

# DEFICIENCY OF WATER

# SOLUBLE VITAMINS

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# **1. THIAMIN (Vit. B1)**

## **IMPORTANCE**

**Thiamin is converted in body to thiamin pyrophosphate, which is a cofactor in oxidative decarboxylation reactions and aldehyde exchanges in carbohydrate metabolism.**

**Deficiency of thiamin leads to extreme anorexia, polyneuritis, and death.**

# SIGNS

- In young chicks, signs appear suddenly before 2 weeks, Anorexia followed by loss of weight, ruffled feathers, leg weakness, and an unsteady gait.
- The chicks sits on its flexed legs and draws back their heads in a “stargazing” position. The body temperature may drop to 35.6°C with A progressive decrease in respiration rate.
- Retraction of the head due to paralysis of anterior muscles of neck. Chicken loses ability to stand or sit upright, and it topples to the floor, where it may lie with the head still retracted.

- **Adult chickens Polyneuritis is observed in mature chickens 3 weeks after feeding a thiamin deficient diet, and show a blue comb.**
- **As the deficiency progresses, paralysis of muscles occurs, beginning with the flexors of the toes and progressing upward, affecting the extensor muscles of legs, wings, and neck.**



# LESIONS

- **Hypertrophy Adrenal glands in females than males, edema, in the skin.**
- **Atrophy of genital organs is more pronounced in males than females.**
- **The heart shows a slight degree of atrophy; the right side may be dilated, the auricle being more affected than the ventricle.**
- **Severe atrophy of stomach and intestinal walls.**

# TREATMENT

- **Chickens suffering from thiamin deficiency respond in a matter of a few hours to oral administration of the vitamin.**
- **Thiamin deficiency causes extreme anorexia, supplementing feed with the vitamin is not a reliable treatment until after chickens have recovered from acute deficiency.**

# 2. RIBOFLAVIN (Vit. B2)

## IMPORTANCE

- **Riboflavin is a cofactor in many enzyme systems in the body.**
- **Riboflavin is essential for myelin metabolism of the main peripheral nerve trunks.**

# SIGNS

- **Chicks**: grow very slowly, weak and emaciated; *birds appetite is good*; diarrhea develops between first and second weeks.
- Chicks do not walk , when forced they walk on hocks with aid of wings.
- Leg paralysis may be more prevalent than curled toe paralysis.
- Toes are curled inward in both walking and resting. Chicks are in resting position with drooped wings.
- Leg muscles are atrophied and flabby.
- Skin is dry and harsh. In advanced chicks stages lie with their legs sprawled out.



## **Young turkeys:**

**There are poor growth and feathering, leg paralysis , encrustations in corners of mouth and eyelids. Severe feet and shanks dermatitis with edematous swelling. Some poult show desquamation, and deep fissures .**



# LESIONS

**In severe cases chicks show marked swelling and softening of sciatic and brachial nerves.**

**Sciatic nerves usually show most pronounced changes, sometimes reaching a diameter 4-5 times normal size.**

**Histologic examination of affected nerves shows degenerative changes in myelin sheaths of the main peripheral nerve trunks.**

- **This may be accompanied by axis cylinder swelling and fragmentation.**
- **Schwann cell proliferation, myelin changes, gliosis, and chromatolysis occur in the spinal cord.**
- **In cases of curled-toe paralysis, degeneration of the neuromuscular end plate and muscle tissues is found.**

# TREATMENT

- **100 g doses of riboflavin should be sufficient for treatment of riboflavin-deficient chicks or poults, followed by incorporation of an adequate level in the ration.**
- **In long standing curled-toe irreparable damage (deformity) has occurred and administration of riboflavin do not cures.**

# 3. PANTOTHENIC ACID

## IMPORTANCE

- **It is a component of coenzyme A, involved in the formation of citric acid in the Krebs cycle, synthesis and oxidation of fatty acids, oxidation of keto acids resulting from deamination of amino acids, acetylation of choline, and many other reactions.**

# SIGNS

- **Chicks show signs those of biotin deficiency: in form of dermatitis, retarded and rough feather growth broken feathers, chondrodystrophy, poor growth, , emaciated, and definite crusty scab like lesions in corners of mouth and mortality.**
- **Eyelid margins are granular, with small scabs ,and may staked together by a viscous exudates and vision is restricted.**
- **Slow sloughing of the keratinizing epithelium of skin. (Outer layers of skin between toes and on bottoms of feet sometimes peel off). Small cracks and fissures appear at these points, enlarge and deepen, so chicks move very little. In some cases, skin layers of feet cornify and wart like protuberances develop on balls of feet.**

# LESIONS

- **Pasty substance in the mouth and an opaque gray-white exudates in the proventriculus .**
- **The liver is hypertrophied and vary in color from a faint to dirty yellow.**
- **The spleen is slightly atrophied.**
- **Kidneys are enlarged.**
- **Nerves and myelinated fibers in all segments of spinal cord down to the lumbar region; show myelin degeneration.**
- **Pantothenic acid is required in diet of breeders for normal hatchability of eggs , weak chicks.**
- **S.C hemorrhage and severe edema are signs of deficiency in the developing chicken embryo .**



# TREATMENT

**Oral treatment or injection with the vitamin followed by restoration of an adequate level in the diet.**

# 4.PYRIDOXINE

(Vit. B6)

