Developmental Orthopedic Disease

Developmental Orthopedic Disease (DOD) is an umbrella term for all growth disturbances and orthopaedic problems in growing foals and older horses. DOD has many manifestations including physisitis, wobbler syndrome, angular or flexural limb deformities and Osteochondritis Dissecans (OCD). All growing animals require energy, protein, minerals and vitamins. The critical minerals for growing horses are microminerals; copper and zinc and macrominerals; calcium and phosphorus. It is recommended to provide adequate supplementation of these minerals to the pregnant mare, particularly during late pregnancy. The unborn foal will gradually build up stores within their liver to be used in their first few weeks of life, as milk is a poor source of minerals.

**Calcium**
Calcium makes up 35% of bone structure and approximately 99% of calcium in the body is found in bones and teeth. It is also involved in other body functions such as muscle contraction and blood clotting mechanisms. A deficiency of calcium has been associated with rickets, characterised by poor mineralisation of osteoid tissue and probability of enlarged joints and crooked long bones. Scientific data has shown linear relationships between dietary calcium intake and perceived severity of DOD. Excessive calcium can occur if feeding large amounts of lucerne (Alfalfa) or by supplementation of calcium via ground limestone. However, an excess of calcium has not been seen to be detrimental if the phosphorus level is adequate.

**Phosphorus**
A critical component for proper skeletal development, making up 14-17% of the skeleton. Phosphorus is also vital for cellular functions within the body. Deficiencies in phosphorus have been shown to predispose horses to DOD and lead to bone demineralisation. When the amount of phosphorus in the diet is greater than that of calcium, it interferes with the absorption of calcium and therefore causes a deficiency. Feeding large amounts of grain or bran can lead to excess phosphorus. It is therefore important to maintain to 2:1 calcium to phosphorus ratio.

**Copper**
Copper is required for several copper dependant enzymes as well as lysyl oxidase which is involved in elastin and for collagen formation. A deficiency in copper does not in fact affect the growth rate. However, without adequate levels of copper necessary for normal bone and cartilage development there will be decreased bone density, ultimately resulting in DOD. Supplementation of copper, zinc and selenium of pasture fed pregnant mares may lead to the reduction of incidence and severity of physisitis and articular cartilage lesions in weanlings.

**Zinc**
Zinc is a component of many metalloenzymes involved in protein and carbohydrate metabolism. Deficiencies correlate with increased incidence of DOD. Zinc and copper ratio needs to be balanced, high levels of zinc with margin levels of copper can lead to DOD, as zinc interferes with the absorption and utilisation of copper.

Nutritional influences are not the only contributions to the development of DOD in growing foals. Exercise, genetic predisposition and confirmation have been associated. A gradual increase in body size combined with gradually increasing strength and activity, can cause the development of bone to gradually accept the load applied. Stress is considered a product of body load and activity. Continual stress is a necessity to dictate proper bone formation. Deprivation of exercise due to illness of mare or foal, weather or management factors over several weeks, can leave the foals newly formed bone inadequate when normal exercise resumes.

**Helpful Tips to Help Minimise DOD:**
- Avoid large meals rich in glucose -yielding carbohydrates, but ensure protein requirements are met with balanced amino acids
- Provide adequate dietary copper
- Provide correct Ca:P ratio
- Provide adequate daily exercise
- Avoid breeding from genetically predisposed stock
- Correct supplementation of pregnant mare
- Feeding specifically fortified feed for young stock – Foal and Yearling Mix

