



Refined vs not refined food (plant food types)

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Refined vs not refined plant food

Wheat



Rice

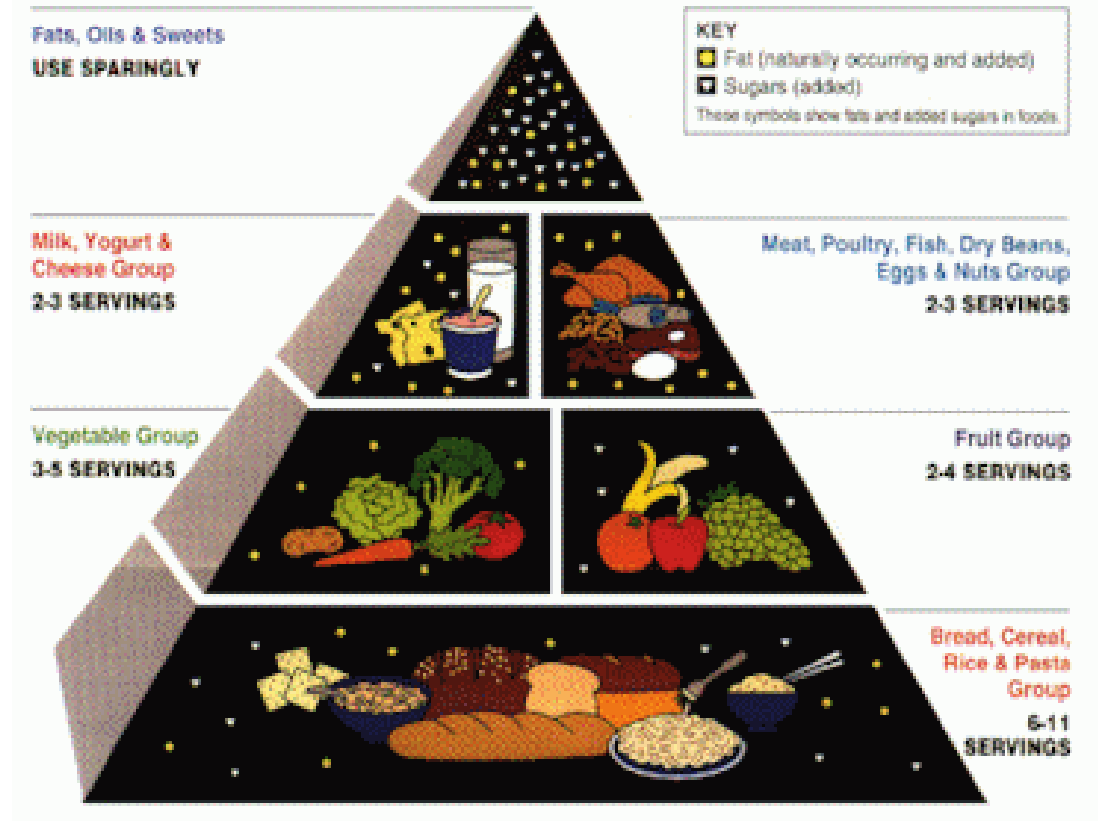


Plant oil



The Food Pyramid

- 6-11 servings of grain a day
- **EAT GRAINS LIBERALLY!!!**



Wheat Kinds

- Wheat is grown in 2 color shades:

Red

White



Wheat comes in 3 types:

1.Hard



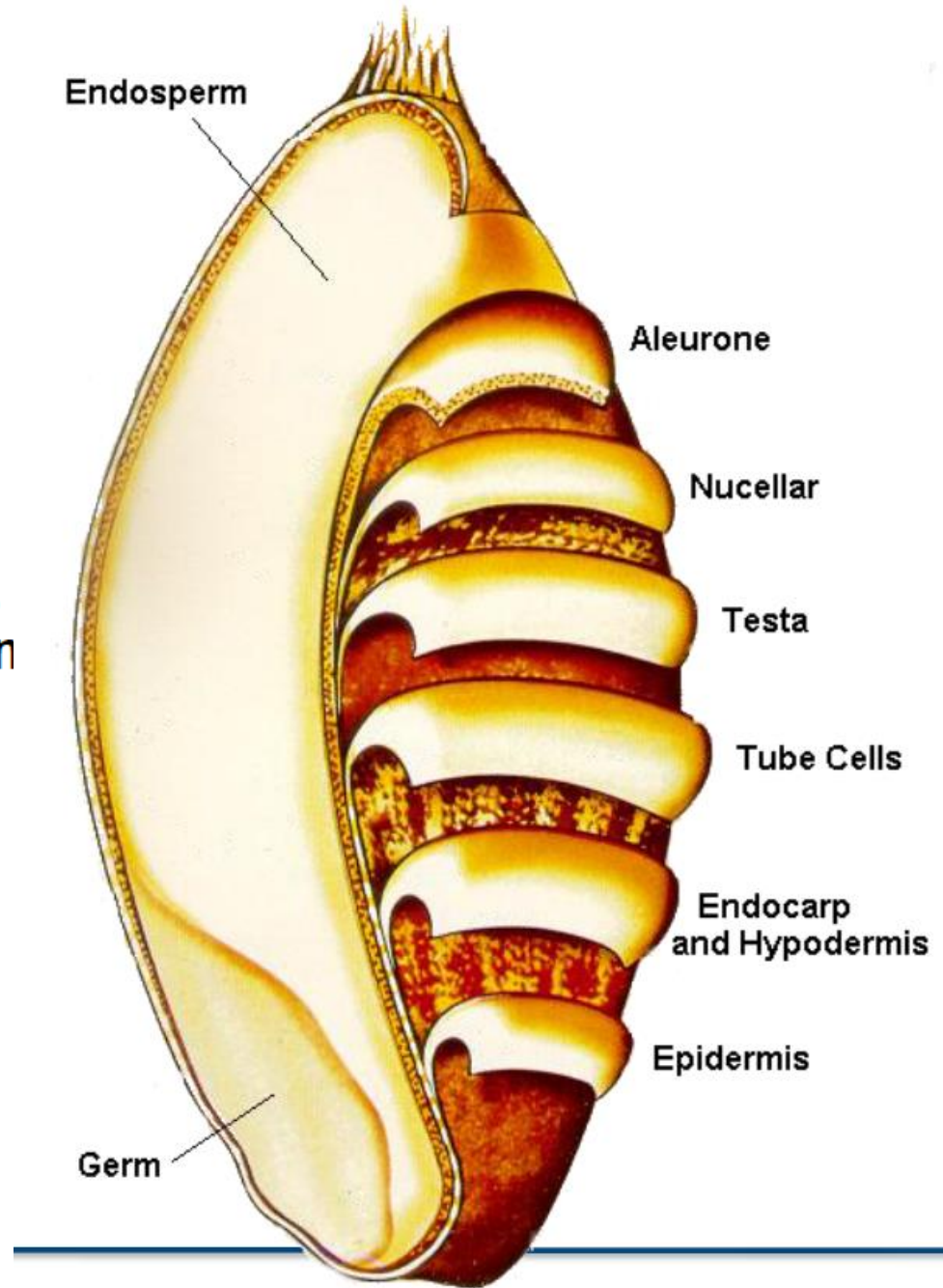
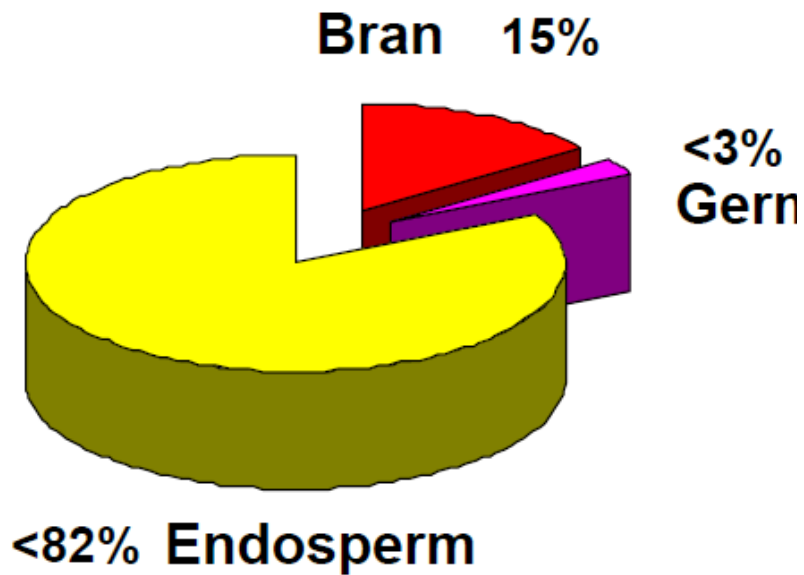
2.Medium



3.Soft



Wheat Structure



Wheat Composition

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



DIET: WHAT ARE WHOLE GRAINS?

