

WEEK TWO

LOCATION AND DISTRIBUTION OF NUTRIENTS IN THE BODY OF FARM ANIMAL

Chemical groups which make up the gross composition of the body of farm animals are not evenly distributed throughout the various organs or tissues. They are however distributed and/or localized according to their functions. Water is available in every part of the body. Although it varies in terms of quantities in different parts e.g water is present in blood plasma up to 92%, it is between 72 – 78% in muscles. Bones have about 55% and teeth is 5%.

Protein is present in all cell tissues. It is also the principal content of all organs and tissues. Fats are deposited under the skin where they form adipose tissue. They are also seen around the intestine, kidney and in lower abdomen. The inorganic substances are mostly mineral matter and their contents increase with age. The most common of the mineral matter in the body is calcium which makes up of 33%, phosphorus 0.75%, Sodium 0.16%, Potassium 0.19%, Mg 0.04%, Chlorine occur in form of chloride 0.11%, and Sulphur 0.15%. These values are however affected by age and stage of fattening.

NUTRIENT

Short and precise definition of nutrient is somehow difficult however a nutrient may be defined as any chemical element or compound in the diet (or given parentarily special cases that support normal reproduction, growth, lactation and maintenance of life processes. There are 6 classes of nutrients:

- a. Water
- b. Proteins & Amino acids
- c. Carbohydrates (crude fibre + Nitrogen free extract)
- d. Lipids
- e. Vitamins
- f. Inorganic elements

Nutrients support cellular needs for water, fuels, structural constituent (Skin, muscles, bones, nerves, fat) and metabolites regulation. Nutrients that are required in the diet

because they cannot be synthesized by the body in sufficient amount to satisfy metabolic needs are termed “Essential or Indispensable” nutrients.

Note: Energy is not a nutrient but a property of energy yielding nutrient is when they are oxidized during metabolism. It is required in the diet of all animals and can be provided by fat, carbohydrate and by the carbon skeleton of amino acid after removal of nitrogen.

WATER

Water often is not thought as a nutrient even though it clearly meets all definition as one. Life cannot be sustained without water. There are 5 sources of water for farm animals:

- a. Drinking water
- b. Water contained in/on feed.
- c. Metabolic water is produced by metabolic processes in tissues mainly by oxidation of nutrients.

Three kinds of nutrients produce different amount of water. 1g of fat produces 1.1g of water, 1g of protein produces 0.4g of water.

- d. Water liberated from metabolic reaction such as condensation of amino acids of peptides
- e. Preformed water associated with body tissues catabolised during the period of negative energy balance.

Note: The importance of these different sources of water differs among animal species depending on diet, habitat and ability to conserve body water.

FUNCTIONS OF WATER

1. Water takes part in digestion (hydrolysis of protein, fats and carbohydrates).
2. Water serves in absorption of digested nutrients
3. It helps in the transportation of metabolites in the body.
4. Excretion of waste products
5. The regulation of body temperature is dependent partially on the high conductive property of water to distribute heat within the body and by vapourization of excess water release by metabolic reaction within the cells.

WATER TURN-OVER

Water turn-over is a term used to express the ratio at which body water is excreted and replaced in tissues. Non ruminant species have a more rapid turn-over because they have

less water in the G.I.T (Gastro-intestinal tract). Those animals that can tolerate greater water restriction e.g camel have lower turn-over than horses and cattle that are less tolerant to water restriction. Water turn-over is affected by: climatic factors e.g temperatures and humidity .

By ingestion of common salt that increases urinary or faecal excretion.

WATER LOSSES

Water is lost by evaporation via the skin, periodic excretion in urine and faeces. Water excreted in urine act as a solvent for excretory product excreted via the kidneys. Urine concentration is related to the type of compound excreted (uric acid, urea and minerals.) for example, poultry excrete uric acid rather than urea as an end product of protein metabolism. Poultry excrete urine in semi-solid form with only small amount of water. This gives birds a slight advantage of production of more metabolic water than does urea. **Note:** Urea is concentrated aqueous solution which could be toxic to tissue. In urine, the urea is diluted by water to harmless concentration and finally excreted. Faecal water loss is considerably higher in ruminants than in other species, being about the same volume to urinary losses. Cattle that consumes fibre diet excrete faeces of 68 – 80% water. Sheep faeces which form pellets contains 50 – 70% water.

WATER REQUIREMENTS

Animals are more sensitive to lack of water than food. The first noticeable effect of moderate restriction of water is a reduced intake in feed. Severe restriction of water intake will result in rapid weight loss and the body dehydrates. Water consumption is related to heat production. Other factors affecting water intake include:

- a. Dietary Factor:** Dry matter intake is highly correlated with water intake at moderate temperature, water content of feed consumed also affect total feed intake. High level of protein intake or fats may also increase water intake. Consumption of common salt or other salts increases consumption and excretion of water greatly.
- b. Environmental Factor:** heat stress i.e the higher the heat the higher the water intake and vice versa.