

MALIGNANT HYPERTHERMIA

ETIOLOGY

- Malignant hyperthermia (MH) is a genetic disorder (autosomal dominant trait) and may occur in conjunction with type 1 PSSM.
- MH occurs in Quarter Horse bloodlines (with a high frequency in two specific lines, including the Impressive line), and horses are generally mature before exhibiting clinical signs.

SYMPTOMS

- Clinical symptoms include elevated body temperature (may be life-threatening) along with an episode of tying up or under anesthesia, metabolic failure, and death following a bout of tying up, particularly in horses with type 1 PSSM in addition to MH.

FOLLOWING A SEVERE EPISODE

- Turn the horse out for 2 weeks.
- Longe once daily for 3 to 5 minutes at a walk and trot. Gradually increase by 2 minutes per day.
- If stiffness is observed, stand the horse for 1 to 2 minutes and then resume walking to see if the stiffness persists.
- If stiffness persists, stop; if not, resume walking for 2 minutes and then resume trotting.
- When the horse can trot for 15 minutes, provide a 5-minute break at a walk and gradually increase walking and trotting after this.
- Once the horse has reached 30 minutes of trotting on a longe line (with a break at 15 minutes), then begin to ride for 20 to 30 minutes and gradually increase duration or intensity of exercise.
- It should take at least three weeks of exercise before the horse is ridden.
- Keeping horses aerobically fit increases oxidative metabolism and is the best prevention, in concert with an appropriate diet, for further episodes.

MANAGEMENT RECOMMENDATIONS

- Consumption of high levels of fructans (plant sugars) can exacerbate clinical symptoms; therefore, horses should be kept off "lush" pastures, new pasture growth (leaves less than 6" high from the ground) and pasture that has been under stress (drought, frost). Depending on management or facility logistics, horses can be muzzled or turned out in a dry lot to limit grass intake and facilitate voluntary exercise.
- In addition to nutritional intervention, an appropriate turnout and regular exercise program are essential to successful management of horses with PSSM.
- Minimize stress and provide regular routine with exercise, turnout and feeding.
- Turn out in large areas, preferably with other horses.
- Exercise therapy consists of daily turnout and as little stall rest as possible. Exercise should be introduced gradually, starting with 3 to 5 min of walk/trot on a longe line or under saddle, working up to 15 min. If no increases in creatine kinase (CK) are evident, the submaximal workload can be gradually increased.
- When the horse can be worked for 30 minutes without difficulty, active riding can be initiated.

DIETARY RECOMMENDATIONS

- Nutritional and management recommendations for Malignant Hyperthermia mirror those for horses with PSSM.
- The majority of the diet should be provided by a consistent supply of high-quality forage such as grass or grass/legume mix hays with controlled starch and sugar content. Hay analysis is strongly recommended as nutrient content of forage cannot be determined otherwise.
- Maintaining a balanced diet while minimizing total dietary (hay or forage + grain or supplement products) starch and sugar intake and maximizing fat and fibre intake is recommended. This can be achieved by providing a majority of the daily calories from fat and digestible fibre and limiting energy sourced from nonstructural carbohydrates. A low calorie protein, vitamin and mineral ration balancer may be used to ensure all nutrient requirements are met without introducing excess energy.
- Fat supplements of vegetable oil, rice bran or corn oil can be used. The rate of 1 lb of fat/1000 lb horse can be accomplished with 2 cups of oil mixed with a soluble fibre such as alfalfa cubes or non-molassed beet pulp. These recommendations must be modified depending on the individual caloric needs of the horse.
- For horses that are obese, minimizing the caloric density of their ration is needed to facilitate weight loss, which can be difficult with high levels of dietary fat. For these horses, rather than providing high levels of supplemental fat to their diet, fasting prior to exercise (~6 hrs) helps promote increases in plasma-free fatty acids and may help alleviate challenges with energy metabolism in these horses.
- Dietary supplementation with vitamin E (600 to 2000 IU/day) may be beneficial.
- Due to insulin hypersensitivity, chromium supplementation to PSSM horses is contraindicated.
- Affected horses also exhibit a sensitivity to potassium.
- Changes in diet should be made gradually, over a minimum of two weeks, to allow for adaptation and reduce the risk of digestive upset.
- Salt should be available free choice. Minerals may be offered.
- Minimize stress and provide a routine with exercise, turnout and feeding.

SUGGESTED PURINA PRODUCTS:

FEED NOTES:

- Feed a low, controlled starch and sugar diet with a majority of the digestible energy coming from fat and digestible fibre.
- Supplemental vitamin E may be beneficial.
- Due to possible insulin hypersensitivity, chromium supplementation is contraindicated.

UNDERWEIGHT HORSES

Recommended:

SUPERFIBRA INTEGRI-T

with an added source of omega-3.

SUPERFIBRA CLASSIC

with an added source of fat and omega-3.



Depending on the quantity of feed offered, **EQUILIBRIUM EQUILIZER** or **OPTIMAL** is recommended to fortify the ration to meet the Purina Superior recommendations.

A supplement such as **EQUI22** can replace Equilizer or Optimal to reduce calcium and phosphorus levels in the ration. Since the use and absorption of potassium are indirectly related to calcium, Equi22 may be a better choice to reduce the risk of seizures while supplementing essential nutrients.

TYPICAL/OVERWEIGHT HORSES

Recommended:

EQUILIBRIUM EQUILIZER **EQUILIBRIUM OPTIMAL** or **EQUI22**



It is recommended to add two cups of oil to the daily ration to promote insulin response.

Preferably use an oil high in omega-3 or a vegetable oil with added ground flaxseed. These can also be replaced by small amounts of **PUR-ATHLETE** (less than one cup per day).

Forage analysis is recommended to determine sugar (fructan) levels. Soaking hay before serving is also recommended to reduce its carbohydrate content (since they are water soluble).

FEED RATE PROTOCOL NOTICE

This feeding protocol described here pertains only to Cargill Limited Horse Feeds. There is not established feeding protocol that all feed companies must follow. Purina provides two feeding rates on their tag a "Minimum" and a "Purina Superior". The "Minimum" meets the levels established by the NRC Nutrient Requirements of Horses (2007), which will prevent all classic nutritional deficiencies. The "Purina Superior" is a greater level of fortification that promotes an optimal level of performance and immunity. By no means does that imply "Minimum" is subpar, and for the non-competitive horse, that stays home year round and has no health issues there is probably no need to exceed this level. However, if you are feeding a true equine athlete, with all the immune stresses associated with that level of competition, then the "Purina Superior" level is paramount to ensure an optimal level of performance and immunity.