

Poultry Nutrition – Practical Approach

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Poultry Nutrition – Practical Approach

- 1. Nutrient specifications and ration formulation for chicken**
- 2. Feeding management of broiler, layer and breeder chicken**
- 3. Designer eggs and meat through nutrient manipulation**
- 4. Feeding management of native chicken, ducks, quails and turkeys**
- 5. Feed additives and supplements for poultry**

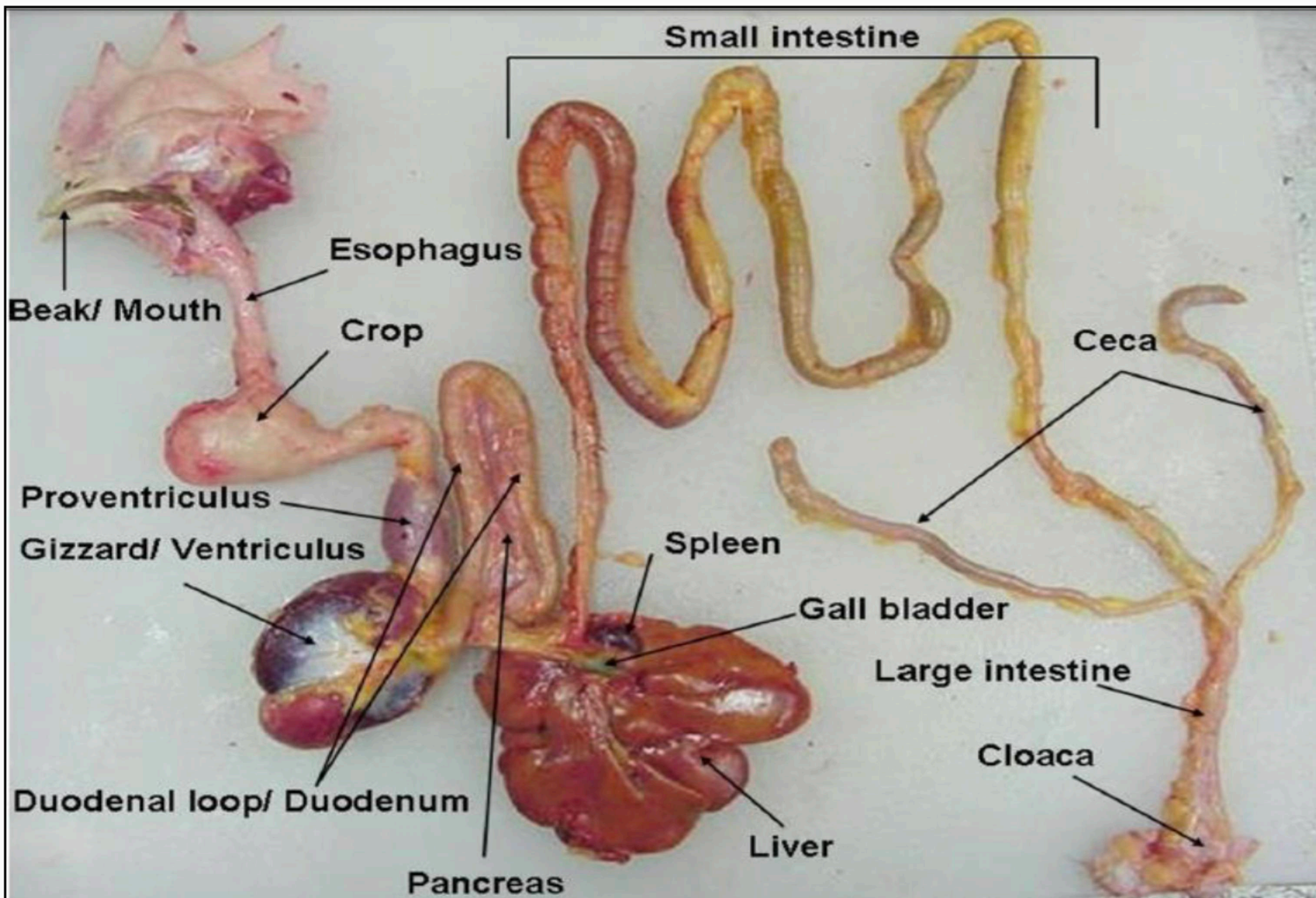


Nutrient specifications and ration formulation for chicken





Digestive system of chicken



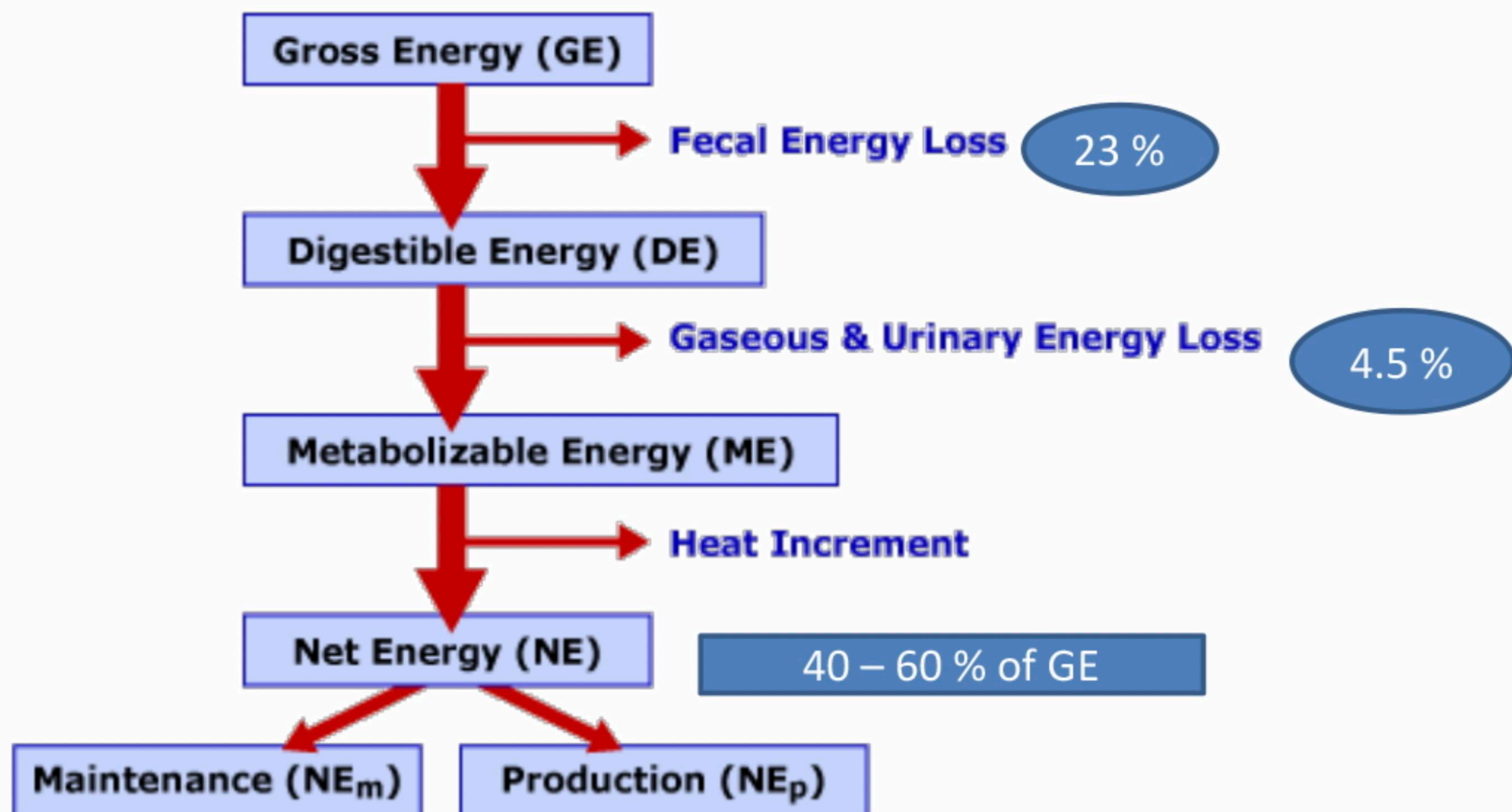
Digestive system of chicken

- ▶ **Crop** - very little digestion takes place in the crop—it is simply a temporary storage pouch.
- ▶ **Proventriculus** - Glandular stomach where digestion primarily begins. Hydrochloric acid and digestive enzymes, such as pepsin, are added to the feed.
- ▶ **Ventriculus (Gizzard)** - grinding, mixing, and mashing. Chickens fed only commercially prepared feed do not need grit.
- ▶ **Cloaca** - void fecal material as digestive waste with uric acid crystals.
- ▶ Starch is well digested and that the digestion of fat and protein and metabolizability of energy are compromised in the newly hatched broiler chick.
- ▶ The capacity to digest the feed, absorb and transport nutrients is limited during the early life of broilers.
- ▶ Nutrient digestibility mainly depends on feed quality, age and environment.

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Nutrient specifications for poultry



Chickens able to control energy intake by regulating feed intake

Nutrient specifications for poultry

- ▶ Maximizing energy intake in commercial broilers, especially in winter, leads to ascites and in summer sudden death syndrome (SDS) due to high body heat load.
- ▶ Deposition of abdominal and carcass fat is also more in high energy diets
- ▶ Normal feed consumption is reduced by 10-15% during summer.
- ▶ Maize, wheat, broken rice, sorghum, fats and oils are high energy supplements.
- ▶ Pearl millet, finger millet and other small millets, rice polish or bran, de-oiled rice bran, wheat bran, molasses, tapioca flour, etc. are low energy supplements.
- ▶ Maize is the commonly used energy feedstuff in poultry.

