

#FROMTHEHORSESMOUTH



SUGARS – FRIEND OR FOE

With sugar taking centre stage of a global debate around human nutrition for some time now and a realisation that we need to curb our intake of this sweet substance, it is not surprising that this topic of conversation has now entered the realm of equine nutrition.

Whilst horses do need sugar and starch in their diets, in fact, they cannot thrive without them, a considerable amount of research has been carried out across the industry and results indicate that certain carbohydrates, specifically sugar and starch, can exacerbate conditions such as polysaccharide storage myopathy (tying up), insulin resistance and laminitis to name just a few. Excess carbohydrate intake can also lead to other conditions, like obesity or behavioural issues.

So how do we use sugars correctly without effecting the overall health of our horse. To full explore this we need to look at what sugars are and why they are necessary.

There are two groups of carbohydrates within the horse's diet, non-structural and structural. Non-structural carbohydrates (NSC), include free sugars such as monosaccharides, disaccharides, and oligosaccharides, as well as polysaccharide starch. Digestive enzymes in the small intestine break these down into their simplest form, glucose, which the intestinal wall can then absorb. The horse can use this immediately for various bodily functions like digestion or fat synthesis, or it can store glycogen in the muscle and liver, for later.



Figure 1: Indication of the types of sugars and starches present in food stuffs Pic taken from https://www.britishhorsefeeds.com/sugar-in-the-horses-diet-what-we-need-to-know

Structural carbohydrates are the fibrous portion of plants and include the polysaccharides cellulose and hemicellulose. Hay makes up the greatest percentage of these in a horse's diet, but grains with hulls, like soya, might also contribute.



Equids are not capable of digesting structural carbohydrates without the help of billions of microorganisms that reside in the hindgut (large intestine and colon) which is why the health of these bacteria is vital. Microbial fermentation in the hindgut breaks down fibre into a usable form of energy called volatile fatty acids.

WHY ARE SUGARS NEEDED?

Working horses are dependent on the production of adenosine triphosphate (ATP) an energy carrying molecule. Simply put ATP "captures" chemical energy from the breakdown of food and releases it as energy for processes such a muscle contraction. ATP production is dependent on the muscle's ability to utilize fuel stores within the body, which is dependent on oxygen availability. The two main ways that the muscle utilizes fuel stores are anaerobic and aerobic metabolism.

Aerobic metabolism is dependent on oxygen to break down fuel stores. This pathway is used for exercise over long periods of time such as endurance. For this type of work fats and fibres are used to supply energy. This is however a slower process and is often referred to as slow release energy.

Anaerobic metabolism is not dependent on oxygen and is thus used for speed-type activities such as racing. Carbohydrates in particular, sugar and starch stored as glycogen, are the main source of immediately available energy. Glycogen is the quickest and most efficient way to fuel muscle contraction, and blood glucose is the quickest energy for all non-muscular energy needs, such as respiration, nutrient digestion, and brain function and so these functions cannot be carried out without the presence of sugar. Sugar provides a rapid means of producing a limited supply of energy which is why its often referred to as, fast release energy.

Sugar and starch are just as important after exercise in replenishing muscle glycogen, especially during events that take place over consecutive days. Research has shown that muscle glycogen repletion occurs faster when a horse consumes hay and grain versus just hay after exercise.

WHERE ARE SUGARS FOUND?

In general, cereal grains contribute the most starch to the daily rations of a working horse. Maize for example contains around 61% starch on a as fed basis, and oats around 38% as fed. If the horse has available grazing, grass pasture contributes the most sugar to its intake. The sugar content of grasses can vary depending on stage of growth, environmental conditions, geographic region, and grass species. Most grasses contain between 5 and 15% sugar on a dry matter basis (meaning percentage of sugar when all water is removed) but it can go as high as 30% in some situations for example in cooler, wetter climates.

Hay is lower in sugars than fresh pasture, at around 2-3% and mature cut hay is typically lower in sugar than immature hay. When choosing the cut of hay note that mature cut hay will generally be lower in total available nutrients and may not be suitable at all.

As far as commercial grain mixes go, additives like molasses whose source is sugar cane, actually contribute very little to a ration's overall sugar content because of its percentage inclusion in the ration. So even though molasses is approximately 45% sugar on an as fed basis, if a manufacturer includes 10% in a ration its overall contribution to sugar is only 4.5% on an as fed basis. This is less than some grazing.

