**Animal nutrition practical**

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**ENERGY: -**

Energy is the fuel that keeps all body functions working. Milk production requires a lot of energy. If energy in the ration is not enough, the animal will lose body condition and for milking cows, milk yield will drop, pregnant cows become ill after calving and the calf will usually be small in size. If there is excess energy in the ration, the animals becomes too fat. Cows that are too fat at calving usually have difficult births, often have problems with retained placenta, displaced abomasums and may suffer from milk fever .

 **Sources of energy are roughages and concentrate supplements fed to your animals.**

**Roughages form the main bulk of the dairy cow ration.**

Roughages are bulky feeds that have a low energy content per unit volume (i.e. hay, straw). They can have a high moisture content (grass). Generally feedstuffs with more than 18% crude fibre and low digestibility are considered as roughages. Ruminating animals (cattle, goats, sheep) need a certain amount of crude fibre to keep a healthy stomach system. On the other hand high yielding animals may not have enough capacity to consume the amount of roughage required to meet the energy requirement due to limitation of stomach size. For this reason, supplementing roughage diets with feeds high in readily available energy is often recommended. Examples of energy sources (forages and fodders, agricultural by- products and concentrates)

**The currently recognized energy feed nutrients include:**

* Simple Carbohydrates such as Glucose, Fructose, Galactose, Sucrose, Maltose and Lactose, all different types of sugar
* Complex (Carbohydrates) Polysaccharides such as Starch, found in roots and tubers as well as in grain,
* Hemicellulose (somewhere between sugar and cellulose chemically speaking),
* Cellulose, the principal constituent of cell walls of plants. Most abundant in more fibrous feeds, generally low in digestibility. Cattle, goats, sheep (as ruminants) and horses (with a large colon-caecum) digest cellulose fairly easily. Pigs and chicken (as mono gastric animals) do not digest cellulose very easily.
* Lignin which essentially is not digestible to animals. Found in over mature hays, straws and hulls. High lignin content in feed may reduce the digestibility of cellulose and other nutrients.

**Fats and oils**. Found in seeds, grains, avocados etc. Fats contain 2.25 times as much energy per kg compared to carbohydrates, but are usually expensive to produce. is the fuel that keeps all body functions working. Milk production requires a lot of energy.

**FUNCTION OF ENERGY**

1. use as materials for the construction of body tissues (growth and maintenance)
2. synthesis of products such as milk and eggs
3. use as sources of energy for work done. The work done include both

metabolic (heat increment and maintenance) and physical e.g. walking and feeding

**TYPE OF ENERGY**

* **Gross energy (GE):-**

 The feed is comprised of chemical ingredients which are broadly classified as carbohydrates, proteins, lipids and vitamins. Heat is released when organic material in such feed is burnt. For this reason, methods have been developed to measure the quantity of chemical energy

present in a feed by determining the amount of heat generated from complete burning a known quantity. This is referred to as gross energy. Most of the common feeds have energy content of about 18.5 MJ/kg DM.

* **Digestible energy (DE):-**

 Not all the gross energy in consumed feed is available and useful to the animal. Some energy is lost from the animal though excretions: it is fixed in the feed in a way the animal cannot reach it. The digestible energy is calculated by subtraction of faecal energy from gross energy. The DE represents the energy content of the digested nutrients. From these digestible nutrients the Total Digestible Nutrients (TDN) can be calculated.

* **Metabolizable energy (ME):-**
* The animal further loses energy containing- substances through excretion of urine and production of gases during metabolic processes. Metabolizable energy is what remains after subtraction of energy lost from urine and combustible gases resulting from the digestible energy of a feed. Loss of energy through methane (a combustible global warming gas) can be substantial, particularly from ruminants; hence can be of serious nutritive and environmental consequence.
* **Heat increment (HI)**

The ingestion of feed by an animal is also followed by losses of energy not only as the chemical energy excreta and gases produced but also as heat. Animals are continuously producing heat and losing it to their surroundings, either directly through radiation, conduction and convection or indirectly through water evaporation from the body. The heat is generated through processes of digestion and metabolism of nutrients derived from the feed. For instance, the act of eating, which includes chewing, swallowing and secretion of saliva, requires muscular activity and this generates heat. Unless the animal is in a particularly cold environment, this heat energy is of no value to it, and must be considered, like the energy of the excreta, as a tax on the energy of the feed. Energy lost in this manner is referred to as Heat increment.

* **Net energy (NE) :-**

The deduction of the HI of a feed from its ME gives the Net energy, which is the energy available to the animal for useful purposes such as body maintenance and various forms of production mil; meat eggs wool

**Gross energy (G E)**

 Fecal energy loss

**Digestible energy (D E)**

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**Net energy ( N E)**

 gaseous& urinary energy loss

**Metabolizable energy(M E)**

 heat increment

**Maintenance(N E m)**

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**PRODUCTION (N E P\_**)