

The Importance of Water, Carbohydrates, and Fats

PROPER animal nutrition is key to successful livestock production. Good nutrition can increase feed efficiency and the rate of gain in animals. Animals must be fed diets that meet their needs. If their needs are not properly met, the animals won't grow, reproduce, or produce milk, and they could possibly die.



Objective:



Describe the importance of water, carbohydrates, and fats as essential nutrients in animal production.

Key Terms:



balanced ration

carbohydrates

complex carbohydrates

essential nutrients

ether

fiber

lipid

nutrient

ration

simple carbohydrates

Essential Nutrients in Animal Production

A **nutrient** is a substance contained in feed that is necessary for an organism to live and grow. A **ration** is the total amount of feed an animal consumes in a 24-hour period. The ration can be fed all at once or be available at various points throughout the day. A **balanced ration** is one that contains all the nutrients an animal needs and in the correct proportions. The nutritional requirements vary depending upon the animal's stages of growth or production, including maintenance, lactation or reproduction, growth and finishing, and work or activity. Too much of any one nutrient is wasteful and may prove harmful to the animal. A nutrient deficiency can result in stunted growth and low production.

Nutrients required for proper growth in all animals are called **essential nutrients**. There are six classes of essential nutrients—water, carbohydrates, fats, proteins, minerals, and vitamins. This E-unit will discuss the first three of these.

WATER

Water is necessary for an animal's survival. An animal can live longer without food than without water. Water makes up about 75 percent of the weight of a mature animal and as much as 90 percent of a newborn. It is found in every cell of the body. The amount of water needed by an animal is related to the activity the animal performs and to its stage of growth or production (lactation, gestation, etc.).

Water can enter the body in many different ways. Most of it enters by drinking. Water is also found in the feed an animal consumes and may be produced through biochemical reactions. Water may be lost from the body through urine, feces, sweat, and vapor from the lungs. Water 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. One is to regulate the animal's body temperature, and the other is to assist in transporting nutrients. Water helps control body temperature because it is able to accumulate, transfer, and lose heat through evaporation. In addition, water is necessary for most metabolic reactions in the body and is a major component of cells, blood, and body tissues.



FIGURE 1. Animals must always have access to water.

CARBOHYDRATES

Carbohydrates are energy-providing feed components composed of carbon, hydrogen, and oxygen. They should make up about 75 percent of an animal's diet. The energy they provide powers muscular movements. Carbohydrates also produce the body heat that helps keep the animal warm. They aid in the use of proteins and fats by the body. Carbohydrates are not stored in the body. They must be provided in the animal's diet every day. Unused carbohydrates are converted into fats to be stored.

Carbohydrates may be either simple or complex. **Simple carbohydrates** are easily digested. Sugars and starch are simple carbohydrates. Simple carbohydrates are found in concentrates, such as corn, wheat, oats, barley, and sorghum. **Complex carbohydrates** are more difficult to digest than simple carbohydrates. Cellulose and lignin are complex carbohydrates. These substances are found mainly in roughages, such as hay and pasture plants.

Carbohydrates can also be classified into one of three types—sugars, starch, and fiber.

Sugars

There are two kinds of sugars—simple sugars, or monosaccharides, and double sugars, or disaccharides. Glucose, galactose, and fructose are simple sugars. Maltose, lactose, and sucrose are double sugars. Glucose is an excellent source of energy for most cells.

Starch

Starch is an important source of energy. Starch is converted to glucose in the digestive process.

Fiber

Fiber is the material left after the food has been digested. Fiber is composed of plant cells and cellulose. Cellulose is the major component of plant cell walls. Fiber absorbs water, provides bulk, and is necessary for the digestive system to function properly. Fiber also plays an important role in ruminant digestion by increasing bacterial populations in the rumen.

FATS

Fats and oils are also known as lipids. A **lipid** is a food component that provides energy and is also the form in which animals store energy. Lipids can be dissolved with **ether**, a colorless liquid solvent used in nutrition research. Fats are solid and oils are liquid at room temperature.

Fats contain the highest amounts of energy. In fact, fats 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. Good sources of fats in animal rations include meat and bone meal or fish meal.

Summary:



A nutrient is a substance contained in feed that is necessary for an organism to live and grow. Nutrients required for proper growth in all animals are called essential



FIGURE 2. Oats, barley, and corn are excellent sources of carbohydrates for livestock.

nutrients. There are six classes of essential nutrients—water, carbohydrates, fats, proteins, minerals, and vitamins. Water, carbohydrates, and fats were discussed in this E-unit. Water is essential for an animal’s survival. Water’s two main functions in the body are to regulate the animal’s body temperature and to assist in transporting nutrients. Carbohydrates provide energy and should make up about 75 percent of an animal’s diet. Carbohydrates may be simple (sugars and starch) or complex (fiber). Fats, or lipids, are food components that provide energy and are also the form in which animals store energy. Fats contain 2.25 times more energy than carbohydrates.

Checking Your Knowledge:



1. List at least four factors that may affect the nutritional requirements of animals.
2. Name the six classes of essential nutrients.
3. Water makes up about what percentage of the weight of a mature animal?
4. Describe the two main functions of water in the body.
5. Carbohydrates should make up about what percentage of an animal’s diet?
6. Compare and contrast simple and complex carbohydrates.
7. What is the best energy source for most cells?
8. How much more energy do fats contain than carbohydrates?
9. Name two sources of fats in animal rations.
10. Name two sources of simple carbohydrates.
11. Name two sources of complex carbohydrates.

Expanding Your Knowledge:



Analyze the nutritional information on a bag of livestock or pet food. What are the major ingredients? What are the food’s percent sugar, percent fiber, and percent fat? Which ingredient is most likely the best source of carbohydrates?

Web Links:



Nutrition and Feeding of the Cow-Calf Herd

<http://www.ext.vt.edu/pubs/beef/400-011/400-011.html>

Necessary Nutrients for Dogs

<http://www.purina.com/dogs/food/NecessaryNutrients.aspx>

Equine Nutrition

<http://www.wisconsinquineclinic.com/html/Equine%20Nutrition.htm>

Agricultural Career Profiles

<http://www.mycart.com/career-profiles>