

Step by Step

Wheat Farming, Milling & Quality Requirements

By
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Wheat Farm





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Cultivation





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Irrigation





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Plant





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Seed





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Grain





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Ready to Harvest





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Harvesting





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Country Elevator





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Rail Car





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Barge Loading





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Barge Unloading





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Shipping





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Wheat Kinds

- Wheat is grown in 2 color shades:

Red

White





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Wheat Types

Wheat comes in 3 types:

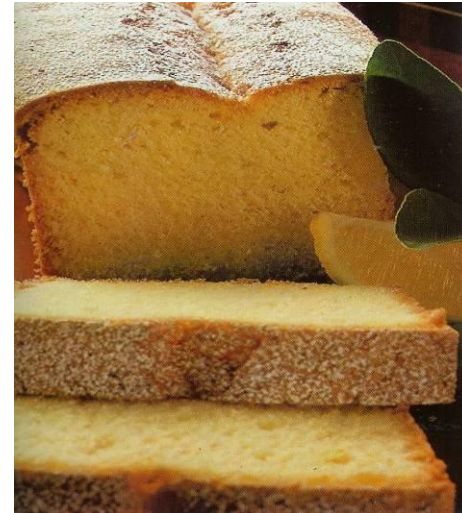
1.Hard



2.Medium



3.Soft





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Wheat Types

Durum wheat is used for pasta products & special milling is required





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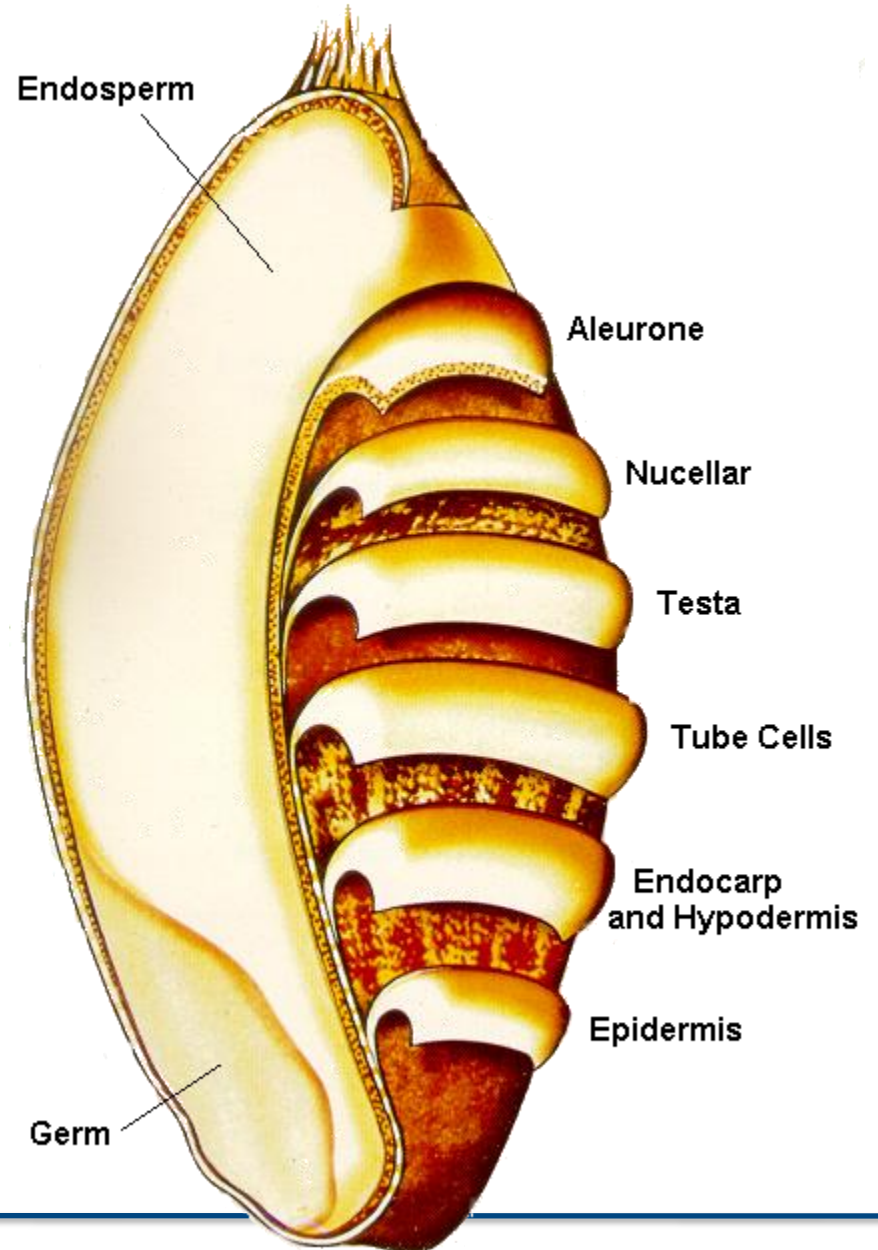
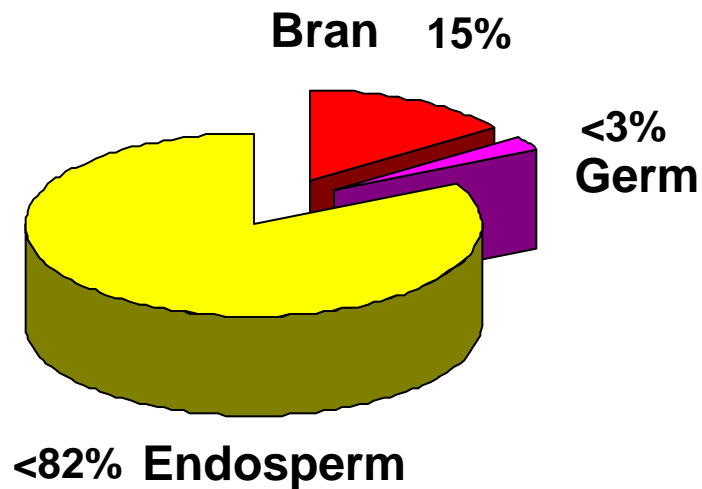
Major Wheat Exporters

