UNIT-2

1. Macrominerals and their deficiency system
2. Microminerals and their deficiency system
3. Fat Soluble vitamin and their role
4. Water Soluble vitamin and their role
5. Feed Additives in Livestock Nutrition

- **Classification of Minerals:** Two type
- **Major (Macro) Minerals**
  - Calcium (Ca)
  - Phosphorus (P)
  - Sodium (Na)
  - Chlorine (Cl)
  - Potassium (K)
  - Magnesium (Mg)
  - Sulfur (S)
- **Minor (Trace) Minerals**
  - Zinc (Zn)
  - Copper (Cu)
  - Cobalt (Co)
  - Iron (Fe)
  - Iodine (I)
  - Manganese (Mn)
  - Selenium (Se)
  - Molybdenum (Mo)

FUNCTIONS OF MINERALS

1. Structural Functions
    - Calcium and Phosphorus: Essential for bone and teeth formation and maintenance.
1. Catalytic Functions
1. Electrolyte Balance
    - Sodium, Potassium, and Chlorine: Maintain acid-base balance and osmotic pressure in body fluids.

1. Macrominerals and their deficiency system

CALCIUM (CA)

- 99% of the calcium is found in bones and teeth
- 1% is involved in vital metabolic functions
- Functions:
- 1. Blood Coagulation
- 2. Nerve Impulse Transmission
- 3. Muscle Contraction
- **Deficiency Symptoms**

1. Young Animals:

- Rickets-weak and deformed bones due to inadequate mineralization.

2. Adult Animals:

- Osteomalacia-Softening of the bones caused by defective bone mineralization.
- Milk Fever (Parturient Paresis)

PHOSPHORUS (P)

- **Deficiency Symptoms**

1. **Pica (Depraved Appetite/Allotriophagy):**

- Abnormal cravings and eating non-food items such as wood, soil, and bones.

2. **Post-Parturient Hemoglobinuria (PPH)**:

- A condition in cows characterized by the breakdown of red blood cells after calving, leading to hemoglobinuria (presence of hemoglobin in urine).

3. **Ca : P Ratio** The optimal calcium to phosphorus ratio is 2:1. An imbalance can lead to conditions such as "**Big Head Disease**" in horses, where excessive phosphorus intake relative to calcium causes bone deformities.

POTASSIUM (K)

- Chief Intracellular Cation
- Nerve and Muscle Activity: Essential for normal nerve impulse transmission and muscle contraction.
- Enzyme Activation: Activates various enzymes involved in carbohydrate and protein metabolism.
- **Sources:**
- Natural Conditions: Grass and green fodder are rich sources of potassium.
- **Deficiency Symptoms**
- Synthetic Milk: Potassium deficiency can occur in animals fed synthetic milk, leading to reduced nerve and muscle activity, and in severe cases, paralysis.

SODIUM

- **Chief Extracellular Cation:** Sodium is the primary cation outside cells, crucial for maintaining fluid balance and nerve function.
- **Functions:**
- Water Intake Increases water intake, which is particularly important during heat stress.
- Acid-Base Balance: Helps maintain acid-base balance in the body.
- **Sources:**
- Common Salt (NaCl): The primary source of sodium in animal diets.
- **Deficiency Symptoms**
  - General: Slow growth, keratinization of corneal epithelium, impotency in males, delayed sexual maturity, and impaired estrus.
  - Poultry: Feather picking and cannibalism.
  - Salt Poisoning: Common in pigs and poultry when excessive salt is consumed.

CHLORINE (CL)

- Importance and Functions
- **Functions:**
- Acid-Base Balance: Helps maintain the acid-base balance in body fluids.
- Electrolyte Balance: Works with sodium to regulate osmotic pressure and fluid balance.
- **Sources**
- Common Salt (NaCl): The primary source of chlorine in animal diets.
- **Deficiency Symptoms**

- General: Deficiency of chlorine can lead to an abnormal increase in the alkali reserve, resulting in alkalosis.
- Poultry: Deficiency can lead to feather picking and cannibalism.

