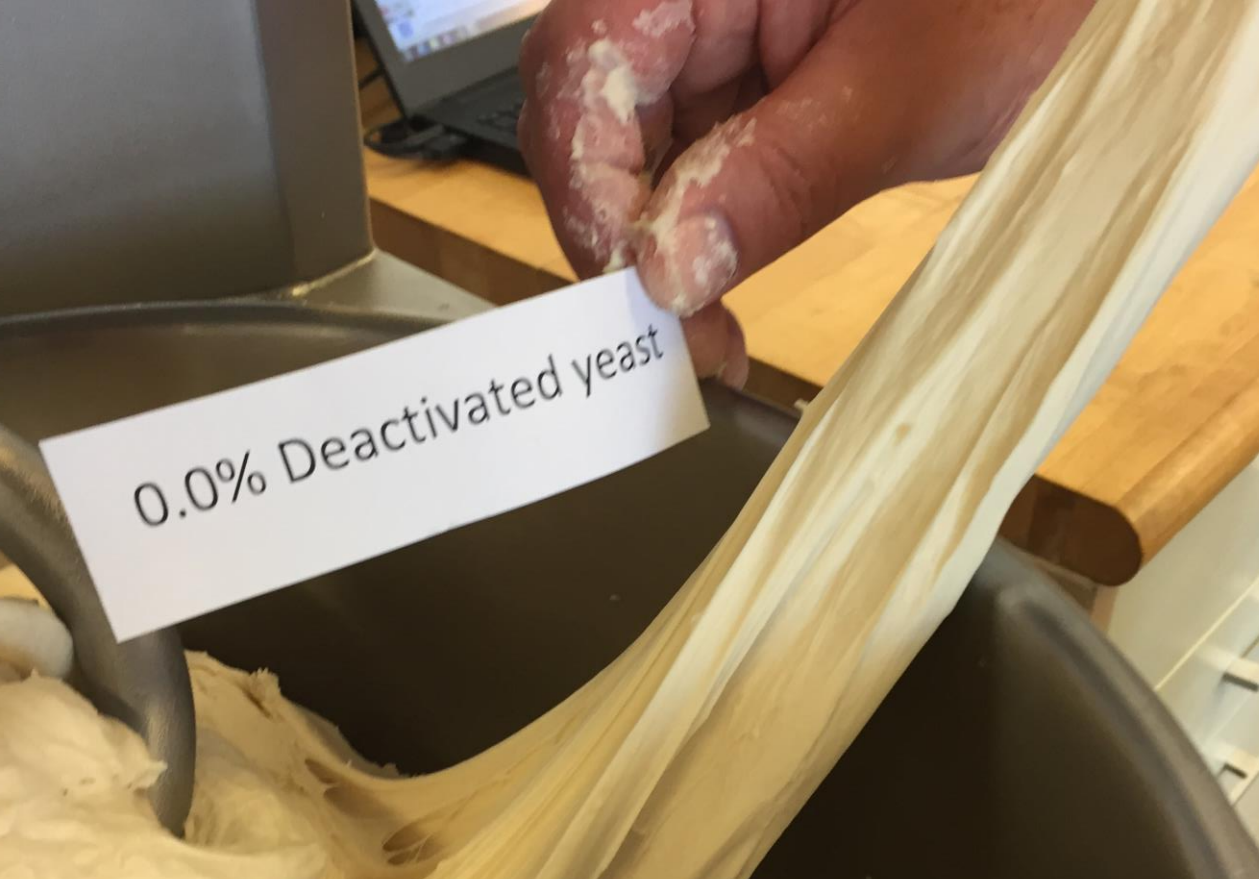
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# Benefits of Deactivated Yeast: Mixing



Like other reducing agents, helps to shorten mixing time

Mixing	Resting	Scaling	Relaxing	Moulding	Final proof	Baking	Finished product
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# Changes in Elasticity and Extensibility of the Dough

# Benefits of Deactivated Yeast: Resting, Scaling, and Relaxing

- DY reaction is not continuous, requires mechanical action, unlike protease and L-Cysteine
  - Gluten disulfide bonds aren't continued to be broken down, prevents over-relaxation of dough
- More consistent dough weights during scaling
- Reducing time required for relaxing the dough



