Veterinary Science

Preparatory Training for the Veterinary Assistant

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Essential Food Nutrients

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Objectives

- Define essential nutrient
- Define non-essential nutrient
- List and discuss the six classes of nutrients

Foods and Nutrients

- Food
  - A material which, after ingestion by an animal is capable of being digested, absorbed and utilized
- Nutrient
  - A component of a food that aids in the support of life
  - Nutrients are chemical elements or compounds
  - Essential nutrients must be provided in food
    - Body cannot synthesize
  - Non-essential nutrients do not have to be provided
    - Body can synthesize

Components/Nutrients of Food

- Water
- Feed/Dry matter
  - Carbohydrates
  - Lipids (fats and oils)
  - Protein
  - Vitamins
  - Minerals

Water

- Most overlooked nutrient
- Water supports
  - Body temperature
  - Body metabolism
- Sources
  - Drinking water
  - Feed

Water Requirements

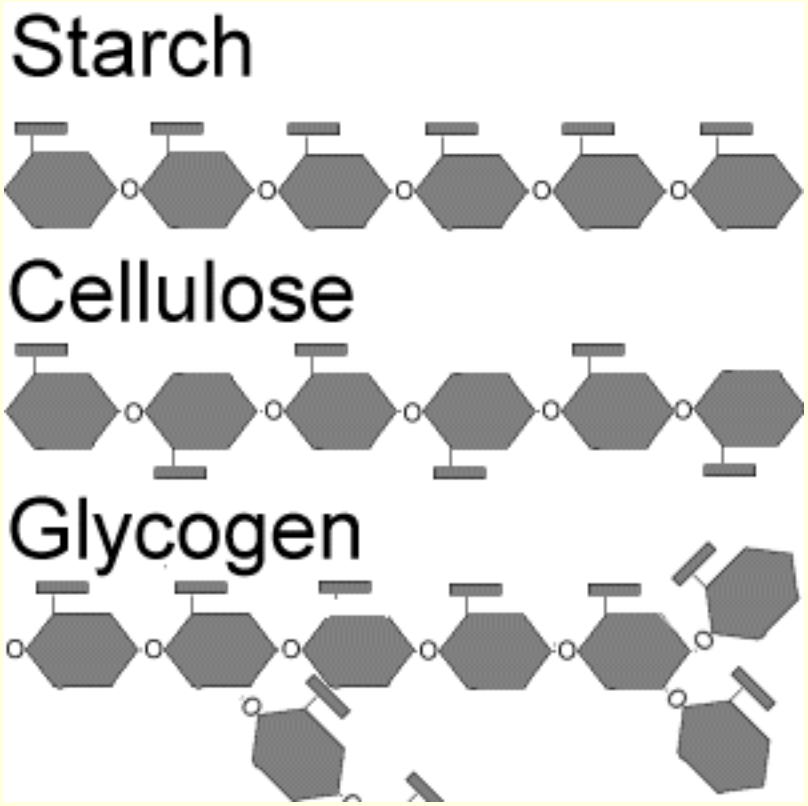
- 1.5 quarts of water per pound of feed
- Amount of water required depends on
  - Environmental temperature
  - Body temperature
  - Lactation
  - Salt content of feed
  - Quality of water

Water Loss

- Routes of water loss
  - Urine
  - Feces
  - Breathing
  - Sweat

Carbohydrates

- Main storage of energy for plants
- Consist of
  - Sugars
  - Starch
  - Cellulose
  - Hemicellulose
  - Pectins



Categories of Carbohydrates

- Nitrogen free extract
  - Easily digested
  - Starches and sugars
- Crude fiber
  - Not easily digested
  - Cellulose, hemicellulose and pectins

Purpose of Carbohydrates

- Provide energy (calories)
  - Low energy feeds – fibers
    - Forages/roughages – grasses, legumes, grain plants
  - High energy feeds – starches and sugars
    - Grains – corn, sorghum, oats, wheat
- Requirements depend on stage of production
  - Growth
  - Milk
  - Reproduction
  - Fattening

