Unit B
Understanding Animal Body Systems

Lesson 3
Understanding Nutrients and Their Importance

Terms

- Balanced ration
- Carbohydrates
- Complex carbohydrates
- Disaccharides
- Essential nutrients
- Ether
- Fat
- Fat-soluble vitamins
- Fiber
- Lipid
- Macrominerals
- Microminerals
- Mineral
- Monosaccharides
- Nutrient

Terms

- Proteins
- Ration
- Simple carbohydrates
- Vitamin
- Water-soluble vitamins

What are the essential nutrients for animal production?

- *Good nutrition can increase feed efficiency and the rate of gain for animals. Animals must be fed a diet that meets their needs.*
- *If these needs are not met properly, the animal won't grow, reproduce, or could possibly die. Feedstuffs contain nutrients.*

- A ***nutrient*** is a substance that is necessary for an organism to live and grow.
- A ***ration*** is the total amount of feed an animal has in a 24-hour period.
  - The ration can be fed all at one time, or available at various points throughout the day.
- A ***balanced ration*** is one that contains all the nutrients that the animal needs in the correct proportions.

- Too much of any one nutrient is wasteful and could prove harmful to the animal.
- A nutrient deficiency can result in stunted growth and low production.
- Nutrients that are required for proper growth in all animals are called ***essential nutrients***.
- There are six essential nutrients:
  - Water
  - Carbohydrates
  - Lipids or Fats
  - Protein
  - Minerals
  - Vitamins

What is the importance of water as a nutrient?

- Water is necessary for an animal's survival.
- Animals can live longer without food than with-out water.
  - It makes up about 75 percent of the weight of a mature animal and as much as 90 percent of a newborn.
- Water is found in every cell of the body.

H2O

Water

- The amount of water needed by an animal is related to the activity the animal performs, and the stage of life of the animal.
- Water can enter into the body in many different ways.
  - Most of it enters by drinking.
  - Water is also found in the feed that animals consume and may be produced through biochemical reactions.
- Water may be lost from the body through urine, feces, sweat, and vapor from the lungs.

Water

- Water that is taken in by an animal should be clean and fresh.
- Water should be available to animals at all times.
- Water has two main functions in an animal's body.

Functions of Water

1. One function of water is to regulate the animal's body temperature.
   - Water helps control body temperature because it is able to accumulate, transfer, and lose heat through evaporation.
2. Water also promotes biochemical processes in the animal.
   - All biochemical reactions in the body require water.
   - Water is a major component of cells, blood, and body tissues.

What is the importance of carbohydrates as a nutrient?

Carbohydrates *are feed components that provide energy and are composed of carbon, hydrogen, and oxygen.*

They are a major component of plant tissues. Carbohydrates should make up about 75 percent of an animal's diet.

Carbohydrates

- Carbohydrates provide energy in a chemical reaction during digestion that is much like burning.
  - This energy powers muscular movements.
- Carbohydrates also produce the body heat that helps to keep the animal warm.
- In addition to energy, carbohydrates aid in the use of proteins and fats by the body.

Carbohydrates

- Carbohydrates are not stored in the body.
- They must be provided in the animal's diet every day.
- Unused carbohydrates are converted into fat to be stored.

- There are three types of carbohydrates:

Types of Carbohydrates

Sugars—There are two kinds of sugars:

- simple sugars ***(monosaccharide**s*)
- double sugars ***(disaccharide**s*).

a. Glucose and fructose are simple sugars.

b. Sucrose is a double sugar.

- Sucrose is what is used to make table sugar.
- Glucose is an excellent source of energy for most cells.

Types of Carbohydrates

Starch—Starch is an important source of energy.

a. Starch is converted to glucose in the digestive process.

Types of Carbohydrates

3. Fiber—***Fiber*** is the material left after the food has been digested. It is made of plant cells and cellulose.
   - Fiber aids the digestive system to function properly.
   - Fiber also absorbs water and provides bulk.
   - It plays an important role in ruminant digestion by increasing bacterial populations in the rumen.

Carbohydrates may be classified as either simple carbohydrates or complex carbohydrates.

simple or Complex

Carbohydrates

Simple carbohydrates are easily digested.

- Sugar and starch are simple carbohydrates.
- This type of carbohydrate is found in cereal grains such as corn, wheat, oats, barley, and sorghum.