- Australia
- Canada
- CIS
- EU
- USA
- Others



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Wheat Structure





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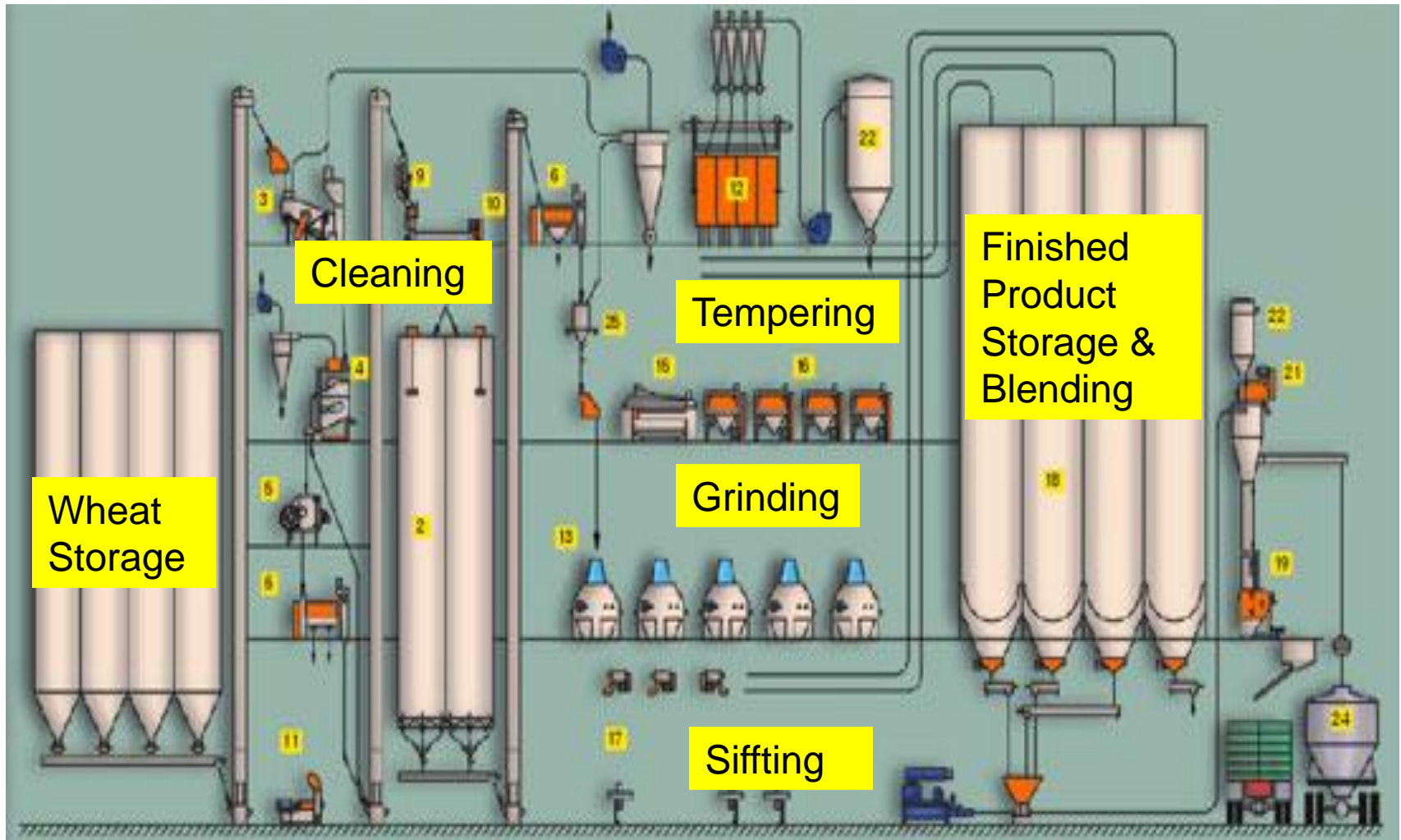
Wheat Composition