Lipids (Fats and Oils)

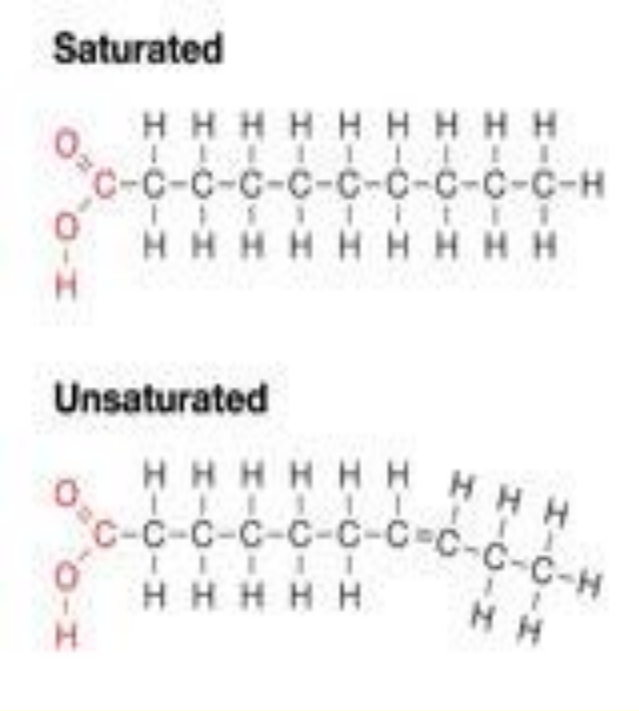
- Organic (plants and animals)
- Insoluble in water, but soluble in organic solvents
- Provide HIGH ENERGY
  - Lipids provide over twice carbohydrates

Sources of Lipids

- Plants
  - Saturated and unsaturated fat
- Animals
  - ALL saturated fat

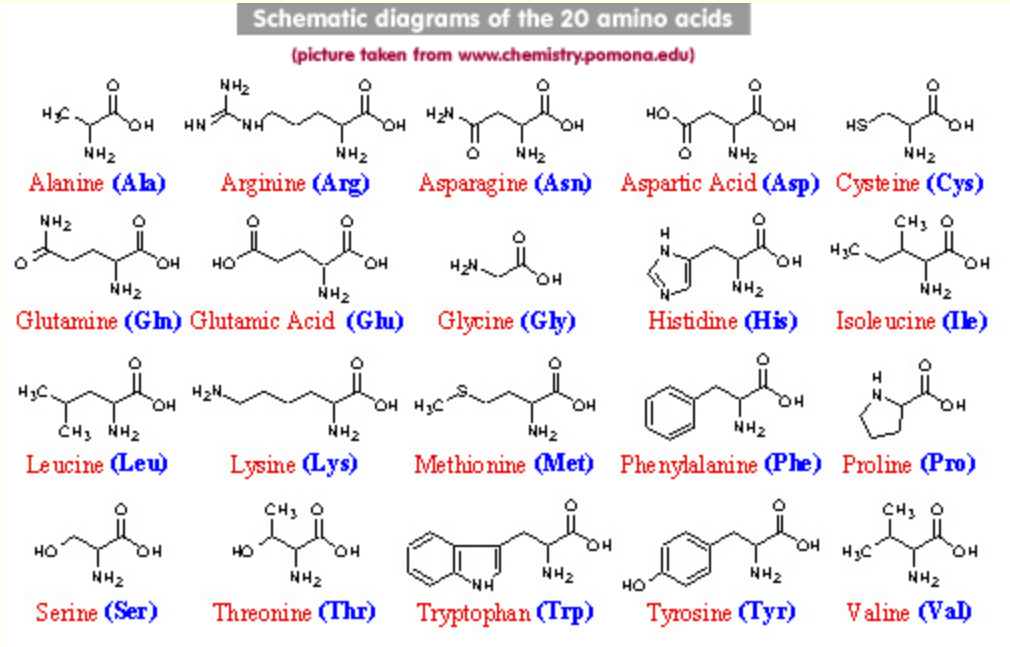
Structure of Lipids

- Fatty acid chains
  - Long chain of carbons with hydrogen
- Saturated
  - All carbons each “saturated” by hydrogens
- Unsaturated
  - More than one carbon-carbon bond is double



