

# Feeding the performance horse: the importance of forage, and what to feed the fizzy horse

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## *Why do performance horses need forage???*

Horses are social, grazing, prey animals. They evolved as hindgut fermenters, spending a large proportion (60 to 80%) of each day grazing. The stomach of the horse is relatively small and inelastic. Digesta passes quickly from the stomach into the small intestine, where enzymes allow digestion of soluble carbohydrates (especially starch from grains), protein and oils. Digesta then passes into the hindgut, effectively a large fermentation vat, full of microbes. Here fermentable carbohydrates (fibre) are broken down in the hindgut by bacteria, producing volatile fatty acids (VFAs), which are absorbed into the blood and used as an energy source. Fermentation is a relatively slow process compared to enzymatic digestion, so the release of energy is slow and constant.

Forage (pasture, hay and haylage) is essential for all horses, as it helps maintain normal gut function, is a good energy source, and gives the horse a feeling of 'fullness'. Horses can cope with 100% forage diets when they are not in work (maintenance), or are only in light work. The increased work associated with athletic pursuits results in increased energy requirements that cannot be met by forage alone in many cases.

There are several reasons why many performance athletes not fed only forages:

1. Pasture and hay have low energy density
2. Many athletes cannot devote up to 80% of their day to eat
3. Horses can only eat up to about 3% of their bodyweight as dry matter each day
4. The energy requirements of athletes in intense work cannot be met by pasture and hay alone
5. High forage diets are associated with great quantities of water in the hindgut, which will increase body weight

Reduction in forage intake of performance horses is usually associated with an increase in dietary concentrates. Reductions in dietary forage are associated with decreased body weight, probably due to reduced water intake and rates of passage of digesta and increased gut fill. Reduced body weight may be especially advantageous for horses that perform at high speeds for short periods. In contrast, endurance horses are fed high levels of dietary forage that results in increased body weight, but also acts as a vital source of water and electrolytes to replace losses in sweat.

Forage is essential for proper function of the equine digestive tract, and for the hindgut microbes. The minimum amount of forage in the diet is 1% of body weight for horses, or ideally at least 50% of the ration. Performance horses will eat up to 3%

of their bodyweight per day as dry matter, thus a 500kg horse would be expected to consume up to 15kg of dry matter per day, consisting of at least 5 to 7.5kg dry matter per day as forage. For some performance horses this is difficult to achieve.

Unfortunately reduced or marginal forage intake can result in a number of serious problems such as colic, laminitis, exertional rhabdomyolysis and behaviour problems such as crib-biting. A compromise needs to be reached between the potentially detrimental effects of forage intake on optimal performance and the potentially detrimental effects that low-forage diets may have on horse health and welfare.

Four times as many chews are given to 1kg of hay compared to 1kg of oats or pellets, so concentrates are eaten very quickly. Ingestion of large concentrate meals stimulates a large outpouring of fluids into the upper digestive tract, and a transient reduction in blood volume. Large meals can increase the rate at which digesta moves to the hindgut, thus reducing time available for enzymatic digestion of soluble carbohydrates in the small intestine, and increasing the amount of soluble carbohydrate reaching the hindgut where it is rapidly fermented. Both episodic feeding (for example, feeding twice daily) and abrupt change to a concentrate diet can markedly affect the pH and the microbial population of the hindgut, resulting in hindgut acidosis.

### **Avoiding digestive problems in performance horses**

Diets of performance horses that closely mimic those of horses kept at pasture are associated with less risk of digestive problems, such as colic and some behaviour problems. Specific management practices to reduce the risk of digestive disorders include

- the provision of small grain feeds 3 to 4 times during the day (no more than 2.5 kg concentrate per feed)
- feeding hay before concentrates
- increased availability of hay or access to grazing
- strictly adhering to set feeding times

### **What sort of forages should we give performance horses?**

In New Zealand we are in the unique position that we often have ready access to good quality pasture for much or all of the year. Good quality pasture can be an important part of a performance horse diet, providing an excellent source of vitamins, fibre and protein. It is also very cheap, and satisfying for the horse to eat. Turnout at pasture also has non-nutritional benefits for the horse, such as more opportunities for social interactions. Some performance horses are stabled with no access to pasture, but can be offered cut grass as a forage source. Road-side grass is often very poor quality.

Good quality hay can be purchased in New Zealand at relatively low cost, and ryegrass or clover hays are commonly used. Lucerne hay may be less readily available than grass hay and has a higher digestible energy content. Lucerne has high protein content, which may be detrimental for performance horses when fed in large amounts. Stabled horses should ideally have free access to hay for much of the day. Good quality hay should be slightly green in colour, free of dust and mould; smell sweet, be free of weeds, and have a high leaf to stem ratio. The major factors that determine the quality of hay are the stage of maturity when cut, environmental and handling conditions when cut, and duration and conditions of storage. Poor quality

hay with a low leaf to stem ratio takes longer to digest in the hindgut, and can result in a 'pot bellied' appearance.

Chaff is simply dried forage that has been cut into small pieces. Lucerne and oaten chaff are commonly added to concentrates before feeding, but their use outside of Australasia is less common. As the forage is cut to short lengths it can be eaten quickly, in contrast to hay and pasture. Good quality chaff should smell fresh, not be dusty, and have no obvious contaminants.

A large number of commercially prepared fermented forages for horses are available in New Zealand, including lucerne and ryegrass. Fermentation occurs post-harvesting in a sealed plastic bag providing an anaerobic environment in which most moulds, yeast and aerobic bacteria cannot survive. Fermentation of soluble carbohydrates results in lactic acid and VFA production, just as it does in the horse's hindgut. Fermented forages are readily accepted by many horses, have good energy levels, and are dust free, so are ideal for horses with respiratory problems. Fermented forages should smell sweet, and not appear 'slimy'. They can be very high in energy, and should be introduced slowly into the diet.