Whole grains include grains like wheat, corn, rice, oats, barley, quinoa, and rye. A whole grain contains all three parts of the kernel. Refining grain typically removes the bran and the germ, leaving only part of the endosperm. Without the bran and germ, about 25% of wheat's protein is lost, along with at least 17 key nutrients.

Processors add back some vitamins and minerals to enrich refined grains, but whole grains are healthier, providing more protein, more fiber and many important vitamins and minerals.

SECTION OF A GRAIN OF WHEAT

KERNEL

Whole grains make up the seed of a plant.

BRAN

The outer skin that protects the core from sunlight and pests.

Health benefit: Antioxidants, B vitamins and fiber

ENDOSPERM

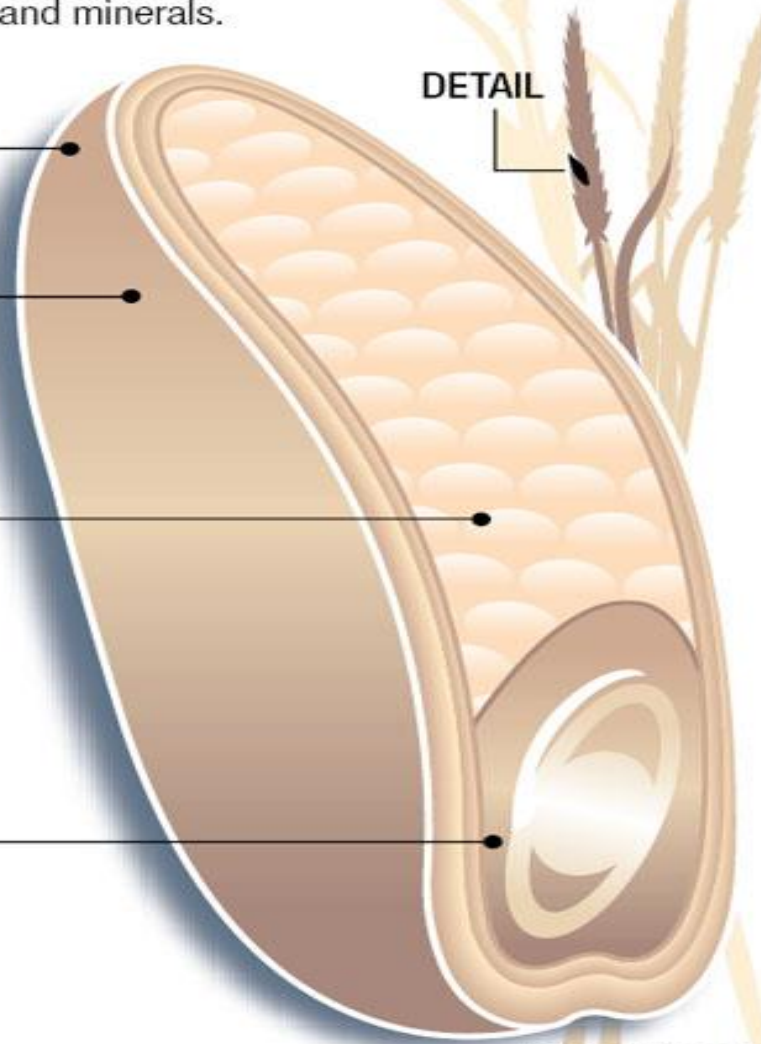
A seed's food supply. This is where starch is stored and in wheat, where the largest amount of flour comes from.

Health benefit: Starchy carbohydrates, proteins, vitamins and minerals

GERM

Embryo that will sprout into another plant if fertilized by pollen.

Health benefit: B vitamins, proteins, minerals and healthy fats



- Archeological findings are indicating that it was domesticated 10 000 to 11 000 years ago.
- Einkorn wheat does not have high yield, it is a low-yield plant, but it can survive much sever climate than present wheat cultivars that are high-yield plants.
- There are three mostly known species of ancient wheat:
 - emmer (*Triticum dicoccon*),
 - einkorn (*Triticum monococcum L.*),
 - spelt (*Triticum spelta L.*).
- The husks of these ancient wheats are tougher than in present wheats, which can serve as better protection against pollution and radiation.



Harvest

- A combine is used to separate the kernel from the plant



Cleaning Process



Grain passes through several machines

Each machine separates the kernels from other objects

Conditioning mixes water with the grain to obtain the right moisture level

Milling Process



Milling consists of grinding and separating the grain

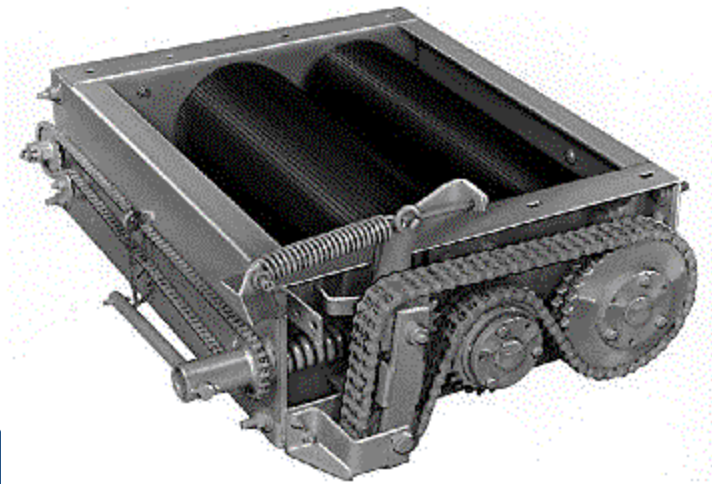
By using different machines, different results can be obtained

Milling Process (continued)

Rollers are used to release the endosperm

The opened grain then passes through a series of sieves to separate the finer grains

These finer grains are considered flour





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



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

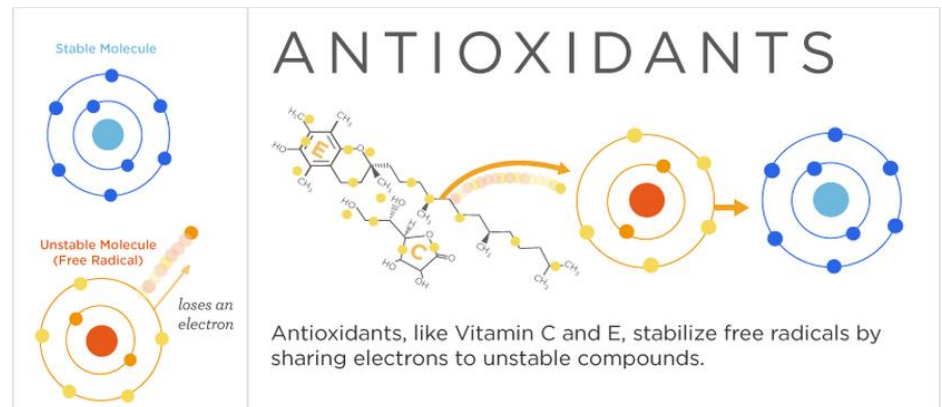
Pay Attention or pay the price.

