Tikrit University
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Introduction and importance of nutrition of farm animals

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Food Types and Feeding Mechanisms

Most animals are opportunistic feeders. Animals fit into one of three dietary categories.

1- **Herbivores**, such as cows, hares, and sheeps, eat mainly autotrophs (plants,).

2- **Carnivores** , such as sharks, hawks, spiders, and snakes, eat other animals.

3- **Omnivores,** such as cockroaches, bears, raccoons, and humans, consume animal and plant or algal matter.

Animal Nutrition is a science of nourishment of animals . It means (all the processes whereby food and oxygen are presented to and utilized by living cells, and waste products are eliminated).

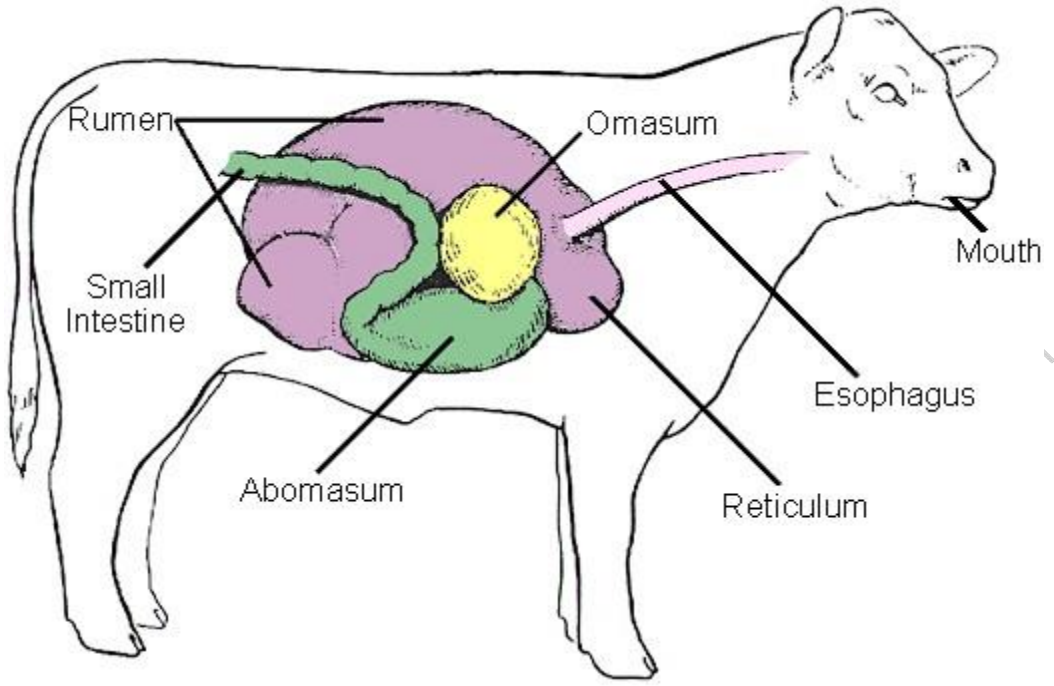
The great French chemist Antoine Lavoisier (1743-1794) is frequently referred to as the founder of the science of nutrition. He was the father of nutrition. He established the chemical basis of nutrition in his famous respiration experiment carried our before the French Revolution. Thereafter, chemistry became an important tool in nutrition studies.

Why is Nutrition important? The utilization of unusable feed stuffs and convert them to desirable products such as meat, milk and eggs.

Nutrition Steps ?

Ingestion , Digestion , Absorption , Assimilation , Metabolic functions and resulting metabolites , Excretion.

RUMINANT DIGESTIVE TRACT



Nutrients: The chemical substances found in the feed materials are necessary for the maintenance, production and health of animals. The chief classes of nutrients include- 25 carbohydrates, 15 fatty acids, 20 amino acids, 15 essential and 10 probably essential minerals, 20 vitamins and water or any chemical compound having specific functions in the nutritive support of animal life.

The Six basic nutrients:

a) **Water -** Often overlooked and not considered as a nutrient when formulating diets for animals, but extremely important.

b) **Carbohydrates -** Definition? Hydrates of carbon formed by combining CO_2 & H_2O(photosynthesis). The primary component found in animal feeds.

c) **Proteins -** Found in the highest concentration of any nutrient (except water) in all living organisms and animals. All cells synthesize proteins, and life could not exist without protein synthesis.

d) **Lipids -** Organic compounds that are characterized by the fact that they are insoluble in water, but soluble in organic solvent (benzene, ether, etc.)

e) **Minerals -** Inorganic, solid, crystalline chemical elements that cannot be decomposed or synthesized by chemical reactions.

f) **Vitamins -** Organic substances that are required by animal tissues in very small amounts. The last group of dietary essentials to be recognized.

Indispensable nutrients: Those cannot be synthesized in the body from other substances, or those cannot be synthesized fast enough to meet its needs. Thus, must be supplied from the diet.

Dispensable nutrients: Those can be synthesized from other substances in sufficient quantity to meet its needs. But, still very important. Use of the term, Essential or Non-Essential Nutrient for amino acids, minerals, and vitamins?

