

FEEDING FROM WEANING TO 2 YEARS OF AGE

Dr J H Stewart BVSc BSc PhD MRCVS

Because we are producing an athlete, soundness, muscle development and proper bone growth are of paramount importance. The potential to develop chronic and debilitating bone diseases occurs early in life and incorrect nutrition is as important as poor conformation in the development of unsoundness. But, unlike conformation faults, incorrect nutrition is 'the hidden handicapper'. Weaknesses developing in bones and joints due to unbalanced nutrition, are often not obvious until they are so far advanced as to cause lameness and breakdowns, sometimes not for months or years - not until the horse is under the pressure of training. Correct nutrition of weanlings and yearlings is essential for their productivity and longevity not matter for which discipline they are to be used. At no other age have we greater opportunity to guide growth and development through correct management and nutrition. Pasture and soil nutrient levels vary widely. When pastures are lush, mineral content can be diluted; certain grasses and feedstuffs contain compounds such as oxalates and phytates which reduce absorption of calcium and phosphorus. These factors need to be considered when calculating what to feed.

Growth rate. Due to increases in the feeding of young horses, growth rate is highest in the first 12 months. By 6 months of age, thoroughbreds have achieved 46% of mature height and 84% of mature weight; by 12 months 66% of expected weight and 90% of height.

As well as soundness, diet influences body composition and correctly fed yearlings achieve greater gains in whither height, reach mature height earlier in life and deposit less fat.

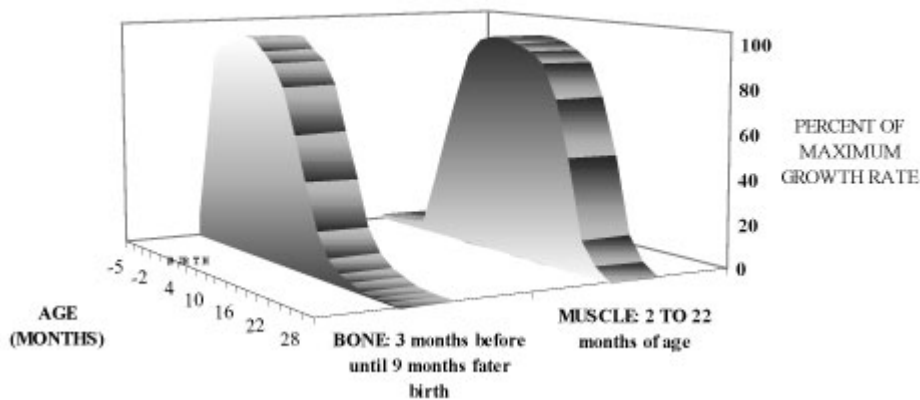
Body composition -fat or muscle and bone: Whether a young horse develops muscle and bone or lays down fat is determined by the quality and quantity of protein in the diet. Quality refers to the type and amount of essential amino acids in the protein. Horses synthesise only half of the 22 amino acids required for bone and muscle growth. The other 10 must be supplied in the diet - hence they are called essential amino acids. When we supply protein in the diet, we are in fact attempting to meet essential amino acid requirements.

Every protein in the body has its own formula of amino acids and protein synthesis is so specific that if the feed has only half the required amount of a particular amino acid, body protein synthesis may be reduced by up to 50%. Unused amino acids are converted to energy and stored as fat - making them unavailable for muscle and bone growth and increasing 'cover'. This affects bone and muscle growth in the young horse because although the feed tag may say 16% protein, it may only be 8% usable. Another factor affecting the ability of the young horse to utilise the dietary protein is the protein digestibility.

The site of digestion plays a major role in whether horses absorb essential amino acids from the diet. Protein not digested in the small intestine is converted to ammonia in the large intestine and essential amino acids are lost to the horse. Steam-extrusion increases digestion in the small intestine to over 90%. This results in less feed being required to achieve desired weight and body composition because of increased bioavailability of essential amino acids. Steam extrusion also reduces protein and energy fermentation in the caecum - lowering the risk of acid build up, veterinary emergencies, heating and temperament problems - all of which affect growth, development and the smooth progress of breaking and pre-training. Thus, a more accurate measure of feed value is *protein digestibility in the small intestine* - rather than percent protein.

Regular monitoring of weight, growth rate and height - using scales and/or 'condition scoring' - are sound management practices. But, horses do not grow simply in weight and size. The tissues and organs of the body develop at different rates.

MAJOR GROWTH PERIODS FOR BONE AND MUSCLE



Maximum bone growth occurs from 3 months before until 9 months after birth; muscle from 2 until 22 months of age and fat deposition begins from around 9 months onwards. If nutrition is unbalanced or incorrect during these periods, the opportunity to achieve optimum muscle and bone development will be missed and body composition will deviate from ideal.

Close attention needs to be paid to the diet and exercise. Adjustments to energy and protein intake are required to accommodate changing musculo-skeletal development and pre-training while recognising the need to protect immature joints. Growth rate declines in the 12 - 15 month old horse and fewer nutrients are required to support skeletal growth and muscle development. In addition, risks for developmental orthopaedic diseases decrease with increasing skeletal maturity.