Glycemic index

Classification	GI range	Examples
Low GI	55 or less	fructose; beans (black, pinto, kidney, lentil, peanut, chickpea); small seeds (sunflower, flax, pumpkin, poppy, sesame, hemp); walnuts, cashews, most whole intact grains (durum/spelt/kamut wheat, millet, oat, rye, rice, barley); most vegetables, most sweet fruits (peaches, strawberries, mangos); tagatose; mushrooms; chilis
Medium GI	56–69	white sugar or sucrose, not intact whole wheat or enriched wheat, pita bread, basmati rice, unpeeled boiled potato, grape juice, raisins, prunes, pumpernickel bread, cranberry juice, regular ice cream, banana, sweet potato
High GI	70 and above	glucose (dextrose, grape sugar), high fructose corn syrup, white bread (only wheat endosperm), most white rice (only rice endosperm), corn flakes, extruded breakfast cereals, maltose, maltodextrins, white potato.

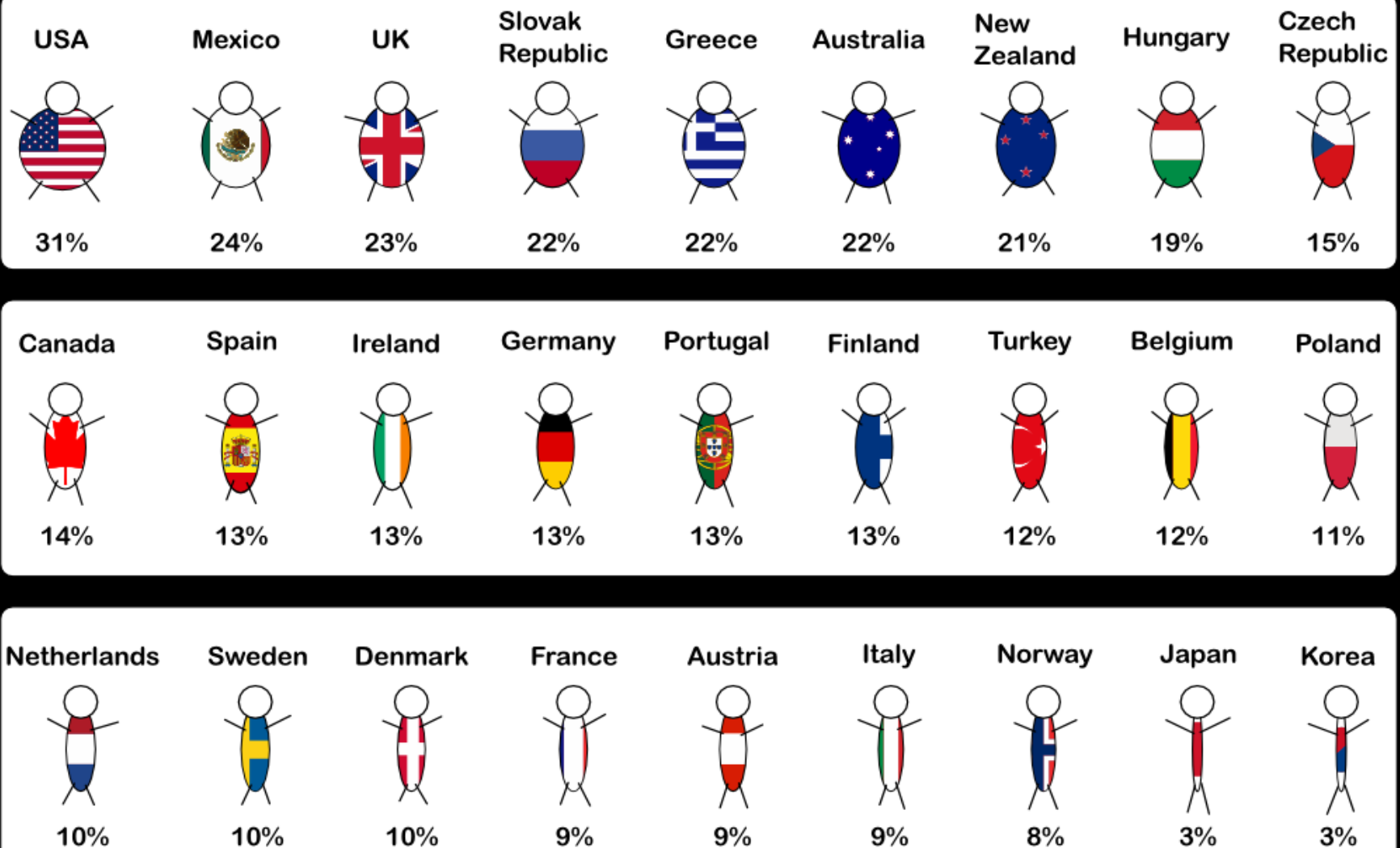


Pigments



OBESITY:

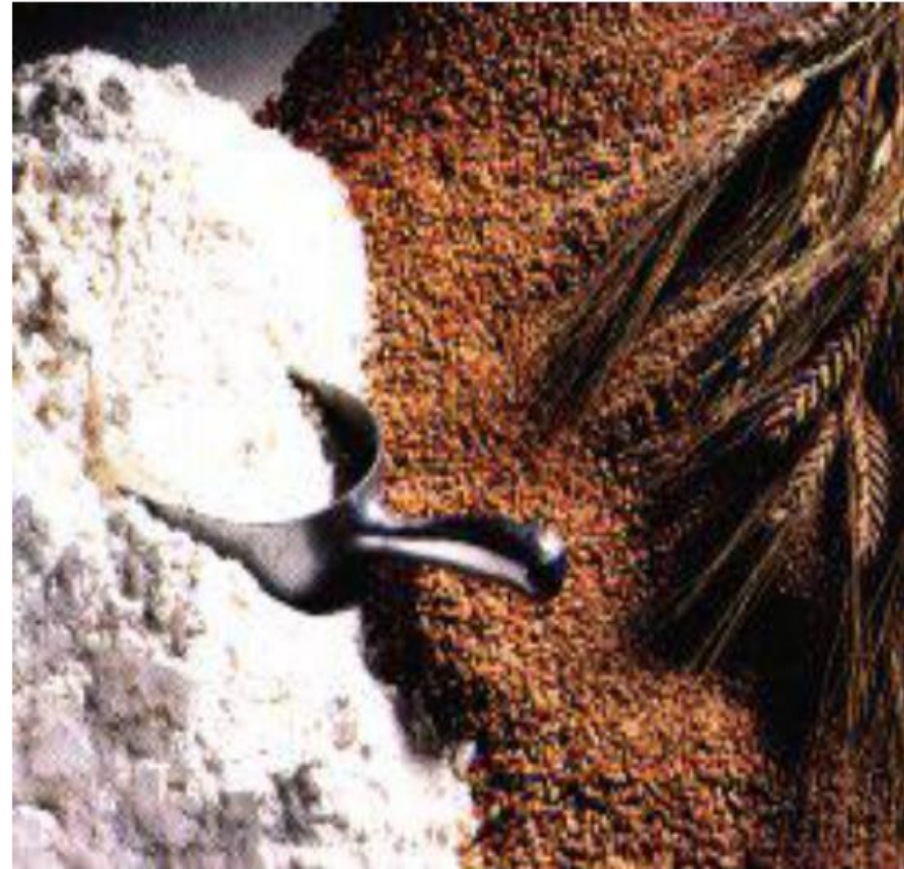
The percentage of the population older than 15 with a body-mass index greater than 30.





