

## Feeding during spelling

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Spelling offers an opportunity to rebuild body protein, mineral and vitamin reserves which become depleted during training. To enable horses to return quickly and tolerate the work required to reach racing fitness, nutrient intake must be maintained during spelling. There are many reasons why racehorses are turned out for a spell.

***When deciding upon a feeding program, the following factors need to be considered: length and reason for the spell; age and condition of the horse.***

Short spells of between 2 and 6 weeks are used to freshen horses - physically and mentally - after a long preparation, prior to a hard campaign or during early training. In addition, short spells may be all that is required for convalescence for conditions such as bruised soles, shin soreness, splints, muscle soreness, epiphysitis and minor ligament and joint inflammations.

A short spell has minimal effects on cardiovascular and muscular fitness, but when exercise level is reduced, bone is lost from the skeleton. Overall bone size does not change, but porosity increases as minerals, especially calcium, are lost. To avoid bone damage, calcium intake must be maintained and exercise should be reintroduced gradually. As a rule of thumb, for every month of conditioning lost, the horse should drop back a month in work load.

**Calcium:** Diseases caused by calcium deficiency may be clinical or sub clinical. Calcium deficiency has also been linked to ruptured tendons, spontaneous fractures, nasal discharges, tying up, poor performance and reduced exercise tolerance. If the body calcium stores become depleted, it can take up to 12 months for levels to be restored.

Requirements increase when horses are spelled, but even when in full work many horses are calcium deficient, despite the widespread use of supplements. However, as well as the absolute amount of calcium in the diet, the ratio of calcium to phosphorus is critical. Hence a calcium deficiency may be due to inadequate levels in the diet; high dietary phosphorus or a reduced ability to absorb calcium.

Horses may begin spelling in a state of calcium depletion for the following reasons:

- grains and bran are high in phosphorus;
- high grain diets increase body acid levels and when this acid is excreted in the urine it drags calcium with it;
- many pasture grasses are high in phosphorus and contain oxalates, bran contains phytates. Phytates and oxalates bind calcium - preventing absorption. Oxalates are present in kikuyu, buffel grass, pangola, green panic and setaria. Horses on these feeds may require up to 100 grams of extra calcium per day - the equivalent of 1/3 kg of lime.

***Longer spells of between 2 and 12 months are generally prescribed for horses recuperating from surgery or more serious athletic injuries. Injury and surgery both increase body tissue breakdown and recovery is hastened if a balanced, highly digestible, complete feed is supplied.***

**Spelling at Pasture:** Most racing diets contain a minimum amount of roughage and a sudden change to a largely roughage diet can cause horses to lose condition or develop deficiency states. Roughage digestion depends on fermentation by the millions of bacteria that live in the hindgut. On a low roughage diet (less than 3.5kg per day) the number of these organisms is low, so when horses are suddenly changed to a largely pasture diet, they are unable to fully digest the grass - leading to reduced protein and energy intake.

***Pasture and hay grown in areas with soil deficiencies often have similar deficiencies.***

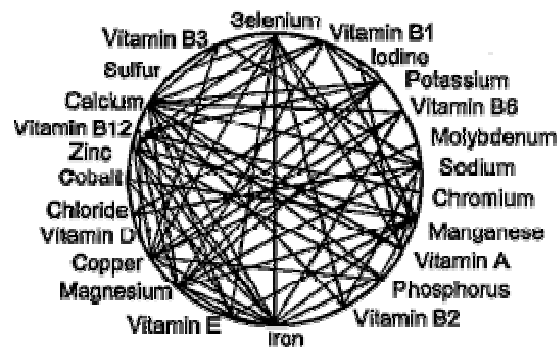
If horses are grazing deficient pastures and being fed hay grown on the same soils, the problems are compounded. Analysis of both pasture and soil will yield valuable information and allow the development of management strategies to address nutrient imbalances.

**Supplements:** Although horses adapt to pasture diets, for optimum growth, performance and fertility, nutrient supplementation is required. The most common trace mineral deficiencies involve selenium, iodine and copper. Deficiencies of minerals such as iron, zinc, calcium, phosphorus, magnesium, copper, potassium and vitamins A, B, D and E also commonly occur in pastured horses. Unfortunately the clinical signs caused by deficiencies are often similar to those caused by excesses eg. iodine and vitamin A.

Of equal importance is the potential for minerals to interact with each other. The graph below summarises current knowledge on mineral interactions.

An excess of zinc will prevent copper absorption so copper deficiency occurs, even though intake is adequate. All the possible interactions are not fully understood, but what is known is that supplementing individual minerals ignores these relationships.

## MINERAL AND VITAMIN INTERACTIONS



***A recent survey found that 78% of horses fed supplements receive excess energy, protein, calcium, phosphorus, copper, manganese and zinc - at levels high enough to unbalance the diet.***

The effects of many borderline imbalances are often sub clinical - ie, they do not affect overall health, but they do reduce performance and ability to reach genetic potential - and they are difficult to diagnose. However, intakes above requirements cannot improve performance and, for many vitamins and minerals, a surplus is as dangerous as a deficiency.