1. The deficiency of which nutrient causes Grass staggers in milch animals? **JKPSC-2020**

A) Manganese
B) Magnesium
C) Sodium
D) Chlorine

2. Grass tetany in cattle is due to deficiency of: Punjab 2021 , **JKPSC** 2012

(A) Manganese
(B) Copper
(C) Magnesium
(D) Calcium

3. "Pica" in cows is due to the deficiency of: **JKPSC** 2012
(A) Protein
(B) Calcium
(C) Phosphorus
(D)Energy

4. Milk fever is due to deficiency of: **JKPSC** 2012, Punjab 2021
(A) Mg
(B) Co
(C) Ca
(D) Na

5. Eclampsia in dog is caused by deficiency of **Punjab 2023**
(a) Iron
(b) Phosphorus
(c) Calcium
(d) Copper

6. Enzootic ataxia is caused due to the deficiency of Punjab 2021
(A) Iron
(B) Copper
(C) Manganese
(D) Zinc

7. A deficiency condition Enzootic ataxia has been associated with pastures as low as 24 mg/kg DM of which mineral element **RPSC 2013**
(1) Sulphur
(2) Magnesium
(3) Copper
(4) Zinc

8. Post parturient haemoglobinuria or Red Water Disease is basically caused due to acute deficiency of which mineral in the blood? **RPSC 2013**
(1) Copper
(2) Magnesium
(3) Phosphorus
(4) Calcium

9. The most important cause of allotriophagy in animals is: Opsc 2021-22 1st
(A) Calcium deficiency
(B) Protein deficiency
(C) Phosphorus deficiency
(D) Vitamin D deficiency

10.Lactation tetany is caused by deficiency of magnesium, but in mares it is caused due to deficiency of: Opsc 2021-22 2nd
(A) P
(B) Ca
(C) Mg
(D) Se

2. Microminerals and their deficiency system

SULFUR

- Importance and Functions

- Amino Acids: Integral component of sulfur-containing amino acids such as cystine, cysteine, and methionine.

- Vitamins: Essential for the synthesis of vitamins like biotin and thiamin.

- Hormones: Part of important hormones like insulin and oxytocin.

- Wool: Rich in cysteine, wool contains about 4% sulfur. The nitrogen to sulfur (N:S) ratio in wool is typically 5:1.

- NPN Supplementation: For non-protein nitrogen supplementation in ruminants, the N:S ratio should be 10:1 (or up to 15:1).

MAGNESIUM (MG)

- Importance and Functions

  - Enzyme Activation: Acts as a cofactor for enzymes such as pyruvate carboxylase and pyruvate
    oxidase.

- **Deficiency Symptoms**

  - Hypomagnesemic Tetany: Also known as grass tetany or lactation tetany, characterized by muscle spasms, convulsions, and potentially death due to respiratory failure.

  - Lactation Tetany: Occurs in lactating animals.

  - Grass Staggers: A condition in grazing animals, particularly ruminants, due to low magnesium
    levels in lush, fast-growing pastures.

IRON (FE)

- Importance and Functions
  - Transport: Iron is transported in the body by transferrin.
  - Storage: Stored in the form of ferritin and hemosiderin.
- **Deficiency Symptoms**
  - Piglet Anemia: Known as "thumps," characterized by labored breathing due to iron deficiency in young pigs.
  - Iron Absorption: Governed by the mucosal block theory, where ferritin saturation in the intestinal mucosa regulates iron absorption.

COPPER (CU)

Functions:

- Essential for normal pigmentation of hair, fur, and wool
- Component of **turacin**, a pigment found in feathers

- **Deficiency Symptoms:**

1. Lambs: Muscular incoordination leading to sway back condition (**enzootic ataxia)**
2. Wool: Loss of crimp, resulting in stringy or steely wool due to disruption of disulfide linkages between cysteine molecules

2. **Falling disease:** Degeneration of heart muscle (myocardium)

2. **Microcytic anemia in pigs, poultry, and calves**

COBALT (CO)

- Functions:
  - Essential component of cyanocobalamin (vitamin B12)
- Deficiency:
  - "Pining" condition in ruminants, characterized by:Loss of appetite

IODINE (I)

- Functions:
  - Essential component of thyroid hormones (thyroxine and triiodothyronine)
- Deficiency:
  - Goiter (enlarged thyroid gland)
- Note on Goitrogenic Compounds:
  - Found in Brassica genus plants (e.g., cabbage)
  - Inhibit iodination of tyrosine, interfering with thyroid hormone synthesis

MANGANESE (MN)

- Functions:
  - Activates glycosyl transferases, important for bone formation
- Deficiency Symptoms: Poultry:
  - Perosis (slipped tendon) - malformation of leg bones Reduced hatchability and eggshell thickness
  - Head retraction in chicks

ZINC (ZN)

- Functions:

· Component of numerous enzymes: Carbonic anhydrase

- Deficiency Symptoms:

1. Skin disorders:

- Parakeratosis in pigs (thickening and hardening of skin) Bone abnormalities: 'Swollen hock syndrome' in poultry