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



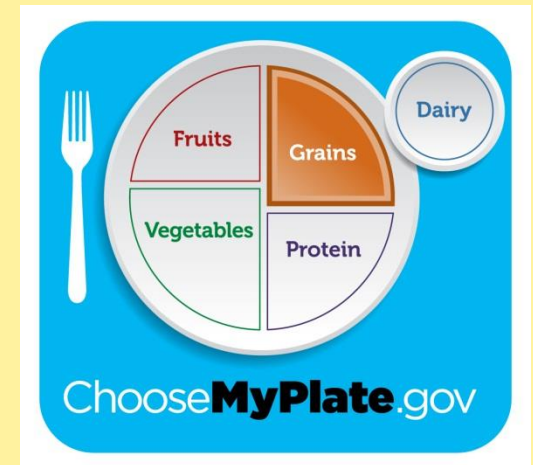


Difficulty of Standardizing Flour Quality

- 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

The Grain Group

- What is included in the grain group?
- Any food made from wheat, rice, oats, cornmeal, barley or another cereal grain is a grain product.
- Make half you grains whole!



Two Types of Grains

- Whole Grains – contain the entire grain kernel.
- Refined Grains – have been milled to remove the bran and the germ.
 - Finer texture
 - Increased shelf life
 - Loss of nutrients (B vitamins, iron and dietary fiber)

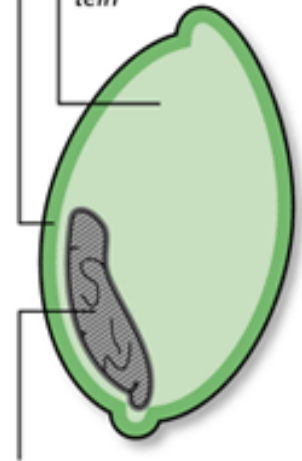
Whole grain kernel

Bran

"Outer shell" protects seed
Fiber, B vitamins, trace minerals

Endosperm

Provides energy
Carbohydrates, protein

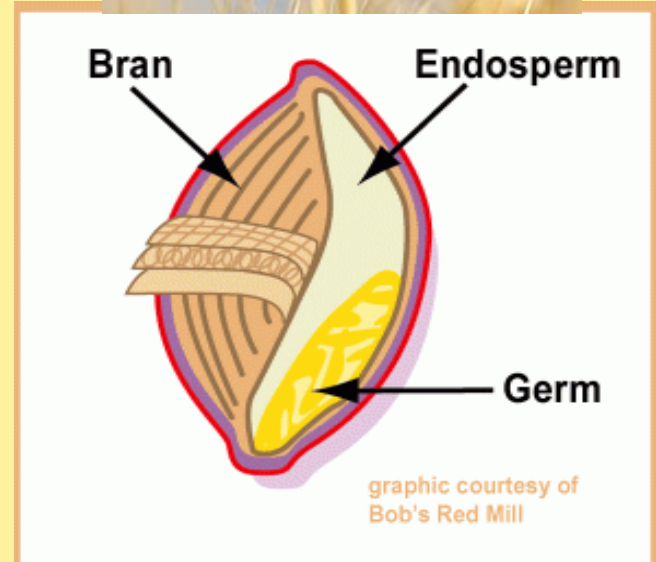


Germ

Nourishment for the seed
Antioxidants, vitamin E, B-vitamins

What's a Whole Grain?

- Whole Grains: Made from entire kernel including bran, germ, endosperm.
- Refined grains: Milled so germ and bran are removed.
- Enriched: Adding nutrients lost during the processing of the grain back into the finished product ex. White flour.



How can I tell the difference?

- Whole Grains

- Labels use the word “whole.” For example “whole grain” or “whole wheat.”
- Brown rice, oatmeal, popcorn, wild rice, etc.

- Refined Grains

- Labels may use the word “enriched.”
- Often found in grain foods with the word “white”:
white rice, white bread,
white flour, etc.

Nutrition Facts	
Serving Size 1 packet (1g)	
Serving Size 100	
Amount Per Serving	
	% Daily Value*
Calories 0	
Total Fat 0g	0%
Sodium 0mg	0%
Total Carb. less than 1g	0%
Fiber less than 1g	0%

Nutrition Facts	
Serving Size 1 packet (1g)	
Serving Size 100	
Amount Per Serving	
	% Daily Value*
Total Fat 1.2 g	1%
Unsaturated Fat 0 g	0%
Sodium 0 mg	0%
Total Carb. 12 g	4%
Dietary Fiber 7 g	26%
Protein less than 1 g	
Protein 2 g	
Vitamin A 0%	Vitamin C 0%
Calcium 0%	Iron 4%



Find the Whole Grain Breads:

- Multi-grain
- Enriched white
- Stone-ground
- 100% wheat
- Whole grain
- Cracked wheat
- Seven-grain
- Whole wheat
- Bran
- Enriched wheat



Don't Be Fooled!

- Multi-grain
- Enriched white
- Stone-ground
- 100% wheat
- **Whole grain**
- Cracked wheat
- Seven-grain
- **Whole wheat**
- Bran
- Enriched wheat





How Much Should I Consume?

- Half of the grains consumed should be whole grains.
- The USDA's recommended amounts vary widely based on age, gender and level of physical activity. For adult men and women the recommendations range between 5 and 8 ounce equivalents.





Ounce Equivalents?!?!

- A sometimes-confusing term for a serving of food from the grain group.
- In general, 1 ounce equivalent from the grains group is:
 - 1 slice of bread
 - 1 cup of ready-to-eat cereal
 - ½ cup of cooked rice
 - ½ cup of cooked pasta
 - ½ cup of cooked cereal





Fiber from Whole Grains

- Dietary Fiber – a non-digestible form of complex carbohydrate that occurs naturally in plant foods.
- Functional Fiber – isolated, non-digestible carbohydrates added to foods and that provide beneficial effects.
- Total fiber is the sum of both dietary and functional fiber.



Health Benefits: Fiber

- Fiber from whole grains:
 - Reduces the risk of coronary heart disease.
 - May reduce constipation.
 - May help maintain a healthy weight:
 - Increased feeling of fullness.
 - Interfere with absorption of dietary fat and cholesterol.





Why do Whole Grains Matter?

- Diets rich in whole grain foods and other plant foods, and low in saturated fat and cholesterol, may help reduce the risk of **heart disease**
- Consuming at least 3 or more ounce-equivalents of whole grains per day can reduce the risk of several chronic diseases and may help with weight maintenance
 - High fiber
 - Low fat
 - More calcium
 - High in B Vitamins
 - Rich Sources of Minerals



Other Health Benefits

- Grains provide many nutrients:
 - Several B vitamins including thiamin, riboflavin, niacin and folate.
 - Eating grains fortified with folate (folic acid) before and during pregnancy helps prevent neural tube defects during fetal development.
 - Iron
 - Magnesium
 - Selenium





Are You Getting Enough Fiber?

