

# Wheat Quality Determination

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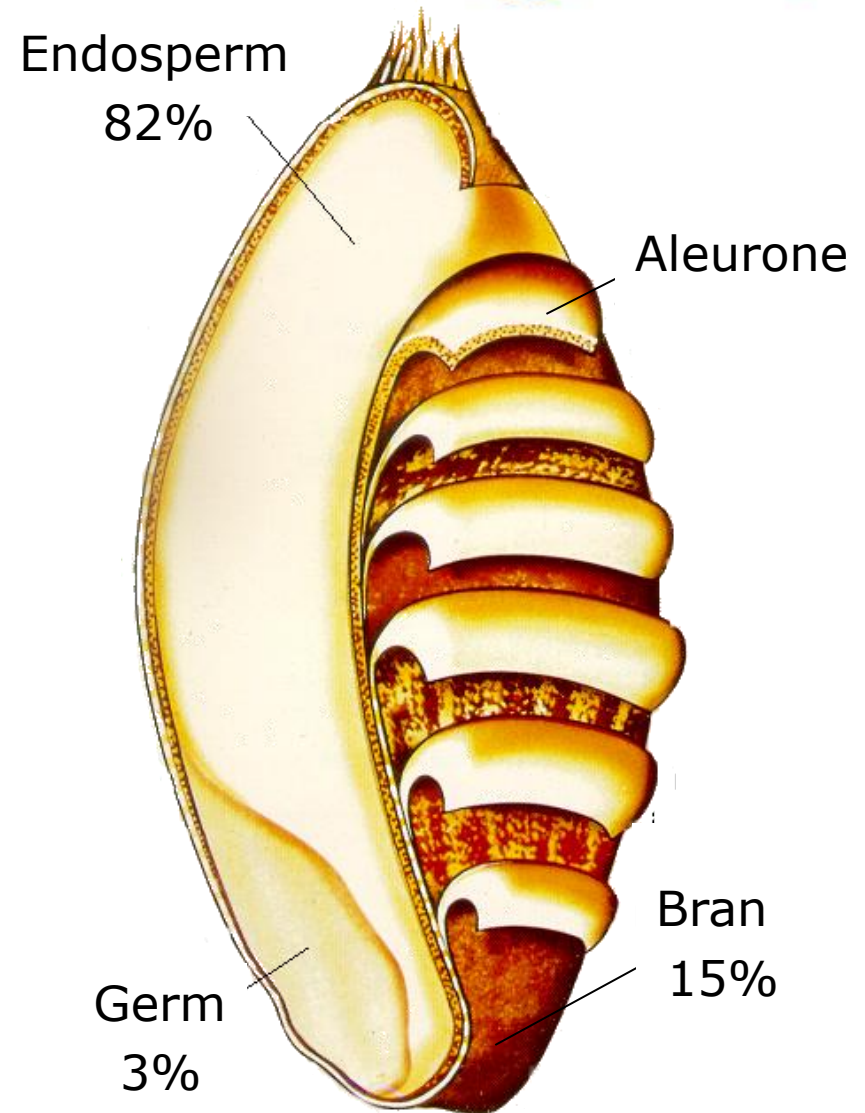
GrainCorp



# Kernel Structure

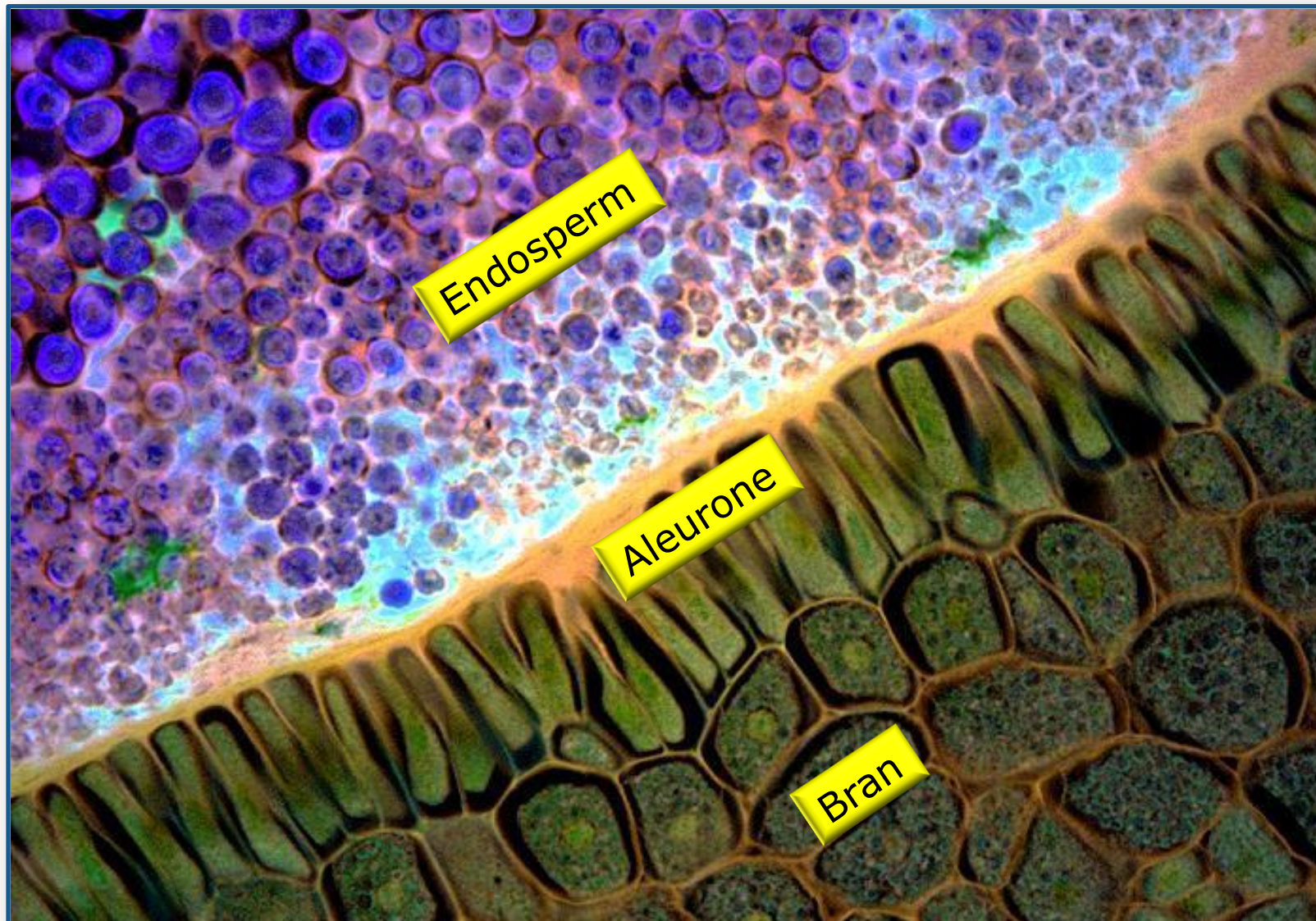


Flour is the product obtained by grinding wheat kernels. The kernel consists of three distinct parts: bran, the outer covering of the grain; germ, the embryo contained inside the kernel; and endosperm, the part of the kernel that makes white flour. During milling, the three parts are separated and recombined accordingly to achieve different types of flours.