# Benefits of Deactivated Yeast: Moulding

## Moulder

Increase extensibility and reduces elasticity



More consistency in shaping

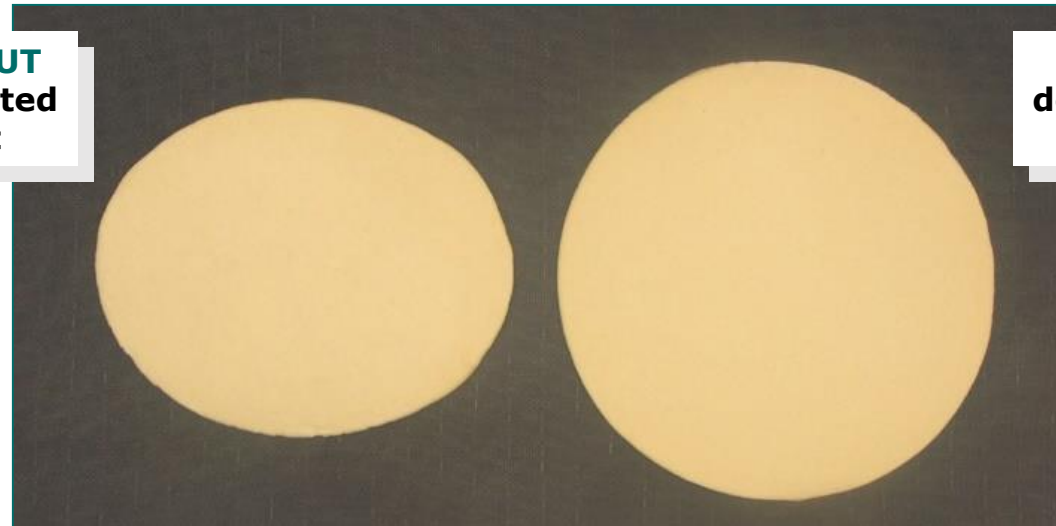
Mixing	Resting	Scaling	Relaxing	Moulding	Final proof	Baking	Finished product
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# Benefits of Deactivated Yeast: Moulding

Makes lamination easier  
during sheeting

**WITHOUT**  
deactivated  
yeast



**WITH**  
deactivated  
yeast



# Benefits of Deactivated Yeast: Moulding

Improves shape consistency and standardizes the size of the product in industrial manufacturing

**WITHOUT**  
deactivated  
yeast



8 inch retail flour tortilla

**WITHOUT**  
deactivated  
yeast



12 inch retail flour tortilla

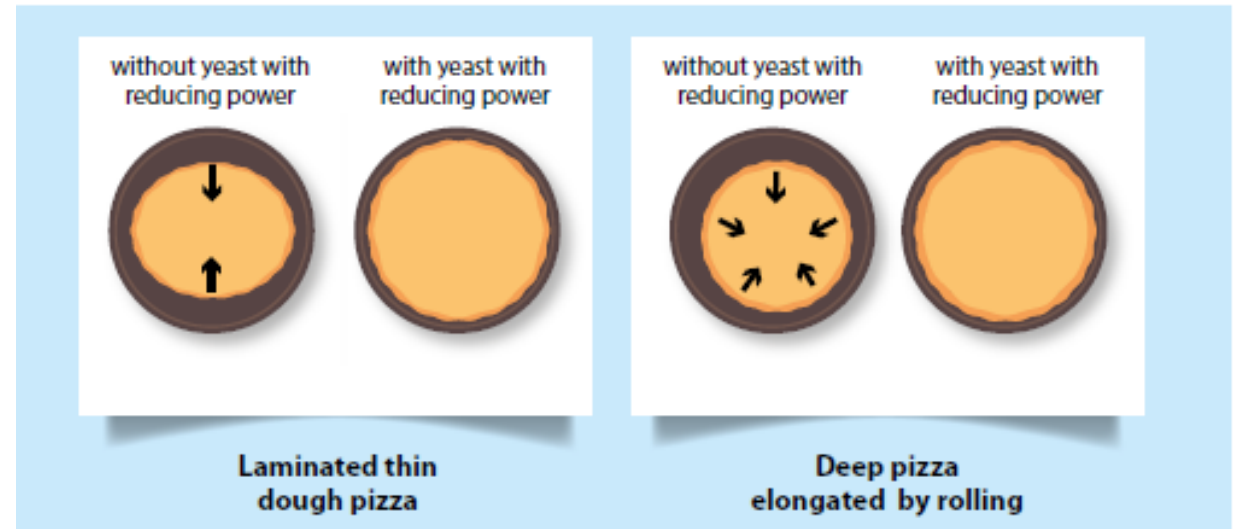
**WITH**  
deactivated  
yeast

**WITH**  
deactivated  
yeast



# Benefits of Deactivated Yeast: Moulding

Helps to reduce shrinkage and dough tearing



# Benefits of Deactivated Yeast: Final Product

- Consistency of shape and color
- Can enhance yeast flavor (certain strains)



Control –No DY    40 ppm L-Cysteine    0.25% Deactivated Yeast – A    0.25% Deactivated Yeast – B

Mixing	Resting	Scaling	Relaxing	Moulding	Final proof	Baking	Finished product
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# What products can Deactivated Yeast Be Used In?



# Conclusion: Advantages Recap

- Not a continuous reaction like protease or L-Cysteine
  - More tolerant during production stops or equipment break downs
- Reduces mixing time
- “Label friendly” for consumers
- Manufactured from yeast (*Saccharomyces cerevisiae*)
- Provides a more consistent end product
- NonGMO and Kosher
- Don’t need to add another ingredient to the label if already using yeast
  - Labeled as “yeast” or “inactive yeast”