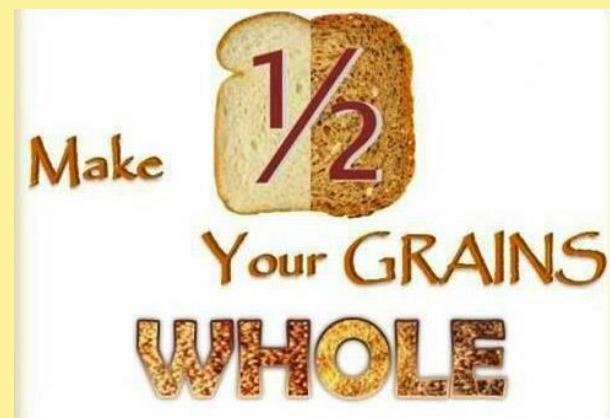
- Recommended: 20-35 grams
- Average American consumes: 15 grams
- How can I make sure I'm getting enough fiber?
 - 5 servings of fruits and vegetables
 - 6 servings of grains





Make Half Your Grains Whole

- Replace white rice with brown rice
- Try whole grain pasta
- Select a whole grain cereal during your next grocery shopping trip
- Substitute half white-enriched flour with whole white wheat flour when baking
- Switch to whole grain tortilla chips



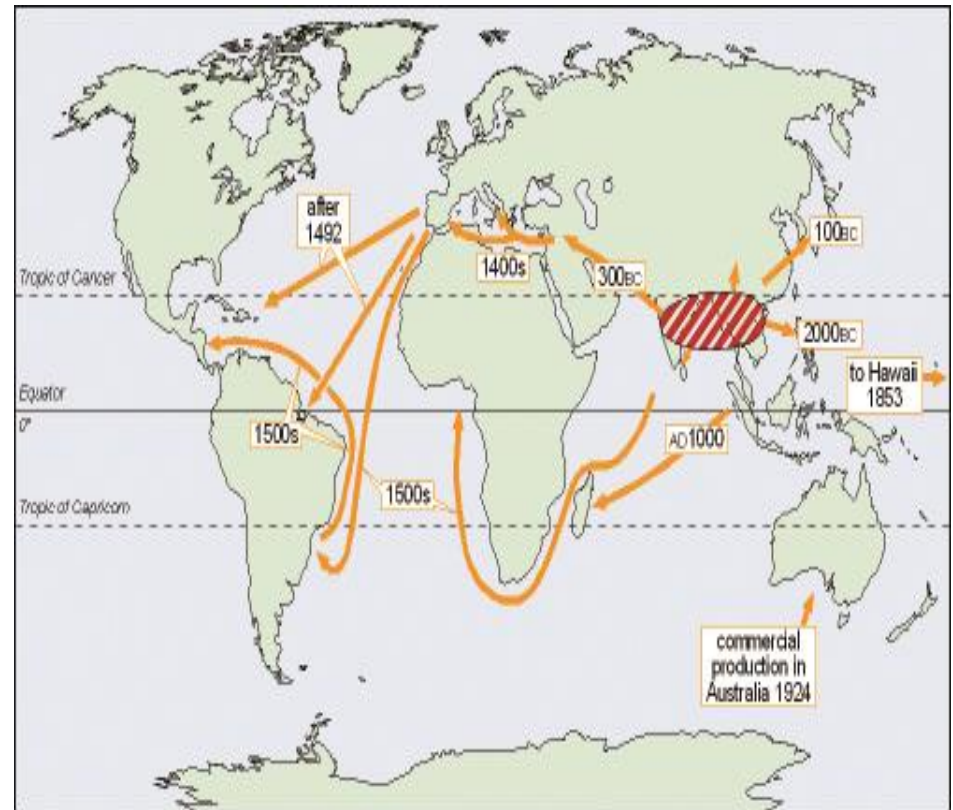
WHAT IS RICE?



- The seed of a semi-aquatic grass that thrives in warm and sub-tropical climates.
- Botanically classified as *Oryza sativa*.
- Grown in many countries around the world.
- Staple food for more than half of the world's population.

RICE – A BRIEF HISTORY

- Originally cultivated in 2000 BC in China and India sub-continent.
- Gradually moved to Southeast Asia, Persia (Middle East), Europe, Africa and then America.



CULTIVATION: FLOODING

- Rice cultivated differently than other grains as it requires controlled flooding and draining of the land.
 - In some countries flooding occurs naturally
- Flooding provides moisture, reduces weeds and controls pests.
- Draining ensures rice grains dry in time for harvesting.



CULTIVATION: RICE HARVEST

- After fields are drained, rice grains separated from stalks.
- Harvested rice kernels were traditionally dried in the sun; modern rice farms use forced air blowers.
- Dried rice (also called rough, paddy or cargo rice) will have 12% to 14% moisture content before milling.

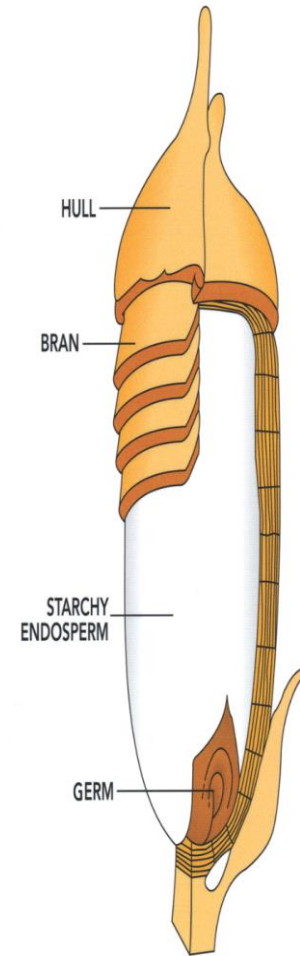


MILLING: ANATOMY OF A RICE GRAIN

Milling transforms paddy rice into food consumable by humans.

Four major parts:

1. Hull – Fibrous indigestible shell
2. Bran – Outer layer of dehulled rice kernel
3. Endosperm – Large interior, containing most nutrients
4. Germ – Embryo of rice kernel containing most of the oil



MILLING STEPS

1. Hull removed by machines (“shellers”), resulting in whole grain rice.
2. Bran and germ removed by machines that rub the grains together, resulting in white rice.
3. Both brown and white rice sorted to remove any broken rice kernels.
4. The most white rice is enriched with a thin coating of nutrients: thiamin, niacin, iron, and fortified with folic acid.



Cool Scurvy and Beri Beri Dudes:



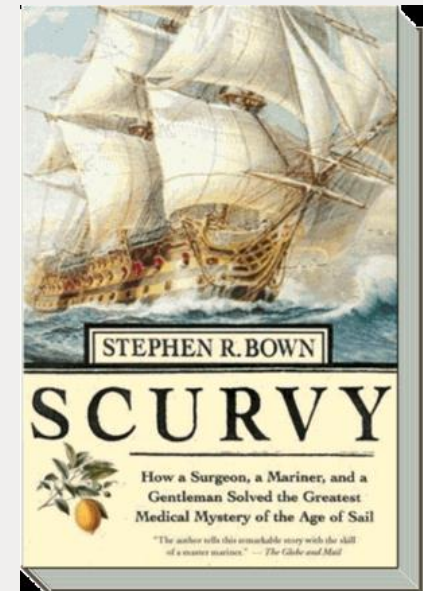
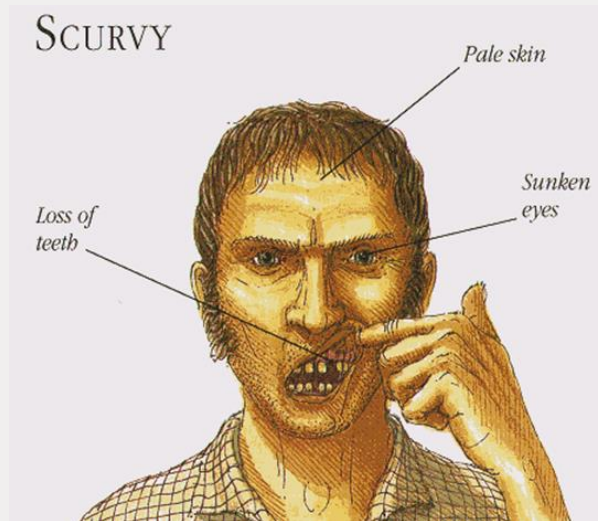
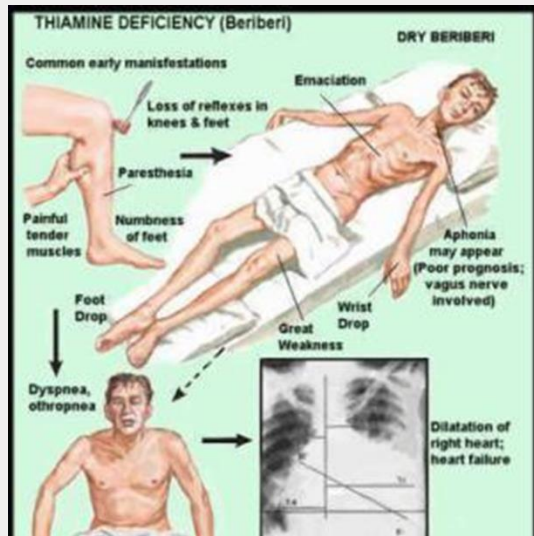
James Cook