# Kernel Structure

“A closer look”



# Milling Wheat



Comes in 3 types:

**1.Hard**



**2.Medium**



**3.Soft**



# Selection Of Right Wheat

- It is difficult to predict the expected **wet gluten** % while selecting wheat (based on its **protein** level)
- Focus of this presentation is to study a **correlation** to find out the possible wet gluten content of the milled flour, which would ease a decision to get the right protein wheat



# Extraction Rate v Grist Rate



- **Extraction Rate % =**  
[Straight Run Flour ÷ Wheat to 1<sup>st</sup> Break] x 100
- **Grist Rate % =**  
Tons of un-cleaned wheat required to make 1 ton of flour



# What is the Best Flour?



- The best flour is one that corresponds exactly to the needs of the customers
- White wheat normally gives 5-8% higher extraction than red wheat

**WHITE**



**RED**



# Testing Protocols



Over 400 wheat samples from Eastern Australia were milled in a lab mill for this project over 3 seasons

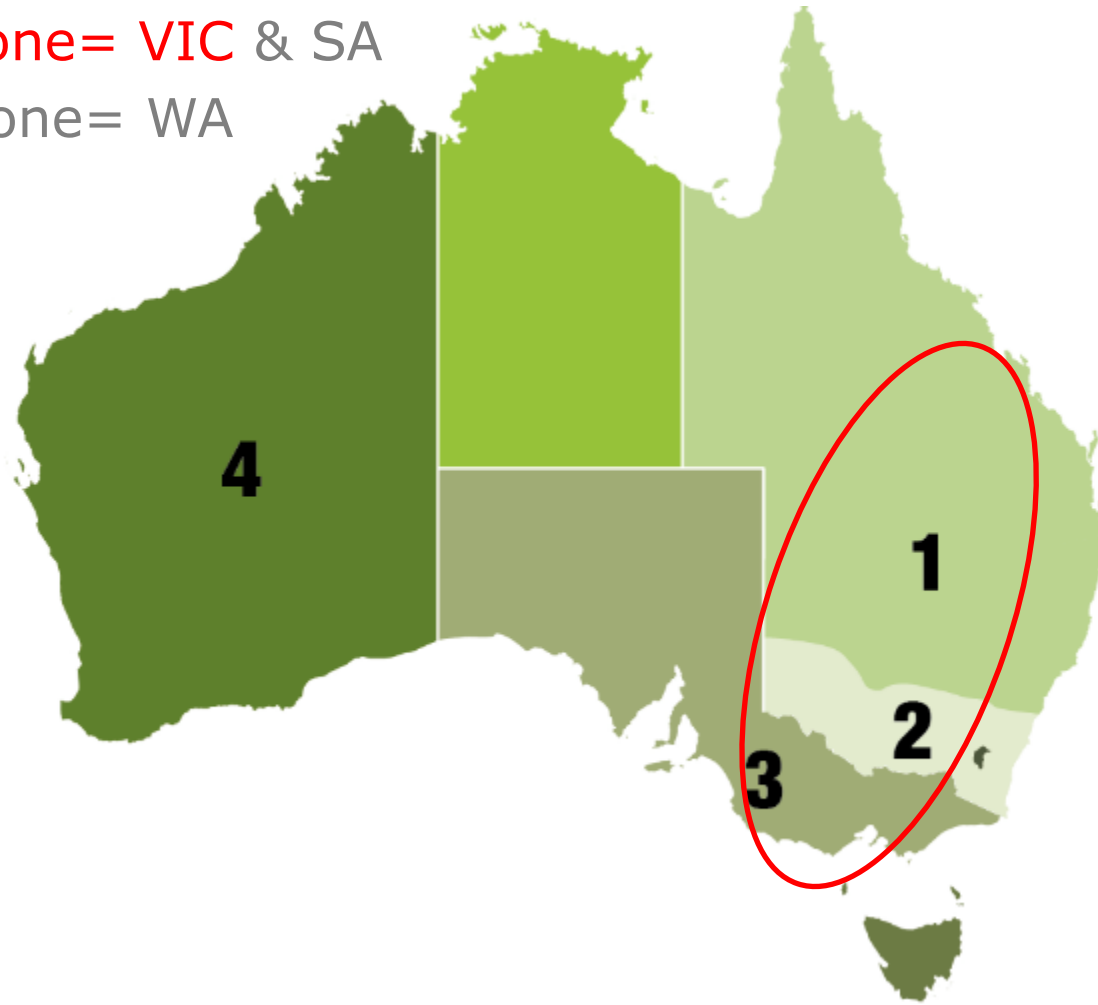




# Australian Classification Zones



1. Northern Zone= QLD, NNSW & CNSW
2. South Eastern Zone= SNSW
3. Sothern Zone= VIC & SA
4. Western Zone= WA

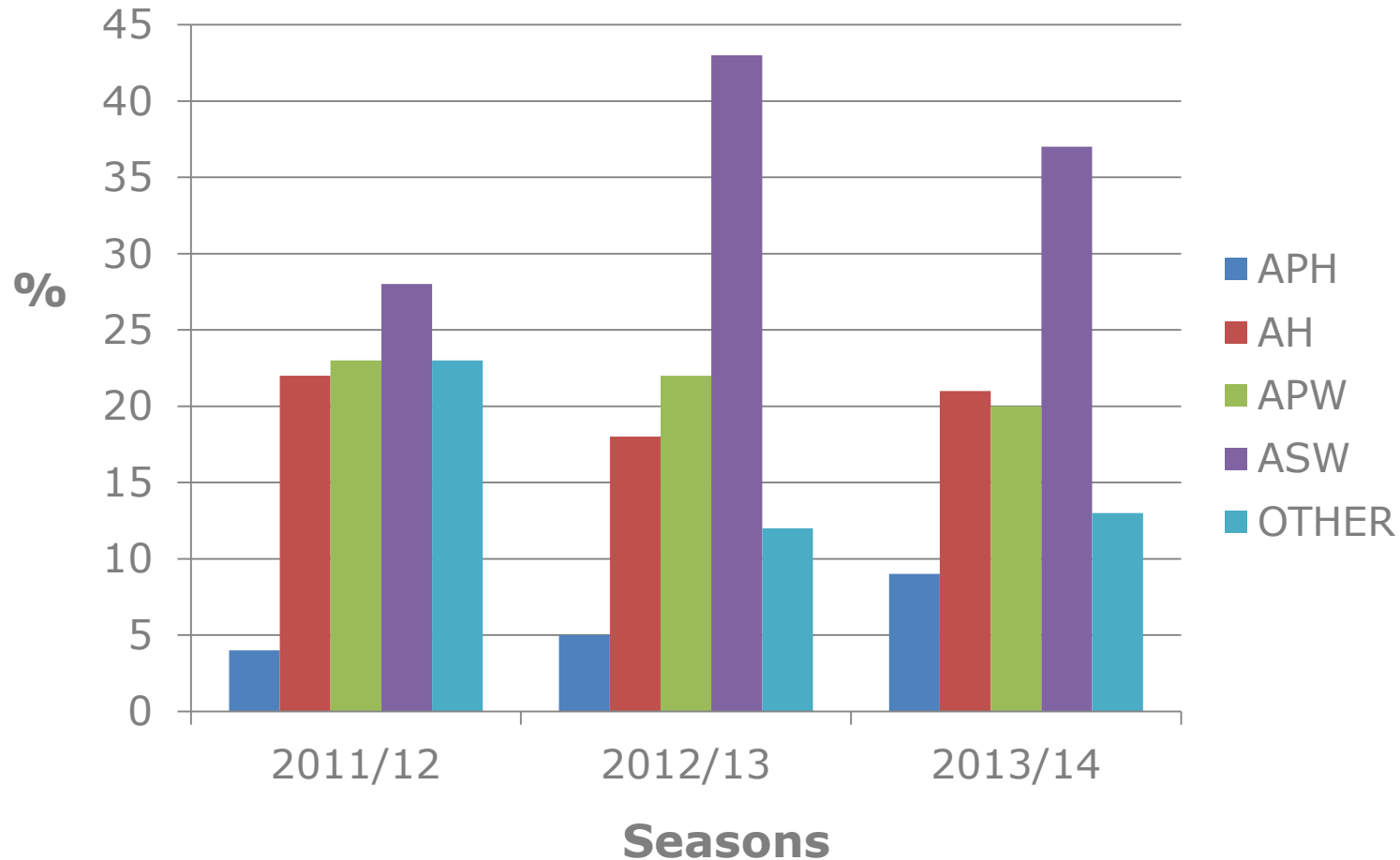


# Test Wheat-Specification



Class	*	Australian Prime Hard	Australian Hard		Australian Premium White	Australian Standard White
Bin Grade	*	APH2	H1	H2	APW1	ASW1
Moisture	max	12.5	12.5	12.5	12.5	12.5
Protein	min	13	13	11.5	10.5	*
Test Weight	min	76	76	76	76	76
Screenings	max	5	5	5	5	5
Falling #	min	350	300	300	300	300

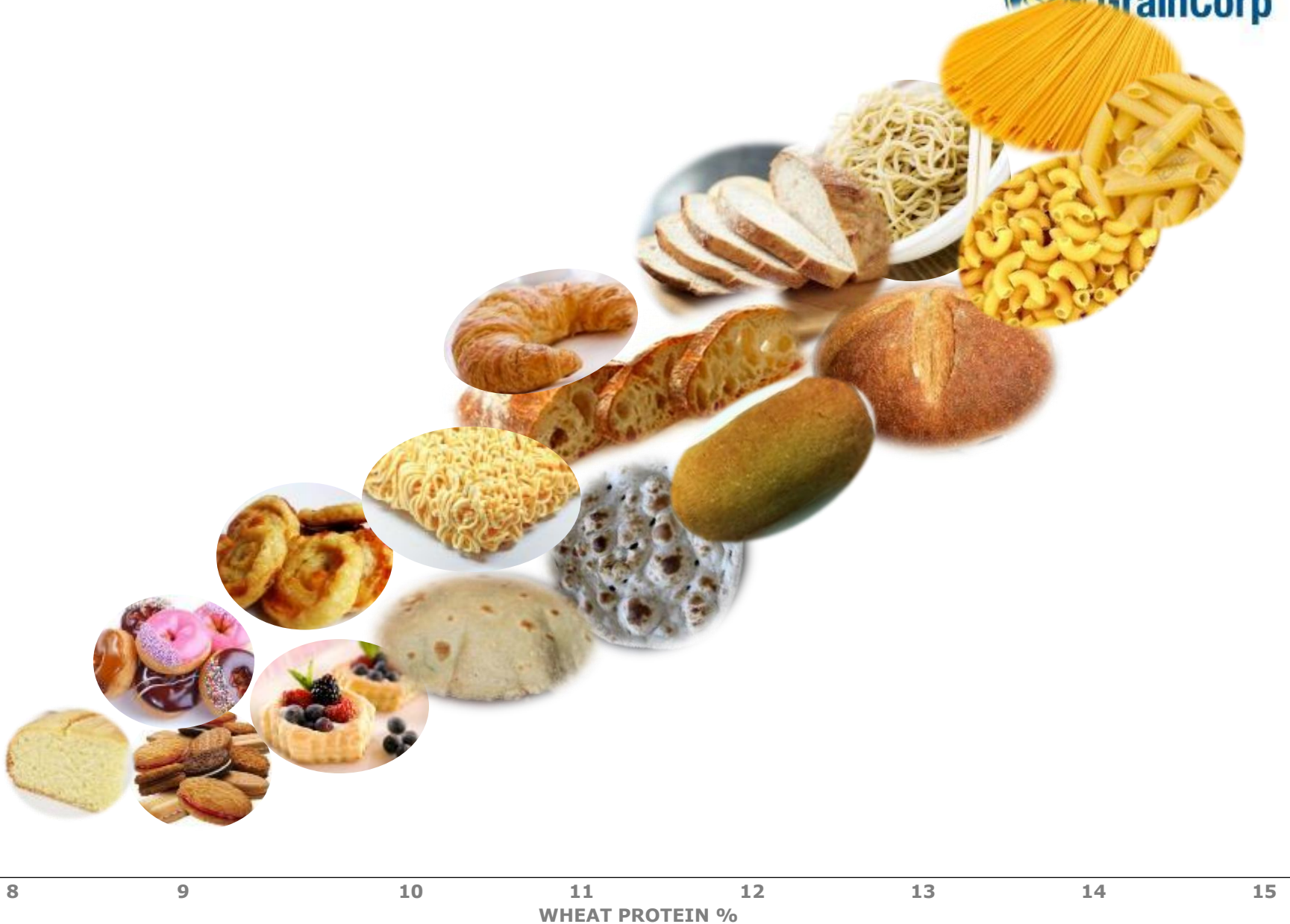
# Eastern Australian Wheat by Grade (%) during 3 Seasons



# Products from Australian Wheat



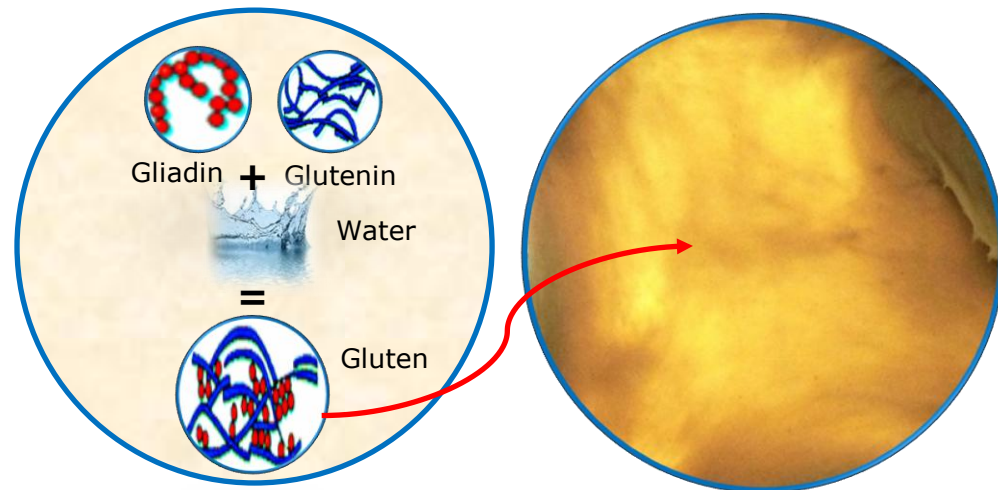
Australian Soft  
Australian Standard White  
Australian Premium White  
Australian Hard  
Australian Prime Hard  
Australian Durum