2. Bone abnormalities: 'Swollen hock syndrome' in poultry

MOLYBDENUM (MO)

- Known for its interaction with copper (Cu)
- Acts as an antagonist to Cu, Zn, and sulfur (S)
- Toxicity/Deficiency:
  - Teartness or peat scour: Can be caused by either Mo toxicity or acute Cu deficiency

SELENIUM (SE)

- Considered one of the most toxic minerals when in excess
- Functions:
  - Component of glutathione peroxidase enzyme
  - Works synergistically with Vitamin E as an antioxidant
- Toxicity Symptoms:

1. Alkali disease
1. Blind staggers
1. Degnala disease
1. Hoof deformity

FLUORINE

- Bureau of Indian Standards (BIS) recommends that F concentration in mineral mixtures should not exceed 0.06%.
- Functions : Prevention of dental caries

CHROMIUM (CR)

- Functions:

1. Acts as a glucose tolerance factor

1. Functions similar to insulin-like growth factor (IGF-1)

1. Carcass modifying effects:Enhances nitrogen (N) retention

1. Helps reduce stress and metabolic disorders

NICKEL (NI)

- Function:

- Important for urease activity in the rumen

VITAMIN SOURCES AND DEFICIENCY SYMPTOMS

- Vitamins are classified based on their solubility into fat-soluble and water-soluble vitamins.

- Fat-Soluble Vitamins

1. **Vitamin A**
1. **Vitamin D**
1. **Vitamin E**
1. **Vitamin K**

3. The deficiency of manganese in poultry causes: **JKPSC** 2012
(A) Osteoporosis
(B) Perosis
(C) Pica
(D) Dermatitis

3. "Parakeratosis" in swine is due to deficiency of: **JKPSC** 2012
(A) Sodium
(B) Zinc
(C) Calcium
(D) Cobalt

4. The "piglet anaemia" is due to deficiency of: **JKPSC** 2012
(A) Cobalt
(B) Iron
(C) Phosphorus
(D) Copper

5. Excess of molybdenum in the diet causes deficiency of: **JKPSC** 2012
(A) Zinc
(B) Copper
(C) Iron
(D) Sodium

6. The mineral supplement in artificial diet of fishes should be PUNJAB 2016
a) Nil
b) 1-2%
c) 4-5%
d) Varies according to geographical distributions

7. Buffaloes in India are found to suffer from Degnala disease due to toxicity of **Punjab 2022**
a) Vitamin E
b) Fluorine
c) Selenium
d) Phosphorus

8. Perosis in birds is due to deficiency of: **Punjab 2022**

a) Calcium
b) Phosphorus
c) **Manganese**
d) Magnesium

9. Mulberry Heart Disease in Swine is due to deficiency of: **Punjab 2022**

a) **Se**
b) Zn
c) Cu
d) None of the above

10. Blind staggers is a condition of cattle and sheep caused due to subacute poisoning with **RPSC 2013**

(1) Manganese
(2) Selenium
(3) Lead
(4) None of the above

11. Sulphur containing vitamins are **RPSC 2013**

(1) Riboflavin and biotin
(2) Riboflavin and choline
(3) Biotin and choline
(4) Biotin and thiamine

12.Hairless calves and piglets with thick, pulpy skin are born due to deficiency of which of the following minerals in the diet of cow and sow? MPPSC 2023

[A] Cu
[B] Mg
(C) Zn
[D] S

WATER-SOLUBLE VITAMINS

1. **Vitamin B Complex**

    1. **Thiamin (Vitamin B1)**
    2. **Riboflavin (Vitamin B2)**
    3. **Niacin (Vitamin B3)**
    4. Choline (Vitamin B4)
    5. **Pantothenic Acid (Vitamin B5)**
    6. **Pyridoxin (Vitamin B6)**
    7. **Biotin (Vitamin B7)**
    8. **Inositol (Vitamin B8)**
    9. **Folate/Folic acid (Vitamin B9)**
    10. **P-Amino Benzoic Acid (Vitamin B10)**
    11. **Salicyclic acid (Vitamin B11)**
    12. **Cyanocobalamin (Vitamin B12)**

2. **Vitamin C (Ascorbic Acid)**

OFFICIAL RECOGNIZE NOW !