## IMPORTANCE

- **Pyridoxine is required in several enzymes, particularly those involved in transamination and decarboxylation of amino acids. The coenzymes are pyridoxal phosphate and pyridoxamine phosphate.**

# SIGNS

## **Chicks:**

- **Depressed appetite, poor growth, chondrodystrophy, and nervous signs.**
- **Chicks show jerky, nervous movements of legs on walking and often undergo severe spasmodic convulsions terminate in death.**
- **During these convulsions, chicks may run aimlessly about, flapping their wings and falling to their sides or rolling completely over on their backs, where they perform rapid jerking motions with their feet and heads.**

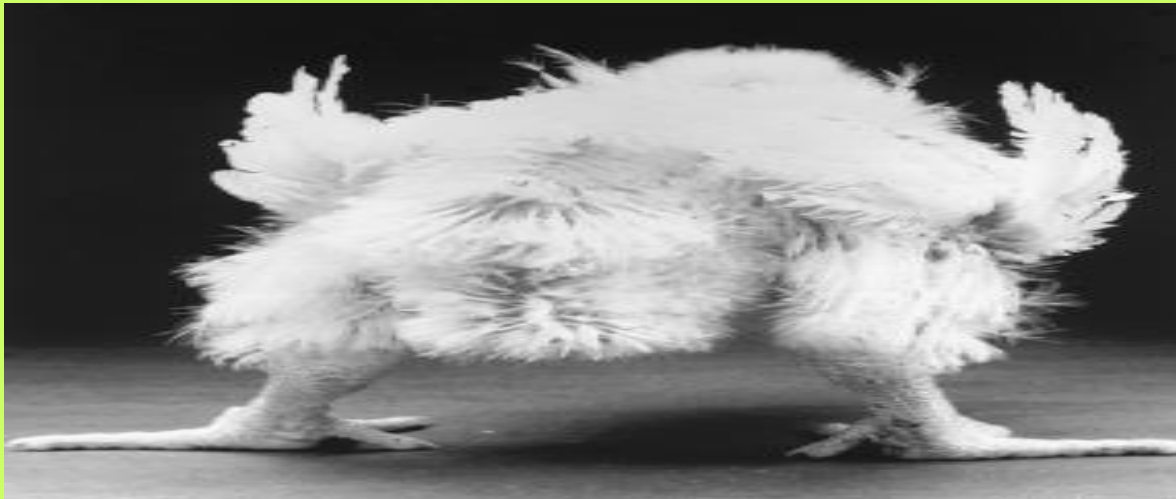
# 5.BIOTIN

## IMPORTANCE

- **Biotin is a cofactor in carboxylation and decarboxylation reactions involving fixation of carbon dioxide.**
- **Biotin is essential for embryonic development**

# SIGNS

- **Dermatosis of the feet and skin around the beak and eyes is similar to that of pantothenic acid deficiency “It is usually necessary to examine composition of the diet”. Chondrodystrophy is a sign of biotin deficiency in growing chickens and turkeys as tibial abnormalities.**



- **In Layer :Many embryos that fail to hatch are chondrodystrophic with reduced size, a parrot beak, severely crooked tibia, shortened or twisted tarsometatarsus, shortened bones of the wing and skull, and shortening and bending of the scapula. Two peaks of embryonic mortality may occur: one during the first week and a second during the last 3 days of incubation.**
- **Biotin has been suspected of having a role in “acute death syndrome” (or “sudden death syndrome”) in broiler chickens. .**

# TREATMENT

- **Injection or oral administration of a few micrograms of biotin was sufficient to prevent biotin deficiency signs in chicks and turkey poults.**

# 6.FOLIC ACID

## (FOLACIN)

- **Deficiency ch. By :poor growth, very poor feathering, anemia, and chondrodystrophy.**
- **Folic acid is required for pigmentation in feathers of Rhode Island Red and black leghorn chicks. Thus, folic acid, lysine, copper, and iron are required for prevention of achroma of feathers in colored poultry.**
- **A deficiency in the breeding diet of chickens or turkeys causes a marked increase in embryonic mortality.**



# TREATMENT

- **A single intramuscular injection of 50-100 g pure pteroylglutamic (folic acid ) causes a peak reticulocyte response within 4 days .**

# 7.VITAMIN B12 (COBALAMIN)

## SIGNS •

- Slow growth, decreased efficiency of feed utilization, mortality, and reduced egg size and hatchability.

*“Specific signs for vit.B12 deficiency have not been demonstrated in growing or mature poultry.”*

- In chicks Vit. B12 deficiency has been reported to cause myelin degeneration, Increased total phospholipids and decreased levels of galactolipids.
- Chondrodystrophy may occur in chicks or poults when their diets lack choline, methionine, or betaine as sources of methyl groups.
- Vit. B12 deficient embryos have a peak mortality at day 17 of incubation, reduced size, myoatrophy in legs, diffuse hemorrhages, chondrodystrophy, edema, and fatty liver.

# TREATMENT

- **IM injection of 2 mg vit. B12/hen increased hatchability of eggs from 15-80% within 1 week.**
- **Addition of 4 mg vitamin B12/ton breeding ration is sufficient to maintain maximum hatchability and to produce chicks having sufficient stores of the vitamin to prevent any deficiency during the first few weeks of life.**