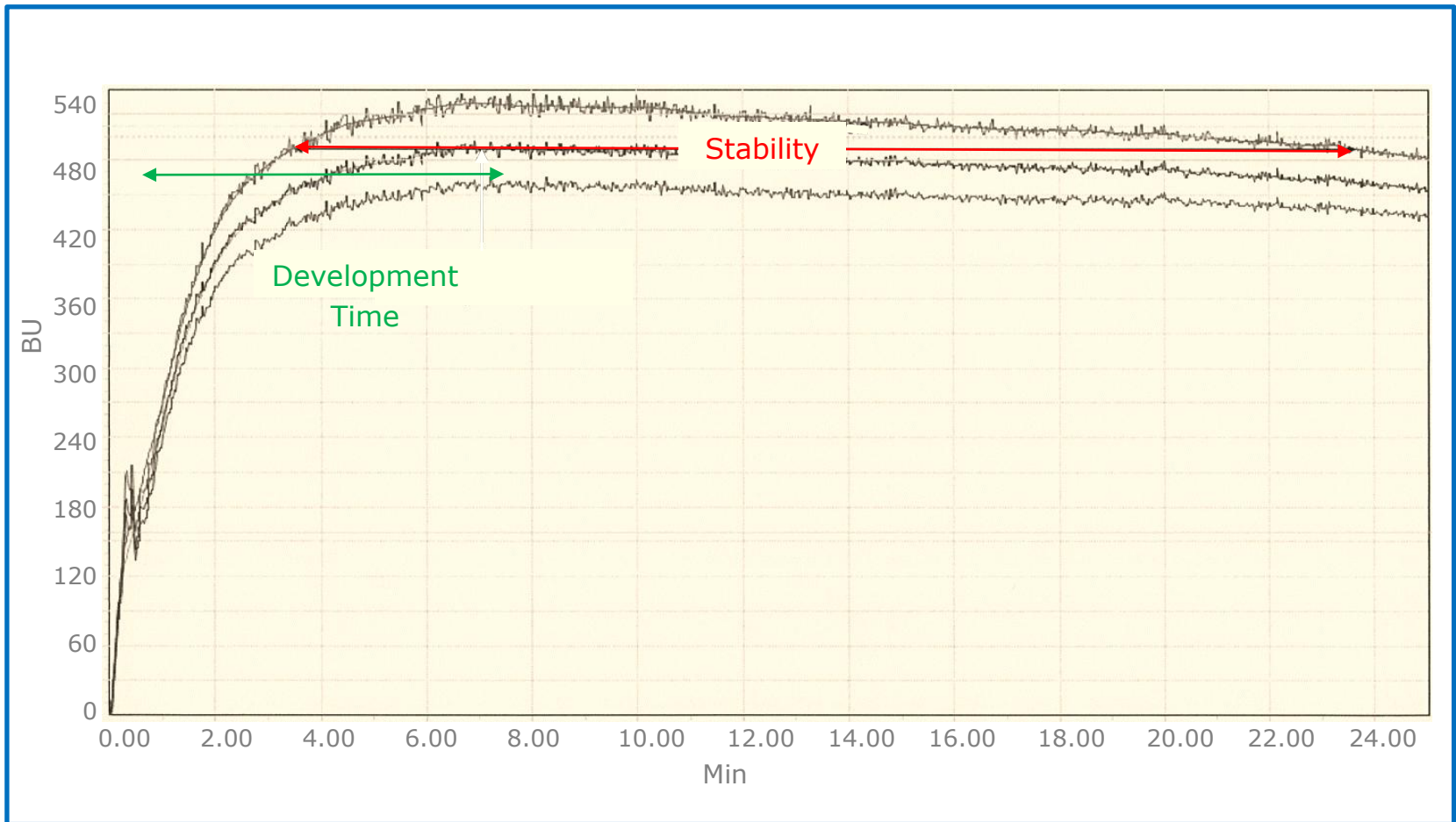
# Gluten



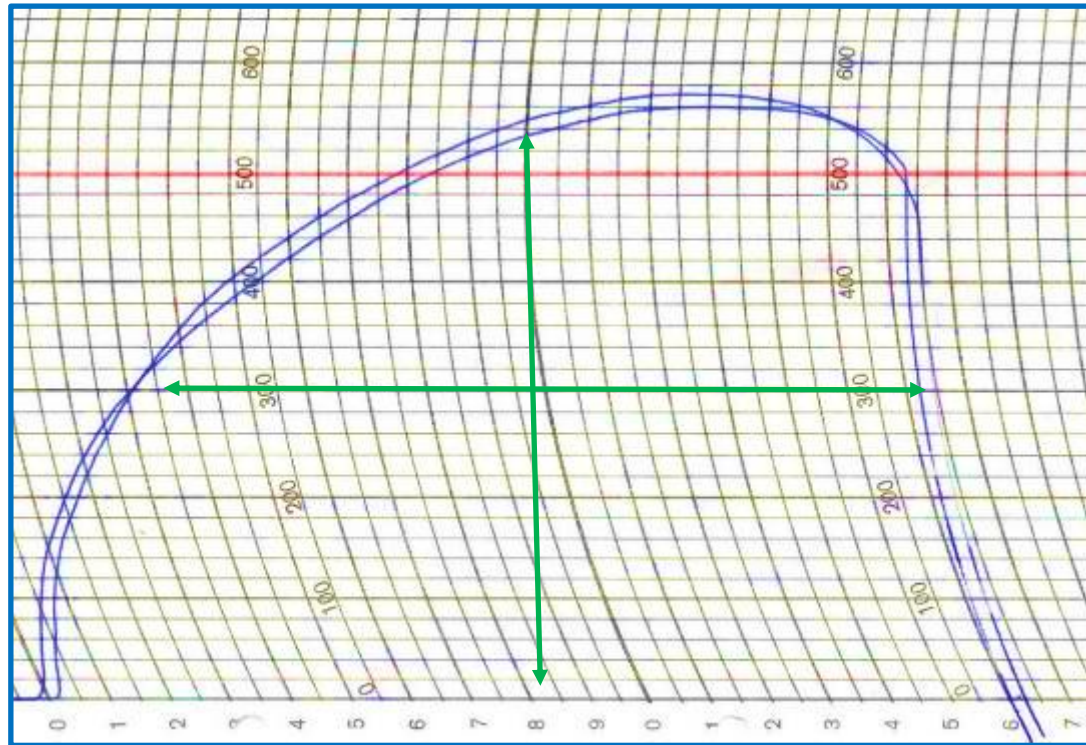
- Oddly enough, freshly milled wheat flour **does not** contain gluten
- It contains two proteins (**gliadin** & **glutenin**), which turn into gluten when they come in contact with water
- Gluten strengthens & binds dough in baking, makes dough "doughy" & helps dough to rise
- Gluten quality = Protein quality
- It provides:
  - Extensibility
  - Elasticity
  - Gas retention



