Digestion Of **protein in non-ruminant**

There is no digestion of protein in the **?** mouth because saliva has no proteolytic enzyme. But saliva softens the food particles, which is helpful for ingestion of protein.

Digestion of proteins in the stomach: The digestion of protein start in, the stomach by the action of peptic enzymes. Pepsin and gastricin are the most important peptic enzymes of the stomach. Both enzymes are most active at about pH 2 to 3, and completely inactive at pH above 5. Gastric glands secrete hydrochloric acid at a pH of about 0.8, but by the time it's mixed with the stomach contents, the pH ranges around 2-3, a high favor able for peptic enzyme activity. These enzymes are capable of digesting protein, collagen and nucleo proteins into proteoses, peptones and polypeptides.

1-Digestion of proteins by pancreatic secretions:

When the proteins leave the stomach they ordinarily are in the forms of proteoses, peptones, large polypeptides and amino acids. Immediately upon entering the duodenum the partial breakdown products are attacked by the pancreatic enzymes trypsin, chymotrypsin and car box poly peptidases. These enzymes are capable of hydrolyzing all the partial breakdown products of proteins to polypeptides and amino adds.

2- Digestion of polypeptides by the epithelial enzymes of the small intestine:

The epithelial cells of the intestine contain several different enzymes for hydrolyzing the final peptide linkages of the different dipeptides into amino acids. So the end product of protein digestion is various amino acids.

Urea recycling: It is now well established that blood urea enter back into the rumen directly by transfusion through rumen wall and also indirectly through saliva. The process would be of great value to animals on low nitrogen intake.

Microbial protein synthesis: Microbes in the rumen degrade large proportion of dietary proteins and utilize some of the degradation products for their own protein synthesis. These microbes can also make use of NPN compound and can upgrade the dietary protein of low biological values into microbial proteins of high biological values. Therefore, it would be advantageous to feed poor quality protein and NPN compound to the ruminants.

Utilization of non-protein nitrogen compound:

Ruminants can utilize non-protein nitrogenous compound as a source of protein through the microorganisms. The compound which are

commercially available are urea and biuret etc. as a source of NPN compounds for ruminants.

Urea is very common and now it has been accepted that urea can replace about 30 to 40 percent of DCP requirement When Urea entering the rumen is rapidly hydrolyzed to ammonia and carbon dioxide by bacterial urease enzyme. This ammonia is used as a nitrogen source by the rumen microorganisms for synthesis of microbial protein along with the carbon skeleton coming from the carbohydrates/proteins. Efficient utilization of ammonia for microbial protein synthesis requires the optimum initial ammonia concentration and a readily available source of energy for protein synthesis.

Structure of proteins:

The structure of proteins can be considered under four basic headings:

- **Primary Structure:** Proteins are built up from amino adds means of a linkage between the a-car boxy 1 of one amino acid and the a -amino group of another acid. This type of linkage is known as the peptide linkage. Large number of amino acids can be jointed together by this means with the elimination of one molecule of water at each linkage to produce poly peptides. The term primary

structure refers to the sequence of amino acid along the polypeptide chains of protein.

- **Secondary Structure:** In secondary structure the peptide chain exist in the form of a right-handed -helix The spiral is stabilized by hydrogen bonding between the amino (NH) and carbonyl (CO) group of adjacent amino acids.

Tertiary Structure: It describes how the chains of the secondary structure further interact through the R-groups of amino add residues. These interaction causes folding and bending of the polypeptide chain, the specific manner of the folding giving each protein its characteristics biological activity. The tertiary structure is stabilized by H- bonding, S-bonding (disulphide linkage), self-bridge between basic amino acid and acidic amino acids and certain amino adds like alanine, phenylalanine and valine in which R- group is non-polar. If it coiled all non- polar amino acids come in contact to form hydrophobic center.

Quaternary Structure: Protein poses quaternary structure if they contain more than one polypeptide chain. IT force that stabilized these is hydrogen bonds and electrostatic or salt bonds formed between residues on the surface of the polypeptide chain.

Protein metabolism: Dietary proteins are digested through the action of proteolytic enzymes to amino acids. These amino acids are absorbed through the small intestine into the portal blood. Major site of absorption of amino acids is proximal 2/3rd of small intestine. Absorption :c an active type in which transport of sodium is involved. Tri peptides are absorbed more rapidly than di peptides, which are in turn faster than free amino acids. There is a competition for absorption within groups of free amino acids, acidic, basic, neutral and amino acids but no competition between groups which suggests that slightly different mechanisms of transport exist for different chemical configurations.

Amino acid deficiency: it is a condition in which the dietary supply of one or more of the essential amino acids is less than that required for the efficient utilization of other amino adds and other nutrients Diets are in general unlikely to be completely devoid of any one or more amino acids but may be deficient in respect of required it*.