

Chapter 41: Animal Nutrition

- Understand the necessity of nutrition to animals lacking the ability to undergo photosynthesis
 - **Animals must have consume an adequate diet that must satisfy 3 nutritional needs**
 - **Chemical energy for cellular processes**
 - **Organic building blocks for macromolecules**
 - **Essential nutrients (The materials that an animals cell requires but cannot synthesize)**
- Be familiar with the 4 types of essential nutrients for animals
 - **Essential Amino Acids, Essential Fatty Acids, Vitamins and Minerals**
 - What does it mean for a nutrient to be essential?
 - **The materials that an animals cell requires but cannot synthesize.**
 - How do humans typically receive these essential nutrients?
 - **Essential Amino Acids – There are 20 amino acids to create a protein, humans require 8 Amino acids in diet that must be found in food. Protein in meat eggs and cheese are considered “complete,” meaning all essential Amino Acids are present in the meal. Incomplete is the deficiency of one or more amino acid in a meal**
 - **Essential Fatty Acids – most animals produce the enzyme to synthesize most, but not all fatty acids – the ones they cannot make are certain fatty acids that contain one or more double bonds (unsaturated). Deficiencies of fatty acids are rare**
 - **Vitamins – organic molecules that have diverse function and are required in the diet in very SMALL amounts (.01 to 100mg a day**
 - **Water Soluble – B & C; dissolved in water, easily excreted through urine and have to be consumed daily**
 - **Fat Soluble – A, D, E & K; soluble in fat; and absorbed along with dietary fats; not normally excreted in the urine and tend to be stored in the body in moderate amounts.**
 - **Minerals – inorganic nutrients (iron and sulfur) that are required in small amounts; large amounts can upset homeostatic balance and impair health**
 - What are some of the major problems associated with a lack of essential nutrients?
 - **Essential fatty acids – deficiencies are rare**

- **Vitamins - fat soluble vitamins are stored as body fat; over consumption leads to toxic levels within the body**
 - **Minerals - upset homeostatic balance. It can also upset the liver**
 - **Lack of essential nutrients could cause:**
 - **Deformities, disease and death**
 - **Protein deficiency is common in humans**
 - **Undernutrition - when our diet fails to provide adequate sources of chemical energy**
 - **If not an adequate amount is consumed, our body uses up stored carbohydrates and fat, breaking down our own protein as fuel**
 - **Muscles decrease and the brain becomes protein deficient**
 - **Anorexia Nervosa**
- **Understand 4 stages of food processing**
 - **1. Ingestion - the act of eating or feeding**
 - **2. Digestion - food is broken down into molecules small enough for the body to absorb**
 - **Mechanical digestion - chewing; breaking down into small pieces, increasing the surface area available for chemical digestion**
 - **Chemical Digestion - breaks down proteins, carbohydrates, nucleic acids, fats and phospholipids in food**
 - **Enzymatic Hydrolysis - breaks bonds with the addition of water; releases fatty acids and other components from fats and phospholipids.**
 - **3. Absorption - Animals cells take up (absorb) small molecules such as amino acids or simple sugars**
 - **4. Elimination - completes the process as undigested material passes out of the digestive system**
- **Know the differences in food processing between animals with a gastrovascular cavity and those with an alimentary canal**
 - **Gastrovascular - functions in digestion as well as in distribution of nutrients throughout the body. Has one opening. Usually found in Cnidarians (hydras). Ingestion and digestion can not happen at the same time because there is only one opening.**
 - **Alimentary Canal - humans; two openings; specialized compartments to carry out digestion and nutrient absorption. Ingestion can occur while digestion is still going**
- **Thoroughly understand the organs and accessory glands of the human digestive system**
 - **Be able to differentiate between mechanical and chemical digestion**
 - **Answer is stated above ^**

- For each digestive organ, be aware of the types of hydrolytic enzymes present as well as the source of the hydrolytic enzymes
 - **Specialized organs for the Digestive system**
 - **Peristalsis** – how food is pushed along; alternating waves of contraction and relaxation in smooth muscle lining of the canal
 - **Sphincters** – muscular layers that form ring-like waves located at some of the junctions between specialized compartments. They act like drawstrings to close off the alimentary canal to regulate the passage of material between compartments
 - **Digestive Tract**
 - **Oral Cavity** – ingestion and initial steps of digestion begin in the mouth; mechanical digestion – increases surface area and easier to digest.
 - **Salivary glands** – stimulated by the presence of food that causes the delivery of saliva through ducts to the oral cavity. When released before food enters, a learned association between eating and the time of day, a cooking order or another stimulus, trigger it.
 - **Amylase** – found in saliva, it hydrolyzes starch and glycogen into smaller polysaccharides and the disaccharide maltose
 - **Mucus** – a viscous mixture of water, salts cells and slippery glycoproteins (mucins). It protects the lining of the mouth from abrasion and lubricates food for easier swallowing
 - **Bolus** – a ball of food formed by movements of the tongue
 - **Pharynx** – throat region. It opens up to two passageways
 - **Esophagus and trachea (wind pipe)**
 - **Larynx** – Directs the bolus into the entrance of the esophagus
 - **Esophagus** – leads to the stomach. It contains striated and smooth muscles. The striated muscles are located at the top of the esophagus and active in swallowing. The smooth muscles function in peristalsis