NATURE *AND* NUTURE

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Athletic ability is determined by genetics, nutrition and training. But while genetics determines the ultimate limit to performance, nutrition and training determine how closely the horse approaches that limit. Correct nutrition of yearlings is essential for their productivity and longevity as racehorses and at no other age have we greater opportunity to influence body composition. Although controversy surrounds the feeding of young horses, we are producing an athlete, so soundness, muscle development and proper bone growth must be of paramount importance. Fortunately 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 precisely match the nutrients in the feed with the changing requirements during growth.

A balancing act between economics, management and nutritional requirements occurs between weaning and 2 years of age. But an incorrectly fed yearling cannot compete in the sale ring or on the track, against those whose growth and development has been nurtured and protected. If protein and/or energy intake are increased during yearling prep, without parallel and appropriate increases in mineral and vitamins, the risk of developmental orthopaedic disease increases. 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.

The racing industry is plagued by a high incidence of bone disorders. The serendipitous nature of these conditions necessitates that close attention be paid to diet and exercise. Adjustments to energy and protein intake are required to accommodate changing musculo-skeletal development, while recognising the need to protect immature joints. Epiphysitis often occurs in yearlings and two year olds. The lesion is characterised by flaring of the long bones and is most frequently observed on the inside of the knees, stifles and fetlocks. In addition, swelling and lameness of the stifles and hocks are more common in this age group. If signs of epiphysitis or other developmental orthopaedic disease appear, the diet is probably not properly balanced. The 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 that addresses mineral requirements should be reintroduced as soon as possible.

Mineral supplementation improves bone strength, but feeding a mixture of grains and protein meals does not address mineral requirements. Diets relying on raw grains also cause acid buildup which lowers mineral retention and affects hormones that control bone and cartilage space development. Oats and lucerne do not supply adequate nutrients for optimum growth. 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. Mineral chelation improves availability by 3-500% compared to naturally occurring minerals, while trace mineral proteinates increase hip height compared to inorganic mineral salts.

Excesses of one mineral can induce deficiencies of others because of mineral interactions. The use of chelated mineral proteinates prevents mineral interactions. Mitavite combines chelated minerals and trace mineral proteinates in the Mitavite range of feeds, eliminating the need for supplements, unless on veterinary advice. Excessive levels occur up to 10 times more frequently when individual mineral supplements are used. An international survey of feeding practices found that 78% of horses fed supplements have nutrient imbalances.

In addition, the amount of different minerals in supplements and feeds does not correlate with availability and absorption. The availability of calcium from lucerne hay has been reported as about 48%, compared to 14% from a pelleted feed. Absorption of phosphorus and magnesium from pasture have been reported as only 35% and 40%, respectively. Except for phosphorus, which is absorbed in both the small and large intestines, minerals and proteins are taken up in the small intestine. Processing of feeds and supplements by steam-extrusion increases digestion in the small intestine from around 30 to over 90% - increasing protein and mineral absorption.

In vitamin-mineral premixes and supplements, trace minerals can catalyse oxidation-reduction reactions. Vitamins tend to be more stable in steam-extruded feeds than in supplements because the trace elements and macro minerals are more diluted and the extruded nut itself constitutes a barrier to stress factors. Stress factors include cooking temperature and pressure, moisture, friction, conditioning time, light and the composition of the feed. The magnitude of these stresses varies with feed type and processing method, for example, vitamins are subject to more friction during pelleting and dry-extrusion than they are during steam-extrusion. As a result of the development and ongoing refinement of vitamins, forms which are much more stable than naturally occurring forms are available. By understanding the stress factors that affect vitamin activity, it is possible to more precisely formulate ingredients and control processing conditions to circumvent vitamin damage. Using the available technology and keeping abreast of developments in vitamin biochemistry, Mitavite feeds are formulated with known and predictable levels of vitamins.

As with vitamins and minerals, recent research has discovered that even if the diet contains recommended levels of protein and essential amino acids, they may not be available to the horse. It doesn’t matter how good the protein looks on paper if the amino acids don’t make their way into the body efficiently.

Digestibility of vegetable proteins varies between 59 and 80%, depending on how carefully they are processed. Steam-extrusion increases digestibility by up to 40%. Overheating is damaging to many amino acids and dry-extrusion results in loss of vitamins and destruction of proteins due to friction and shear in the extruder barrel. Studies in Switzerland have shown up to 50% lysine damage when dry extrusion is used. Losses during steam-extrusion are negligible (around 5%). The absorption of amino acids is also affected by whether the feed is digested in the small intestine or the hindgut. Protein needs to be digested in the small intestine. Any not digested passes into the hindgut where it is converted to ammonia and lost to the horse. So although the diet may meet essential amino acid requirements, these are lost to the horse if they escape digestion in the small intestine.

If protein and essential amino acids are deficient in the diet or not in a readily absorbed form, yearlings lay down more 'cover' and less muscle. In assessing protein requirements, it is important to remember that horses require a number of grams of protein and essential amino acids each day, not a percentage. The percent protein listed on the feed bag does not indicate whether all essential amino acids are included at adequate levels or whether they are readily digested. If one essential amino acid is deficient, the others cannot be used and are stored as fat. Muscle and bone protein building is so specific that even if the diet provides adequate levels of 9 of the 10 essential amino acids, but only 50% of the 10th, protein synthesis will be reduced by 50%. Analysis of diets given to yearlings that are laying down too much cover - instead of gaining in height and muscle development - have revealed essential amino acid deficiencies.

Owners and trainers want well-muscled, well-grown yearlings and avoid those that are overfat. Growing horses are frequently fed diets high in carbohydrate to promote rapid early growth and development. In addition, the absorption of large amounts of carbohydrate affects hormones that control bone and cartilage growth and development. The type of feed used on a stud is strongly correlated with the incidence of OCD. Processing of feeds by steam-extrusion causes smaller changes in blood glucose and insulin levels than textured or sweet feeds of the same formulation and therefore may be preferable to textured sweet feeds, especially in foals with a genetic history or predisposition to OCD.

For growth to proceed in a balanced and synchronised way, the diet must provide all nutrients required. The yearling needs to develop bone and muscle whilst maintaining an athletic appearance. To achieve this, exercise and nutrition must be tailored to the individual and selection of the diet becomes critically important in meeting nutritional requirements. Feeding rates of supplements must be adjusted and juggled to match energy and protein intake. Mitavite Yearling Prep is precisely balanced for mineral, vitamin and essential amino acid intake – taking the guess work out of yearling feeding. Nutrition is a powerful tool when used properly.

There is no substitute for knowledge in any business, but in the horse business it is vital. There are so many variables to deal with, that minimising mistakes plays

a key role in management. The importance of nutrition cannot be overemphasized. The value of attending to the nutrition of growing horses is demonstrated by the fact that correction of poor nutritional regimes on properties with inferior yearling presentation or a high incidence of musculoskeletal abnormalities, has been shown to lead to a significant reduction in these problems. Even the best and most careful management will not prevent all musculoskeletal abnormalities in yearlings, but a number of recommendations can be made which should help reduce the incidence and severity of problems.

To create a winning horse and allow it to achieve genetic potential, requires a recognition of the limits of the animal's physical capabilities. Mitavite recognises the nutritional demands on the yearling and the multiple demands on those involved in yearling management. As in any business, advisers are important and it is important to have a team of advisers. Mitavite YEARLING PREP has been formulated by equine veterinarians, nutritionists and agricultural scientists. For more….