# Optimum Flour

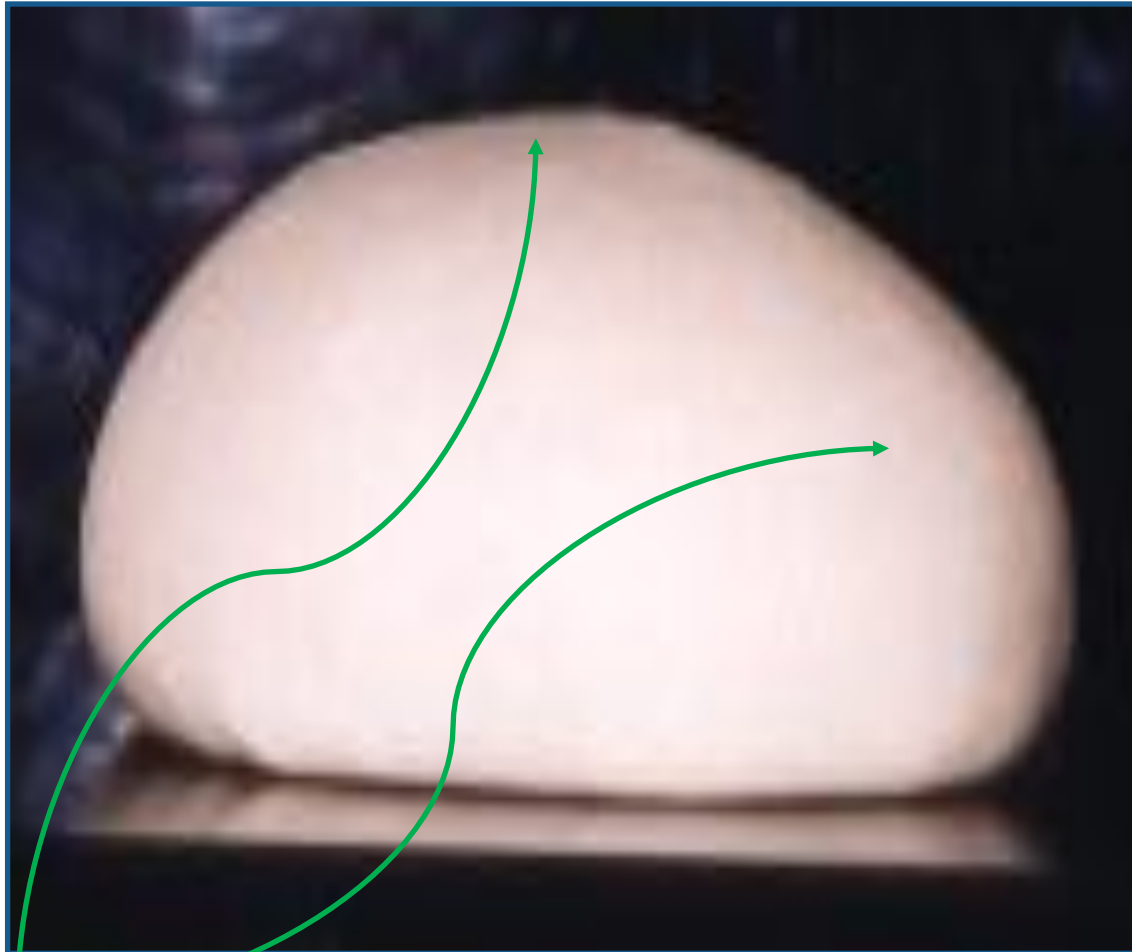


# Optimum Flour



Well Developed Curve

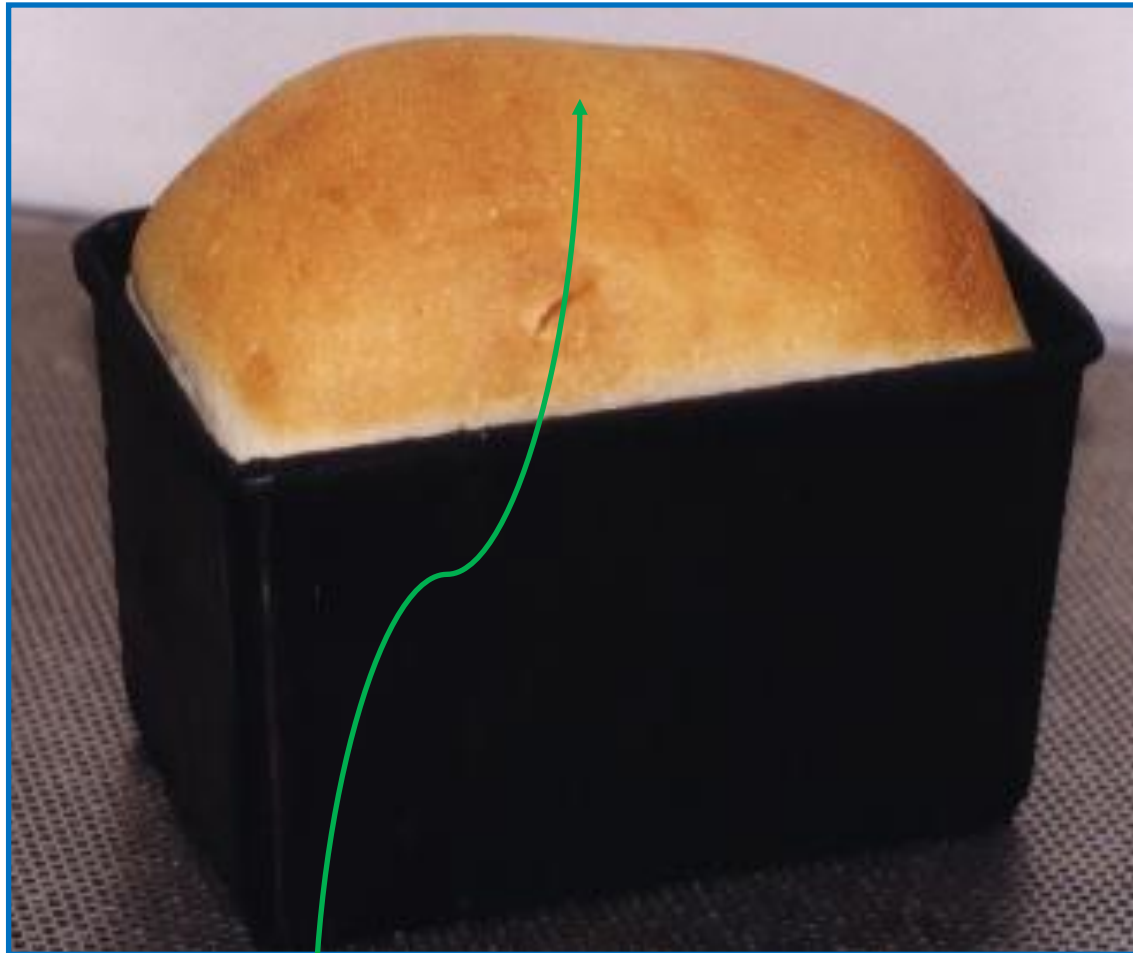
# Optimum Flour



Suitable for long fermentation  
& Good in tolerance

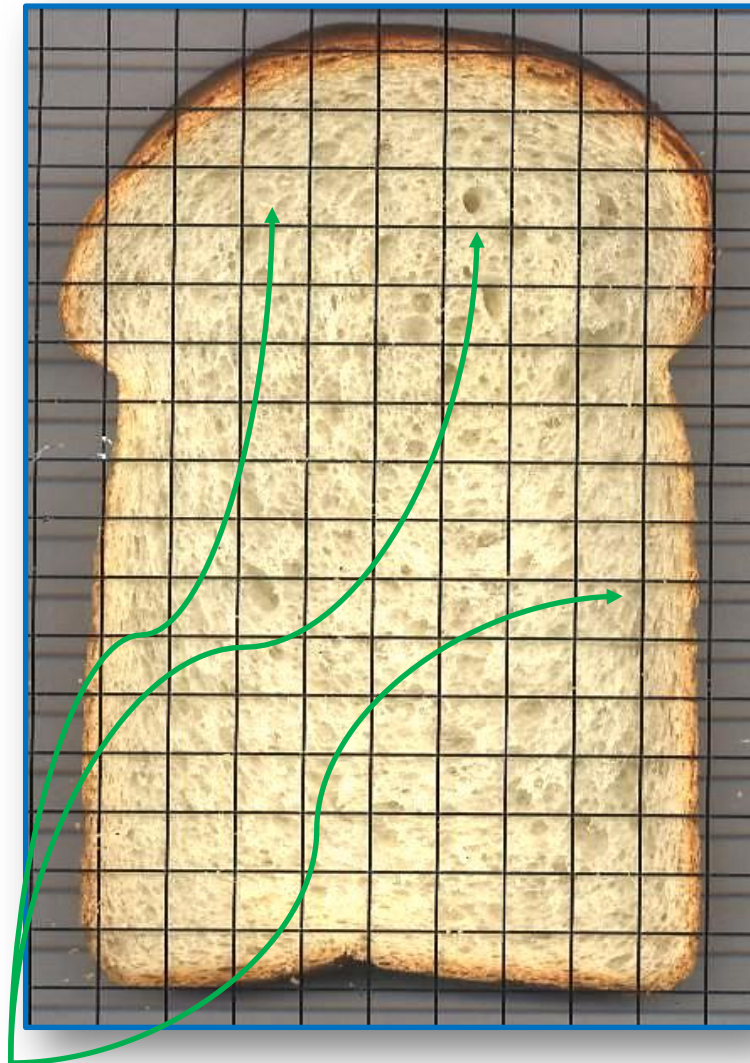


# Optimum Flour



Good in volume