Role of nutrition in animal production and health

The factors responsible for efficient animal production are:

1. Genetic potentiality of animal
2. Nutritional status of animal
3. Management factor Nutrition plays an important role in the **animal production and health by following ways:**

1. It exploites the genetic potentiality of the animal. For example if a cow has capacity
to produce 30 liter of milk per day (by its genetic makeup) but it cannot be possible if the cattle is under fed.
2. It makes the animal production cheap and economical. Because cost of feeding and feeds accounts for 70-80% of total animal production cost. So it is the major means by which production system can be made economical.
3. It also minimizes the competition between human and animal for food by introducing non-conventional feed ingredients for animal feeding.

4. It also manipulates feed ingredients for effective utilization of nutrients. In this way nutrition play an important role in animal production and health.

Some terms related to nutrition:

Feed : is diet provided to animal through 24 hours for keep animal requirement (maintenance and production) .

Feed stuff : is diet which can be digest and absorbed .

Concentration feeds : is the diet high contain in energy and protein and low fibers like grains .

Roughage feeds : is the diet high ratio of fibers and low in energy and protein like straw .

Hay : is green grass after drying .

Silage : is fermented green grass in store without oxygen .

Balanced ration :is mixture feed which contain in compositions balance ratio from protein , energy and mineral salts .

Dry matter :is feedstuff after remove moisture .

Digestible protein : is amount of crude protein intake minus amount of crude protein output by feces .

Crude fiber : is complex compound of carbohydrate include cellulose and hemicellulose and lignin .

Mineral : is inorganic part of feedstuff like calcium and phosphor .

Nitrogen Free Extract (N . F . E) : is carbohydrate found in feedstuff after remove crude fiber .

Nutrients : is composition of the diet or nutrition substance which is necessary to body requirement for maintenance and production like protein , fat , carbohydrate .

Digestible nutrient : is the part of diet should be absorbed and utilize by body .

Energy : is the heat which produce from nutrient oxidation in body .

Gross energy : is the heat should be produce from oxidation of limited weight of diet outside the body.

Nutritious: Substances that promote growth and participate in repairing tissues of the body.

Nourish: To feed an animal with substance necessary for life and growth.

Feed (Feed stuff): Food of animals comprising any naturally occurring ingredient or material fed to animals for the purpose of sustaining growth and development.

Diet: A regulated selection of a feed ingredient or mixture of ingredients including water , which is consumed by animals on a prescribed schedule.

Additives: An ingredient or a combination of ingredients added to the basic feed mixture for specific purposes like to increase feed ingestion or to alter metabolism.

Ration: A fixed amount of feed for one animal , fed for a definite period, usually for a24hour period.

Balanced ration: The ration which provide an animal with the proper amount, proportion and variety of all the required nutrients to keep the animal in its form to perform best in respect of production and health.

Complete ration: A single feed mixture, which has all of the dietary essentials except water for a given class of livestock.

The composition of animal body is affected by species, strain, age, sex and state of nutrition. The percentage composition of animal body

Species	As such or fresh matter basis				Water and fat free basis	
	Water	Protein	Fat	Ash	Protein	Ash
Calf (new born)	74	19	3	4.1	82.2	17.8
Steer (thin)	64	19	12	5.1	79.1	20.9
Steer (fat)	43	13	41	3.3	79.5	20.5

Sheep (thin)	74	16	5	4.4	78.2	21.8
Sheep (fat)	40	11	46	2.8	79.3	20.7
Hen	56	21	19	3.2	86.8	13.2
Horse	61	17	17	4.5	79.2	20.8
Man	59	18	18	4.3	80.7	19.3

Water

Water content of animal body is variable and decreases as age increases. For example,

A cattle embryo contains -- 95% water
A new born calf contains -- 75-80% water
5 months old calf contains -- 66-72% water
Mature animal contains -- 50-70% water

The distribution of water within the body is not uniform. Blood plasma contains 90-92%, heart, kidney and lungs – 80%; muscles – 75%, bones – 45% and tooth enamel only 5% water. Water content of animal body also depends on nutritional status of the animal.

Fat

Fat is the most variable of all components. Fat content of animal body increases with age. Fat is usually found in adipose tissues, which is present under the skin, around kidney, around intestine and other internal organs.

Protein

It is the major constituent of dry matter in muscles, soft tissue, liver, heart, kidney, lungs, intestines, etc. Muscles contain nearly 75-80% protein. Protein is also present in hair, nails, feathers, hooves, skin, wool, tendons and bones. Protein along with some inorganic elements is responsible for the structure of the animals.

Carbohydrates

It is present only around 1% of the total animal body. It is being constantly formed and broken down and serves a multitude of functions. It is usually present as glucose or glycogen in liver and muscles.

Inorganic elements

Animal body contains many minerals. The amount of mineral in animal body vary which depend on the function of the particular part of the body. Concentration of some minerals in animal body is as follows:

Calcium - 1.3%, Phosphorus - 0.7%
Sodium - 0.16%, Potassium - 0.19%
Magnesium - 0.04%, Sulphur - 0.15%

Calcium is the mineral that occurs in largest amount in the body and is almost entirely present in bones and teeth. Phosphorus is present in bones in close association with calcium. Phosphorus is also present in association with proteins, fats and other inorganic salts. Na, K and Cl are present in inorganic form in various fluids. Other minerals form component of tissues, fluids or enzymes.