## The Protein in Animal Nutrition

Proteins are complex organic nitrogenous compounds made up of amino acids. All proteins contain carbon, hydrogen, oxygen, nitrogen and generally sulphur, many contains phosphorus. Element such as iodine, iron, copper and zinc are also occasionally present The approximate average elementary composition of protein is as follows:

Elements		Average	percent
Carbon		50	(51-55)
Hydrogen		7	(6.5 -7.3)
Oxygen		23	(21.5-23.5)
Nitrogen	16		(15.5-18.0)
Sulphur		0-3	(0.5-2.0)
Phosphorus		0-3	(0.0-1.5)

Most proteins contain about 16 percent nitrogen, which means that the weight of protein nitrogen multiplied by 6.25 (100/16 = 6.25) equal the weight of protein. Suppose a feed sample to be analysed yields 1.0 gram of nitrogen by Kjeldahl process, then the weight of protein represented as  $1.0 \times 6.25 = 6.25g$ . Milk nitrogen is multiplied by 6.38 because milk protein contains 15.87 percent nitrogen.

Amino acids: Proteins are hydrolyzed by enzymes, acids or alkalies into amino acids. About 20 amino acids are commonly found as components of proteins. Amino acids have a basic amino group and an acidic carboxyl group. So amino acids are amphoteric in nature and exist as dipolar ions or zwitter ions in aqueous solution. A pH value called isoelectric point for

a given amino acid at which it is electrically neutral.

## Classification of amino acids:

- Amino acids can be classified into three groups, namely, the aliphatic, aromatic and heterocyclic amino acids.
- I. Aliphatic Amino Acids
- Mono amino-mono carboxylic acids
- Glycine
- Alanine
- Serine
- Threonine
- Valine
- 6- Leucine
- 7- Isoleucine
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- •
- Mono-amino di carboxylic acids (Acidic amino acids)
- 8. Aspartic acid 9. Glutamic acid
- Di-amino mono carboxylic acids (Basic amino acids) •
- 10. Lysine
- Arginine
- Citrulline
- - (d)Sulphur containing amino acids
- 13. Cystine 14-Methionine ... 15-Cysteine
- Aromatic Amino Acids
- 16. Phenyl alanine
- Tyrosine
- Heterocyclic Amino Acids
- Histidine
- Proline
- Hydroxyproline
- Tryptophane

Function of proteins:

- Proteins form muscles and tissues of the body; hence it is essential for the growth and development of the body.
- They help in maintaining the loss of body tissues and muscles.
- They help in the formation of enzymes, hormones, antigen, antibody, digestive juices of the body and regulate body osmotic pressure and acid-base balance.
- They help in the repair of body cells as well as for the production of new cells.
- They also supply energy to the body.
- They are essential for the formation of egg, milk protein, wool and hairs of the animals.
- They provide the basic cellular matrix within which the bone mineral matter is deposited.
- Under condition of non-digestion and no-chances for de-naturation, the protein accumulates inside the cells and produce toxicity, i.e. venoms of snakes and insects are infected by biting into the blood.
- Endorphins (peptide) are found in brain and are involved in the suppression of pain.

## Essential amino acid (indispensable amino acid):

- An essential amino acid is one needed by the animal that cannot be synthesized by the animal in the amounts needed and so must be present in the protein of the feed as such.
- Non-essential amino acid (dispensable amino aicd): a non-essential amino acid is one needed by the animals that can be formed from other amino acids by the animals and so does not have to be present as the particular amino acid in protein of the feed.

S. No.	Essential amino acid	Non-essential amino acids
1.	Arginine	Alanıne
2.	Histidine	Aspartic acid
3.	Iso- Leucine	Cıtrulline
4.	Leucine	Cystine
5.	Lysine	Glutamic acid ^
6.	*Methionine	Glycine
7.	Phenylalanine	Proline
8.	Threonine	Hydroxyproline
9.	Tryptophan	Serine
10.	Valine	Tyrosine