



ALL TIED UP?

About Tying Up

Azoturia, *exertional rhabdomyolysis* and *exertional myopathy* are the interchangeable clinical terminology commonly used for 'tying up'. The syndrome most commonly occurs within minutes to an hour following the commencement of exercise following one or more days of rest/inactivity. The risk is particularly high if a concentrated, energy dense (grain based) diet has been provided while the horse has been confined whereby little or no exercise has occurred. Unfortunately, little exercise may be needed to induce an episode however, the more strenuous the exercise in the absence of beginning physical activity slowly, generally the sooner following the onset of exercise that the condition occurs.

Clinical Signs

Clinical signs may range from slight post-exercise stiffness and muscle soreness, shortened stride, change of gait (more prominent in the hind) and decreased athletic performance. In more severely affected animals, severe muscle cramping may occur and horses may have a 'tucked-up' appearance due to pain and discomfort, sweat profusely and are reluctant/unable to move.

Muscle enzymes such as AST (aspartate transaminase), CK (creatine kinase), LDH (lactate dehydrogenase), myoglobin and phosphorus concentration in the blood may be elevated due to muscle damage. Levels of CK rise most rapidly (peaking within 4 to 12 hours of muscle damage) and resolving first (in 1 to 2 days) if no further damage occurs. This is followed by LDH and finally AST, which peaks in 24 to 98 hours and may remain elevated for 2 to 4 weeks. Levels of LDH peak approximately 12 to 24 hours after skeletal or cardiac muscle damage and return to normal within 5 to 10 days if there is no further damage. Although CK and AST elevations are proportional to the degree of muscle damage, they do not always reflect the severity of clinical signs. Horses with recurrent attacks may have very high CK activity but no obvious signs. Additionally, it has been reported that some horses may show typical signs without marked CK or AST elevations.

Causes of the Disease

Tying Up is a multi-factorial condition, meaning there is more than one factor contributing to the occurrence and severity. Essentially, anything which increases muscle glycogen deposition or rate of utilization or decreases circulation to the muscle, predisposes to the occurrence of an episode of tying up. These include;

- Familial predisposition to any of these factors (genetic inheritability).
- Poor physical conditioning, which decreases circulation to the muscle.
- Excessive physical conditioning, which increases the amount of glycogen stored in the muscle and the rate that it can be mobilized.
- High energy intake, particularly from cereal grains during a period of rest which increases muscle glycogen deposition.
- Failure to begin physical activity slowly in order to increase muscle circulation.
- Exercising above the horse's level of fitness.

On each occasion when an animal is afflicted with an episode, the more likely the condition will recur. Additionally, anxious, nervous or hyperactive horses may be more prone to recurrent episodes.

Prevention of Tying Up; Management Factors

Steps one should take include;

- A regular exercise program without any complete rest days.
- Decrease confinement and allow more frequent exercise.
- Begin physical activity slowly and increase it gradually.
- In horses that are repeatedly affected, thyroid function should be determined, as thyroid supplements may be helpful in preventing recurrence if thyroid function is low.

Prevention of Tying Up; Nutritional Factors

Steps one should take include;

- **Feed more hay and less grain**, or refrain from feeding any grain, particularly when the horse is not being exercised.
- Avoid feeding grain for at least 6 hours before strenuous exercise.
- Addition of **Vitamin E, selenium** and **B-Group** vitamins to the ration may be of significant benefit.
- **Supplementation of electrolytes** to ensure dehydration does not occur due to prolonged exertion and sweating.
- Some research reports that adding common **salt** to the diet may help prevent recurrence.
- Some research suggests that supplemental **branched-chain amino acids** provided to muscle cells during work may postpone the onset or alleviate the severity of post-exertional myopathy in athletic horses susceptible to this condition. Studies have shown that a single dual dose or pre- and post-race treatments markedly decrease the leakage of muscle and liver enzymes into the blood and additionally, exercise-induced increments in plasma lactate concentrations were significantly smaller in supplemented horses at all exercise times.

General Feeding Principles

The most important point is to **feed according to workload**, and to feed for the work done not for the work about to be done. Therefore, on rest days, a resting diet is appropriate, and as the workload increases, so too do the levels of each of the ration ingredients.

To aid in decreasing the incidence and severity of tying up, the aim is to maintain a low level of dietary starches known as Non Structural Carbohydrates (NSC's), while still providing energy, which is preferably more so derived by the addition of supplementary dietary fat and protein. Feeding a **low starch/high fat ration** is of benefit in lowering serum CK levels after exercise when a high caloric intake is required. The supplementation of fat without complete elimination of starch containing feeds is appropriate for these horses. This type of high energy diet can be provided through a combination of grains (no more than 2.2kg sweet feed/day) and fats such as vegetable oil (up to 600ml per day), rice bran (up to 2.2kg per day) or other commercially available fat supplements and highly fermentable fibre sources (soy hulls, beet pulp, stabilized rice bran).

Lastly, research has shown significant benefit by appropriate electrolyte (calcium, magnesium, sodium and potassium) supplementation. It is also advisable to ensure sufficient Vitamin E and selenium supplementation as in certain individuals, deficiency may be a permissive factor in the syndrome.

In the absence of the aforementioned requirements, muscle cell damage occurs, resulting in a reduced ability for muscles to contract and relax during extreme exertion. Muscle fatigue sets in, the ability to use oxygen efficiently rapidly decreases and an increase in lactic acid can lead to performance reduction and tying-up.

SUPPLEMENTS TO INCLUDE IN ANTI-TIE RATIONS



Salkavite® provides all essential electrolytes that a horse in work loses including sodium, potassium, calcium, magnesium, chloride, phosphate and sulfate as well as additional B-Group vitamins. It also contains Vitamin E and Rutin due to their acknowledged benefits to a horse subjected to extreme physical stress.



Racing Oil® supplies a palatable supplementary source of energy with Linolenic (Omega 3) and Linoleic (Omega 6) fatty acids in appropriate balance. Additionally, the supplementation of dietary oil has beneficial effects to aerobic performance whereby the use of dietary fats spare muscle glycogen stores, thus extending endurance and minimizing lactic acid build-up. The addition of fat into the diet also assists the absorption of fat soluble vitamins (A, D, E, K) contained in the feed or added to the diet in supplement form while improving the stability and increasing the protection of cell membranes and the health of the skin.



Electropaste® provides a concentrated, portable source of B-Group vitamins, electrolytes and anti oxidants including Vitamin E, to rapidly replenish body stores depleted by hard exercise or transportation.



Muscle-E® has been scientifically formulated to minimize muscle damage as seen by soreness, stiffness and fatigue after work, and in severe cases tying up. Muscle-E provides a blend of Vitamin E, Thiamine and Choline to ensure optimal muscle health and nutrition, exerting a powerful anti-oxidant function while also playing a role in immune, cardiovascular, circulatory and neuromuscular functions. Furthermore, supplementation has been shown to improve track performance in racehorses.

References

- Glad, M.J. (1992). *Post-exertional myopathy field project. Veterinary Review, 12, 79-80.*
Lewis, L.D. (1995). *Equine Clinical Nutrition: Feeding and care. Williams and Wilkins, pp 262-264*

RANVET PTY LTD

10-12 Green St Botany, NSW 2019

Toll Free: 1800 727 217

www.ranvet.com.au