By C. Kohn
Based on "Canine Feeding and Nutrition" by the Alabama Cooperative Extension System and "Nutrition" by Tiffany Griffin, Baker College

Canine Feeding and Nutrition

Introduction

- While dogs may be carnivores, they like and need a variety of foods
- Dogs need to consume a nutritionally balanced diet to stay healthy.
- Like humans, dogs have nutritional needs for…
  - Carbohydrates
  - Fats
  - Proteins
  - Vitamins, minerals, and water

Carbohydrates

- *Carbohydrates* are mostly high-energy, plant-based nutrients (exception: lactose in milk is the only sugar produced by animals).
- Carbohydrates can be found as *simple sugars, starches, soluble fiber, and insoluble fiber*.
- Examples include grains, sugars, milk, beet pulp, etc.

Carbohydrates

- There is no known dietary requirement for carbohydrates in dogs.
- However, carbohydrates are an excellent source of energy and are a valuable part of a dogs diet when fed in moderation.
- Cereal grains (corn, barley, rice, or wheat) have a high content of starch, and comprise a main source of energy in commercial dog foods.
- In the wild, the carbohydrates in a dog's diet would have already been broken down by the stomachs of their prey.

Carbohydrates - Fiber

- Insoluble carbohydrates (fiber, e.g. beet pulp) can help prevent and/or treat diarrhea and other digestive disorders.
- Fiber can also speed up digestion and decrease the amount of time that food is retained in the digestive tract.
- Fiber can help in preventing constipation and can reduce obesity rates by increasing satiety (the feeling of being full).

Carbohydrates

- Milk is also high in carbohydrates (lactose sugar) but may cause diarrhea in some dogs.
  - Because of this, milk should not be fed to dogs after they are weaned from their mother's milk
- A diet too low in fiber can lead to *diverticulosis*, or the formation of pockets in the large intestine that can lead to inflammation and infection.
- A diet too high in fiber can cause dental tartar buildup, and cause large, smelly stools.

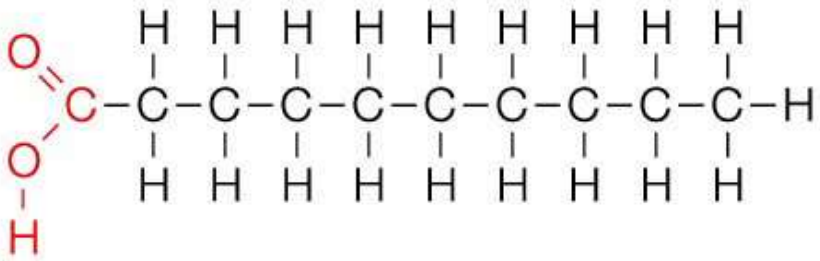
Fats

- Fats are a more concentrated form of energy than carbohydrates.
- *Saturated, unsaturated, and Linoleic acid* are the three essential fatty acids needed in a canine diet.
- Fats used commercially include cottonseed oil, hydrogenated vegetable oil, poultry fat, lard, and tallow.

Fats

- *Saturated fats* are "saturated" with hydrogen atoms.
- *Unsaturated fats* have a double-bond, reducing the amount of hydrogen that can bond to this molecule.

Saturated



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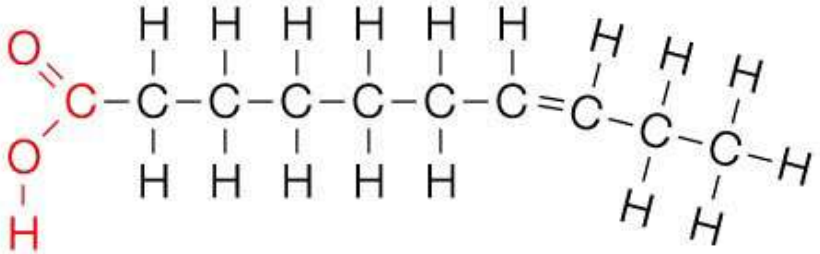
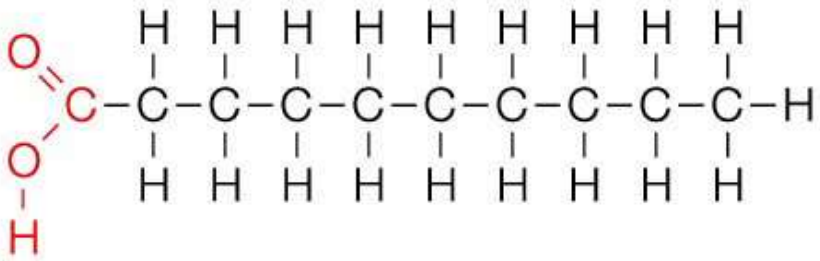


Fats

- The presence of this double-bond keeps unsaturated fats liquid at room temp.
- A diet too high in saturated fat can lead to high cholesterol and heart disease.