### **Main points**

- forages are a vital component in the diets of **all** horses for normal digestive function and an as energy source
- performance horses should be fed **high quality** forages
- performance horses must have pasture or hay every day, and ideally **50%** of the diet should be **forage**
- most forage should take **time** for the horse to consume and be available for most of the day

### ***What can I feed my 'fizzy' performance horse?***

There are a large number of factors that may contribute to 'fizzy' behaviour in horses. These include:

- Breed
- Maternal/paternal influences
- Individual temperament
- Rider/trainer temperament
- Excess dietary energy
- Grains

'Hot-blooded' horses are renowned for having a nervous or fizzy temperament, although there is large degree of variation in temperament between individuals. More 'fizzy' temperaments can be managed by behavioural modification in some instances. Often the owner or trainer can have a large influence on an individual's temperament, and in some cases the owner or trainer might benefit from behaviour modification.

Too much energy from any feed source can result in increased physical activity, often seen as 'fizzy' behaviour. Simply decreasing energy intake will often improve the horse's behaviour. For performance horses it can be a delicate balance between

providing enough dietary energy to perform at the required level and providing too much dietary energy that may impair performance.

The source of energy from a diet can also have effects on behaviour. Fermentation of starch in the hindgut may result in a nervous or excitable horse, and some individuals appear to have a very low tolerance of starch in the hindgut. These individuals will often benefit from a reduction in grain intake and the inclusion of alternative energy sources. Also, further processing of grains (such as grinding and heat treatment) can improve the small intestinal digestibility, so less starch reaches the hindgut.

### **Alternative energy sources for ‘fizzy’ performance horses**

Increasing the amount of **good quality forage** in the diet, while reducing the amount of grain, can be useful for fizzy horses. However some performance horses require energy-dense alternatives to grain to meet their high energy requirements.

**Fats and oils** are very energy dense, containing 2.5 to 2.8 times as much digestible energy as oats on an equal weight basis, and are very well digested by the horse. They can replace a proportion of the grain, and thus reduce the actual amount a horse needs to consume. Dietary fat facilitates absorption of the fat-soluble vitamins (A, D, E and K). Once fats and oils are absorbed in the small intestine can be used directly for energy, or stored as fat. These stores of fat in the body are vital for horses that are involved in medium or long-term exercise such as three day eventers, hunters and endurance horses.

As much as 10-15% of the dietary energy can come from fats and oils, although the oil should be introduced in small quantities and gradually increased over a period of several weeks while grain is reduced. Maize (corn) oil is the most palatable. Alternatively there are many prepared feeds available that are high in fats and oils (often 8 to 10% crude fat).

**Rice bran** is a highly digestible by-product of rice milling, and is the outer brown layer of the rice kernel. It is high in fat (~20%) but relatively low in soluble carbohydrates (starch). There are also products available combining rice bran with rice, which is highly digestible in the small intestine.

**Sugar beet pulp** of a by-product of processing sugar beets. It is available as pellets which need to be soaked for variable lengths of time before feeding, and may have added molasses. It is a good source of fibre, with moderate energy content.

**Lupin seeds, sunflower seeds, and copra meal** are often incorporated in horse feeds in Australasia. Lupin seeds are high in energy and fat, with little starch and are a good source of fermentable carbohydrate fibre. Sunflower seeds contain high levels of oil (26 to 40%) and fibre. Copra meal is a by-product of processing coconuts, and can be moderately high in fat (~10%) and fibre, but low in starch.

There are a large number of feeds promoted as ‘**cool feeds**’ for horses that become ‘fizzy’. These products usually contain added fats, or higher fat feeds (for example: copra meal, sunflower seeds, lupins, rice pollard or rice bran), fibre and may also include processed starches. Be aware that cool feeds are not necessarily low in

energy, but they are less likely to result in hindgut acidosis compared products high in grain. They are often marketed as slow-release forms of energy.

### Other supplements that may benefit ‘fizzy’ horses

The inclusion of the antibiotic virginiamycin (Founderguard) may result in improved behaviour, probably due to reduced fermentative acidosis in the hindgut. Some authors suggest the inclusion of tryptophan, B-vitamins or magnesium may be beneficial for ‘fizzy’ horses.

### Main points

- **Excess dietary energy** can result in undesirable behaviour
- Some horses are very sensitive to **starch in the hindgut**
- Many **alternative energy sources** to grain are available
- Feed digested in the hindgut produces a ‘**slow release**’ energy (VFAs) for the horse

**Table 1** Estimated digestible energy content of selected feeds on a dry matter basis

Feed type	Energy content (MJ DE/kg DM)	
<b>Grains</b>	Oats	13.4
	Barley	15.5
<b>Forages</b>	NZ Pasture	
	Ryegrass + white clover	
	Autumn	10.8
	Winter	11.4-11.2
	Spring	10.8-11.8
	Spring (leafy)	12
	Summer (leafy)	10.3
	Summer (stalky)	8
	Meadow hay	8.6-11.4
	Lucerne haylage	15
	Lucerne chaff	8.6-10.5
Oaten chaff	8	
<b>Alternative energy sources</b>	Copra meal (coconut meal)	11.7-15.6
	Lupins	15.2
	Rice bran/rice pollard	12.1-15.8
	Sugar beet	10.9
	Sunflower seeds (whole)	21
	Vegetable oil	37.6

## **References and further reading**

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