

## Lecture 4

### NUTRIENTS IMPORTANT IN CATTLE PRODUCTION

#### Energy

Feed intake is regulated by an animal's energy needs. Therefore, energy should be considered first when attempting to balance animal diets. Adequate energy concentration in the diet allows cattle to utilize other nutrients such as protein, vitamins and minerals. Major determinants of animal's energy requirements are:

1. Weight
2. Body condition score
3. Milk production
4. Rate of growth
5. Level of activity
6. Impacts of climate (heat, cold, humidity etc)

Fresh grass, with high quality grass-legume can meet energy requirement of growing or lactating cattle in the wet season. Energy supplementation on pasture helps in maintaining high grains and milk production. Dry cows can subsist on lower quality feed stuffs and maintain an acceptable body condition score in order to be successfully bred and deliver a healthy calf. Energy supplement such as grain can result in better protein digestion and therefore higher milk production and greater weight gains.

Forages have the ability to supply all the energy needed to maintain highly-productive cattle throughout the growing season, but only managed intensively. Legume-grass pasture will easily have protein content greater than 18% during the vegetative stage. As plants mature, the nutrient values lowers. Consider getting your forage analyzed to determine nutrient content and concentration.

#### Protein

Cows generally require crude protein in the range of 7-14% of daily dry matter intake. Requirement is less for dry cows, pregnant and lactating cows especially dairy cattle require more. Growing cattle e.g. replacement heifers and steers require from 10.5-14% of their dry matter intake to be protein

#### Minerals and Vitamins

Principal mineral requirements are calcium and magnesium. Others are to consider are salt, phosphorus, potassium and sulfur. They are needed for cellular respiration, nervous system development, protein synthesis and metabolism, reproduction. Vitamins are important for formation of catalysts and enzymes that support growth and body maintenance in animals. Vitamin A supplementation should be included in the mineral mix at about 1,200 to 1,700 IU's (International units) per pound of dry matter of feed intake per day. Green forage, high quality hay and cereal grains are typically high in Vitamin E.

#### Water

Cattle require 3-30 gallons of water per day. One gallon of water per 45kg body weight is required during the wet season. Two gallons of water is needed during hot weather. Double estimates for lactating cattle. Water should be clean and fresh. Dirty water decreases water intake. Decreased water decrease nutrient metabolism. Factors that affect water intake include, age, physiological status, temperature and body size.

### **Sources of Feeds**

There are three sources of feeds for cattle and these are roughages, concentrates and succulents.

#### **Roughages**

Roughages possess great bulk, low nutrients and high fibre, digestibility is low, provide tactile stimulation, satisfy appetite and prevent digestive disturbances. This needs to be supplemented with other feeds high in nutrient concentration. Quality of roughage depends on the stage of maturity when cut, pliability of the stem, proportion of leaves, roughage include various classes of straw, low grade dried grass and hay.

#### **Concentrate**

These are feeds with low fibre and high nutrient concentration. Energy and digestibility values are high. Large variation in protein content such that concentrates are classified on this basis into low, medium and high quality. Cereal grains constitute the low quality protein group. Cereal grains are combined with feeds that are high in protein to make up for the deficit. Peas, beans and their residues are in the medium quality group (12-25% digestible protein). Meat, blood, liver meals, fish meals and dried separated milk (i.e dried skim milk where butter content has been removed). Their use is limited in beef production partly for economic reasons. Also, ruminants are capable of utilizing a low quality protein concentrate efficiently. Have great use in the production of monogastric animals.

#### **Succulents**

These include green feeds such as young cereals but mainly root crops like yam, cassava, sweet potato and banana. They are characterized by high moisture and fairly low dry matter contents. Roots have high percentage of easily digestible and metabolisable sugar. Protein content is very low and fibre is negligible. They are fed with fibrous feed for normal functioning of the digestive system. Green feeds are suitable only when young as fibre contents increase with advancing age with a corresponding decrease in digestible protein

#### **Feed Additives**

##### **Fats**

Accumulated fat in processed carcass are suitable for livestock feed. But must be stabilized with suitable anti-oxidants, otherwise, they will become rancid and unpalatable. Example of anti-oxidants is Butylated Hydroxyly Anisol (BHA). Serves as sources of energy and reduce dustiness in ground dry ration. High levels of fat depress digestibility of other nutrients

### **Non-Protein Nitrogen (NPN)**

Examples include urea, biuret, creatinine, ammonium salts. These are synthetic compounds with high protein equivalence. Urea contains 46.7% nitrogen (27.3% crude protein). However, urea is not protein. In rumen, protein is synthesized by bacterial degradation of urea to  $\text{NH}_3$  which combine with carbohydrate fragments to form protein in bacterial cells. When urea is used, carbohydrate should be present to promote rapid growth in the rumen bacteria. Synthetic NPN could be toxic in concentrate form and thus be used with care. If used, a period of adjustment (2-6 weeks) has to be given so that the rumen micro-flora can effectively degrade them for subsequent protein synthesis. Microbial protein becomes available when the bacterial cells are digested

### **Molasses**

Low quality roughages, farm by-products and urea are not palatable. Molasses addition will

1. Increases the palatability of the ration.
2. Supply part of the energy needed for rapid growth of the rumen micro-organisms.
3. Enhances effective microbial breakdown of the ligno-cellulose fractions of the roughage portion of the diet.

When dried ground feeds are used molasses reduces dustiness.