MJF COLLEGE OF VETERINARY & ANIMAL SCIENCES, CHOMU, JAIPUR (RAJ.)

DEPARTMENT OF ANIMAL NUTRITION

FAT SOLUBLE VITAMINE
DATE- 29/12/23 – 30/12/23

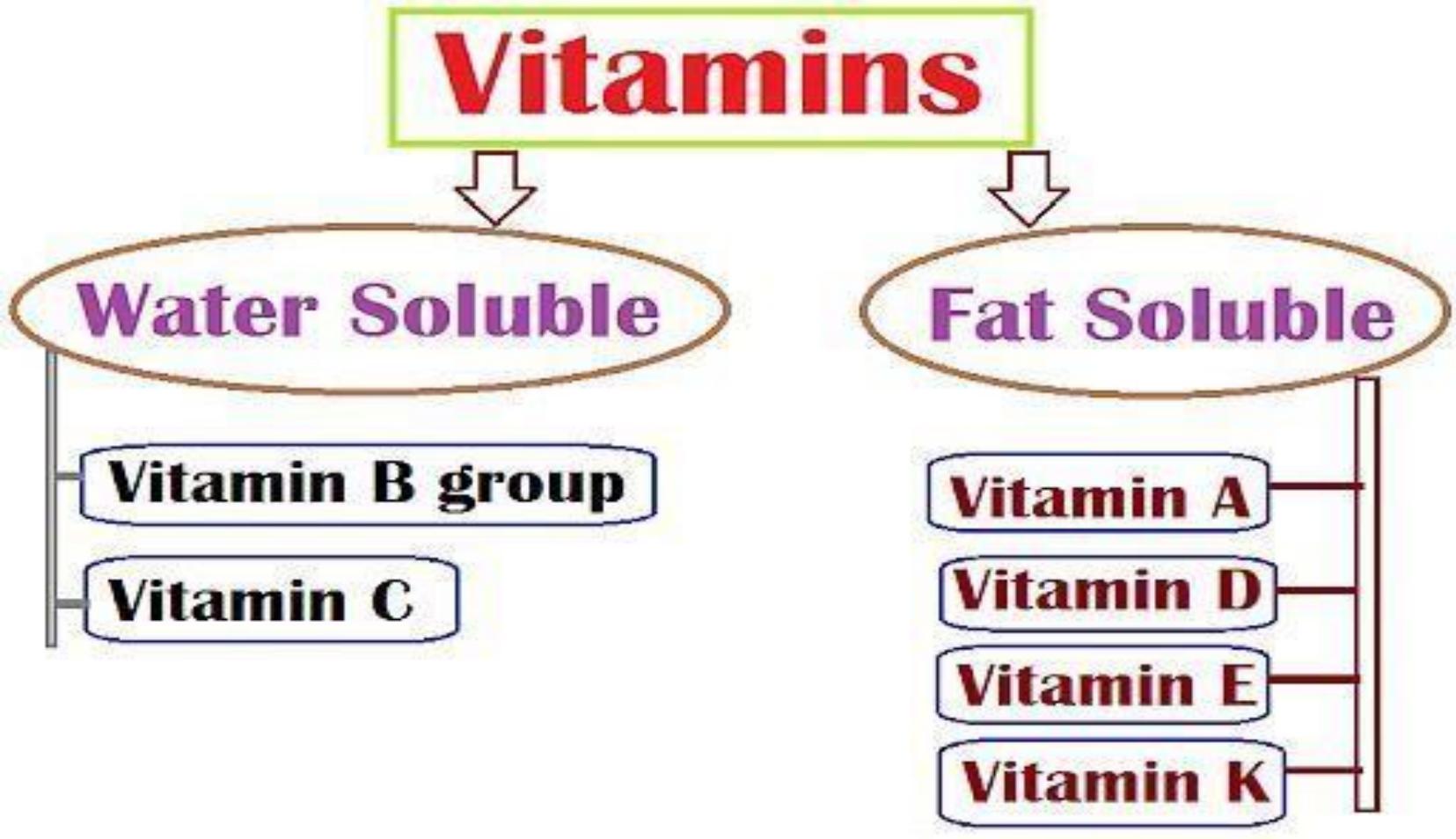
Delivered by-
Dr. Vijay Prakash Saini
Dr. Abhishek Mehta

WHAT ARE VITAMINS?

VITAMINS ARE GROUP OF COMPLEX ORGANIC COMPOUNDS REQUIRED IN TRACE AMOUNTS THAT ARE ESSENTIAL TO NORMAL METABOLISM TO PERFORM SPECIFIC CELLULAR FUNCTIONS AND LACK OF WHICH IN THE DIET CAUSES DEFICIENCY DISEASES.

- These are not synthesized by animals, therefore must be taken in diet.
- Prevent acute deficiency disease; maintain general health.