Also bear in mind that the horse's sugar and starch intake will be determined by the amount of the ration that is consumed. If we take the molasses example above where the sugar constitutes 4.5% on an as fed basis, if 3 kg per day was provided the horse's intake of sugar would be 135 grams. By contrast, hay at 3% sugar on an as fed basis, fed at 8 kg a day would be equivalent to a sugar intake of 240 grams. In this instance concentrates are the smaller portion of the diet and so focusing on hay and grazing will make a greater impact on your horses overall dietary sugar, should you need to.

Some manufacturers include the amount of sugar and starch on the feed label's guaranteed analysis individually and some provide it as an NSC percentage. NSC is the total of sugar and starch.

Some products may be labelled "molasses free" however that doesn't mean it is sugar free (don't forget sugars are also present in other feed ingredients) or that it is suitable for horses with metabolic issues. For example, a product may have 1% sugar on an as fed basis but may have 18% starch. This would give an approximate total NSC of 19%, which would not be ideal for a metabolic horse.

HOW MUCH SUGAR SHOULD BE FED?

Currently there is no maximum sugar level guide for horses. For most horses strictly monitoring the amount of sugar within the diet is not necessary and we know it is impossible to remove all sugar and starch completely, even without feeding grain. It's also known that too little sugar and starch can negatively affect the performance of exercising horses. There is a risk that a horse will not be able to perform maximally for an extended period when



THEIR PERFORMANCE, YOUR SUCCESS

inadequate sugar and starch is provided as they may have lower glycogen available. Performance horses will get some non-structural carbohydrates from their hay or pasture, but it won't be enough to allow them to perform at their best and therefore some grain is needed.

Here are a few ways that you can avoid concerns whilst still using grain.

- Feed by weight, not by volume.
- Limit the amount of starch per meal to 1g per kg of bodyweight. If you fed a concentrate considered to be "high NSC" (30% NSC) that would mean 1.5kg of concentrate feed per meal could be fed to a 500kg horse. Feeds lower in NSC could be fed at higher amounts.
- Feed processed grains (extruded, etc.) to help improve starch digestibility.
- Feed small meals more frequently to reduce hindgut overload. If not digested and absorbed in the small intestine, sugars and starch enter the hindgut where they undergo microbial fermentation, just as forages would. However, fermentation of sugar and starch produces lactic acid and decreases the hindgut's pH, potentially leading to digestive disturbances such as hindgut acidosis and colic.

For those concerned with their horse's NSC intake for medical conditions, the starting point would be to look at choosing low sugar hay types as well as restricting

TESTIMONIALS

In the past we have struggled to keep the condition on my 5year old Warmblood mare, White Waters Omelias Silver lining. She stands 18.3hh tall and so is a big girl but was she getting so much food, yet her body condition didn't pick up, and her energy levels weren't good. After changing her onto the Epol Rider Muesli she has improved incredibly. She has only been on it for 6 weeks and she has picked up muscle, condition and her energy is fantastic!

Thank you Epol for such an incredible feed.

Jessica Moreira and Mia

grazing time when pastures are lush. It should be noted here that turning out in paddocks during a drought is also not ideal as the small amount of grazing within this area can be high in sugars as the plant tries to "hold" onto as much sugar as possible to try and continue growing.

Should you not be able to choose your hay variety soaking is a must as it can reduce the proportion of sugars and starch. Soaking hay for 30 – 60 mins reduces NSC's without impacting too dramatically on nutrient content and hygiene quality. Although soaking can be useful it should be noted that hays with extremely high levels of NSC (such as Oat hay) may not achieve enough of a reduction to be used even with soaking. Should you be in the position to have your hay tested target a level of <12% NSC.

When selecting a concentrate for a sugar sensitive horse look for products with a NSC content below 16%, which will ensure both sugars and starch levels are reduced. The product should also provide elevated levels of fat and fibre to provide alternative energy sources.

If you are soaking your hay, limiting grazing and not feeding a concentrate, be sure to maintain a balance of all nutrients as some could be lacking. Consider using a balancer product when concentrates are not needed as these tend to be low in sugar and starch.



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1

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