# Optimum Flour



Smooth texture, Smooth structure & High volume

# High Resistance & Low Extensibility Flour



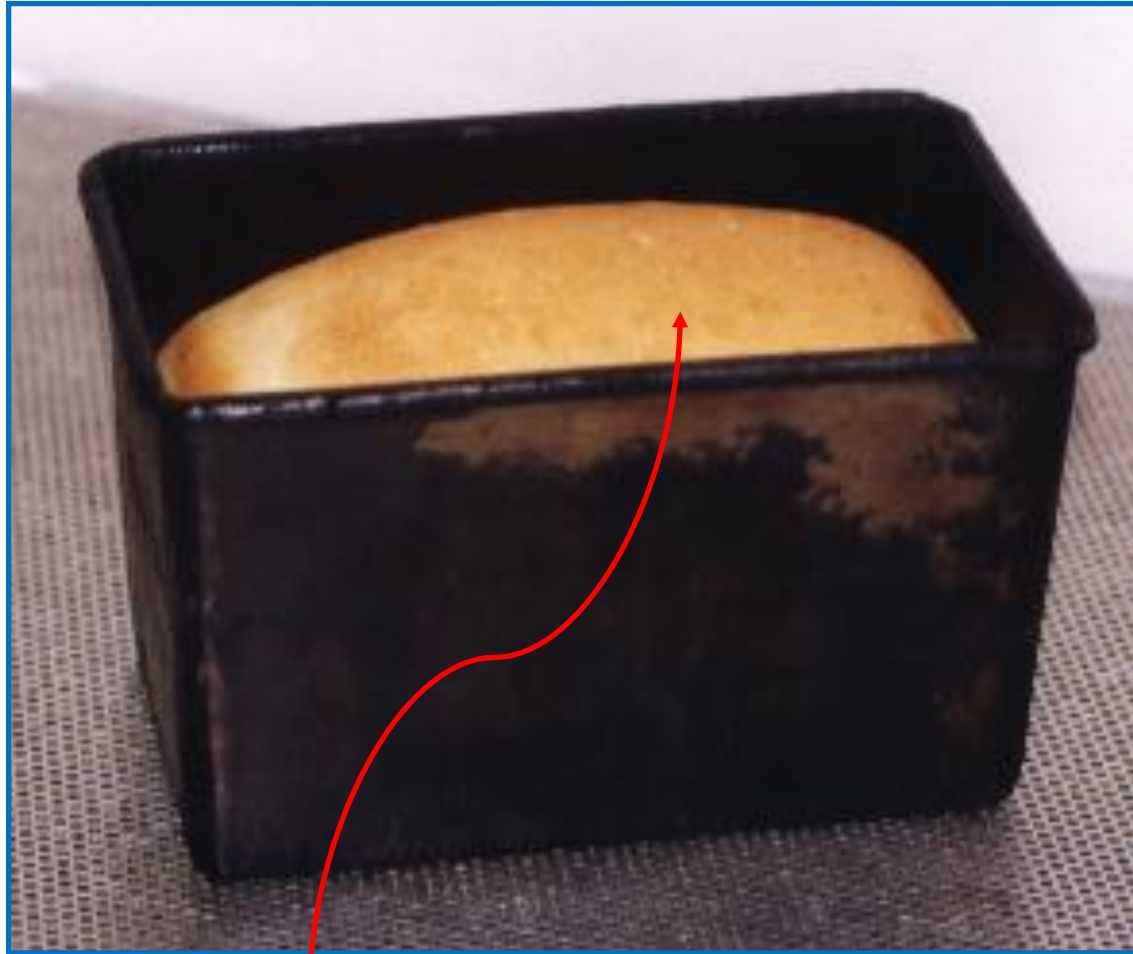
Short Curve

# High Resistance & Low Extensibility Flour



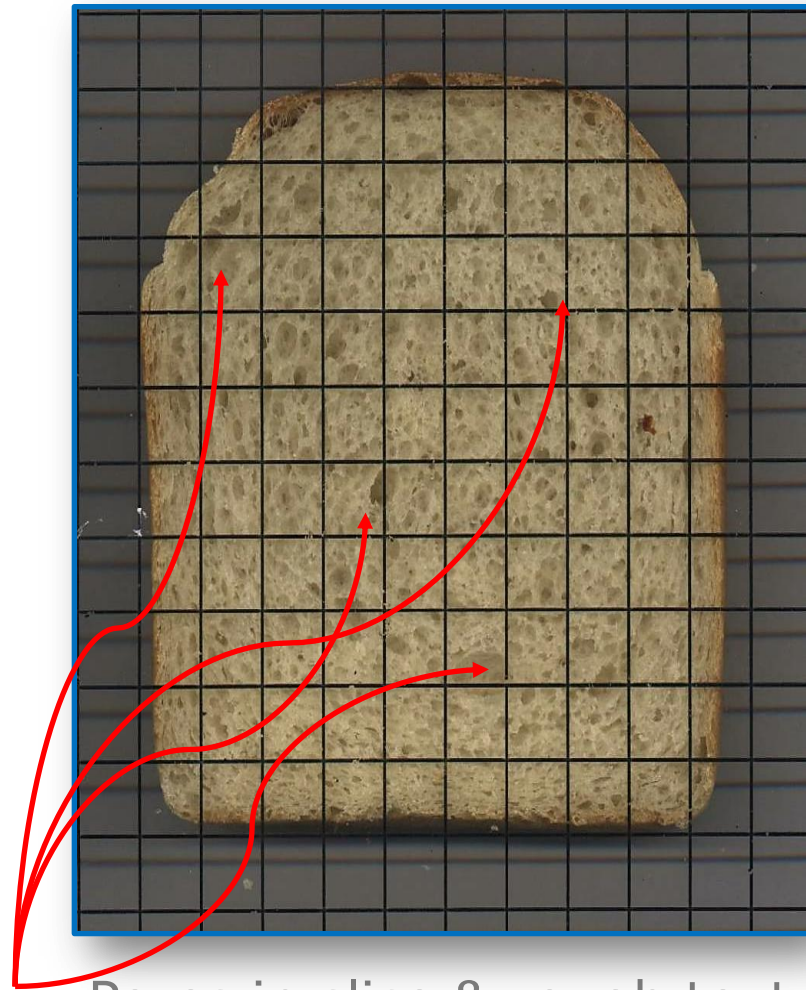
Weakens during fermentation &  
Collapses when over fermented

