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Vitamin D deficiency

Vitamin D acts like a hormone in the way it regulates calcium and phosphorus and, as such, is very important for the production of strong healthy skeletons and strong eggshells in poultry.

Vitamin D₃ (cholecalciferol) can be synthesised under the skin with the influence of ultraviolet light/sunshine but this alone is not enough to meet the needs of the modern, confined bird. Poultry diets are therefore normally supplemented with vitamin D₃. The plant form of this vitamin (ergocalciferol) is not utilised efficiently by poultry.

The metabolically active form of vitamin D₃ is 1,25-dihydroxycholecalciferol and this undergoes primary and secondary methylations in the liver and kidneys respectively. Primary methylation produces the form of vitamin that is circulated and stored by the bird and the renal secondary methylation is stimulated by parathyroid hormone in response to low levels of circulating phosphorus and/or calcium. Vitamin D₃ is also involved in the intestinal absorption of calcium, influencing osteoblast and osteoclast activity in the bones and increasing renal tubular reabsorption of calcium in the kidneys in response to metabolic demands for calcium.

Clinical signs

In breeders hatchability is reduced and embryonic mortality is highest in the latter stages of incubation. Chicks have a high incidence of chondrodystrophy including a shortened lower beak. Soft shelled eggs are seen.

In growing birds the first sign is reduced growth and some difficulties with walking. As the condition (rickets) progresses the long leg bones bend due to poor mineralisation and this become more and more apparent. Other signs include rubbery beaks, birds sitting on hocks and ruffled feathers.

Pathology

Changes are typically seen in the bones and enlarged parathyroid glands. Bones are soft and easily break. Typical swellings or knobs are seen at the costochondral junction on the ribs. Poor calcification is observed at the growth plates of the long leg bones with enlarged growth plates typically seen. In cases of extreme decalcification bone fractures can be seen.

Decalcification due to mineral (calcium and/or phosphorus) and/or vitamin shortages in the diet. Rickets can be seen when coccidiosis interferes with mineral absorption from a marginal diet.

Diagnosis & treatment

Diagnosis is by clinical and post mortem findings, coupled to feed analysis results. Change from a deficient diet and treat with vitamin D in the feed or via the water.

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