- Carbohydrate 70%
- Protein 9-15%
- Fat 2-2.2%
- Fiber 2-2.5
- Ash 1.8 %
- Moisture 9-13%



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Wheat Milling Process





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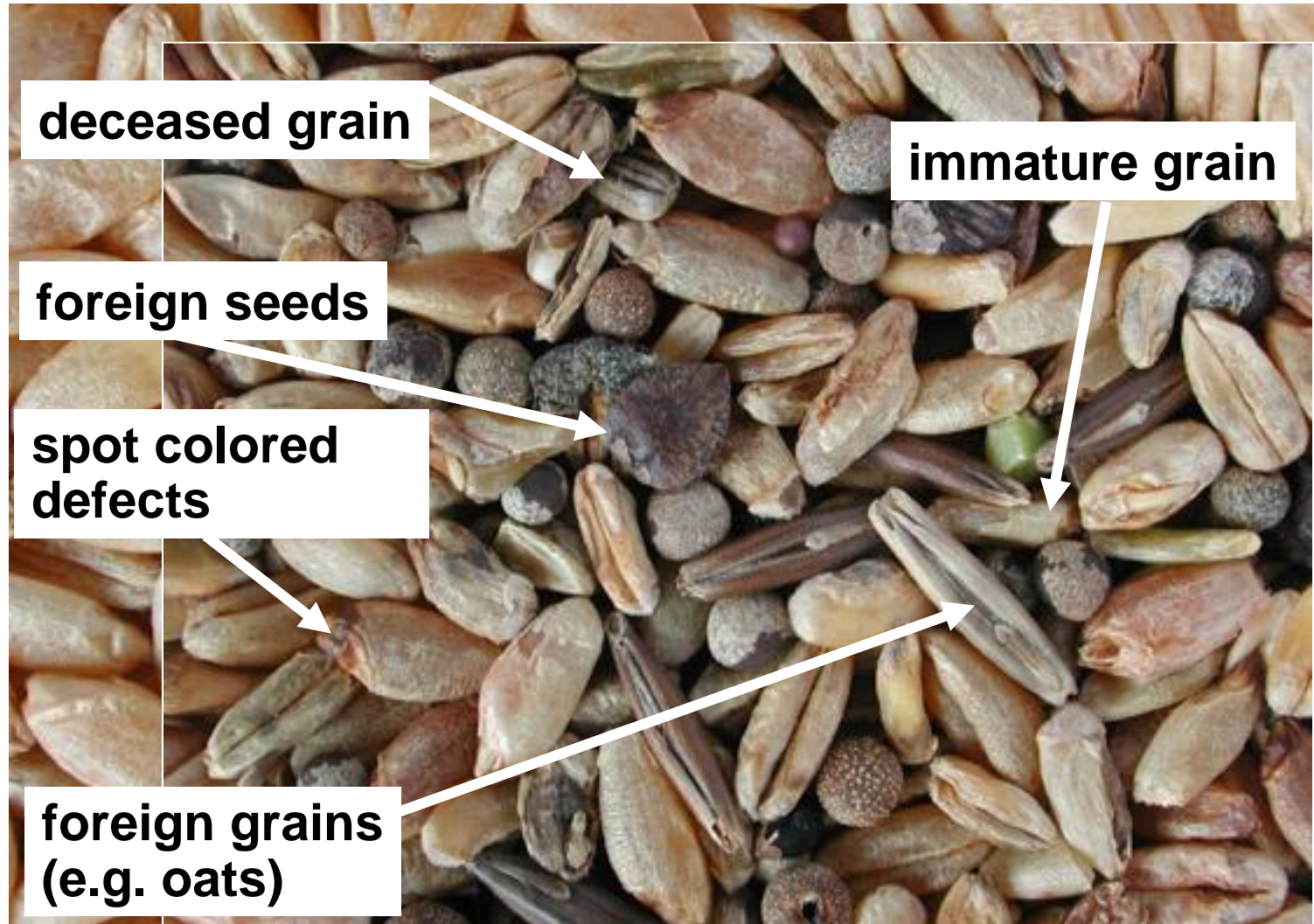
Cleaning

- The first milling steps involve equipment that separates wheat from seeds and other grains, eliminates foreign materials such as metal, sticks, stones and straw; and scours each kernel of wheat. It can take as many as six steps



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Dark Sort Defects





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1. Magnetic Separator

- The wheat first passes thru magnet that removes iron and metal particles





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2.Separator

- Vibrating screens remove bits of wood and straw and almost anything bigger or smaller than wheat





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3. Aspirator

- Air currents act as a kind of vacuum to remove dust and lighter impurities





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4.De-Stoner

- Using gravity, the machine separates the heavy material from the light to remove stones that may be the same size as wheat kernels





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5.Cockle Cylinder

- Wheat passes through a separator that identifies the size of the kernels even more closely. It rejects anything longer, shorter, more round, more angular or in any way a different shape





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6.Scourer

- The scourer removes outer husks, crease dirt and polish the outer surface with an intense scouring action. Currents of air pull all the loosened material away.