Proteins

- Basic structure is multiple amino acids
  - 20 amino acids are commonly found in proteins



Sources of Protein

- Plants
  - Grains
  - Grain plants
  - Grasses, legumes
- Animals
  - By-products (meat, bone and blood meal)
  - Milk
- Non-protein nitrogen (protein formed in rumen)
  - Urea
  - Manure

Purpose of Protein

- Protein levels needed for different stages
  - Growth
  - Development
  - Milk
- Protein also provides energy

Vitamins

- Organic
- Present in small amounts
- Essential for metabolic activity
  - Growth, development, milk, reproduction
- Disease occurs when deficient
- Animals must be fed vitamins (animal and plant products) or vitamins must be formed by microbial synthesis

Fat Soluble Vitamins

- Vitamin A
- Vitamin D
- Vitamin E
- Vitamin K

- Regulate metabolism of structural units
- Dietary intake (animal and plant products)
- Synthetic products
- Excreted in feces
- Stored in body

Water Soluble Vitamins

B Vitamins

- Thiamine B1
- Riboflavin B2
- Niacin B3
- Panthothenic Acid B5
- Pyridoxine B6
- Biotin B7
- Inositol B8
- Folic Acid B9
- Cyanocobalamin B12
- Choline

C Vitamin

- Ascorbic Acid

•More involved in regulating transfer of energy

•Daily dietary intake (animal and plant products)

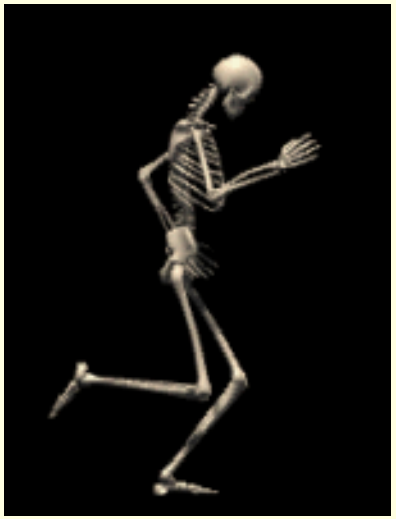
•Synthetic products

•Rumen and colon microbes synthesize

•Excreted in urine

Minerals

- Essential for various life processes
  - Skeletal formation
    - (Ca, P, Mg, Cu, Mn)
  - Protein synthesis
    - (P, S, Zn)
  - Oxygen transport
    - (Cu, Fe)
  - Fluid balance and acid/base regulation
    - (Na, Cl, K)
  - Enzyme systems
    - (Ca, P, K, Mg, Fe, Cu, Mn, Zn)



Macrominerals (Major Minerals)

- Needed in larger amounts than other minerals (%)
  - Calcium – Ca
  - Phosphorus – P
  - Sodium – Na
  - Chlorine – Cl
  - Potassium – K
  - Magnesium – Mn
  - Sulfur – S

Microminerals (Trace Minerals)

- Needed in very small amounts (PPM)
  - Iron – Fe
  - Copper – Cu
  - Iodine – I
  - Cobalt – Co
  - Molybdenum – Mb
  - Fluoride – F
  - Manganese – Mn
  - Zinc – Zn
  - Selenium – Se

Sources of Minerals

- Dietary intake
  - Animal products
  - Plant products
  - Water
- Synthetic products

Purpose of Minerals

- Bone development
- Teeth development
- Chemical process regulation
- Nervous system function
- Reproduction
- Blood building