1. Vitamin B1 (thiamine)
2. Vitamin B2 (riboflavin)
3. Vitamin B3 (niacin)
4. Vitamin B5 (pantothenic acid)
5. Vitamin B6 (pyridoxine)
6. Vitamin B7 (biotin)
7. Vitamin B9 (folic acid)
8. Vitamin B12 (cobalamin)

No need to remember 4,8,10,11

3. Fat Soluble vitamin and their role

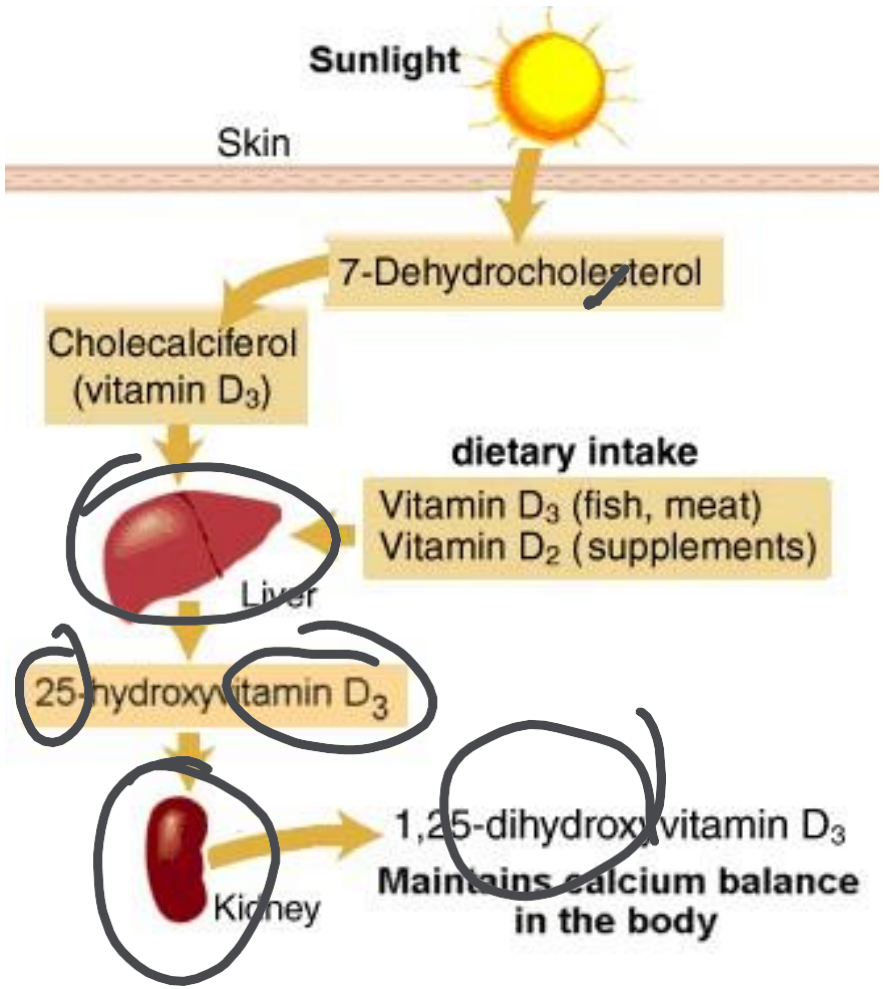
VITAMIN- A (RETINOL)

- **Sources**
  - Carotenoids: Found in plant-based foods, including carotenes (e.g., beta-carotene) and xanthophylls.
  - Animal-Based Sources: Liver, fish oils, egg yolk, and dairy products.
- Conversion in the Body
  - Intestinal Mucosa: Carotenoids are converted into retinol in the intestinal mucosa.
  - 1 Molecule of Beta-Carotene: Yields 2 molecules of Vitamin A (Retinol).

- **Functions-** Vision: Essential for the synthesis of rhodopsin, a pigment in the retina that is necessary for night vision.

- Deficiency Symptoms

1. **Night Blindness**: Impaired synthesis of rhodopsin leads to difficulty seeing in low light conditions.
2. **Xerophthalmia**: Dryness of the conjunctiva and cornea, which can lead to blindness.
3. Infertility: Reproductive issues due to impaired development and function of reproductive organs.
4. **Nutritional Roup in Poultry:** Respiratory infection characterized by nasal discharge, swollen eyes, and reduced egg production.
5. **Bitot's Spots:** Foamy patches on the conjunctiva, indicative of severe vitamin A deficiency.



VITAMIND

Types of Vitamin D

Vitamin D2 (Ergocalciferol)Source

Vitamin D3
(Cholecalciferol)Source

VITAMIN D

Functions

- Hormone-Like Activity: Vitamin D acts like a hormone in the body, regulating calcium and phosphorus metabolism.
- Antirachitic Activity: Prevents rickets, a disease characterized by softening and weakening of bones in young animals.