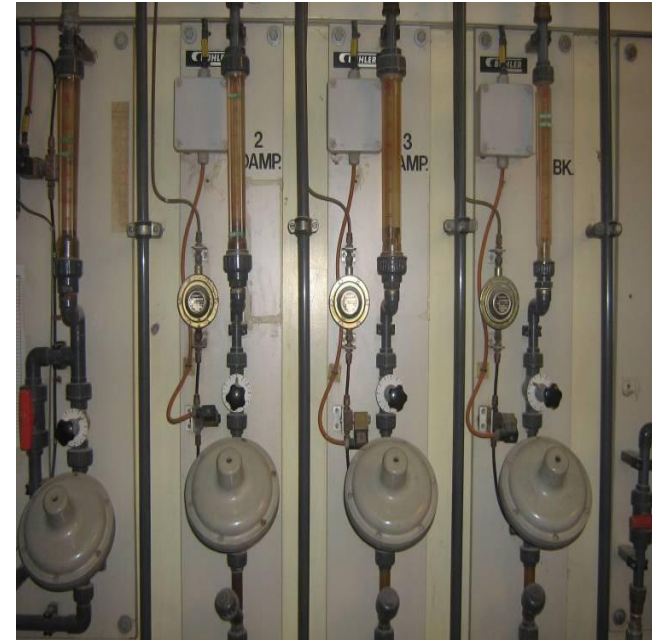




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Conditioning/Tempering

- Wheat is conditioned for milling. Moisture is added in certain amounts to toughen the bran and mellow the inner endosperm. This help the parts of the kernel to be separated easily and cleanly
- Tempered wheat is stored in bins from 8-24 hours, depending on the type of wheat - soft, medium or hard





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Scanner

- Wheat is scanned & discolored kernel are separated





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Grinding (Milling)

- Milling process is a gradual reduction of the wheat kernels to produce particles of endosperm which are then graded & separated from the bran by sieves & purifiers
- Each size returns to corresponding rollers & the same process is repeated until the desired flour is obtained





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Grinding (Milling)

- The rolls are paired & rotate inward against each other, moving at different speeds
- Just one pass through the corrugated "first break" rolls begins the separation of bran, endosperm and germ





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Sifting

- The broken particles of wheat are introduced into huge, rotating, box-like sifters where they are shaken through a series of bolting cloths or screens to segregate the larger from the smaller particles





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Sifting

- Up to 6 different sizes of particles may come from a single sifter, including some flour with each sifting. Larger particles are shaken off from the top, or "scalped," leaving the finer flour to sift to the bottom
- These fractions are sent to other roll passages and particles of endosperm are graded by size and carried to separate purifiers





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Purifiers

- In a purifier, a controlled flow of air lifts off bran particles while at the same time a bolting cloth separates and grades coarser fractions by size and quality





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Reduction Rolls

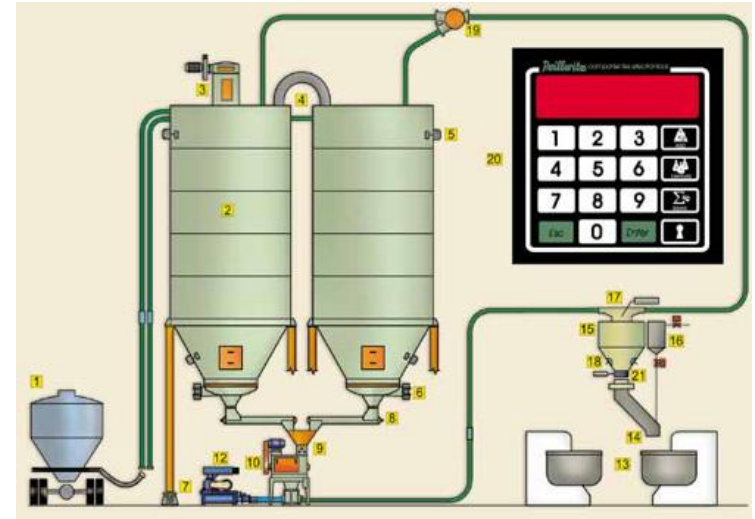
- Reduction of particle size of semolina into fine flour by passing it through a pair of smooth rolls





Final Product

- The process is repeated over and over again, sifters to purifiers to reducing rolls, until the maximum amount of flour is separated, consisting of close to 75 percent of the wheat





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Miller's Job

- “The job of the miller is to produce the best flour from the cheapest grist for the maximum number of days per year, at the lowest conversion cost”



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Wheat Milling & Flour

Why should a baker care about the wheat?

- Flour comes from the wheat
- All wheat is not created equal
- Therefore all flour is not created equal



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What is Flour

- Finely ground purified material from the wheat kernel
- Purification of process depends up on wheat source
- Usually remove the outer fibrous coating through a gradual milling process
- Increased palatability but reduced nutritional value
- Wheat Flour Pass through 10 XX sieve
- Flour particle size range from 1μ to 200μ



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What is the Best Flour?