James Lind



Christiaan Eijkman



Chemical Characteristics

	Brown rice	White rice	Bran
Moisture content (%)	13-14	13-14	13-14
Starch (%)	68-70	80	9
<i>Amylose</i>	28-30	33	6
Protein (%)	6-8	6-7	14
Fat	3	1	20
Fiber	2-3	0.5	25
Crude ash	1-1.5	0.5	9-10

RICE MILLING OVERVIEW

Types of Rice by Milling	Degree of Milling	Description
Paddy Rice	None	The whole rice grain after harvest before it is milled. Indigestible by humans, but may be used for animal feed.
Whole Grain Rice (such as Brown, Red or Black Rice)	Hull (husk) removed, with bran and germ intact	100% whole grain rice takes on the natural color of the bran; has a chewy texture and nutty flavor; contains vitamins, minerals, fiber, antioxidants and phytonutrients.
White Rice	Hull, bran and germ removed	A nutritious, complex carbohydrate and the predominant form of rice consumed around the world. White to off-white in color and has a mild flavor and aroma.

The modern milling process

1. Pre-cleaning
2. Removing the husk (dehusking or dehulling)
3. Paddy separation
4. Whitening or polishing
5. Separation of white rice
6. Rice mixing
7. Mist polishing
8. Rice weighing



Rubber roller husker



Vertical core polisher

Refined Grains



- ▶ Refined grains
 - Milled – remove bran and germ
 - Gives grains finer texture
 - Improves shelf life
 - Removes dietary fiber, iron and many B vitamins
 - Examples: white flour; de-germed cornmeal; white bread; white rice.
 - Most are enriched – vitamins and minerals added back in, but NOT dietary fiber.

Oils



- ▶ Oils are fats that are liquid at room temperature. Although oils are NOT a food group, they do provide essential nutrients.
- ▶ Examples: canola oil; corn oil; cottonseed oil; olive oil; safflower oil.
- ▶ Some foods are naturally high in oils: nuts; olives; some fish; avocados.
- ▶ Only small amounts of oils are recommended.

Health Benefits of Oils



- ▶ Increasing energy and stamina;
- ▶ Improving brain function;
- ▶ Speeding up recovery and healing processes.
- ▶ Assisting in many body processes.

The situation in the market

- Rapeseed oil
- Sesame oil
- Pumpkin seed oil
- Sunflower seed oil
- Olive oil



Harvest time

Raw material
quality

Processing type

Packaging

Storage
condition

Olive oil extraction

Traditionally, olive oil was produced by beating the trees with sticks to knock the olives off and crushing them in stone or wooden mortars or beam presses. Nowadays, olives are ground to tiny bits, obtaining a paste that is mixed with water and processed by a centrifuge, which extracts the oil from the paste, leaving behind pomace.



Flowsheet of Olive oil production

Obtaining Olives

Washing

Crushing

Malaxing

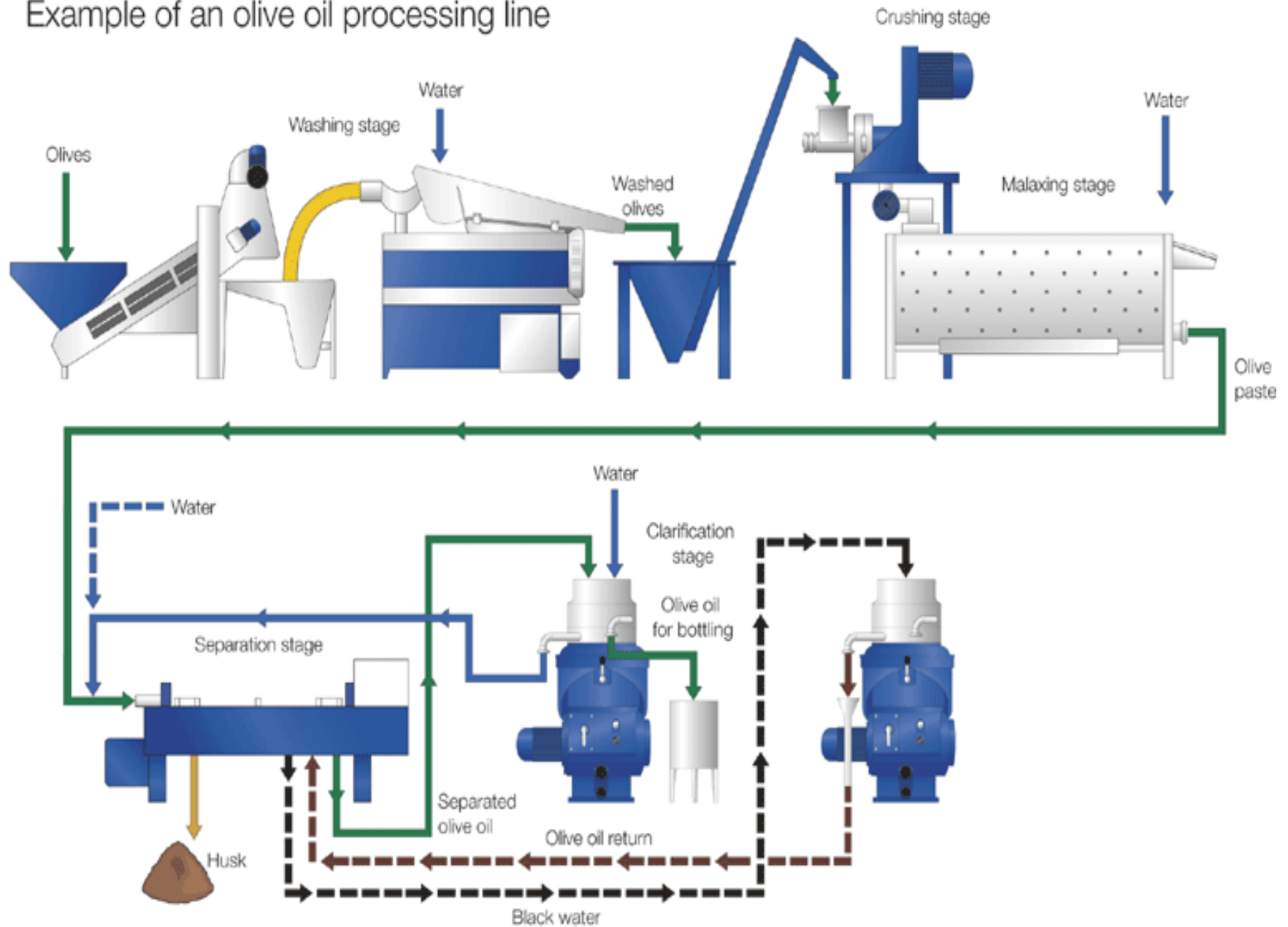
Separation

Clarification

Storage - bottling



Example of an olive oil processing line



Weighing



Olives milling



Malaxation



Olive dough during malaxation



Olive dough to decanter



Decanter



Extra virgin olive oil



2500 t/h



























Significant quality parameters of cold press oil

- Acidity level
- Primary oxidation
- Secondary oxidation
- Pigments content



Acidity level/the number of acidity < 1%

- The condition of harvested raw material
- The determination of free fatty acids in olive oils. The content of free fatty acids is expressed as acidity calculated conventionally.
- The titration method