Deficiency Symptoms

1. Young Animals:Rickets-Characterized by weak and deformed bones due to inadequate mineralization.
2. Adult Animals:Osteomalacia-Softening of the bones caused by defective bone mineralization.

Sources

- Vitamin D2: Found in plants, particularly in fungi and yeast.
- Vitamin D3: Found in animal products such as fish liver oils, egg yolk, and synthesized in the skin upon exposure to sunlight.

VITAMIN E (TOCOPHEROLS)

- Role and Functions

- Antioxidant: Vitamin E acts as a powerful antioxidant, protecting cell membranes from oxidative damage. It works in association with the selenium-containing enzyme glutathione peroxidase.

- Free Radical Scavenging: Vitamin E is the first line of defense against free radicals, neutralizing them before they can cause harm.

- Glutathione Peroxidase: This enzyme destroys any remaining peroxides, preventing further oxidative damage.

VITAMIN E (TOCOPHEROLS)

- Deficiency Symptoms

1. **Calves:**

- Nutritional Myopathy: Also known as muscular dystrophy or white muscle disease
- Fatal Syncope: Sudden death due to heart failure.

2. **Lambs:** Stiff Lamb Disease: Muscle stiffness and weakness due to nutritional myopathy.

2. **Pigs:** Mulberry: Heart Disease: sudden death due to heart muscle degeneration.

Fatal Syncope: Similar to calves, sudden death due to heart failure.

4. **Chicks:**

- Encephalomalacia: Also known as "crazy chick disease," characterized by neurological symptoms such as incoordination and convulsions.
- Exudative Diathesis: Edema and hemorrhages due to increased capillary permeability.

5. **Cats:**

- Yellow Fat Disease:Also known as steatitis, characterized by inflammation of fatty tissues.

VITAMIN - K

- Functions

1. Synthesis of Prothrombin: Vitamin K is essential for the synthesis of prothrombin in the liver, a protein and clotting factor that is crucial for blood coagulation.

1. Blood Clotting: It plays a vital role in the blood clotting process by activating clotting factors that help in the conversion of prothrombin to thrombin.

1. Bone Health: Vitamin K is also involved in the regulation of calcium in bones and other tissues.

- Deficiency Symptoms

1. Hemorrhagic Conditions: Deficiency in vitamin K can lead to bleeding disorders due to impaired blood clotting. This can manifest as excessive bleeding from wounds, bruising, and internal bleeding.

2. Sweet Clover Poisoning: In cattle, sweet clover poisoning occurs when the plant becomes moldy and produces dicoumarol, a compound that antagonizes vitamin K. This leads to a decrease in prothrombin levels, resulting in hemorrhagic disease.

VITAMIN - K

- Sources
  - Green Leafy Vegetables: Such as spinach, kale, and broccoli.
  - Animal Products: Liver, egg yolk, and fish.
  - Synthesized by Gut Bacteria: In the intestines of animals.
- Types of Vitamin K

1. Vitamin K1 (Phylloquinone): Found in green plants.
1. Vitamin K2 (Menaquinone): Produced by bacteria in the intestines.
1. Vitamin K3 (Menadione): A synthetic form of vitamin K.

1.'Nutritional roup' in poultry characterised by mucopurulent rhinitis is caused due to deficiency of MPSC 2011

(1) Vitamin A (2) Vitamin D (3) Vitamin E (4) Vitamin K

2. The "antirachitic factor" is: **JKPSC** 2012
   (A) Vitamin A
   (B) Vitamin D
   (C) Vitamin C
   (D) Vitamin B
3. Which of the following vitamins is not of vegetable origin? **JKPSC** 2012
   (A)Vit. A
   (B) Vit. C
   (C) Vit. B
   (D) Vit. D
4. Which of the following vitamins has hormone like properties? PUNJAB 2016
   a) Vitamin A
   b) Vitamin E
   c) Vitamin D
   d) Vitamin C
5. Crazy chick disease is caused due to the deficiency of **RPSC 2013,** Opsc 2021-22
   (1) Vitamin E
   (2) Vitamin B
   (3) Vitamin B12
   (4) Vitamin B2

8. Vitamin B1 deficiency in small ruminants causes: opsc 2018-19 1st

(A) Beri-Beri
(B) Digestive disorders
(C) Peripheral paralysis
(D) Polio-encephalomalacia