Proteins

- ▶ **Essential amino acids**
- ▶ **Limiting amino acids**
- ▶ **Lysine and methionine**
- ▶ Threonine (Thr) is the third limiting amino acid for broilers, second limiting amino acid in growing Japanese quails and first limiting amino acid in starting egg-type pullets.
- ▶ **Ideal protein concept** – Feed formulation based on digestible amino acid basis
- ▶ Ratio of different dietary amino acids is important - deficiency, imbalances, toxicity and antagonism of amino acids.
- ▶ Methionine - limiting aa - based on soybean meal.
- ▶ Heat treatment – mallard reaction – lysine availability is affected.

Proteins

- ▶ Protein supplements are divided into vegetable and animal protein supplements.
- ▶ The former group includes cakes and meals of different seeds like groundnut, soybean, rapeseed, mustard, cottonseed, sunflower, safflower, sesame and cluster bean.
- ▶ Roasted full-fat soybean meal is also very good source of protein and fat, especially for broilers.
- ▶ Now extruded expander soybean meal is also available.
- ▶ Maize gluten, rice gluten, dried distillery grains with soluble (DDGS) etc. are also very good sources of protein.
- ▶ Animal protein supplements include fish meal, meat-cum-bone meal, meat meal, blood meal and poultry byproduct meal.



Minerals

- ▶ Calcium carbonate / oyster shell / cheap marble are used as sources of calcium, and dicalcium phosphate or monocalcium phosphate as source of calcium and available phosphorus.
- ▶ Common salt is added as source of sodium and chlorine.
- ▶ Trace minerals (Cu, Zn, Fe, Mn, Se, I and sometimes Cr) are added in the form of premix (trace mineral premix).
- ▶ They are either procured from the market or may be prepared at mill/home.
- ▶ Organic sources of trace minerals are available commercially, which may have better bioavailability.
- ▶ Recent concepts – hydroxy minerals and nano minerals



Vitamins

- ▶ **Vitamins are supplemented either through premixes or through individual vitamins**
- ▶ **Vitamin deficiencies are due to inadvertent omission of a complete vitamin premix from the birds' diet.**
- ▶ **Multiple signs - signs of B vitamin deficiencies appear first because there are some stores of fat-soluble vitamins in the body, it often takes longer for these deficiencies to affect the bird, and it may take months for vitamin A deficiency to affect adult birds.**
- ▶ **Feed processing – Pelleting and crumbling**
- ▶ **Separate vitamin mixture for broiler, layer and breeder chicken**
- ▶ **Excess fat soluble vitamins – Toxic**

Nutrient Specifications

- ▶ **Indian Standard - POULTRY FEEDS — SPECIFICATIONS**
- (Fifth Revision - 2021) - **IS 1374:2007.**
- ▶ **Livestock Feeds and Equipment Systems Sectional Committee, FAD 5**
- ▶ **Nutrient requirements of poultry 2013 ICAR feeding standard**
- ▶ **NRC (USA) 1994 – Poultry**
- ▶ **Breeder specifications – concerned firm supplying the birds**

Indian Standard - POULTRY FEEDS - SPECIFICATIONS - (Fifth Revision - 2021)

S.No	Characteristic	Broiler Feed			Broiler Breeder Feed			
		Pre-starter	Starter	Finisher	Chick	Grower	Layer	Male
vi)	Calcium (as Ca), percent by mass, Min	1.0	1.0	1.0	1.0	1.0	3.5	1.0
vii)	Total phosphorus, percent by mass, Min	0.7	0.7	0.7	0.70	0.70	0.70	0.70
viii)	Available phosphorus, percent by mass, Min	0.45	0.45	0.45	0.45	0.45	0.40	0.40
ix)	Lysine, percent by mass, Min	1.3	1.2	1.0	1.0	0.8	0.85	0.80
x)	Methionine, percent by mass, Min	0.5	0.5	0.45	0.45	0.40	0.45	0.40
xi)	Metabolizable energy (Kcal/kg), Min	3000	3100	3200	2800.	2750	2800	2750
xii)	Aflatoxin B ₁ (ppb), Max	20	20	20	20	20	20	20

Indian Standard - POULTRY FEEDS - SPECIFICATIONS - (Fifth Revision - 2021)

Sl.No	Characteristic	Broiler Feed			Layer Feed			
		Pre starter	Starter	Finisher	Chick	Grower	Layer Phase I	Layer Phase II
i)	Manganese, mg/kg.Min	100.0	100.0	100.0	70.0	60.0	60.0	60.0
ii)	Zinc, mg/kg.Min	80.0	80.0	80.0	60.0	60.0	60.0	60.0
iii)	Copper, mg/kg.Min	12.0	12.0	12.0	12.0	9.0	9.0	9.0
iv)	Choline, mg/kg.Min	500.0	500.0	500.0	500.0	200.0	400.0	400.0
v)	Linoleic acid, percent by mg/kg.Min	1.1	1.1	1.1	1.0	1.0	1.0	1.0

