

Zinc deficiency

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Zinc deficiency

- Normal visceral organs contain zinc in trace while skin, hair, wool are rich in zinc content.
- Zinc is component of certain enzymes like carbonic anhydrase required for removal of CO₂; alkaline phosphatase required for phosphorylation; concerning lipid metabolism and lactic dehydrogenase for the interconversion of pyruvic acid and lactic acid.
- It is also necessary for RNA synthesis.

Symptoms

(1) Retarded growth:

Animals become stunted and dwarf poor growth due to reduced appetite and poor food utilization.

(2) Skeletal disorder:

- A. Bones grow proportionately and remain fragile.
- B. Stiffness of joints and lesion around the hoofs may be occur. These deformities may be linked up with decreased osteoblastic activity.

(3) Abnormal keratogenesis:

- A. Rough, dry, scaly hair coats and alopecia.
- B. Imperfect keratinization of the epithelial cells of the skin (Parakeratosis) due to poor dietary zinc and excess calcium content of diets.
- C. In dairy cattle excess thickening of skin (Hyperkeratosis) occurs.
- D. Partial or complete alopecia and general dermatitis around the head, neck and other parts may be occur. Such dermatitis often respond to zinc therapy and is known as “Zinc responsive dermatitis”.

(4) Reproductive disorder:

- A. Sexual maturity of animal is delayed as well as adverse effect in the process and spermatogenesis and development of secondary sexual.
- B. It also affects the entire gametes of reproductive organs, females starting from heat up to lactation following parturition. Such bull and cow remain infertile and cause breeding obstacle in the farm.

Diagnosis

- (1) History of diet, clinical findings.
- (2) Estimation of serum zinc level (Normal 80-120 ug/dl), reduction of zinc, alkaline phosphatase and carbonic anhydrase level of serum

Treatment

- A. 2 gm per week of zinc sulphate orally or 0.2% zinc carbonate are added to the diet for cow or 100 to 200 mg of zinc sulphate for dog.
- B. NB: Zinc sulphate should be added daily for prevention as 25 (cattle), 10 (calf), 5 (sheep) or 2.5 mg for lamb.

Cobalt deficiency (Pine)

- Cobalt plays a vital role in ruminant animals.
- Generally, pasture content of cobalt can meet the requirements of the animals. But pasture cobalt level below 0.1 ppm cause deficiency signs in animals.
- Lamb and sheep are more susceptible than calves, Cows are the least.

Pathogenesis

- (1) Ruminal micro flora need cobalt to synthesize vitamin B12 which plays a crucial-role in the production of red cells. Maturation of RBC is delayed due to absence of vitamin B12.
- (2) Cobalt deficiency in ruminants causes the inability to metabolize propionic acid which is accompanied by a failure of appetite.
- (3) Cobalt is a growth factor.

Symptoms

- It is non specific.
- (1) **Acute deficiency** manifested by photosensitization and toxic hepatopathy, which treated by dietary cobalt or thiamin.
- (2) **Chronic deficiency** is manifested by general emaciation, anemia, loss of appetite, pica, lacrimation, rough hair coat, loss of milk production, infertility, diarrhea and death within 3-12 months.

Diagnosis

- (1) History of diet, clinical signs.
- (2) Estimation of cobalt level of soil, plant and blood.
- (3) Animals show normocytic normochromic anemia.
- (4) Forages containing less than 0.07 ppm cobalt.
- (5) Greyish color in the liver in PM (White liver disease).



Treatment

(1) Cobalt sulphate should be given in the following dose:

- Cow and buffalo: 500 mg/day;
- calf: 100 to 200 mg/day;
- sheep and goat: 100 to 200 rag/day;
- Lamb and kid: 0.5 mg/day.
- Intervals of 2 weeks between dosing are best.

(2) Preparation containing copper, cobalt and iron may be fed when there is severe anemia.

1) Vitamin B12 can be given parenterally.

2) Pasture can be treated with 30 gm per acre of land.

Iodine deficiency

Etiology

- (1) Feeding of animals from iodine deficient pasture. Soil iodine may have poor iodine content.
- (2) **Excess calcium, excess linseed meal and certain plant (Goiterogenic plants)** e.g. Brassica sp., cause deficiency of iodine through their interaction.

Pathogenesis

- (1) Goiter is seen in lamb, kid, piglet, calf, dog and cat.
- (2) Iodine helps in the **production of thyroxine** in the thyroid glands so iodine deficiency leads to **less production of thyroxine** which is very much needed for the metabolic activities of the body. Physical, mental and sexual activities are governed by it.
- (3) The decrease in the thyroid **output stimulates** the **anterior pituitary gland** to increase the thyrotropic hormones which stimulate the function of the thyroid gland follicles to increase their secretion to meet the body need of thyroxine, accordingly, compensatory proliferation of the thyroid occurs causing enlargement of the thyroid gland due to hyperplasia (goiter) which stopped by iodine (table 10).

Total serum calcium levels			Ionized calcium (as CaF)			
Normal	Slight decrease	Severe decrease	Normal	slight hypocalcemia	Moderate hypocalcemia	severe hypocalcemia
2.1 and 2.6 mmol/L (8.5 -10.4 mg/dL)	5 mg (1.2 mmol/L)	2 mg (0.5 mmol/L)	4.3-5.1 mg/dL (1.06-1.26 mmol/L)	4.2-3.2 mg/dL (1.05-0.80 mmol/L)	3.2-2.0 mg/dL (0.79-0.50 mmol/L)	<2.0 mg/dL « 0.50 mmol/L)

Clinical findings

- (1) Loss of condition and weakness.
- (2) Decreased milk production in dairy cows.
- (3) Impairment of libido in bull and failure of estrus in cows.
- (4) Increased gestation length in mares, sows and ewes.
- (5) Still birth and leg weakness, goiter.

Manganese deficiency

Manganese is concerned with reproductive processes and skeletal integrity. Deficiency of it causes infertility and skeletal abnormalities.

Etiology

- (1) Low content of it in the soil and heavy lining of soil.
- (2) Plants grown on those soils are deficient in manganese content.

Symptoms

- (1) Infertility and limb deformities.
- (2) Bones are weak, short and painful.
- (3) Animals are reluctant to move.
- (4) Delayed estrus or sub estrus.

Diagnosis

- (1) History of feeding, clinical signs.
- (2) Decrease of blood manganese level.

Treatment

Add 2-4 gms of manganese sulphate /os/daily/ cattle.