- The best flour is one that corresponds exactly to the needs of the customers
- Is the flour which gives the maximum extraction (flour from wheat) in the mill
- History tells us that this is not necessarily the cheapest flour
- History also tells us that bakers prefer consistent flour quality above all other considerations



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Basic Understanding of Flour

1. Types of Flour
2. Protein (Quantity vs Quality)
3. Ash
4. Extraction
5. Gluten



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1.Types of Flour

Flour Types	Usage
• Bakers Flour	• Pan Breads, Roll & Buns (automated bakeries)
• All Purpose Flour	• Pizza, French Breads, Arabic breads
• High Extraction Flour	• Tandoori Bread, Chapati & Puri
• Soft Flour	• Cake & Biscuits
• Whole Meal Flour	• Whole Meal & Brown Bread
• Semolina	• Pasta & Sweets
• Pre-Mixes	• Specialty Breads & Cakes



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2. Protein: Quantity vs Quality

- Protein quality is best defined in terms of its intended use
- Protein quality is more important than quantity
- There are no established industry standards for protein quality
- Estimates with Gluten index
- Obtain some information from farinograph, extensograph or alveograph



3.Ash

- Mineral residue remaining after incinerating a small amount of flour
- Provides an estimate of the degree of separation of bran and germ from the endosperm during the milling process
- Most mineral matter of wheat is contained in the bran and particularly in the aleurone
- An indication of the degree of extraction (flour grade)
- Soft wheat flours generally have lower ash than hard wheat flours
- Ash is NOT a guide to flour's baking quality



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4.Extraction

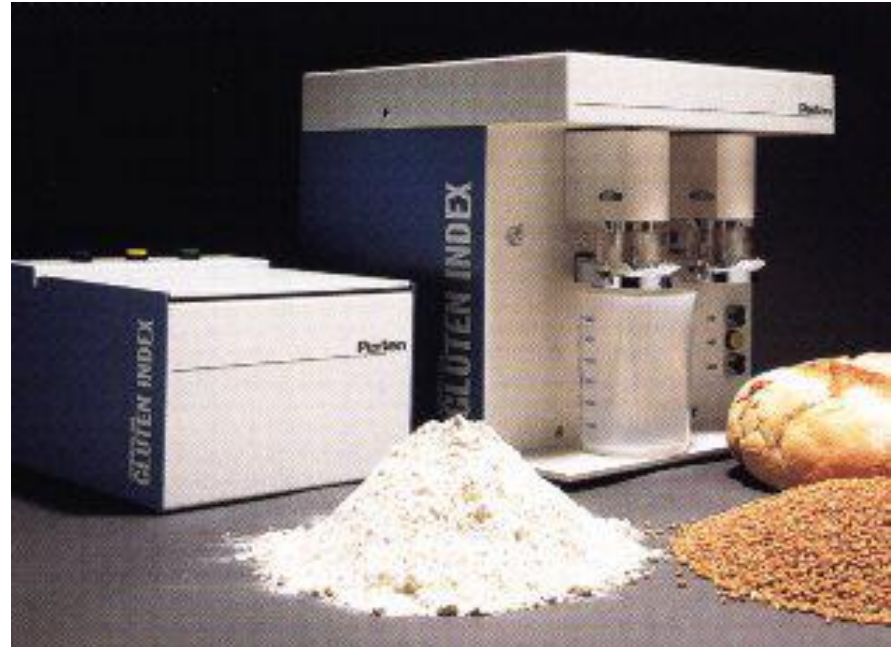
- Weight of flour produced from given weight of cleaned wheat
- Tons of flour per 100 tons of cleaned wheat



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5. Gluten

- Protein complex that is formed when wheat flour is combined with water
- Energy (mixing) speeds process
- Gluten quality = Protein quality
- Provides:
 - Extensibility
 - Elasticity
 - Gas retention





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Choice of Flour

For quality baked products, a baker may define flour by the following characteristics:

- 1-Colour (whiteness)
- 2-Strength: is the ability of the flour to be made into large “well-piled” loaves, provided any deficiency in the rate of gas production in the dough is adjusted in suitable manner
- 3-Tolerance: ability to produce satisfactory results over an extended fermentation period
- 4-Absorption: The ability of flour to carry maximum amount of moisture in the dough
- 5-Uniformity” Shipment of the same type o flour from the same mill are expected to be uniform in quality



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The Judgments of Flour

- Two lots of flour are never exactly alike, although the miller strives, with the help of the Q.A to produce a uniform product from a non uniform raw material (wheat)
- A perfectly standardized flour is impossible from mill to mill and even still less from crop year to crop year





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Difficulty of Standardizing Flour Quality

- What may be quality to one baker is not quality to another
- Much depends upon the point of view, bakery equipment, methods, customers and demand
- The baking characteristics of flour are not definitely indicated by chemical tests
- Crops of wheat vary from season to season and from section to section
- Wheat and flour change with age
- Milling techniques