Height and weight are important, but *maximum* growth rate is not compatible with *optimum* skeletal development. Achieving *optimum growth* requires thought and study so that genetic potential is reached without inducing bone diseases. The period of maximum risk for the development of skeletal abnormalities occurs when weight gain is high - so it is critical that we understand and manage this period of rapid growth because, as well as height and weight, we must be concerned about '*soundness*'.

There is a link between above average weight gains and onset of bone diseases. For growth to proceed in a balanced and synchronised way, the diet must provide all nutrients required. If gaining more than 0.6kg per day, mineral intake must be increased. Grains supply more phosphorus than calcium and cause frank deficiencies in many trace minerals. Yearlings on recommended trace mineral intakes deposit more bone than those fed suboptimal levels and when minerals are supplied as proteinates, hoof growth is increased. Steam-extrusion improves mineral absorption whereas pelleting has been found to reduce calcium and magnesium absorption. This is one of the reasons Mitavite has applied steam-extrusion to the preparation of Mitavite [Breda](#) and [Promita](#). **Bone diseases:** Excessive loading - due to excess body condition, an unbalanced diet or hard exercise - affects the pattern of bone growth. Epiphysitis occurs in young horses that are growing too rapidly, and is characterised by flaring of the long bones. In addition, swelling and lameness of the stifles and hocks can also occur as part of the syndrome of developmental orthopaedic disease (DOD) of which OCD (osteochondritis dissecans) is the most common abnormality.

In a recent study of 6 stud farms in Kentucky, it was found that the incidence of surgical OCD varied between farms - some had no foals affected, while on others, 32% of weanlings required surgery for OCD lesions. Strong correlations were found between the glucose and insulin responses to feeding, the type of feed and the incidence of OCD, such that the type of feed used on a stud was strongly correlated with the incidence of OCD. Raw grains affect bone and joint development because they cause acid buildup, reduce mineral retention and affect hormones that control bone and cartilage development.

Nutritional imbalances, such as copper deficiency, are known to be risk factors for the abnormal maturation of cartilage. Oats and alfalfa do not supply adequate nutrients for optimum growth. Other nutritional factors are thought to have an important role in cartilage development through their impact on various hormonal systems within the horses body. Recent work has focussed on the hormonal response to feeding and how different diets

affect thyroid hormone, growth hormone and cortisol levels.

Processing of feeds by steam-extrusion causes smaller changes in blood glucose and insulin levels than textured or sweet feeds of the same formulation. Because diet has such a dramatic effect on glucose/insulin responses, current recommendations from leading equine nutritionists include the following:

- concentrates should provide 18% usable protein and be balanced for calcium, phosphorus, copper and zinc in a formulation specifically designed for growing horses. Higher amounts of protein and minerals (in grams per day) are required if the hay is not prime lucerne or the pasture not irrigated/improved.
- Weanlings and yearlings need to eat the equivalent of 2.5-3% of their bodyweight as feed each day. To prevent wood, bedding and tail chewing, the diet should comprise roughage at a minimum of 1.5% of bodyweight and concentrate at 1%.
- Since steam-extruded feeds cause lower glucose and insulin responses than sweet feeds, they may be preferable to textured sweet feeds, especially in foals with a genetic history or predisposition to OCD.
- If signs of epiphysitis or other DOD appear, diet/exercise is probably not balanced. Amount of concentrate should be temporarily reduced while a full diet analysis is performed. Any deficiencies or excesses should be corrected and a properly balanced ration reintroduced as soon as possible.
- Starving foals by feeding grass hay and oats for a prolonged period resulting in weight loss and poor growth will not correct the problem of growth abnormalities on a long term basis.
- Prolonged feeding of feeds which cause constantly elevated insulin levels may affect cartilage development by leading to faulty mineralization or by influencing other hormones such as thyroid hormone.
- diet-induced extremes in blood glucose and insulin levels predispose to OCD, but other factors such as trauma and/or sudden rapid growth spurts determine the final development of OCD
- To summarise the advice of Huntingdon (KER Australia): extruded feeds are gaining in popularity in Australia due to higher feed conversion efficiency and greater safety.

A balancing act between economics, management and nutritional requirements occurs frequently between weaning and 2 years of age. But there is a lot of technical information available which tells us how nutrient requirements vary with age and stage of growth, so it is possible to more precisely match the nutrients in the feed with the changing requirements during growth. A poorly fed horse cannot hope to compete against those whose growth and development has been nurtured and protected.

To reduce the risks associated with weanling diets and yearling prep, Mitavite produces fully steam-extruded *Mitavite Breeda*, *Mitavite Promita* and *Mitavite Yearling Prep* for weanlings and yearlings.

Fundamental to their formulation and preparation is an understanding of the requirements, risks and growth patterns of the young horse. *Breeda*, *Promita* and *Yearling Prep* apply the results of the latest equine nutrition research for the advantage of breeders and their horses.