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Lecture title: **Animal nutrition: Introduction and importance of nutrition of farm animals**

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Summary:

Introduction and importance of nutrition of farm animals

Many studies investigating the nutrient requirements of livestock and poultry during their life cycle under various physiological conditions. This is because these agriculturally important animals are the major source of high-quality proteins, as well as vitamins and minerals, for consumption by humans and to sustain their optimal growth, development, reproduction, and health.
animal production accounts for 25%–40% of the total amount of agricultural output in developing nations, Foods derived from animals provide one-third of the protein and one-sixth of the energy supplied to the world's human population. With adequate intake of nutrients, they survive, grow, develop, and reproduce as important parts of the ecosystem.

Animal Nutrition is the study of animal body requirements of nutrients and the mechanisms of feeding, digesting and metabolizing of nutrients to maintain animal health and production.

Animal Nutrition includes:

1. Food intake
2. Digestion,absorption, assimilation, biosynthesis, and catabolism of nutrients
3. Excretion of metabolites.

Antoine Lavoisier (1743-1794) was the founder of the science of nutrition. He was the father of
nutrition. He established the chemical basis of nutrition.Nutrition plays an important role in the animal production and health by following ways:

1-It exhibits the genetic potentiality of the animal.

2. It makes the animal production cheap and economical.

3. It also minimizes the competition between human and animal for food.

4. It also manipulates feed ingredients for effective utilization of nutrients.

If the animal doesn't get a proper nutrition the Growth rate,Reproduction rate,Health status Will affected, While the proper nutrition provide energy for all vital functions therefore producers must know the appropriate ration for a specific animal.

On the basis of the types of food they consume, animals are classied as:

- **Carnivores** (e.g., cats and dogs) whose diets consist mainly of nonplant materials (e.g., meat fish and insects);
- **Omnivores**: (e.g., poultry, rats, and mice) whose diets include both plant and animal materials
- **Herbivores** ruminants e.g., cattle, goats, sheep, horses, and rabbits whose diets are composed primarily of plant materials

According to their digestive system they divided into:

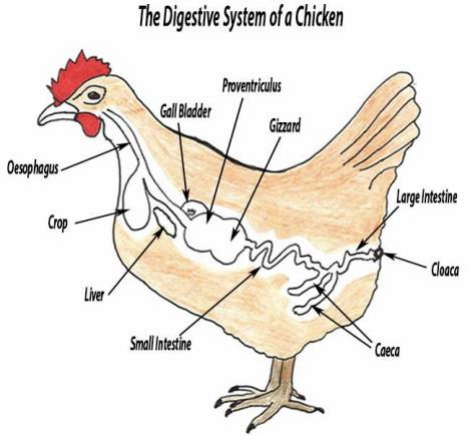
- **Mono gastric**: avian and horse
- **Poly gastric**: ruminants like cow, sheep, goat, and buffaloes

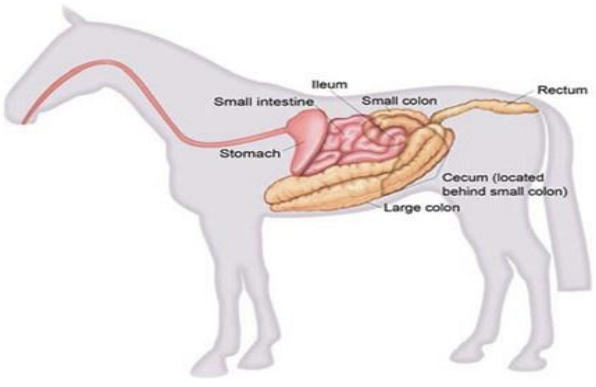
This will reflect the differences in nutrients requirements among animal species.

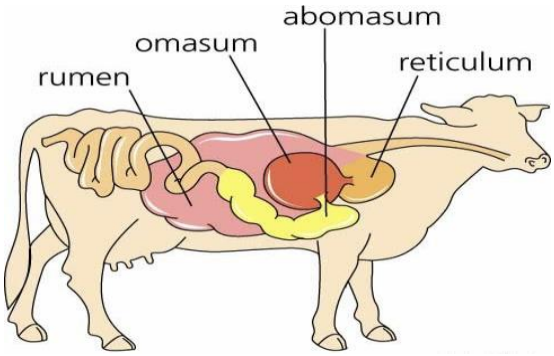
Digestive system

Comparative aspects of the digestive systems in mammals and birds. Nonruminants (e.g. horses, and chickens) have a single stomach, the small intestine (duodenum, jejunum, and ileum), and the large intestine (colon and cecum). The digestive system of birds differs markedly from that of nonruminant mammals in that birds have the crop (a temporary storage pouch), the proventriculus (also known as the "true stomach"), and the gizzard (ventriculus; also known as the mechanical stomach).

In ruminants, the stomach consists of four compartments: rumen, reticulum, omasum, and abomasum, with the first three parts being called the forestomach. The rumen contains large amounts of bacteria to ferment dietary substances, carbohydrates, and proteins. The abomasum in ruminants acts like the stomach in nonruminants.







Types of nutrients

there are six main classes of nutrients, which is essential for body needs:

- proteins
- carbohydrate
- fats
- vitamins
- Minerals
- Water

The amounts of nutrients required by animals are influenced by:

- The type of gastrointestinal tract
- The age of the animal
- The species of the animal
- It's level and type of productivity (maintenance, work, growth, milk, eggs and pregnancy).

Terms in animal nutrition

Diet is a mixture of feedstuffs that supplies nutrients to an animal.

Meal is the feed consumed by an animal on regular occasions (e.g., morning and evening).

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

Concentrate: feeds high in energy and also high (more than about 60%) in T.D.N on air-dry basis and low in crude fiber (less than 18-20%).

Balanced ration: a combination of feeds that will provide the essential nutrients in proper proportions.

Total mixed ration (TMR): consist of all the feed ingredients mixed together to form the ration allowance for the animal.

Feed efficiency: the amount of feed required to produce one unit of product, such as pounds (KG) of feed to produce one pounds (KG) body weight gain, or one pounds (KG) of milk or one dozen eggs.

Dry matter: the part of feedstuff after remove of moisture (DM) it is the sum of crude protein, crude fiber, ether extract, nitrogen free extract and ash.

Organic matter: the total weight of the feed minus the weight of the mineral matter (or ash) in feed.

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

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

Forage: crops used as a pasture, hay, silage or green chop for feeding purposes

Hay: is green grass after drying.

Straw: the part of manure plant remaining after removal of seed by threshing or combining, for example are wheat straw, barley straw, rice straw.

Silage: is fermented green grass in store without oxygen.

Silo: A semi-airtight structure designed for use in production and storage of silage.

Supplement: a product that contains high levels of one or more nutrients and that is fed to correct or prevent deficiencies of these nutrient.

Pellets: Compacted particles of feed formed by forcing ground material through die openings.

Ad libitum: As desired by the animal, it's meaning free access of feed and water.

Ration: is the daily allowance or amount of feed provided to an animal.
A fixed amount of feed for one animal, fed for a definite period, usually for a 24-hour period.

Feed conversion ratio (FCR): The amount of feed in Kg necessary to produce one Kg of weight gain.

Feed Conversion efficiency (FCE): The gain in weight in Kg, produced by one Kg of feed.
For dairy cattle FCE a measure of how many kg of milk you get for every kg of dry matter (DM) consumed