Carbohydrates

Complex carbohydrates can also be called fiber.

- Cellulose and lignin are complex carbohydrates.
- These substances are more difficult to digest than simple carbohydrates.
- These are found mainly in roughages such as hay and pasture plants.

What is the importance of lipids as a nutrient?

IV. A ***lipid*** is a food component that provides energy and is also the form in which animals store energy.

- Most lipids are fats or oil.
- A ***fat*** is the solid form of a lipid.

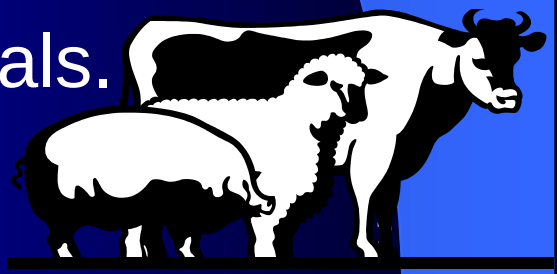
What is the importance of lipids as a nutrient?

- Fats contain the highest amounts of energy.
  - They can contain 2.25 times more energy than carbohydrates.
- Fats play an important role in supplying the energy needed by an animal for normal body maintenance.
- A key role of fats is they are the only way the fat-soluble vitamins A, D, E, and K can enter the animal's body.

What is the importance of protein as a nutrient?

v. ***Proteins*** are organic compounds primarily made up of amino acids.

- This nutrient is needed to grow new tissues and to repair old tissues in the animal.
- Three to five percent of the body's proteins are rebuilt every day.
- The highest amounts of protein can be found in the muscles of animals.

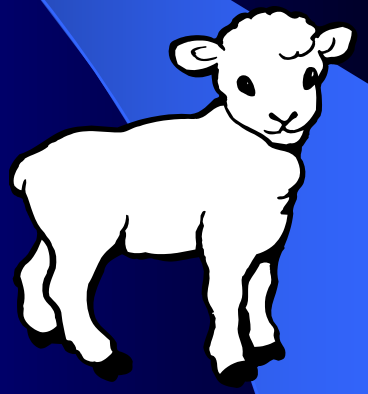


What is the importance of protein as a nutrient?

- Proteins can be classified as either essential or nonessential.
- Sources of protein include soybean meal, cottonseed meal, fish meal, and alfalfa hay.
- Protein is the most common nutrient deficiency.

What is the importance of protein as a nutrient?

- Symptoms of a protein deficiency include anorexia, slow growth rate, decreased feed efficiency, low birth weight, and lower milk production.
- Young animals need diets higher in protein than older animals.
- Animals in gestation or lactation stages also need higher levels of protein in their diets.



What is the importance of minerals as a nutrient?

VI. A ***mineral*** is an inorganic element found in small amounts in the body.

- Minerals are essential in skeleton growth and necessary for body systems to function properly.
- There are two groups of minerals.

A. Macrominerals or major minerals are needed in the diet in relatively large amounts.

Macro-Minerals

- The minerals included in this group include:
  - Salt (NaCl) [Sodium & Chorine]
  - Calcium (Ca)
  - Phosphorus (P)
  - Magnesium (Mg)
  - Potassium (K)
  - Sulfur (S)

B. ***Microminerals*** or trace minerals are minerals that are required in small quantities.

- These minerals are just as important as macrominerals, they are just needed in smaller quantities.

Chromium (Cr)
Cobalt (Co)
Copper (Cu)
Fluorine (F)
Iodine (I)
Iron (Fe)
Manganese (Mn)
Molybdenum (Mo)
Selenium (Se)
Silicon (Si)
Zinc (Zn)

What is the importance of vitamins as a nutrient?

VII. A ***vitamin*** is an organic substance needed in small quantities to perform specific functions.

- They do not provide energy, but are necessary in using energy.
- Vitamins aid the animal's body by assisting to regulate body functions, keeping the body healthy, and developing resistance to diseases.
- The deficiency of a vitamin can lead to disease or death.

Vitamins

- Vitamins are in one of two groups.
  - A. ***Fat-soluble vitamins*** are vitamins that are stored in the fat and released as they are needed by the body.
    - These include vitamins A, D, E, and K.
  - B. ***Water-soluble vitamins*** are vitamins that are dissolved by water and need to be consumed every day.
    - They include vitamin C and the B vitamins.