Digestion Of protein in Ruminants

The digestion and metabolism of proteins in ruminants are different than non-ruminants. The biological success of the ruminant in utilizing crude proteins and non-protein nitrogenous (NPN) substances seems to be dependent upon the physiological regulation of rumen environment as microbial habitat As the microbes multiply, they synthesize protein to construct their own bodies by utilizing dietary protein and NPN substances. This microbial protein is available to the host for subsequent digestion in the lower part of the gut.

Ammonia production: The ammonia in rumen liquor is the key intermediate in the microbial degradation and synthesis of protein. Parts of the ammonia produced in the rumen liquor is utilized by the rumen bacteria along with carbon moiety to synthesize the microbial proteins, and excess of ammonia is absorbed into the blood, carried to the liver and converted to urea. Some of this urea may be returned to the rumen via the saliva, and also directly through the rumen wall, but the larger part is excreted in the urine and thus wasted out. The rumen fluid has a pronounced urease activity so that urea entering it is rapidly hydrolysed to ammonia and carbon dioxide. Increased quantity of readily fermentable sugars decrease the concentration of ammonia in the rumen thereby helping better utilization of proteins and non-protein nitrogen.

Urea toxicity symptoms: Nervousness, muscle tremors, Artieulty in respiration, excessive salivation, bloat tetany, convulsions and death within 2 to 3 hours are the symptoms of urea toxicity. The severity of symptoms depends upon the dose of urea intake. The drenching of glacial acetic acid cold water is the line of treatment in urea toxicity. To avoid urea toxicity, urea should be mixed properly in the feed and level of urea should be 3 percent in the concentrate mixture or 1 percent in the sole ration of ruminants. recommended 1 percent of urea in the concentrate mixture of ruminants.

Protein deficiency Symptoms: It includes reduced feed intake and utilization, reduced growth rate, infertility, reduced serum protein concentration, accumulation of fat in the liver and carcass, reduced synthesis of certain enzymes and hormones resulting depression of most metabolic activities which may lead even to early death.

Classification Of proteins

- Proteins may be classified into three main groups according to their shape, solubility an chemical composition.
- 1-Fibrous Proteins*:* These proteins are insoluble and very resistant to animal digestive enzymes. They are composed of elongated, filamentous chains, which are joined together by cross linkages. They are as follows:

a- Collagens are the main proteins of connective tissues. I make up about 30 percent of // the total proteins in the mammalian body. Hydroxy proline is the important component / of collagens.

b- Elastin is the protein found in elastic tissues such as tendon and arteries. It is rich in alanine and glycine

c- Keratins are the protein of hair, hoof, nails etc. These proteins are very rich in sulphur containing amino acid, cystiene. Wool protein contains about 4 percent sulphur.

Globular Proteins: This group includes all the enzymes, antigens and hormones that are protein.

a- Albumin is water-soluble and heat coagulable and occurs in eggs, milk, blood and many plants.

b- Globulins are present in eggs, milk and blood and are the main reserve protein source in seed.

c- Histones are basic protein, which occur in cell nucleus where they are associated with DNA. They are water-soluble but not heat coagulable, and on hydrolysis yield large quantities of histidine and lysine.

d- Protamines are basic protein of relatively low molecular weight, which are associated with nucleic acid and are found in large quantities in the nature, germ cells of vertebrates. Protamines are rich in arginine.

-conjugated Proteins: Conjugated proteins are composed of simple protein combined with some non-protein substances as prosthetic group.

Phosphoprotein is the protein which on hydrolysis yields phosphoric acid and amino acids. Casein of milk and phos-vitin of egg yolk are the best known phosphoproteins.

Glycoproteins are conjugated proteins with one or more heterosaccharides as prosthetic groups. In most of the glycoproteins, glucosamine or galactosamine or both, in addition galactose and mannose may be present. Glycoproteins are components of mucous secretions which act as lubricants in many parts of the body eg. Ova albumin.

Lipoproteins are proteins conjugated with lipid lecithin and cholesterol. They are the main components of cell membranes and play a basic role in lipid transport.

Chromo proteins contain pigment as a prosthetic group. Examples are haemoglobin, haemocyanin, cytochrome and flavoproteins.

Nucleoproteins are compound of high molecular weight and conjugated with nucleic acid.

Metalloproteinase a large group of enzyme proteins contain metallic elements, such as Fe, Co, Mn, Zn,^{M} Cu, Mg, etc. which are essential part of these proteins.

Derived Proteins: This class of proteins includes those substances formed from simple and conjugated proteins.

Primary derived proteins: If there is a slight change in the proteins molecules such as metaproteins and coagulated proteins, they are called primary derived proteins.

Secondary derived proteins: If there is a large change in protein structure, they are called secondary derived proteins. They are precipitated by phosphotungstic acid. The examples are proteoses, peptones and peptides.

Nucleic acid: Nucleic acids are high molecular weight compounds which, on hydrolysis, yield a mixture of basic nitrogenous compound (purines and pyrimidines) a pentose (ribose and deoxyribose) and phosphoric acid. They play a fundamental role in living organism as a store of genetic information and synthesis of proteins. Nucleotide containing ribose is termed as ribonucleic acid (RNA) while those containing deoxyribose are referred as deoxyribonucleic acids (DNA).