

# Tying Up: Information Guide

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# Feeding horses and ponies prone to tying up

Exertional Rhabdomyolysis Syndrome (ERS) or 'tying up' is an umbrella term for several different conditions, which means the best feed and management strategy will depend on which condition you are dealing with and in some cases, your horse/ pony's breed. However, in any case, the secret to success lies in making appropriate changes in both diet and management.

## Forms of tying-up

Horses prone to tying up can be broadly categorised as one of two types; those where susceptibility is linked to an underlying muscle condition and those who do not have an underlying muscle condition. Related underlying muscle conditions include:

- Recurrent Exertional Rhabdomyolysis (RER)
- Polysaccharide Storage Myopathy type 1 (PSSM1)
- Polysaccharide Storage Myopathy type 2 (PSSM2)
- Myofibrillar Myopathy (MFM)

In horses without an underlying muscle condition, episodes of tying up may be triggered by a number of potential risk factors including over exercising after a period of rest or light work and over-feeding, high intakes of 'starch and sugar' coupled with a low forage/ fibre diet, electrolyte imbalances, rapid changes in feed or forage, a virus and stress. Triggers may vary between individuals but management in many cases is similar to that of RER.



### Electrolytes (all horses)

Electrolyte imbalances may have a role to play and include an imbalance in the diet e.g., under-supplying electrolytes for those sweating regularly, as well as issues in the individual horse's ability to store and/ or utilise electrolytes. Access to a salt lick, the recommended amount of an appropriate feed or balancer and suitable forage should meet maintenance requirements in most cases but horses sweating regularly are likely to need some form of electrolyte replacement. Simple table salt is generally an effective solution although the amount required will depend on sweat loss and the base diet so speaking to a nutrition advisor may be helpful.

#### Vitamin E and Selenium (all horses)

Vitamin E and selenium are powerful antioxidants and play a key role in supporting muscle health. Although there is no scientific evidence to show that deficiencies in vitamin E and selenium cause tying up (or that increased supplementation helps to prevent further episodes), they may be 'permissive' to the development of tying up in some cases.

# Polysaccharide Storage Myopathy type 1

Polysaccharide Storage Myopathy type 1 (PSSM1) is a glycogen storage disease caused by a mutation in the GSY1 gene. Affected horses accumulate abnormally large amounts of glycogen – the 'normal' form of stored sugar in muscles – as well as an abnormal form of sugar in their muscle tissue. PSSM1 was first recognised in Quarter Horses and their crosses, Draughts and Warmbloods but has now been identified in over 20 different breeds (but is very rare in some breeds including Thoroughbreds and Arabs). A genetic test using hair or blood samples is required to confirm diagnosis.

### Feed & management tips for PSSM1

Although it may take several months, many horses with PSSM1 show improvements in clinical signs following appropriate changes in diet and management. In many ways, nutritional management is similar to that of a laminitic and involves strict restriction of non-structural carbohydrate (NSC) or 'starch and sugar'. This includes restriction of water-soluble carbohydrate (WSC) or 'sugar' in forage – WSC is predominantly made up of simple sugars and fructan, the 'storage' form of sugar in the majority of UK grasses. In those with high energy requirements, oil is the ideal replacement for cereal starch - it has been suggested that oil may support energy metabolism and/or reduce glycogen storage in muscle cells. However, the amount of oil in the diet should be adjusted according to the horse's body condition – oil is high in calories!

- Watch their waistline! Horses with PSSM are often good doers and best suited to a balancer. Avoid feeding large amounts of oil to good doers.
  - If additional energy (remember energy = calories!) is required, choose feeds that are high in oil and low in starch and sugar.
    - Ideally have your forage analysed and feed a low (<10-12%) NSC hay.

• Soaking hay helps to reduce the WSC or 'sugar' content (and consequently the calorie content too), but results are highly variable. While steaming is by far the superior option for respiratory health, it has little effect on WSC.

• Due to the loss of nutrients (and therefore dry matter), each slice of hay will contain more water and less 'hay' post soaking. Increase the amount of hay you soak by approximately 20% to compensate – this will help to prevent forage intake being restricted too severely.

• Restrict grass intake, especially when WSC levels are likely to be high such as during spring and autumn or when grass has been exposed to bright sunlight in conjunction with cold temperatures e.g., sunny frosty mornings.

Appropriate daily exercise including suitable periods of warm up, stretching and rest are extremely important. Even small amounts of exercise may be helpful and rest days should be avoided wherever possible.

