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## Vitamins

The quantities of vitamins required in poultry diets is very low ranging from 0.0000003% for vitamin B12 to 0.001% for pantothenic acid, yet moderate deficiencies can be quite debilitating. Vitamins function as cofactors for enzymes and hormones (vitamins A and D) or as antioxidants (vitamins A and E). Technically, choline is not a vitamin but will be considered to be one in this section.

## Symptoms of deficiency

Although the various functions of the water soluble vitamins are quite distinct the same can not often be said for the clinical signs of their deficiencies. Overall growth rate is reduced in young birds. Tissues with a rapid turnover are most seriously affected, including bone growth plates and feather follicles, resulting in symptoms such as dyschondroplasia, chondrodystrophy, dermatitis and poor feathering as well as an increased susceptibility to infectious diseases. Chondrodystrophy or perosis is seen in young birds deficient of choline, nicotinic acid, pyridoxine, biotin, folic acid or the minerals zinc and manganese. Dietary analysis is needed to determine the specific cause of perosis.

## Fat soluble vitamins

The fat soluble vitamins A, D and E are stored relatively well in the bird and poultry can withstand long periods of receiving deficient feed before clinical signs appear. The level of vitamins deposited in each egg directly correlates to the level in the feed. Marginal vitamin deficiencies in breeder diets are unlikely to depress egg production, but are likely to adversely affect the developing embryos.

Excretion rates of vitamins A, D and E are limited, which favours the development of toxicity problems with these vitamins. On the other hand, water soluble vitamins are relatively non-toxic because they are not stored to such an extent.

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