Classification of vitamins



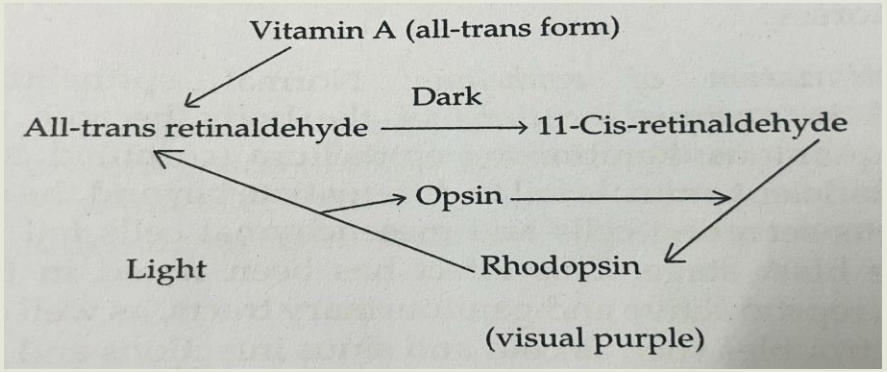
FAT SOLUBLE VITAMINS
VITAMIN –A/ Retinol

- **SOURCE : 1.** Carotenoids present in plants, yellow maize, carrots, greens are rich in source.

  2. Fish liver oils, liver, egg yolk, butter, cream, whole milk are rich in source.

- **PHYSIOLOGICAL FUNCTIONS:**

1. Vision :



2. Bone growth: In cattle, a blindness occurs as a result of narrowing of the bone canal through which optic nerve passes. Changes in bone growth are reported to cause the rise in CSF pressure.

3. Maintenance of mucus secreting cells of the epithelia .

- **DEFICIENCY SYMPTOMS :**

1. **Night blindness (Nictalopia):** Deficiency of vitamin A first manifests as a slow, dark adaptation and progresses to total blindness.
2. **Xerophthalmia :** It is characterized by a fry condition of the cornea and conjunctiva, cloudiness and ulceration.

— **Copious lacrimation** is a more prominent eye symptom in cows and horses.

Xerophthalmia

Copious lacrimation

3. Keratinization of epithelium: Normal epithelium (columnar epithelium) in various locations of body like Respiratory, alimentary, reproductive and genitourinary tracts become replaced by a stratified squamous, keratinising epithelium (cornified cells).

4. Reproductive performance is impaired in male and female.

VITAMIN –D/Calciferol

- **SOURCE:** Ergosterol of plants and 7- dehydrocholesterol do not possess any vitamin D activity but on conversion to ergocalciferol (D2) and cholecalciferol (D3), respectively, by UV light the become active.

—The natural foods that containing vitamin D are those of animal origin e.g. egg-yolk, liver, salt water fish (salmon etc.) fish liver oils like cod liver oil rich in vitamin D.

— Sun cured hay and roughages for livestock.

— The dead leaves of growing plants also contain vitamin D as ergocalciferol.

- **FUNCTIONS:**

1. Vitamin D3 is the 3rd major hormone involved in the regulation of calcium metabolism and skeletal remodelling.
2. Vitamin D3 stimulates both intestinal calcium and intestinal phosphorous transport.
3. Active form of vitamin D (I.e., $1,25(OH)_2D_3$) stimulates the synthesis of calcium binding protein. The binding protein is necessary for calcium absorption.

- **DEFICIENCY SYMPTOMS:**

1. Rickets in young ones:

— It is a disease of growing bone.

—Deficient mineralization at the growth plate.

—occurs before the growth plate fuse.

— muscle weakness.

1. Osteomalacia in adults:

—Impaired mineralization of the bone matrix.

— softening and weakening of bones.

3. Penguin like squat(Poultry).

VITAMIN- E/Tocopherol

- **SOURCE :** Tocopherol is a plant product
  - — It is also found in milk, meat, fish, eggs etc. (plant source ingredients are richer in vitamin E than animal source ingredients.
  - — young green grass is a better source than mature fodder.
  - — **Alfaalfa** meal is a rich source of tocopherol
- **FUNCTION :**

1. Natural antioxidant at a cellular level and play important role in biological oxidation- reduction reactions.
2. Vitamin- E plays a significant role in the development and function of the immune system.
3. Vitamin-E also closely associated with sulphur amino acid metabolism, the synthesis of ubiquinone, phosphorylation reactions.

- **DEFICIENCY SYMPTOMS:**

1. **Nutritional muscular dystrophy:** It is seen cattle, sheep, pigs, chicks affecting primarily skeletal muscle and occasionally heart muscle , in pigs it is commonly known as mulberry heart disease.
2. **Mulberry heart disease.**
3. **Stiff lamb disease(lamb).**

VITAMIN- K/Phylloquinone:-

- **SOURCE:** Green leafy vegetables are rich source of phylloquinone.
  — liver, egg and fish meal are good animal source.
  — **Menaquinones K3** are synthesized by bacteria in the digestive tract of animals.
- **FUNCTIONS:**

1. Vitamin K is required for synthesis of prothrombin and other clotting factors.
2. It is also involved in electron transport and in bacteria , oxidative phosphorylation.

- **DEFICIENCY SYMPTOMS:**

1. **Haemorrhagic sweet clover disease:** Ruminants consuming mouldy sweet clover develop vitamin K deficiency symptoms.
   — when sweet clover undergoes spoilage with certain moulds, the moulds convert the coumarin to dicoumarol, which is a potent vitamin K antagonist.

REFERENCE: PRINCIPLES OF ANIMAL NUTRITION AND FEED TECHNOLOGY 3rd edition DV REDDY

THANK YOU