Peroxide number/level < 20 mEq O₂/kg

- Mainly influenced by **storage** types and conditions
- **Primary products** of oxidation: peroxides, dienes, free fatty acids
- The titration method



Thiobarbituric acid assay/malondialdehyde content < 1 mg/100g

- Influenced by storage type and conditions
- **Secondary products** of oxidation: aldehydes, ketones
- Spectrophotometric method



Specific coefficients of absorbance

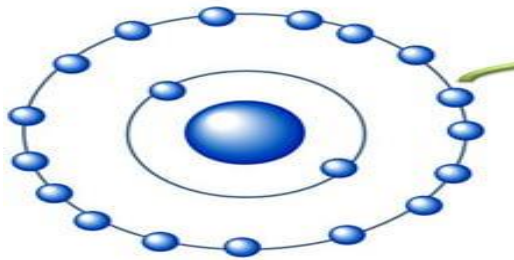
- K_{232}
Primary products of oxidation
- K_{270}
Secondary product of oxidation
- ΔK
Primary product of oxidation
- Spectrophotometric method



Phenol, carotenoid, chlorophyll

- Influenced by cultivar, harvest, storage type and conditions

Antioxidant



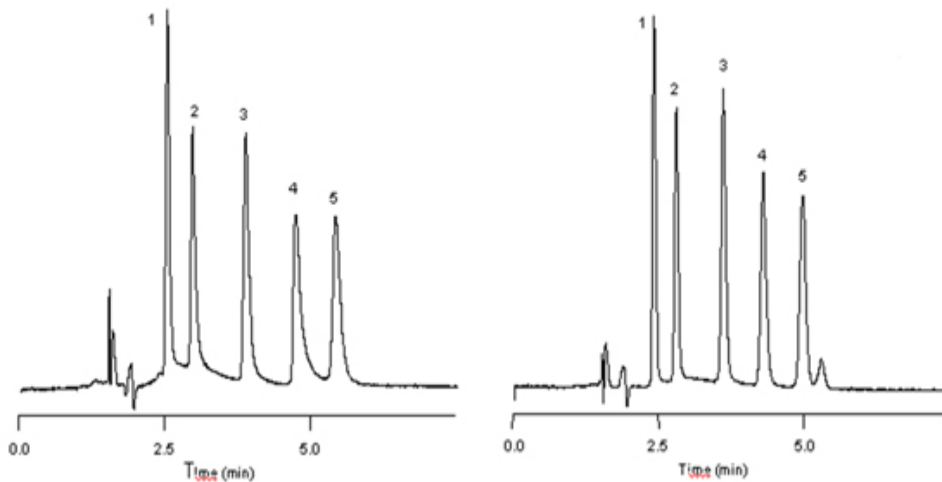
Pro-oxidant activity

- Spectrophotometric method



Pigments profile determination on HPLC

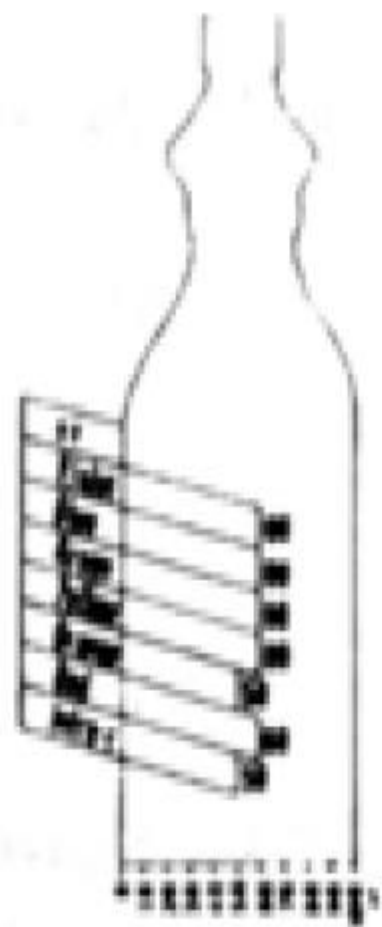
- How issues (cultivar, harvest, storage) influence individual pigments in edible oils



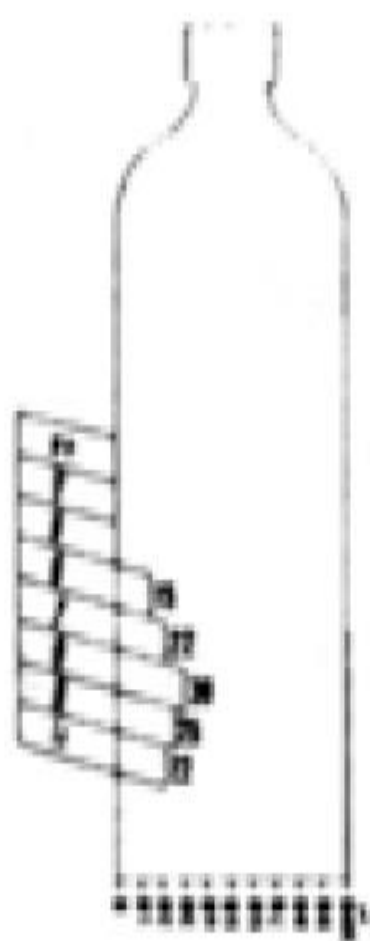
- Chromatographic method



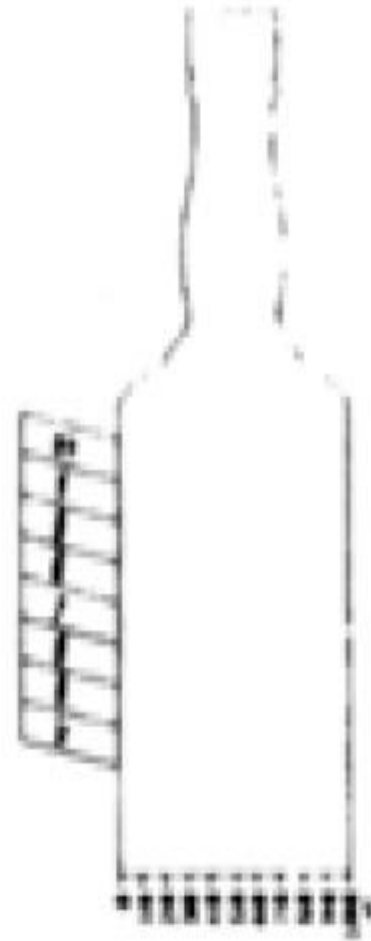
CLEAR
GLASS



BROWN
GLASS



OPAQUE
CONTAINER



VEGETABLE OIL QUALITY PYRAMID

THE BEST & HEALTHIEST
QUALITY VEGETABLE OIL

FRESH
Vegetable Oils

FRESH
Vegetable Oils

“The only vegetable oils
health conscious people
should use.”