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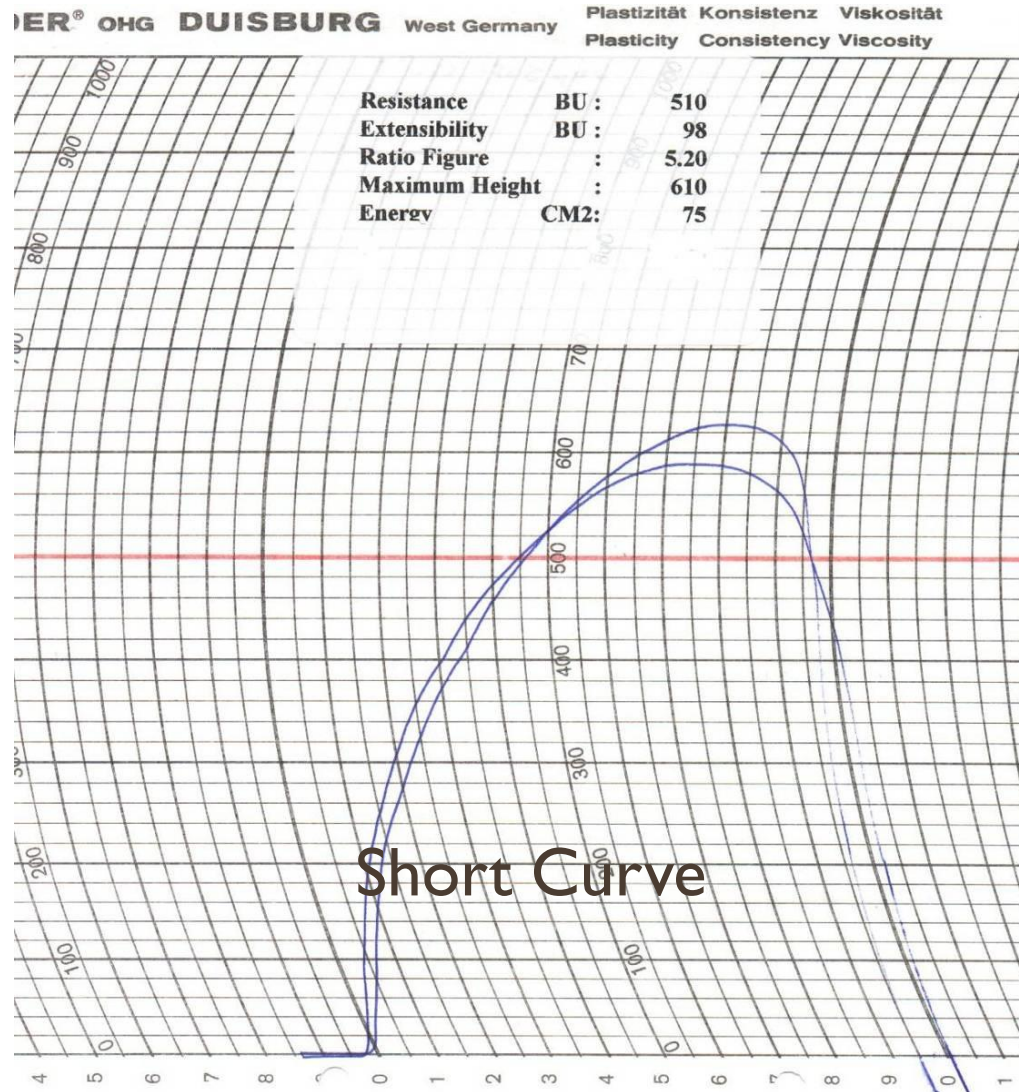
Baker's Most Common Complaints

- Variable Performance Bakers and biscuit manufacturers accept to pay more for consistency – this is proven
- Bakers Yield
- Weight loss in finished products.
- Unacceptable Bread Color, despite addition of sugar
- Lack of bread volume
- Bad Functionality of flour
- Lack of Choice (functional Flours)



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High Resistance & Low Extensibility Flour





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High Resistance & Low Extensibility Flour



Weakened during fermentation & Collapses when overfermented



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High Resistance & Low Extensibility Flour



Flattened bread



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High Resistance & Low Extensibility Flour

