

Importance of Vitamins in poultry Production

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Introduction

Poultry is one of the fastest growing segments of the agricultural and livestock sector in our countries. Adequate supply of minerals and vitamins in diet is the key for good poultry production. Birds require almost all the vitamins through feed products. Vitamins B₁, B₂, B₆, biotin, pantothenic acid and niacin are involved in energy metabolism, but folic acid and vitamin B₁₂ exert their activity in the cell and growth maintenance. The feeding of vitamins and minerals deficient diet can produce numerous health problems for chicks including death in some cases. Sometimes, in spite of the presence of proper amount of vitamins in the feed they may be destroyed due to improper storage and may result in deficiency diseases. Vitamins such as A, D and E which easily get destroyed by the oxidation process and pantothenic acid and thiamin also undergo early destruction.

Diseases caused by deficiency of vitamins:

Vitamins are divided into two categories: fat-soluble and water-soluble. The fat-soluble vitamins are A, D, E, and K. The water-soluble vitamins include vitamin C and the B vitamins. The functions and deficiency symptoms of various vitamins are elaborated as follow:

Vitamin A deficiency- It is also called as 'Infection resisting vitamin' because this vitamin play important role in development of epithelium, bursa of Fabricius and development of immunity. Deficient birds show retard body growth, ruffled feathers and abnormally large combs and testis. In breeder flock deficiency cause embryonic death and table eggs show blood spots. Twisting of the head to one side and improper development of blood vessels in embryos are common.



Vitamin D Deficiency- Vitamin D can be produced when sunlight hits the bird's skin. Vitamin D3 is required for proper absorption and utilization of calcium and phosphorous, which are required for normal growth, bone development, and eggshell formation. Deficiency leads to rickets. Birds produce thin shelled eggs with reduced hatchability, show leg weakness and penguin like sitting posture. The beak, claws and ribs become very pliable. The utilization of calcium and phosphorus by laying birds can be enhanced by the addition of different sources of vitamin D in rations. Thus, the deficiency consequences of this vitamin are serious, including rickets, poor growth and immune response and also reduction of the production.

Vitamin E deficiency- Vitamin E is very important for poultry and acts as antioxidant. It helps in preservation of other vitamins like A, D and fatty acids and complimentary relations with selenium and cysteine. The deficiency signs of clinical vitamin E include exudative diathesis, muscular myopathy and encephalomalacia in chicks (disturbance of the nervous system), as well as some subclinical vitamin E deficiency such as slow growth performance, diminished fertility and frequent health problems

- **Avian Encephalomalacia-** This disease is most commonly seen in 2-6 wks old bird. Diseased chick appears to push its head beneath its breast and finally chicks become paralysed. Due to characteristic symptoms the disease is also known as “Crazy Chick Disease”.
- **Exudative Diathesis-** This disease is most commonly seen in 2-6 wks old bird. Affected birds shows oedema in the subcutaneous tissue, ventral aspect of body and pericardium, which later turns green colour due to lyses of blood. Birds develop anaemia, haemorrhage in breast muscle, thigh, intestine and gizzard, and later develop muscular degeneration.
- **Muscular Dystrophy-** This disease is most commonly seen in 4 wks old ducks, chickens and turkeys. In chickens this disease develops due to deficiency of Vitamin E and Sulphur containing amino acids like methionine but in ducks only vitamin E deficiency leads to muscular dystrophy. White necrotic areas of muscles are seen in the breast muscles.
- **Enlarged hock-** This disease is most commonly seen in 2-6 wks old bird. Hock joints become enlarged and unusually distorted.

Vitamin C Deficiency- It plays a significant role in the biosynthesis of corticosterone, a hormone that enhances energy supply during stress. Of note, poultry can produce vitamin C. Ascorbic acid is synthesized in the kidney in birds, and in the liver in some mammals. Poultry can make vitamin C,



so there is no dietary requirement established for this vitamin. Vitamin C supplementation is useful when birds are in stress.

Thiamin (Vitamin B1) Deficiency- This vitamin is present in grains and their husks. This vitamin plays important role in the carbohydrate metabolism and functioning of the nerves. Deficiency of this vitamin occurs mainly in young chicks and slowly in adult. Disturbance of carbohydrate metabolism cause subnormal temperature and paralysis of extensor muscles of legs causes the bird to sit on the hocks. Pulling of the head towards back and birds are characteristic “star grazing in appearance”.

Riboflavin (Vitamin B2) Deficiency- Riboflavin helps in the synthesis of oxidising enzymes and helps in normal metabolism of body. Deficiency of this vitamin affects nerve and body growth and shows symptoms like inward toes and sitting on the hocks, the condition is known as “curled toe paralysis”. Gradually diarrhea become develops. Affected birds show drooping of wings, and head and dermatitis of eyelids, feet and mouth. The sciatic nerve of the diseased chick or embryo becomes 3-4 times thick and oedematous.

Pantothenic Acid Deficiency- This vitamin is also called as ‘Bird dermatitis vitamin’. This vitamin is essential for the synthesis of coenzyme A which is required for the metabolism of carbohydrates, proteins and lipids.

Pyridoxine (Vitamin B6) Deficiency- This vitamin helps in metabolism of amino acids. Deficiency of this vitamin results in stunted growth, depressed appetite, staggering and encephalomalacia. Birds may show jerking movements of legs and wings resulting into rolling onto back with leg upwards. The birds may run aimlessly with flapping of wings and death.

Folic acid / Pteroylglutamic Acid (Vitamin V9) Deficiency- Folic acid takes part in the synthesis of amino acids and nucleic acid, hence it is important for the cell division and ultimately helps in growth. It is also essential for colouration of feathers. Death of embryo takes place due to proper multiplication. In turkeys folic acid deficiency shows neck paralysis and anaemia.

Choline deficiency- Choline regulates functioning of parasympathetic nerves, thus regulating the activity of heart, eyes and digestive system. “Perosis” is the most characteristic symptoms of choline deficiency in chicken and turkeys in which there is deformity in the tibio-tarsal joints, slipping of gastrocnemius tendon and lateral deviation of legs. Choline also plays an important role in the origin of fatty liver syndrome.



Conclusion

Balanced diet with essential minerals and vitamins are imperative for good health of poultry birds. The deficiency of these nutrients in feed can lead to several health problems, which can severely affect the poultry production, causing economic losses to the farmers. Therefore, farmers should provide properly formulated diet so that chicks do not suffer from nutrient deficiency diseases. It is recommended that well balanced feed with essential vitamins and minerals should be given to birds to run the poultry farm in profit.

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