# High Resistance & Low Extensibility Flour



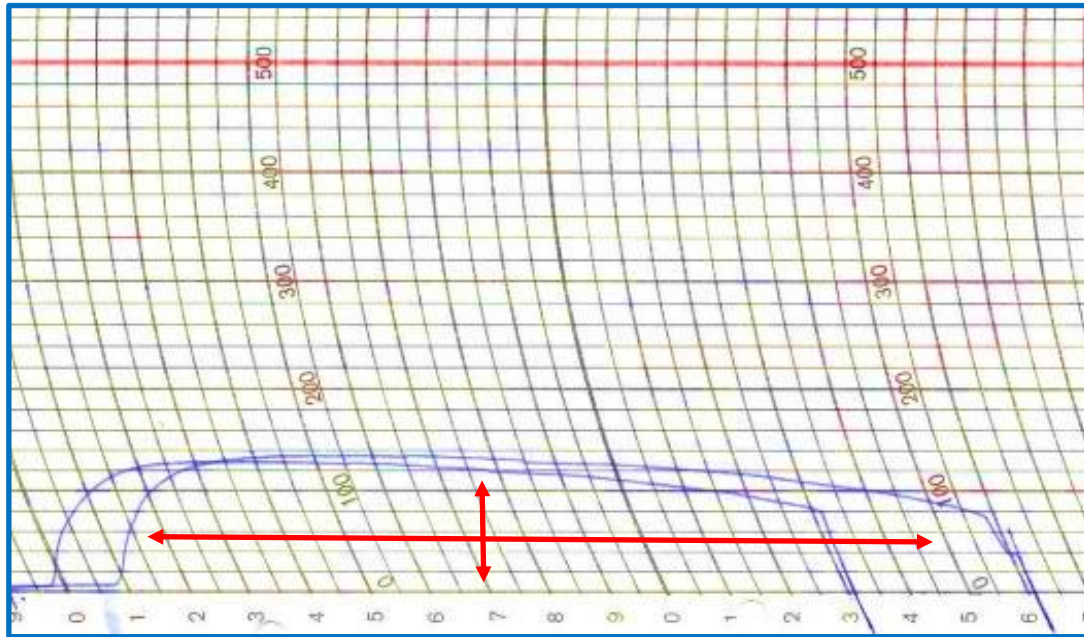
Flattened bread

# High Resistance & Low Extensibility Flour



Pores in slice & rough texture

# Less Elastic & Highly Extensible Flour



Weak & Inelastic

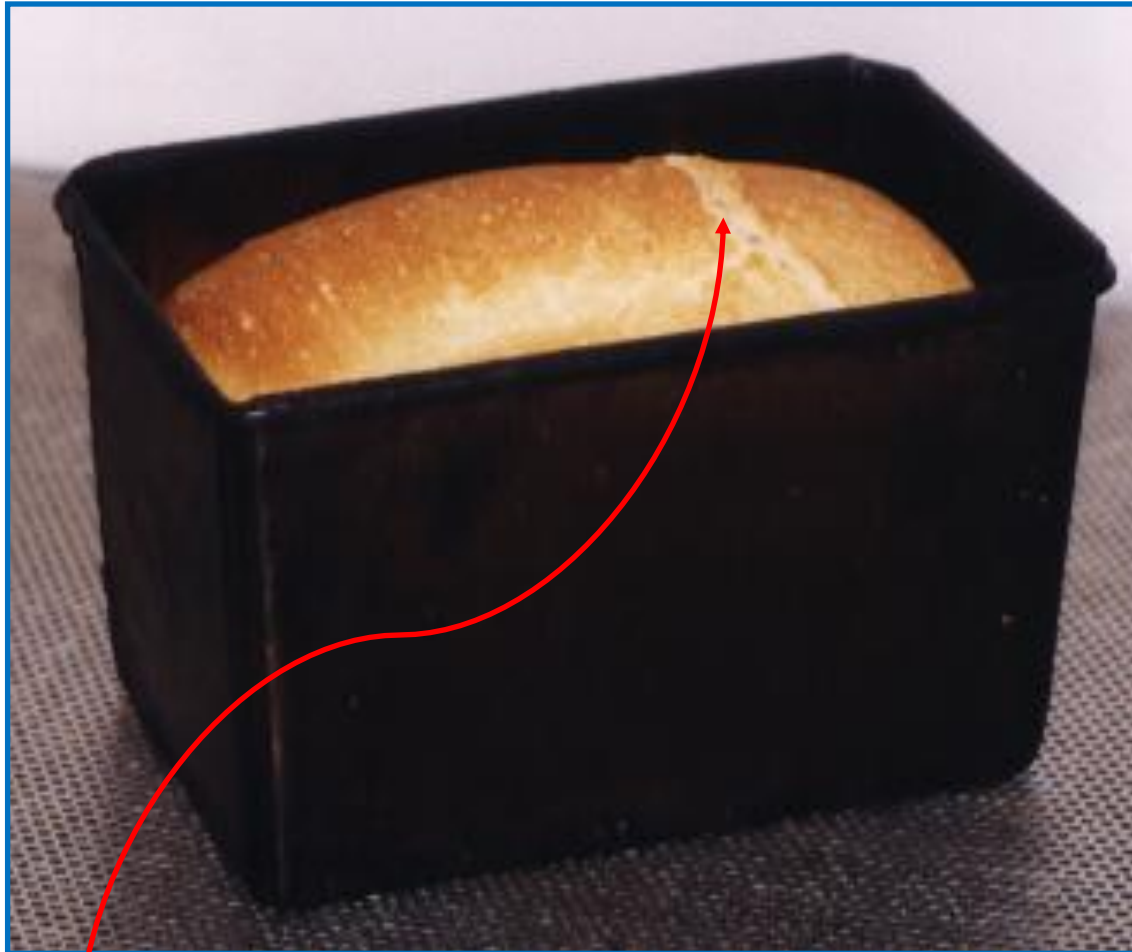
# Less Elastic & Highly Extensible Flour