9. Stiff lamb disease (Nutritional myopathy in lambs) is due to the deficiency of: Opsc 2021-22 2nd

(A) Vitamin A and Calcium
(B) Vitamin D and Phosphorus
(C) Vitamin E and Selenium
(D) Vitamin K and Magnesium

10. Vitamin E is absent in Mpsc 2019

(A) Wheat germ oil
(B)Fish liver oil
(C) Cotton seed oil
(D)Sunflower oil

11. How many times of Vitamin - A is found in colostrum in comparison to milk? Uppsc 2022

(a) 9
B10
(c) 11
(d) 12

4. Water Soluble vitamin and their role

VITAMIN-C

- Sources

  - Primary Sources: Citrus fruits and green leafy vegetables are rich sources of vitamin C.

  - Synthesis: Most animals can synthesize vitamin C in their bodies from glucose using the enzyme gluconolactone oxidase. However, humans, guinea pigs, and some other species lack this enzyme and must obtain vitamin C from their diet.

- Functions

1. Antioxidant: powerful antioxidant, protecting cells from oxidative damage

1. Immune Function: Enhances the immune response and helps in the absorption of iron from plant-based foods.

VITAMIN-C

- Deficiency Symptoms

1. Scurvy: A disease caused by severe vitamin C deficiency, characterized by symptoms such as:

- Anemia Dry, rough skin covered with reddish spots
- Weakness and fatigue
- Swollen and bleeding gums
- Loosening of teeth
- Joint pain and swelling

2. Poor Wound Healing: Due to impaired collagen synthesis, wounds may heal slowly.
2. Increased Susceptibility to Infections: Weakened immune response can lead to a higher risk of infections.

THIAMINE (VITAMIN B1)

Deficiency Disease:

Polyneuritis in birds

Beri-Beri in Men

Chastek Paralysis – foxes

Opisthotonous/star grazing

Riboflavin (V I TA M IN B 2)

- Functions:
  - Component of flavoproteins, flavin mononucleotide (FMN), and flavin adenine dinucleotide (FAD)
  - Involved in protein and carbohydrate metabolism
  - Used by cells to transport hydrogen in metabolic pathways
- Deficiency Symptoms:

1. Curled Toe Paralysis

- Occurs in poultry, especially chicks

2. Clubbed Down Syndrome/Condition

- Feathers continue to grow within the follicle, leading to curled feathers
- Affects the appearance and health of the bird's plumage

NIACIN (VITAMIN B3)

- Niacin can be synthesized in the body from the amino acid tryptophan.

- Deficiency Disease:

1. Pellagra or blue tongue in men
2. Black tongue in dogs
3. Enlargement of hock joint or bowing of legs similar to perosis.

VITAMIN-B5

- Functions: Component of Coenzyme A: Essential for acyl transfer and fatty acid metabolism.
- **Deficiency Symptoms**
  - Pigs: Goose-stepping gait, characterized by a peculiar high-stepping walk.
  - General: Poor growth and skin lesions.

VITAMIN B6

- Functions: Protein and Amino Acid Metabolism: Acts as a coenzyme in the metabolism of amino acids and proteins.

- Deficiency Symptoms: Convulsions, anemia, slow growth, and hatchability
issues in poultry.

Deficiency Disease

1. **Rat Pellagra**
2. **Spasmodic convulsions**

BIOTIN(VITAMIN B7)

- Functions: Carboxylation Reactions: Acts as a coenzyme for carboxylase enzymes involved in fatty acid synthesis and gluconeogenesis.

- Deficiency Symptoms

  - Raw Eggs: Contain avidin, which binds biotin and leads to deficiency.

  - **Perosis** in poultry is caused due to deficiency of biotin, manganese, choline and Folic acid.

CHOLINE

- Functions

1. Methyl Donor: Choline acts as a methyl donor in transmethylation reactions, which are crucial for fat mobilization.

2. Transition Animals: Helps prevent metabolic diseases such as ketosis in transition animals (e.g., dairy cows around calving).

2. Poultry Chicks: Prevents perosis (slipped tendon), a condition also influenced by manganese (Mn).

- Deficiency Symptoms

- Perosis in Poultry: Characterized by slipped tendon, where the tendon slips from its normal position, leading to leg deformities.

VITAMIN B12

- Functions

1. Synthesis: Vitamin B12 is synthesized exclusively by microorganisms.
1. Mineral Requirement: Requires cobalt (Co) for synthesis.
1. Absorption: Absorbed in the gut when bound to a glycoprotein called intrinsic factor, which is produced in the stomach.