Saturated



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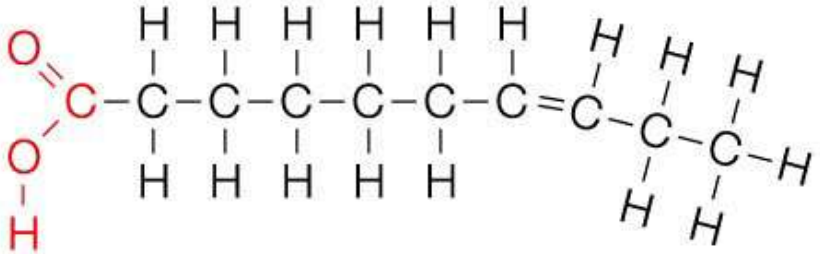

Fats

- News Release - 03/03/2003 - AU Research Keeps Bomb-Sniffing Dogs on Heightened Alert
- "We found that unsaturated fat is metabolized faster and sustains physical exertion longer than saturated fat," Cummins said.
- "Both before and after periods of intense exercise, the dogs on the unsaturated-fat diet were more alert and their senses of smell significantly more sensitive than those on the saturated-fat diet."

Fats

- *Saturated fat* comes from animal sources and is used mainly for energy.
- *Unsaturated fat* is used for skin and coat and one of the best sources for it is flax seeds.
- *Linoleic acid* is also found in flax seeds, and also in safflower oil. *(Source: Baker College)*

Fats

- Fats contribute to *palatability*, or the tastiness and texture of dog food.
- Fats carry the *fat-soluble vitamins* A, D, E and K.
- The most prevalent problem related to fat is overconsumption and obesity.

Fats

- Some of the outcomes of not having enough fat in your dog's diet could include:
  - *Course Dry Coat*
  - *Improper Growth*
  - *Poor Blood Clotting*
  - *Itching*
  - *Lack of Energy*
  - *Heart Problems*
  - *Cell Damage*
  - *Skin Lesions*
  - *Skin Growths*
  - *Calluses & Skin Infections*

Proteins

- Protein is among the most important nutrients found in dog food.
- Dogs need protein for *amino acids*, the building blocks of protein.
  - Proteins are essentially chains of amino acids.
- There are 20 amino acids required for dogs; dogs can synthesize half of these within their bodies. The other half must be consumed.

Protein & Amino Acids

- Those amino acids that cannot be produced by the dog's body and must be consumed are called *essential amino acids*.
- Every protein contains varying levels of each of the 20 amino acids.
  - Because of this, some proteins are of higher quality than others.
- Animal-based proteins are higher quality proteins than plant-based proteins because they will have a more complete balance of amino acids.

Vitamins

- Vitamins are *enyzmes*, or *biological catalysts* in biochemical reactions in the body
  - i.e. *they enable the chemical reactions necessary for life to occur more efficiently and with less energy*
  - Some biochemical reactions in our body cannot occur without the presence of adequate levels of specific vitamins.

Vitamins

- Vitamin A was discovered by Dr. E.V. McCollum at UW-Madison in 1917.
- McCollum's work was based on Dr. Stephen Babcock's "single-grain" experiments performed on cattle at the UW Dairy Barn.
  - Dr. Babcock eliminated specific grains one at a time to determine the impact on their health.
- McCollum discovered Vitamin A in the milk of cows after Babcock's initial work.
  - He later discovered Vitamin B and also showed that Vitamin D prevented the bone disease rickets.
  - The letter names were meant to be temporary until more suitable names could be found.

Vitamins

- Dr. Harry Steenbock at UW-Madison invented the process by which Vitamin D is added to milk.
- Steenbock used the money from his patent on this process to create the Wisconsin Alumni Research Foundation, or WARF
  - WARF funds scientific research at UW
- Today WARF is one of the largest funders of research in the world.

Vitamins

- Vitamins can be classified in one of two groups:
  - *Fat soluble* vitamins A,D,E, and K.
  - *Water soluble* vitamins B's and C
    - There are multiple B vitamins
- Because fat-soluble vitamins are commonly stored in fat tissue, they can build up to toxic levels if over-supplemented.
  - This is less likely with water soluble vitamins.

Vitamins

- Insufficient vitamin levels can lead to immune problems, weakened teeth and gums, and reduced ability to acquire energy from digested food.
- Excess water soluble vitamins can be excreted from the body and are rarely a problem
- Excess fat-soluble vitamins can cause toxicity and poisoning.

Minerals

- Minerals play a similar role in metabolism as vitamins.

- Minerals…
  - assist in the formation of blood and bones
  - enable proper salinity and composition of bodily fluids
  - carry oxygen in the blood
  - and promote a healthy nervous system.

Minerals

- Minerals can be divided into two categories
  - *Macrominerals* – needed in large amounts
  - *Microminerals* – needed in small amounts
- A deficiency, imbalance, or excess of minerals can cause severe skeletal deformities

Water

- Water a key nutrient for every living thing, plant or animal.
- Water assists in…
  - body temperature regulation
  - blood formation and the creation of liquids throughout the body
  - and prevents dehydration.
- **Clean water should be available all times for your dog.** *(Source: Baker College)*