Low fermentation without volume & lifeless dough

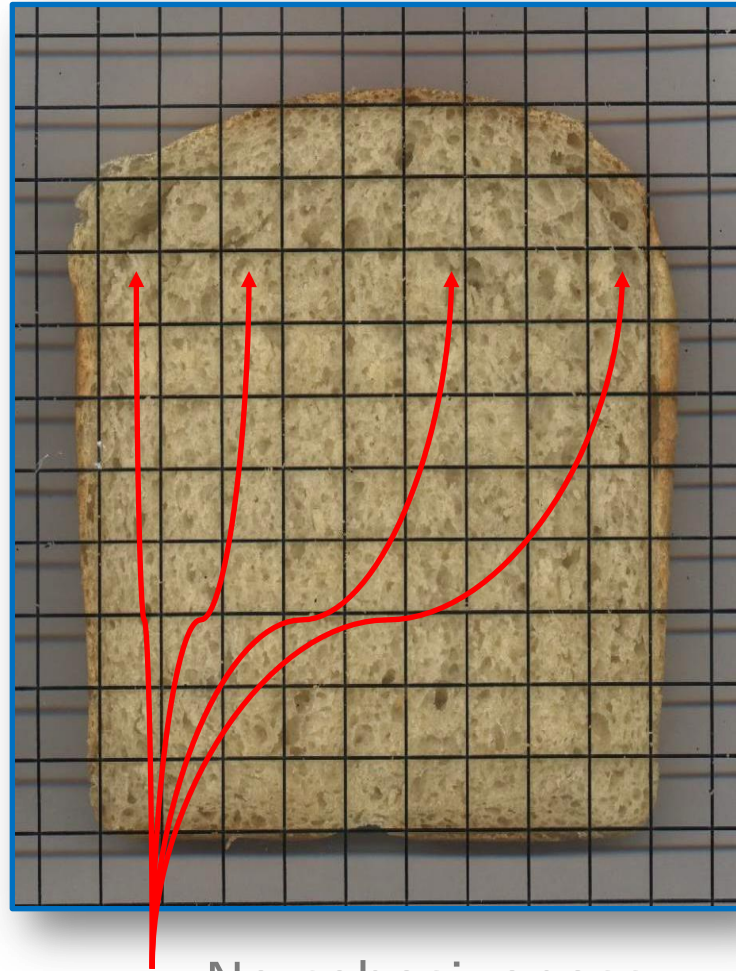


# Less Elastic & Highly Extensible Flour



Low volume bread with cracks

# Less Elastic & Highly Extensible Flour



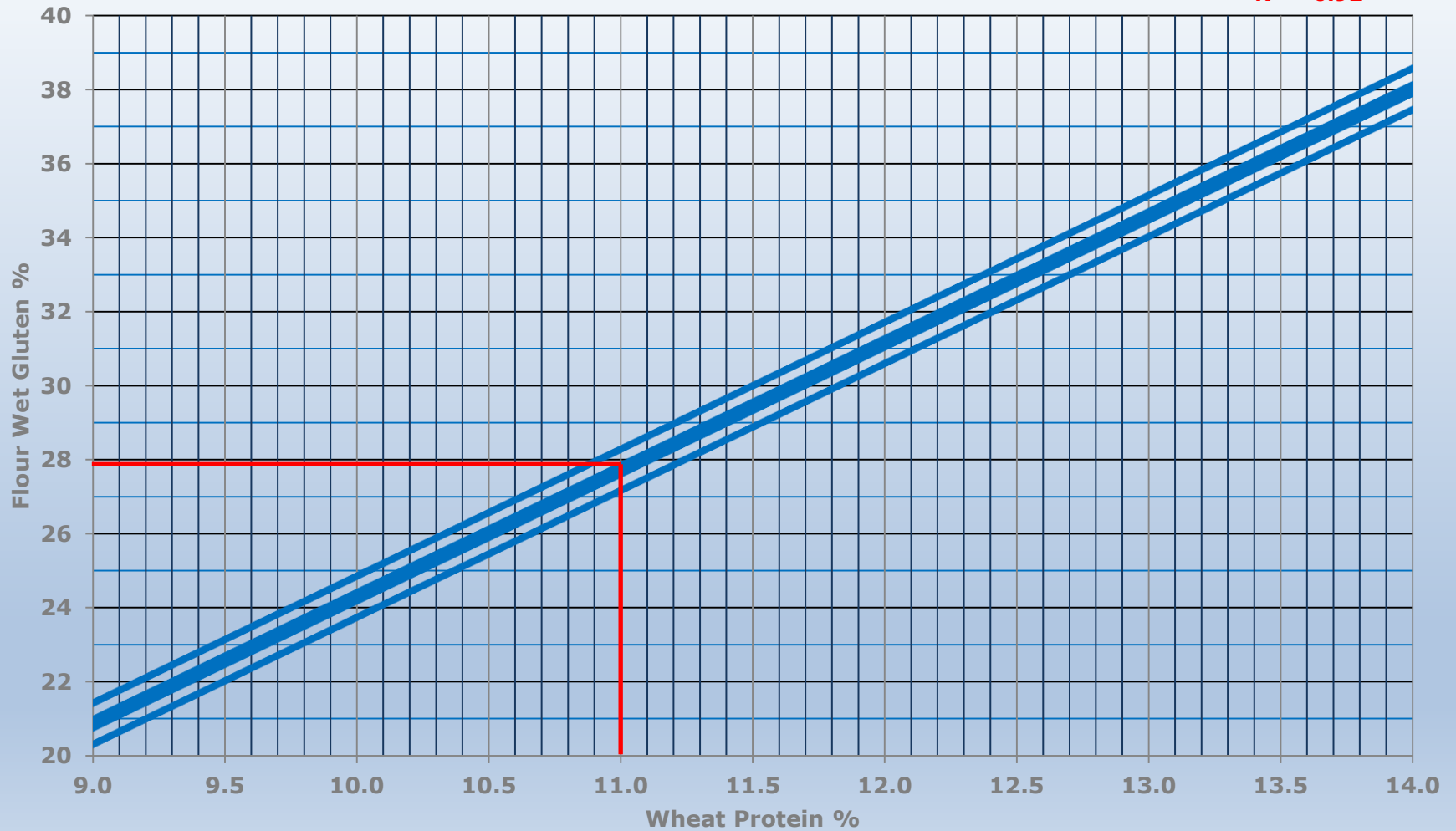
No cohesiveness

# Correlation



## Wheat Protein vs Flour Wet Gluten

$y = 3.045x - 5.2585$   
 $R^2 = 0.92$



# 2014-Australian Crop Quality



Grade	Moisture	Protein	Test Weight	Falling #	Screenings
BRISBANE ZONE					
APH2	9.6	13.4	83.2	474	2.2
H2	9.4	12.3	83.6	451	2.2
APW1	9.3	11.0	83.9	421	2.4
NEW CASTLE ZONE					
APH2	9.2	13.6	82.3	439	3.4
H2	9.1	11.9	82.3	419	3.7
APW1	9.2	10.8	82.7	398	3.5
PORT KEMBLA ZONE					
APH2	8.3	14.0	82.0	396	2.8
H2	8.3	12.2	82.5	372	2.9
APW1	8.4	10.9	82.9	354	2.8