- Sources

- Microbial Synthesis: Synthesized by microorganisms in the gut.
- Animal Products: Found in liver, kidney, and other animal products.
- Not Present in Plants: Vitamin B12 is not found in plant-based foods.

- **Deficiency Symptoms**

- Pernicious Anemia: A type of anemia characterized by the inability to absorb vitamin B12 due to the lack of intrinsic factor. Symptoms include weakness, fatigue, and neurological issues. (Macrocytic Hyperchromic anemia)

3. "Curled toe paralysis" in chicks is due to deficiency of: **JKPSC** 2012

(A) Pyridoxine

(B) Riboflavin

(C) Pantothenic Acid

(D) Biotin

4. Curled toe paralysis in chicks is caused by the deficiency of which of the following? **Punjab 2022**

a) B1

b) B2

c) B6

d) B12

5. Black tongue in dogs is caused due to deficiency of: **Punjab 2022**

a) Thiamin

b) Niacin

c) Riboflavin

d) Vitamin C

6. Vitamin B1 deficiency in poultry causes: **Punjab 2022**

a) Encephalomalacia

b) Polyneuritis

c) 'Curled toe' paralysis

d) Black tongue

7. Curled toe paralysis in poultry occurs due to deficiency of **Punjab 2023**

(a) Thiamin

(b) Vitamin A

(c) Vitamin D

(d) Riboflavin B2

8.Fatty liver disease is often associated with Punjab 2021

(A) Choline

(B) Niacin

(C) Thiamine

(D) Pyridoxine

9. Which of the following is essential in prevention of perosis in chicks? opsc 2018-19 2nd

(A) Choline

(B) Biotin

(C) Folic acid

(D) Pantothenic acid

10. A deficiency of which of the following vitamins most likely would cause central nervous signs in cats? Opsc 2021-22 1st

(A) Riboflavin

(B) Niacin

(C) Thiamine

(D) Pantothenic acid

11. Goose stepping gait in pigs is due to deficiency of: Opsc 2021-22 2nd

(A) Thiamine

(B) Niacin

(C) Pantothenic acid

(D) Riboflavin

12.For the absorption of vitamin B12 in the terminal ileum, one of the following is needed: Opsc 2021-22 2nd

(A) Gastric Intrinsic Factor

(B) Extrinsic factor

(C) Vitamin C

(D) Folic acid

5. Feed Additives in Livestock Nutrition

- Non-nutritive product that affects utilization of the feed or productive performance of the animal
- Added to a basic feed in small quantities
- for fortifying it with certain nutrients, stimulants or medicines other than as a direct source of nutrients.
- Affects utilisation of the feed or productive performance of the animal

Advantages of feed additives:

- Increase feed quality and feed palatability
- Improve animal performance
- Improve the final product
- Economize the cost of animal protein

Disadvantages:

- May leave their residues
- May favour the proliferation of antibiotic resistant micro organisms

Types of feed additives:

1. Additives that promote growth and production: antibiotics, probiotics, prebiotics
2. Additives that alter metabolism: Hormone (estrogens, androgens, progestogens, GH, thyroxine, glucocorticoids)- residues
3. Additives that enhance feed intake: antioxidants, flavoring agents
4. Additives that enhance the color: food color, pigments
5. Additives that facilitate digestion and absorption: grits, enzymes
6. Additives that affect the health status of livestock: antifungals, Anticoccidials/coccidiostat, acidifiers

Antibiotics:

- Bacteriostatic or bactericidal properties
- Small amounts– prevent subclinical infections
- Example: penicillin, oxytetracycline, chlortetracycline, bacitracin, streptomycin, neomycin, erythromycin

Mechanism of action of antibiotics includes:

- Nutrient-sparing effect by increasing growth of vitamin and protein synthesizing microorganisms
- Reduces the thickness of the intestinal wall
- Reduce or eliminate the activity of pathogens causing "subclinical infection."
- Reduce the growth of microorganisms that compete with the host for supplies of nutrients
- Antibiotics alter intestinal bacteria so that less urease is produced and thus less ammonia is formed
- Ammonia is highly toxic and suppresses growth in poultry
- Antibiotics appear to spare the dietary requirement of the chick for unidentified growth factors

Probiotics: direct-fed microbials

- Live non-pathogenic microbial feed supplement, which beneficially affects the host
- Species: Lactobacilli, saccharomyces, and Streptococci spp. (30x109 CFU/g)

Mechanism of action:

