

Animal Nutrition

Need for Nourishment

- body processes require the use of energy
- obtained from ingested food or stored fat
- animal must have food to store energy in fat cells

Need for Nourishment

- animals spend most of their time in search of food
- maintenance ration must be met first

Need for Nourishment

- wild animals eat a variety of foods to obtain proper nutrients
- agricultural animals depend on the producer to provide balanced a ration

Feedstuff

- one component of a feed ration
- not normally fed by itself

Nutrients

- water
- protein
- carbohydrates

Nutrients

- fats or lipids
- vitamins
- minerals

Metabolism

- all the chemical and physical processes that take place in the body

Metabolism

- anabolism - metabolism that builds tissue
- catabolism - metabolism that breaks down materials

Water

- most abundant compound in the world
- animals must have frequent intakes of water to remain alive

Water

- provides basis for all of the fluid of the animals body
- bloodstream requires liquid for circulation

Water

- digestion requires moisture for breakdown of nutrients and movement of feed
- needed to produce milk

Water

- provides cells with pressure to allow them to hold their shape
- helps body to maintain constant temperature

Water

- flushes the animal's body of waste and toxic materials
- a loss of 20% of body water will result in death

Water

- animals generally need about three pounds of water for every pound of solid feed they consume

Protein

- largest and most costly part of the ration
- composed of amino acids

Amino Acids

- building blocks of life
- tissue development
- muscle production

Protein

- enzymes are composed of protein
- protein can be used to supply energy

Protein

- some animals need more protein than others
- young animals
- lactating (milk producing) animals

Protein

- twenty three types of amino acids
- ten essential
- thirteen nonessential

Protein

- crude protein content
- total amount of protein in a feed
- calculated by multiplying nitrogen content percentage times 6.25

Protein

- digestible protein
- the protein in a feed that can be digested and used by the animal
- usually about 50-80% of crude protein

Protein

- protein sources
- animal
- slaughterhouse by products
- dried fish meal

Protein

- plant
- superior to animal sources
- cottonseed meal
- soybean meal, linseed meal
- peanut meal, corn meal

Protein

- balancing rations is based on the amino acid content

Carbohydrates

- main source of energy
- compounds of carbon, hydrogen and oxygen
- include sugars, starches and cellulose

Carbohydrates

- almost all come from plants
- generally found in grain
- wheat
- oats
- barley

Carbohydrates

- types of sugars
- monosaccharides - simple sugars
- glucose
- fructose, galactose

Carbohydrates

- disaccharides - complex sugars
- sucrose
- lactose

Fats

- group of organic compounds known as lipids
- found in plants and animals
- provide and store energy

Fats

- essential fatty acids:
necessary for production of
some hormones and hormone
like substances

Fats

- most important sources are the grains that contain oil

Minerals

- inorganic
- have role in providing structural support for the animal
- bones (calcium and phosphorous)

Minerals

- egg shells (calcium)
- other essential needs provided by minerals
- aid in construction of muscles, blood cells, internal organs and enzymes

Minerals

- mineral elements required
- macro - 7
- micro - 9

Minerals

- usually added to feed in their chemical form
- often fed free choice
- mineral ox or trough
- salt block

Vitamins

- considered micronutrients
- essential for the development of normal body processes

Vitamins

- health
- growth
- production
- reproduction

Vitamins

- provides animal with ability to fight stress, disease, and to maintain good health

Vitamin A

- fat soluble
- converted from carotene

Vitamin D

- fat soluble
- depends on ultraviolet light for synthesis
- can be made commercially from irradiated yeast

Vitamin E

- fat soluble
- found in several forms of the organic compound tocopherol

Vitamin K

- fat soluble
- utilized to form the enzyme prothrombin
- synthesized in rumen and monogastric intestinal tract

Vitamins

- thiamine: coenzyme in energy metabolism
- riboflavin: part of two coenzymes that function in energy and protein metabolism

Vitamins

- pantothenic acid: component of coenzyme A
- niacin: involved in metabolism of fat, carbs and proteins

Vitamins

- pyridoxine: coenzyme component
- biotin: part of enzyme involved in fatty acid synthesis

Vitamins

- folic acid: needed in body cell metabolism
- choline: component of fats and nerve tissues
- needed at greater levels than other vitamins

Vitamins

- B12: coenzyme in several metabolic reactions
- essential part of red blood cell maturation

Vitamins

- inositol: found in all feeds and synthesized in the intestine
- para-aminobenzoic acid (PABA): function not well known

Vitamins

- C: essential in the formation of collagen

Digestion

- nutrients are converted to a form that the cells can use
- nutrients are transported by digestive system

Digestion

- gastrointestinal tract
- organs that make up the digestive system
- also referred to as the alimentary canal

Monogastric system

- has only one compartment to the stomach
- process goes through the:
 - mouth
 - esophagus

Monogastric system

- stomach
- small intestine: duodenum, jejunum, ileum

Monogastric system

- large intestine: cecum, colon, rectum

Monogastric system

- humans
- dogs
- cats
- horses

Ruminant system

- multicompartment stomach
- ruminant animals are often called “cud chewers”
- no upper front teeth in ruminant mouth

Ruminant system

- no enzymes in the saliva
- examples of ruminant animals:
 - cows, sheep, goats

Rumen Compartments

- Reticulum
- has appearance of a honeycomb

Reticulum

- traps dangerous objects and prevents them from proceeding through the rest of the tract.
- Called hardware disease:
cow eats wire, nails, staples

Reticulum

- stores, sorts, and moves feed back to the esophagus for regurgitation (throwing up)

Rumen

- functions as a storage vat
- food is soaked, mixed, and fermented

Rumen

- some absorption of nutrients
- some breakdown of feed through microbial action

Omasum

- grinds roughage

Abomasum

- only true stomach
- functions similarly to a monogastric stomach