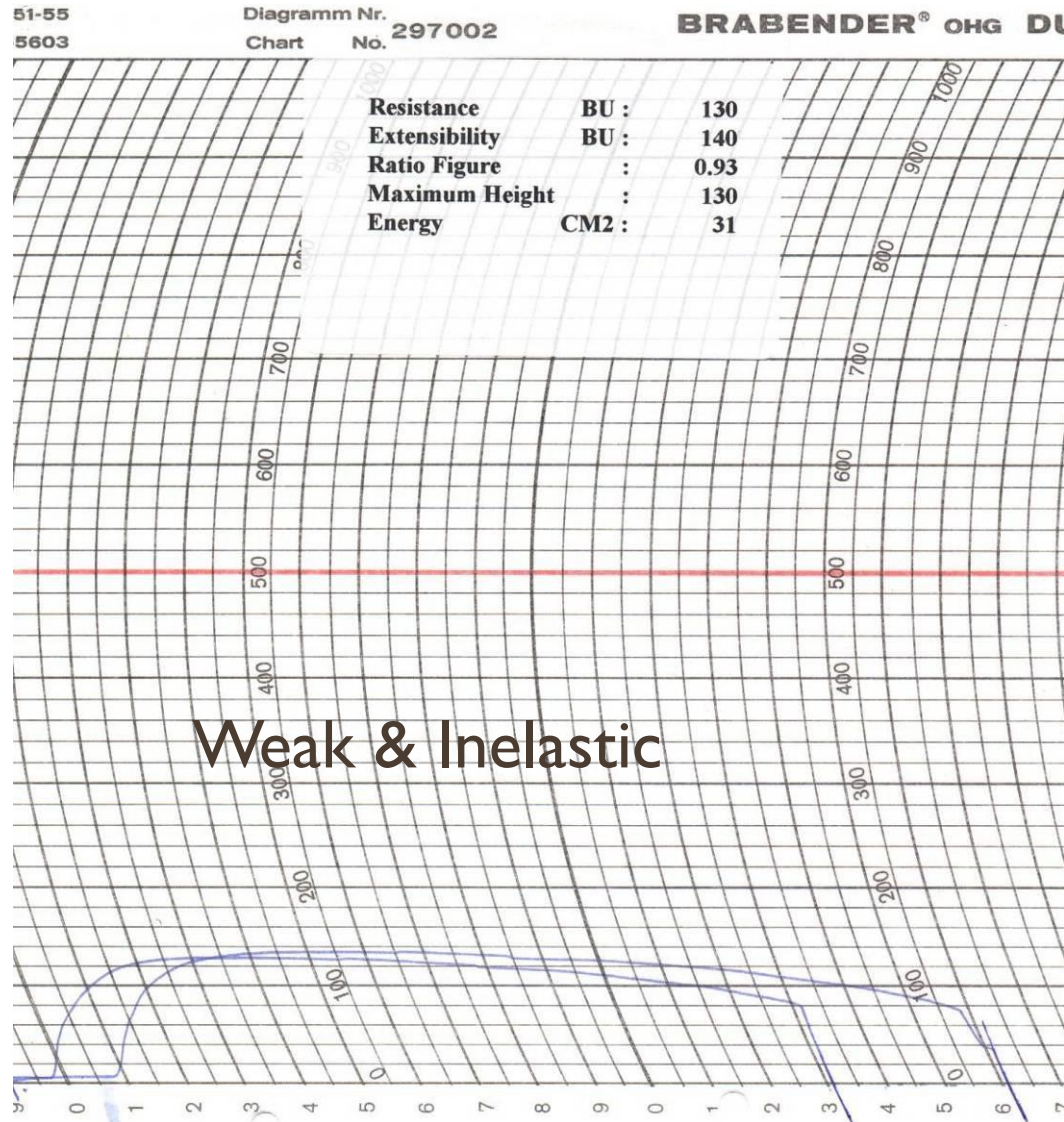
Pours in slice &
rough texture





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Less Elastic & Highly Extensible Flour





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Less Elastic & Highly Extensible Flour



Low fermentation without volume
& Lifeless dough



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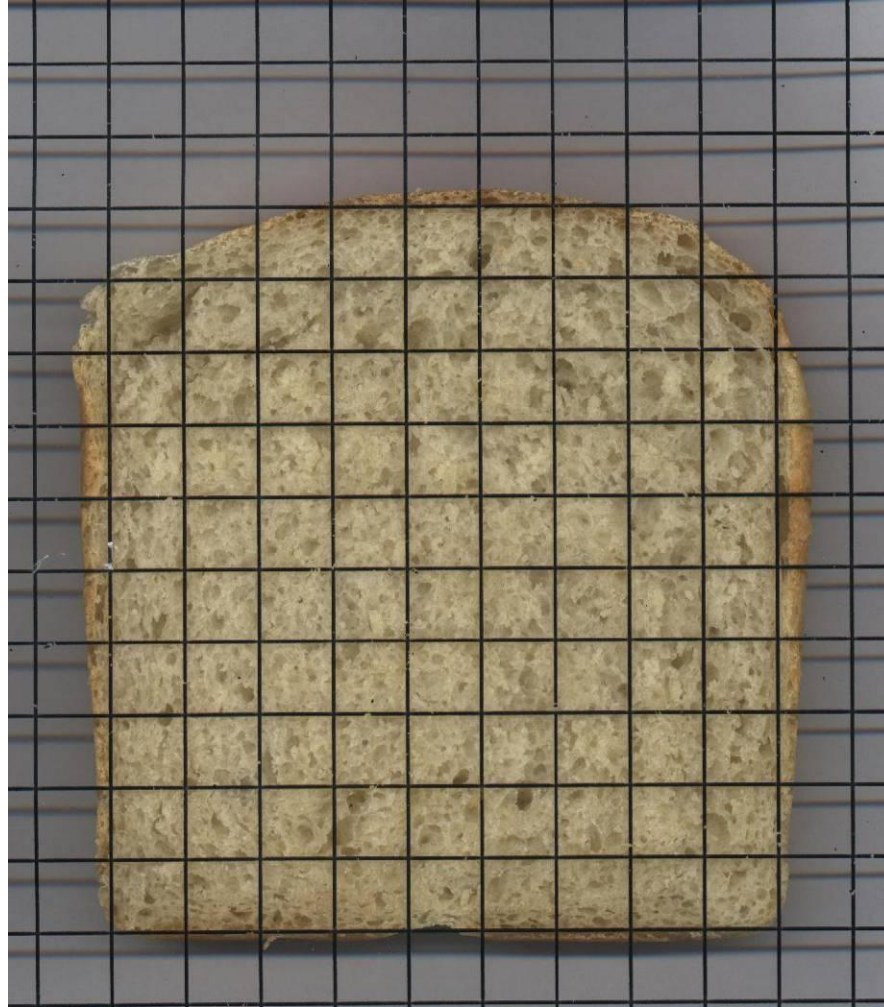
Less Elastic & Highly Extensible Flour