- Having a direct effect against undesirable or harmful organism
- Stimulation of the immune system
- Neutralisation of toxins formed by a pathogenic organism

Antioxidants:

- Prevent oxidative rancidity of polyunsaturated fats and enhance feed intake
- Example: Vit. E, Se, Ethoxyquin or BHT (butylated hydroxytoluene)

Prebiotics:

- Non-digestible food ingredients that benefit the host by selectively stimulating the
- growth of desirable bacteria in GIT
- Modify the balance of the microflora population by promoting the growth of beneficial bacteria & thereby providing a healthier intestinal environment.
- Examples: Oligosaccharides (Mannan-oligosaccharides, fructo-oligosaccharides)

Source:

- Soya bean meal, rapeseed meal & legumes contain-galactooligosaccharides (GOS)
- Cereals contain fructo-oligosaccharides (FOS);
- Milk products have trans-galactooligosaccharides (TOS);
- Yeast cell walls contain mannan-oligosaccharides (MOS).

Symbiotic : probiotics+ prebiotics

Flavouring Agent:

- Increase palatability and feed intake e.g. Monosodium glutamate (MSG).
- **Flavouring agents are needed when:**
  - When highly unpalatable medications are being mixed
  - During attacks of diseases
  - When animals are under stress
  - With less palatable feedstuffs are being used

Food colours:

- Make food more attractive and pleasing.
- Examples: acid fuchsine, brilliant blue, β-carotene, saffron, beetroot red, chlorophyll, etc

Pigments:

- Examples: Carotenoids/ xanthophyll
- Feed additives that enhance the colour or quality of the marketed product
- Colour of an egg yolk or eggshell may be due to carotenoids
- Carotenoids in alfalfa produce yellow pigmentation of the skin and fat of chicken

Grit:

- Function: poultry do not have teeth to grind any hard grain, most grinding takes place in the gizzard to increase the surface area for digestion and absorption
- Oyster shells and limestone are used as grit

Enzymes:

- Enzymes are biological catalyst
- Examples: beta-glucanase and xylanase, cellulose, and Phytase
- They:
  - Improve the efficiency of the utilization of the feed.
  - Upgrade cereals by-products or feed components that are poorly digested
  - Provide additional digestive enzymes to help poultry to withstand stress conditions

Antifungal additives:

- Mould inhibitors are added to feed liable to be contaminated with various types of fungi such as Aspergillus and Penicillium spp.
- Propionic, formic acid, and acetic acid are added in high moisture grain to inhibit mould growth
- Antifungals such as Nystatin and copper sulphate preparations are also in use to concentrate feeds to prevent moulds.

Acidifiers:

- As preservative and prevents attaching of microbes to gut wall
- Organic acids like formic acid, propionic acid, fumaric acid etc. are used as acidifiers

Ionophore antibiotics

- Ex: monensin, lasalocid, salinomycin
- Rumensin = 50-100 mg/head/day
- Active against G +ve bacteria = fibrolyitc bacteria
- Support G –ve bacteria: concentrate digestion- propionate
- Nutrient partitioning agents: phenylethanolamine = towards muscle
- **Deodourising agents:** *Yucca Schidigera* (block urease= no ammonia)
- **Methyl donor:** methionine, betaine, choline
- **Bio preservatives:** Nisin produced by Lactococcus lactic- inhibit G-ve and G+ve bacteria.
- **Defauning agent:** copper sulphate
- **Pellet binder:** sepiolite
- **Buffer:** sod. Bicarbonate, MgO
- **Mycotoxin binder:** zeolite, mineral clay

1. Which of the following is not a prebiotic used in poultry diets ? **MPSC 2017**

(a) Fructo - oligosaccharide
(b) Inulins
(c) Lactobacillus strains
(d) Lactosucrose

2. Non-digestible food substances that selectively stimulate the growth of favorable species of bacteria in gut are called **RPSC 2019**

(1) Prebiotics
(2) Probiotics
(3) Symbiotic
(4) Enzymes

3. Probiotic is classified under Rpsc 2013

(1) feed supplement
(2) feed additive
(3) feed ingredient
(4) All of the above

4. Non-digestible food ingredients that selectively stimulate the growth of favorable species of bacteria in gut are called as Mppsc 2021

(A) Probiotics
(B) Synbiotics
(C) Prebiotics
(D) Postbiotics

5. Which of the following are non-nutritive feed additives ? Mppsc 2022

a. Antibiotics
b. Antioxidants
c. Enzymes

Options:

1. a and b only
2. b and c only
3. **all above**
4. none