Module 31: Food

Recall our main themes: energy->water->food->culture

Food!

Three main groups:

- **Proteins**: always include Nitrogen
- **Carbohydrates**: CHO in chains (starches) or simple (sugars)
- **Fats**: CHO again, but in a special branch structure (glycol backbone) that is good for energy storage and insulation (e.g. killer whales, eskimos)

Proteins: complex molecules of CHO and N.

- Look up amino acids, note the common structure.
- Now look up the amino acid methionine.
- What element does it contain as well?
- Why do rotten eggs, swamps (and Kilauea volcano) stink?

CHO=carbohydrates (clever name),

- usually in a chain, short chains are sugars (used for fuel),
- longer ones are starches and can be used for structures (e.g. cellulose in plants) or pasta...
- smallest: sugars, all end in -ose (glucose, sucrose) LOOK THESE UP, CHECK OUT THEIR MOLECULE SHAPE
- glucose is a "monosaccharide" created by photosynthesis
- longer chains: starches (rice, pasta) slowly digested (see diabetics, and glycemic index)
- structural CHO: cellulose-little boxes with goo inside, need enzymes to break these down (cows)
- ENZYMES ALL END IN -ASE

Fats/lipids: same chemical structure as CHO, but built along a glycol (alcohol) backbone.

- If the fats have long carbon chains with only single bonds, they are saturated (lots of Hydrogen atoms) and can hold together (e.g. animal fat)
  https://en.wikipedia.org/wiki/Saturated_fat
- If the long chains have double bonds and don't fit together, they melt easier (e.g. oils) and are called "unsaturated", usually better for your health.
- n.b. McDonalds® got into real hot water a while ago for frying all of their stuff in "supersaturated fats". Ugh...

Notes: Chapter 11 FR Overview:

- Frog 12.3 Agriculture
- Frog 12.4 Food Production
- Ch. 12 assessment
- FR ch. 11 feeding the world
- **FR mod 31 nutritional needs**
- **FR mod 32 industrial ag-insecticides, GMO**
- **FR mod 33 sustainable farming**

Big picture:

- Trophic pyramids in nature are sustainable
- Planet is nearing carrying capacity (K)
- Think of how many "earths" your global footprint represents
- To meet this food demand, current farming and fishing is industrial, not sustainable

Mod 31: Nutritional needs-what humans on our planet need, and what they lack
Read the case study p. 373-how is this like a trophic pyramid in nature?

- **Undernutrition**: lack of calories
- **Malnutrition**: lack of critical part of diet, usually protein (Kwashiorkor)
  https://en.wikipedia.org/wiki/Kwashiorkor
- **Food security:** not just in lesser developed countries ("LDC"), also in the US"Food deserts"-what are these?
- **Famine**: one of these impacting a large group, often from crop failure, drought or war/displacement

- **Overnutrition**: common in the US, look up the US obesity rate-how is this determined? Why? Seen any food ads lately?

Look up US obesity rate-----
Meat diet: high in protein, also in fat (energy store) and cholesterol-these contribute to heart disease

- Wait-Eskimos eat lots of blubber, why don't they have heart disease?
- How is this different from Kalahari bush tribes?Climate
- Wait, wait-what happened to Japanese health care system when they moved from their traditional diet?
- What impact does this have globally?
- Diet for a small planet 1971: planet can sustain population using fewer calories while supplying protein, vitamins and calories. Not by relying on meat.Vitamins="vital amines"

Food energy subsidy (cost factor):

- 20 kg of grain to produce 1 kg of beef (20:1 factor, or subsidy factor 20x)
- 2.8 kg of grain to produce 1 kg of chicken (2.8:1 factor, or subsidy factor of 2.8)
- Better to eat beef, chicken, fish or tofu? (you need protein in some form)



Migrated from Apple Server Wiki. Original page ID: k6Q9C9e

Revision #2
Created 2026-09-29 15:57:55 UTC by Admin
Updated 2026-09-29 16:18:54 UTC by Admin