Low volume bread

Less Elastic & Highly Extensible Flour

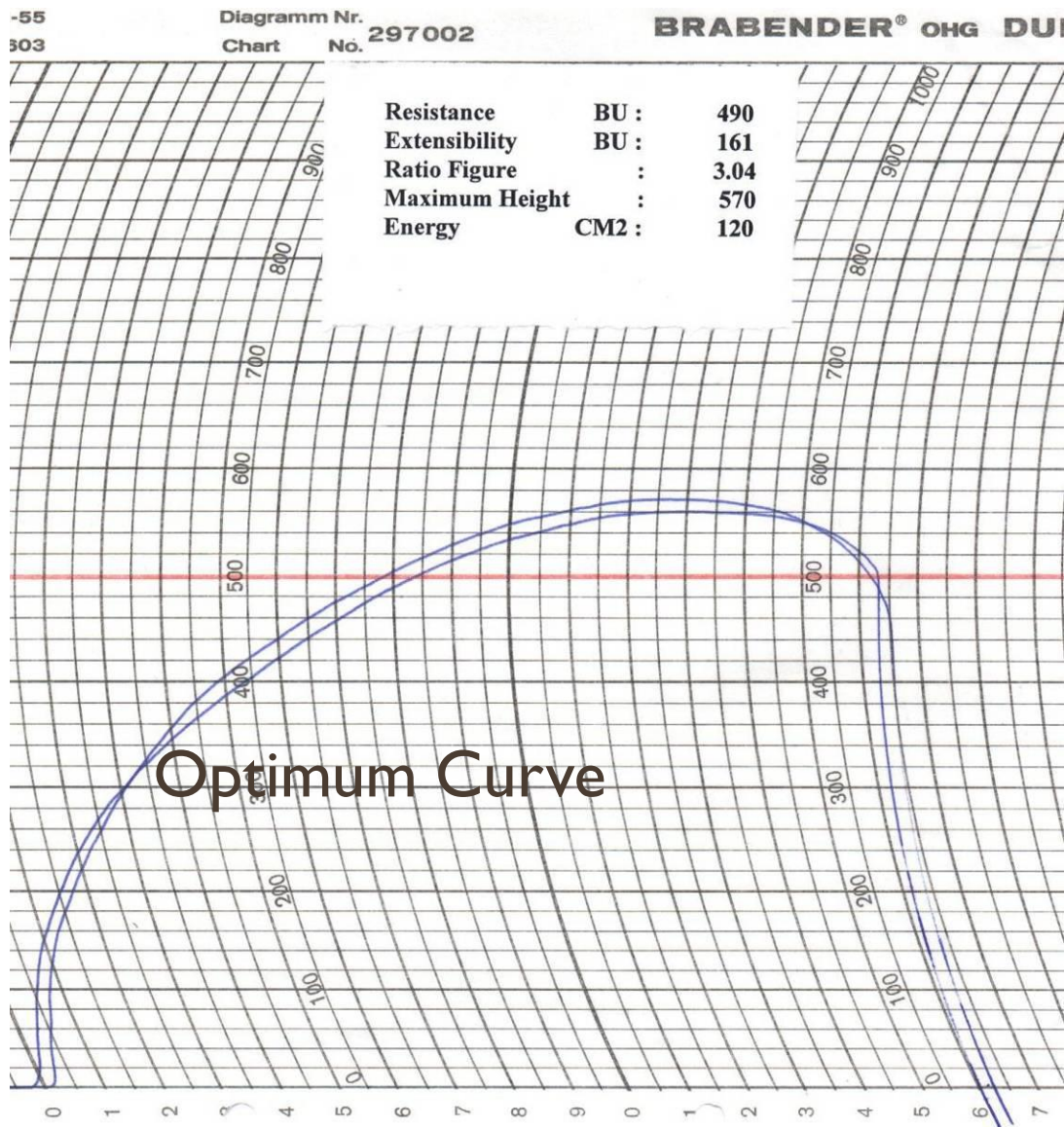
No cohesiveness





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Optimum Flour





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Optimum Flour



Suitable for long fermentation

& Good in tolerance



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Optimum Flour



Good in volume



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Optimum Flour

Smooth texture,
Smooth structure
& High volume