The safety margin for selenium, iodine and vitamin A is very narrow. In addition, the higher the desired level of performance and growth, the narrower the optimal range of a nutrient.

Excessive levels of individual nutrients occur up to 10 times more frequently when supplements are used - and deficiencies may still exist. In addition, when several supplements are used in an attempt to meet individual requirements, overlap can occur and the risk of sub clinical excesses and toxicities increases.

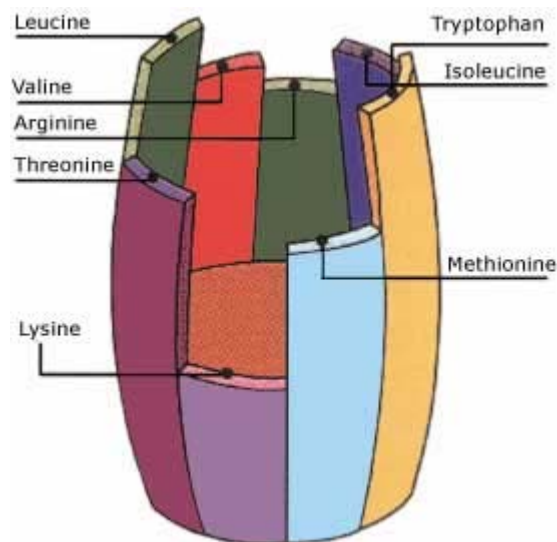
**Supplements and Group feeding:** In group feeding situations supplements can be difficult to control. 'Aggressive' feeders who consume other horse's feeds may receive supplements not intended for them. If all feeds contain the same supplement then 'greedy' feeders may receive a double dose if they rapidly consume their own feed followed by that of their friends.

***If essential amino acids are not provided, horses lay down more 'cover' and less muscle. The percent protein of a feed does not indicate whether all essential amino acids are included.***

***Spelling and condition - cover or muscle? The importance of essential amino acids:*** Although energy levels of hard feed do not need to be high when pasture is good, the vitamin, mineral and amino acid balance of the feed is important - for all spellers, but especially for 2 year olds.

***Muscle and bone protein building is so specific that if the diet provides 9 of the 10 essential amino acids, but only 50% of the 10th, protein synthesis will be reduced by 50%.***

If one essential amino acid is deficient, the others cannot be used and are stored as fat. Think of each amino acid as a wooded slat in an old-fashioned water barrel. The barrel can only hold water to the level of the shortest slat. Similarly, the amount of protein the body can build is limited by deficiencies of essential amino acids.



Regardless of the % protein in the feed, if there is not enough of each amino acid then each particular body protein cannot be made. Analysis of diets given to horses that are laying down too much cover - instead of gaining in height and muscle development - have revealed essential amino acid deficiency.

***Recent research has discovered that even if the diet contains recommended levels of essential amino acids, they may not be available to the horse.***

The absorption of amino acids is affected by whether the feed is digested in the small intestine or the large intestine. In the small intestine, proteins are cleaved into amino acids for absorption. In the large intestine proteins are fermented to ammonia and lost to the horse. So although the diet may meet essential amino acid requirements, these are not available to the horse if they escape digestion in the small intestine.

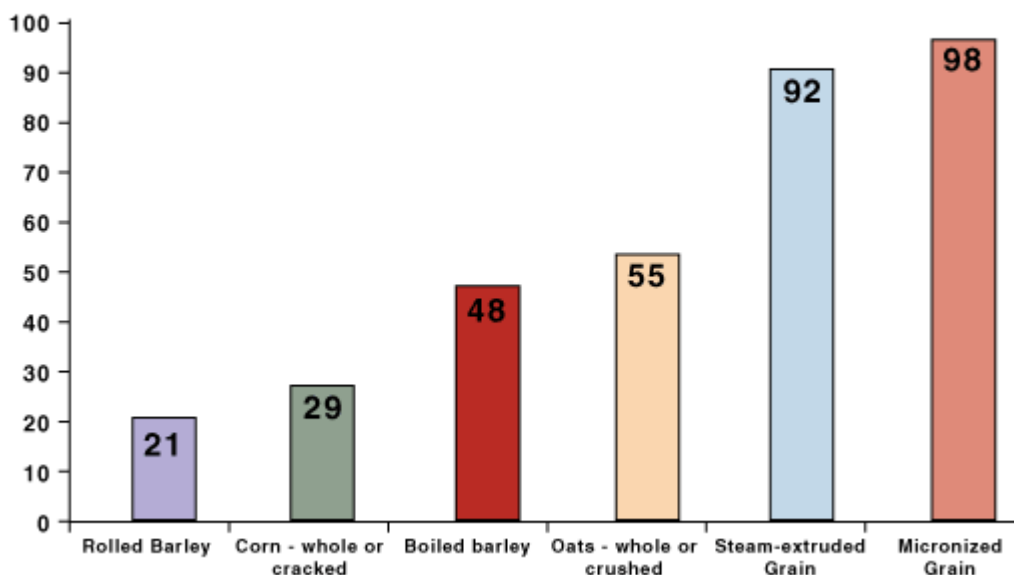
***Feed processing:*** Fortunately recent research has developed processing methods which increase digestion in the small intestine to over 90%. Refining and advancing time-honoured practices, steam-extrusion cooks grains and protein meals at the correct temperature and for the precise time required to improve digestion without damaging nutrients. Older methods - such as boiling barley, grinding corn, crushing oats and pelleting feeds - damage nutrients because temperature and duration of cooking were not known or controlled - and have little effect on digestibility, as shown in the graph below.