Elizabeth Huntley

Ph.D. Nutritionist

MID-RANGE QUALITY

- Certified Organic Oils
- Extra Virgin Olive Oil
- Unrefined Expeller Pressed Oils
- Expeller Pressed Refined Oils

- Certified Organic Oils
- Extra Virgin Olive Oil
- Unrefined Expeller Pressed Oils
- Expeller Pressed Refined Oils

Until recently, the best
available to quality
conscious shoppers

LOW QUALITY

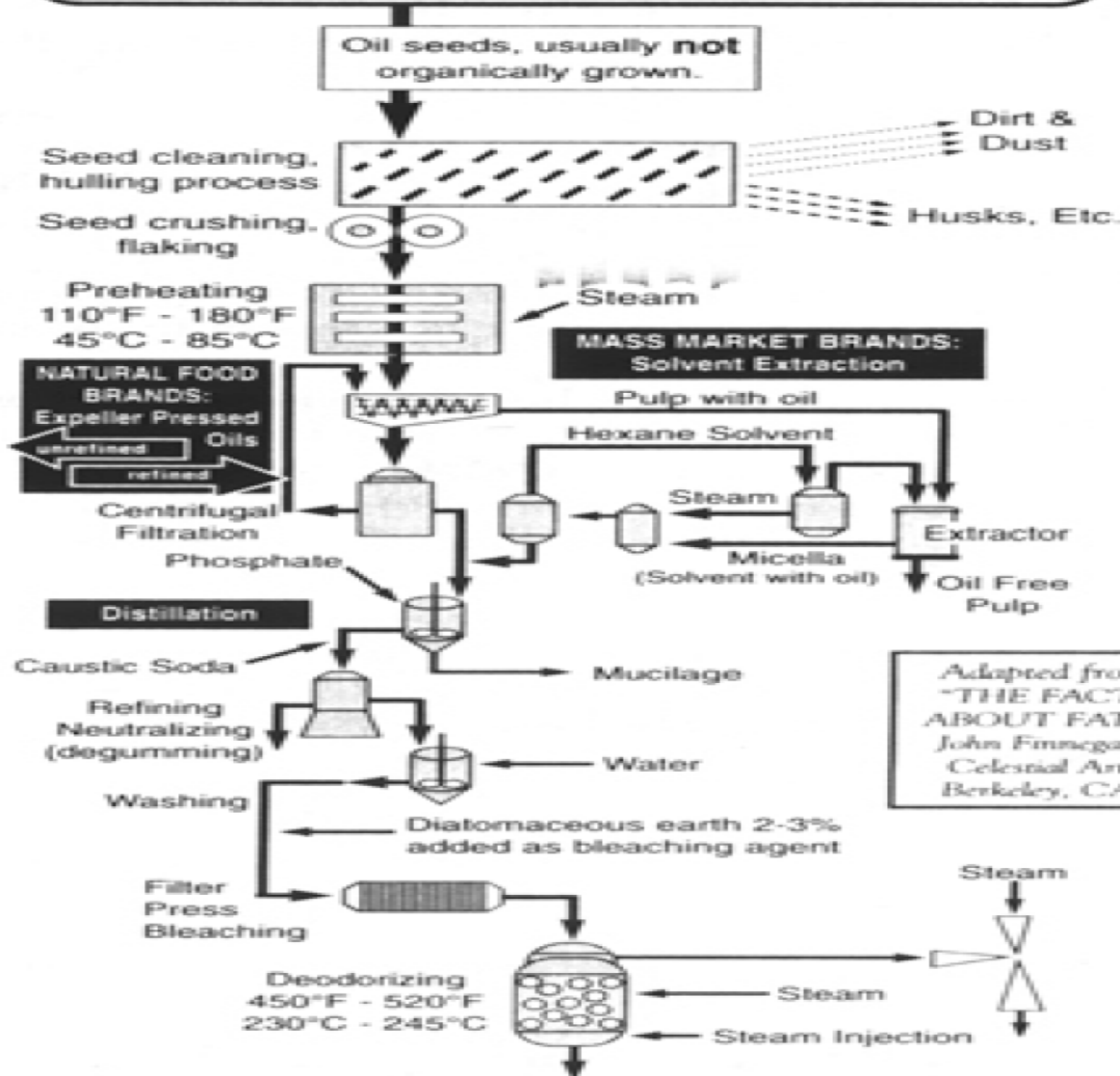
SOLVENT EXTRACTED OILS

SOLVENT EXTRACTED OILS

MASS
MARKET
BRANDS

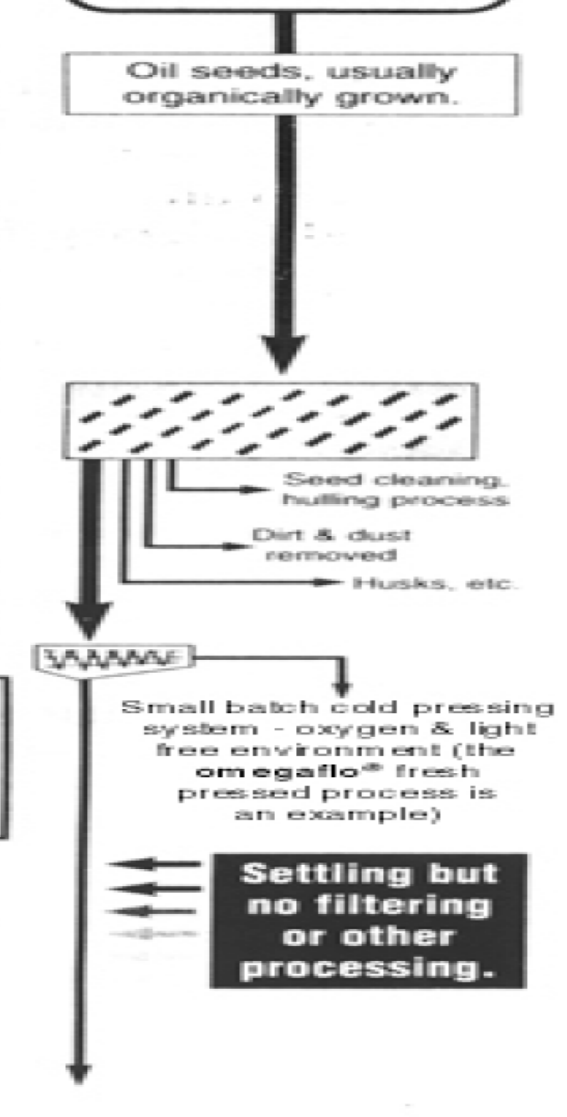
OIL PRESSING AT A GLANCE

SOLVENT EXTRACTED AND EXPELLER PRESSED OILS



Adapted from "THE FACTS ABOUT FATS", John Finsegan, Celestial Arts, Berkeley, CA.

FRESH OILS



FRESH OILS

With all nutrients intact. **NO toxic substances!**

EXPELLER PRESSED: "Natural Brands" | **SOLVENT EXTRACTED: "Mass Market Brands"**

LITTLE NUTRITIONAL VALUE. Nutrients either altered or removed. Contains toxic trans fatty acids, free radicals, and other toxic substances.

Saturated Fat vs. Trans Fatty Acids

Saturated Fats (Good)

Are a normal fat made by the body

Raise HDL (good) cholesterol

Lower Lp(a), a lipoprotein
Harmful to arteries

Conserve omega-3

Do not inhibit insulin binding

Do not interfere with enzymes that trigger prostaglandin production

Are used by the body to fight viruses, bacteria, and protozoa

Stearic acid is the body's preferred heart food

Provide proper modeling of calcium in the bones

Carry vital fat-soluble vitamins in the blood

Trans Fatty Acids (Bad)

Are abnormal, not made by the body

Lower HDL cholesterol

Raise Lp(a)

Cause loss of omega-3

Inhibit insulin binding

Interfere with enzymes that trigger prostaglandin production

Interfere with immune function

Replace stearic acid in cell membranes, thus depriving the heart

Cause softening of the bones

Do not carry vitamins

Thank you for your attention

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