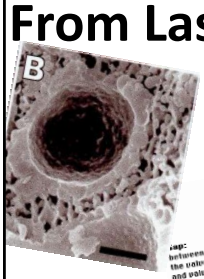
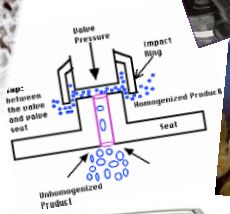
From Last Time:





Fermentation

Yogurt

- Bacteria "digestion" of lactose
  - Impact on lactose intolerance?
- Produces lactic acid
  - Impact on properties?
- Streptococcus salivarius – thermophilus
  - More active at lower acid concentration (higher pH)
- Lactobacillus delbrueckii – bulgaricus
  - More active at higher acid concentration (lower pH)
- High acetaldehyde production – green apples

Yogurt properties

Stabilizes milk for storage

Lactoglobulin (a whey protein)

facilitate casein networks

- Similar to fat globules in whipped cream
- Casein networks hold aqueous phase rather than air

Probiotic bacteria

- Contributes to and enhances intestinal floral
- Aids digestion

Read the label!

What should yogurt contain?

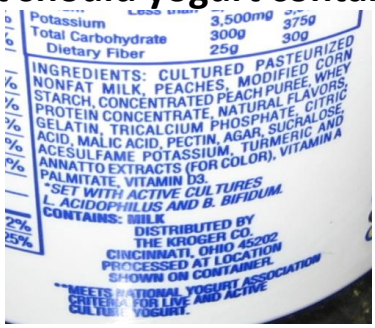


Image: http://cheeseforum.org/forum/index.php?topic=546.0

What should yogurt contain?

Image: http://ronjones.org/CurrentComments/GutCheck/June-08.htm

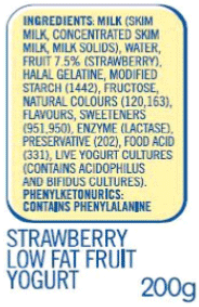
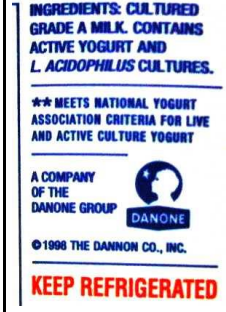


Image: http://www.nestle.com.au/Nutrition-Health-Wellness/Fact-Sheets/Decoding-Food-Labels

What should yogurt contain?



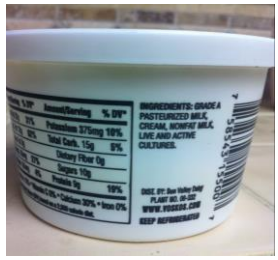


Image: http://bare5.com/grocery-labelsingredients-guide/

Image: http://gourmandgrammarian.blogspot.com/2011/07/greek-yogurt.html

Why all the thickeners?

Texture

Smoother

Limit separation

Fat replacement

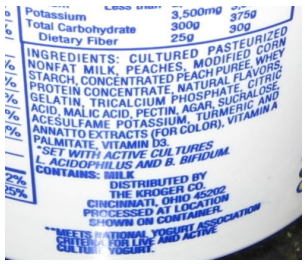


Image: http://cheeseforum.org/forum/index.php?topic=546.0

Making Yogurt

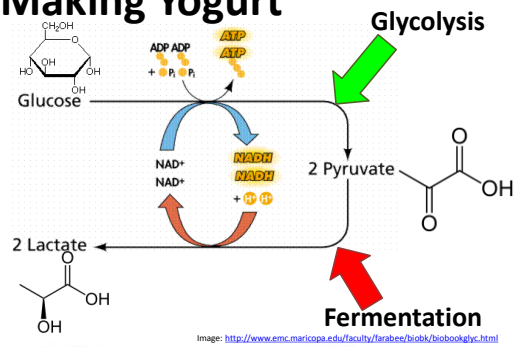


Image: http://www.emc.maricopa.edu/faculty/farabee/biobk/biobookglyc.html

Sugar Metabolism

Glycolysis

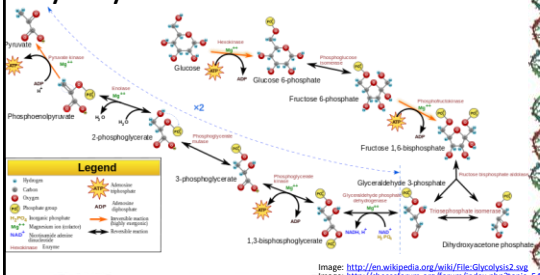
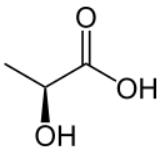


Image: http://en.wikipedia.org/wiki/File:Glycolysis2.svg
Image: http://cheeseforum.org/forum/index.php?topic=546.0

Making yogurt



Role of Lactic Acid

- Denatures casein micelles
  - Re-form as protein networks
- Acidifies
  - Preservative
  - Sour flavor

{figure on p45 of McGee}

Yogurt or Sour Cream?

Mesophilic

lactococci, leuconostoc
"particles of pasturage"
~85°F/30°C

Thermophilic

lactobacilli, streptococci
More lactic acid
~113°F/45°C

Exam 1

"Good" science

Many fields involved in cooking

Food molecules

- Water
- Inorganics
- Small organics
- Macromolecules

Exam 1

Small Organics
- Vitamins, sugars, metabolites

Macromolecules - Fats/Lipids
- Long carbon/hydrogen chains
- Hydrophobic
- Fatty acids, triglycerides, phospholipids
- Saturated vs. Unsaturated

Exam 1

Proteins – polymers of amino acids
- Side chain/Side group tunes properties
- Structure determines function
- Formed by dehydration/condensation

Carbohydrates – C/H/O molecules
- "Simple" sugars – monosaccharides
- "Simple" sugars – disaccharides
- Polysaccharides – sugar polymers

Exam 1

Polysaccharides
- Starch – glucose polymer, plants
- Amylose – unbranched
- Amylopectin - branched
- Binds water, thickening agent
- Formed by dehydration/condensation
- Broken down by amylase (hydrolysis)

Exam 1

Polysaccharides
- Glycogen – glucose polymer, animal
- Highly branched, compact
- Binds water, thickening agent
- Formed by dehydration/condensation
- Broken down by hydrolysis

Exam 1

Polysaccharides
- Cellulose – β-glucose polymer, plants
- Rigid, tough, cross-linked fibers
- Insoluble vs. soluble fiber
- Binds water
- Ruminant animals break down with bacteria in their rumen

Exam 1

Milk and Dairy
Milk – aqueous phase
Milk – fat phase
Lactase & lactose intolerance
Milk proteins – whey & casein
Curdling
Acids and Bases

Exam 1

Homogenization
Pasteurization
Milk foams – protein or fat
Butter – whip it good…
Fermentation – yogurt and others

Good luck!