Steam extrusion and micronization increases digestion in the small intestine to over 90%, releasing previously unavailable amino acids, minerals and energy.

**Spelling, diet and veterinary emergencies:** The incidence of colic and choke is higher in group feeding systems. Gastrointestinal emergencies are reduced when horses are changed from a pelleted to a steam extruded feed. This is thought to be due to a slower rate of feeding and more saliva production with steam extruded feeds. And this has major implications for stomach ulcer prevention and management.

The equine stomach produces between 10 and 30 litres of gastric juice per day. The high content of hydrochloric acid reduces stomach pH to around 1.5 to 2.0. Under natural conditions, the acid is buffered by saliva which has a very high bicarbonate and mucus content.

### Percent of Feed Digested in Small Intestine



**Horses produce up to 12 litres of saliva per day which lubricates the food, helping prevent 'choke' and buffering the stomach acid.**

But horses only produce saliva when they are eating and feeding large meals once or twice a day, with little in between means there are many hours during which acid levels are rising, but there is no saliva flow to act as a buffer. Prolonging feeding time, extends the period of saliva production, thereby having a protective effect against ulcers. Rapidly eaten feeds such as pellets are linked to ulcers because of the reduced feeding time.

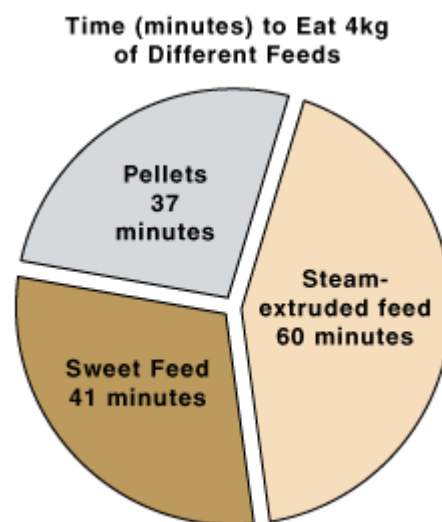
**Both yearling and adult horses consume pellets faster than they eat traditional grain diets.**

Less saliva is produced when feed is eaten quickly and the sudden flow of a large volume of feed into the stomach causes a rapid increase in acid secretion. These studies also found that steam-extruded nuts are eaten more slowly and require greater chewing than both traditional and pelleted feed. The chart shows the amount of time taken to consume pellets, unprocessed feed or steam-extruded nuts.

The amount of bicarbonate in saliva increases as saliva production increases and so the longer the horse takes to eat a feed, the higher the buffering capacity of the saliva.

Because of the cost and the high risk of recurrence once treatment stops and horses resume work, management strategies that assist in preventing ulcers are advisable. Practices, which mimic the natural grazing situation and respect the function of the gut, are important. These include:

- avoid prolonged periods of fasting - ulcers have been shown to develop within 10-12 hours when horses have no access to feed.
- roughage available at all times.
- feedbins placed on the ground - horses chew and swallow more efficiently when their heads are down and the throat extended - as they have done for many millennia.
- feed frequent small meals - optimum is 4 times a day and not more than 2kg of grain per feed.
- use steam-extruded feeds which have been processed in such a way that eating is slower, resulting in more chewing, increased saliva production and higher saliva bicarbonate levels.



**Hoof Health during spelling:** Essential amino acids, biotin and minerals such as zinc are all important for hoof growth and wall strength. Stable floors, hard work and frequent plating exact a toll. Added to this is the increased body acid level associated with raw grain training diets. Crumbly white lines, dropped soles and wall cracks have all been linked to high grain diets.

***Because hoof growth is slow and the benefits of biotin - in terms of hoof quality and strength - are not seen for up to 9 months, it is prudent to maintain intake during spelling.***

**Oil:** Similarly, to receive the advantages of added oil, it must be fed for at least 3 weeks. It takes 3 weeks for the intestine and muscles to fully absorb and utilise oils. Although all oils offer cool, safe energy and delay the onset of fatigue during exercise, only Omega 3 oils improve circulation and oxygen delivery by improving red blood cell function. Red cells have a turnover of around 3 weeks in the racehorse, so Omega 3 oils must be fed for 3 weeks before the new Omega 3-enriched red blood cells enter the circulation.