# Polysaccharide Storage Myopathy type 2 (PSSM2)

PSSM2 is used to describe horses that do not have a mutation in the GSY1 gene but from which muscle biopsies show an abnormal 'clumping' of glycogen. The cause is currently

the only reliable method of confirming diagnosis. Clinical signs tend to vary between breeds – in Quarter Horses and Arabs for example signs may resemble RER whereas in Warmblood's poor performance as opposed to episodes of 'tying up' is more common. Until recently, much of the advice for managing PSSM2 was based on recommendations for PSSM1. However, the very strict restriction of 'starch and sugar' recommended for PSSM1 may not be necessary. The most appropriate changes in feed and management may vary between individuals and breeds – while some horses may benefit from a diet very low in NSC, others may respond well to management similar to that of RER for example.

- Quality protein, particularly the essential amino acids lysine, threonine and methionine, is of increased importance. Some horses may benefit from a supplement based on whey protein which is also a good source of branched chain amino acids which may be helpful.
- Appropriate regular exercise is still very important although some horses seem to adapt very well to 3 days off per week once clinical signs have improved (provided they have daily turnout).



#### Recurrent Exertional Rhabdomyolysis (RER)

RER involves an abnormality in muscle contraction, likely caused by abnormal calcium regulation in muscle cells – although most of us associate calcium with strong bones and teeth, it plays an important role in muscle contraction too. RER is most commonly seen in Thoroughbreds and Standardbreds, particularly young fillies (it's more common in 2-year-olds than 3 or 4-year-olds) with nervous or excitable temperaments. Other risk factors include intense work, high levels of fitness, stressful environments, irregular exercise schedules, being 'held back' at gallop and pain from lameness. Diagnosis is normally made based on an assessment of the horse's history, clinical signs and blood tests to check for elevated levels of the muscle enzymes creatine kinase (CK) and aspartate aminotransferase (AST) which indicates muscle damage.

The good news is that many horses with RER respond relatively quickly to changes in diet and management. Restricting starch and sugar intake and increasing energy intake from oil has been recommended. The benefit of this seems to be in reducing the risk of excitability as a result of restricting starch intake rather than any 'protective' benefit of increasing oil intake. In fact, high oil diets may only be of benefit in horses with high energy (calorie) requirements.

- The amount of starch that can be tolerated varies between individuals but in practice, many horses respond well to compound or fibre feeds containing oil.
- Reduce cereal-based feeds on days off as a guide reduce by half from the evening before to the evening after.
- Whether or not restricting WSC or 'sugar' intake from forage is of added benefit is unclear, but in some horses at least, choosing hay/ haylage with a low-moderate level of WSC may be helpful.
- Avoid rest days and box rest.
- Find ways to reduce stress during work, travelling and around the yard wherever possible.



# Take home tips

- Get a confirmed veterinary diagnosis this is key to identifying the most effective management but may also help to prevent unnecessarily strict changes. It's also important to ensure that other possible causes of poor performance or lameness are ruled out.
- Monitor your horse's weight and body condition score (BCS). A BCS of 5 out 9 is generally considered ideal.
- Suitable forage should be the foundation of the diet and fed ad lib wherever possible.
- Total daily forage intake should not be restricted to less than 1.5% of current bodyweight on a dry matter basis. This equates to approximately 9kg of hay (or 11kg if you intend to soak it before feeding) on as 'as fed' basis (the amount of hay you weigh out) for a 500kg horse without grazing.
- Consider having your forage analysed, particularly in cases of PSSM.
- Make all changes in feed and forage gradually.
- Consult a nutritionist for specific feeding advice, especially for those diagnosed with an underlying muscle condition or those unable to maintain weight on forage and a balancer. It's also wise to seek advice before adding oil to your feed as high oil diets should be balanced with additional vitamin E. High oil diets may also be counterproductive for horses with MFM.
- Take care when feeding supplements, especially those containing selenium. Selenium can be harmful or even toxic if over-supplied. The total diet should provide no more than 5mg of selenium per day for a 500kg
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  Ask your vet for advice on changes in training and management. The most appropriate type, intensity and frequency of exercise, including returning to work after an 'episode', will depend on the form of tying up. Your vet should also be able to point you in the direction of other sources of reliable, evidence-based advice.

For more advice speak to one of our Nutrition Advisors on 01908 226626.