MJF COLLEGE OF VETERINARY & ANIMAL SCIENCES, CHOMU, JAIPUR (RAJ.)

DEPARTMENT OF ANIMAL NUTRITION

COMPOSITION OF ANIMAL BODY AND PLANT

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Composition of animal & plant body

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Composition of plants

- Wide variations in composition

Moisture:

- principal constituent of living plants is moisture.
- moisture content of plants is highly variable.
- Young plants have more moisture content.
- **As the plant mature, the moisture content decreases.**

Composition of plants

- **Protein**
- Protein is primarily present in active tissue such as the leaf.
- As the plant mature there is migration of the protein from the leaves to the seeds to serve as a reserve material for germination.
- Young tissues of plant, fruits, and seeds, especially leguminous, are rich in protein.

Composition of plants

Fat

- Fat is present at highest level in the seeds followed by leaves and stem.
- Oil-bearing seeds have higher percentage of protein and fat compared to cereals.

Composition of plants

Minerals & Vitamins

- The mineral content of plants is highly variable.
- **Legumes are rich in Calcium**
- **Seeds are rich in Phosphorus**
- **Cereal grains are low in calcium and sodium**
- Differs with species and plant parts and is also influenced by soil and other environmental factors.
- Vitamins both fat-soluble and water-soluble are also present in plants.
- **Provitamin A (Beta carotene)??**

- In plants there are various organic acids (citric, malic and fumaric), which are important for metabolism in the cells of plant.

Factors affecting chemical composition of plants

- **Soil composition:**
  - Deficiency or excess of minerals is reflected in plant composition. *Astragalus* -bioindicator plant
- **Variety and strain of Plant** –
  - **G**enetic material. eg.Golden rice ??
- **Agro-climatic condition** –
  - Atmospheric temperature and humidity
- **Cultivation practices** –
  - Irrigation, seed rate, time of sowing, fertilizer application,
- **Stage of growth** – The content of crude protein, soluble ash is higher just before flowering and goes down at seed formation stage,
  - Crude fibre and dry matter content increase as the plant matures.
  - Fat decreases progressively at maturity of the plant.

Composition of Animals body

- J.B. Lawes and J.H. Gilbert analyzed the entire bodies of farm animals and published it in 1859
- **Water and Fat are highly variable in animal body**
- **Composition of fat free body:**
  - **Water: Protein: Ash= 19:5:1 (74-76%:20-22%: 3-5%)**
- **Composition of moisture and fat free body:**
  - **Protein: Ash= 80:20**
- Body composition of a moisture free and fat free body is practically constant
- **Level of water and fat varies inversely**

Composition of animals body

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.

Composition of animals body

- **Protein**
- Protein along with some inorganic elements is responsible for the structure of the animals.
- 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.

Composition of animals body

- **Fat**
- Fat is the most variable of all components.
- Fat content of animal body increases with age.
- Usually found in adipose tissues, which is present under the skin, around kidney, around intestine and other internal organs.
- **Carbohydrates**
- only around 1% of the total animal body.
- being constantly formed and broken down and serves a multitude of functions.
- Usually present as glucose or glycogen in liver and muscles.

Composition of animals body

- **Inorganic elements**
- Animal body contains many minerals.
- Amount 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.
- Ca and P are major inorganic component of body and represent 70% of body ash.
- Na, K and Cl are present in inorganic form in various fluids. Other minerals form component of tissues, fluids or enzymes.