

Equine Metabolic Syndrome

West Valley Equine
Veterinary Services, LLC



Traci Hulse, DVM

Your horse has just been diagnosed with Equine Metabolic Syndrome (EMS), also referred to as Insulin Resistance (IR) and Hyperinsulinemia. This condition is similar to Type-2 Diabetes in humans. Both are commonly associated with chronic obesity. Horses that are overweight and being fed rich alfalfa, pasture and/or rich feed for prolonged periods of time are predisposed to this disease. Symptoms of EMS can include previous or current laminitis, obesity, abnormal fat deposition (fat pockets) on the neck (cresty neck, back, sheath or tailhead), and abnormal reproductive cycles. Diagnosis of Equine Metabolic Syndrome has 3 criteria: High insulin levels (insulin resistance), obesity and/or abnormal fat pockets, and prior or current laminitis. Not all obese horses are insulin resistant, and not all insulin resistant horses are obese. Certain breeds tend to more predisposed to this disease including Morgans, Quarter Horses, Arabians and Paso Finos.

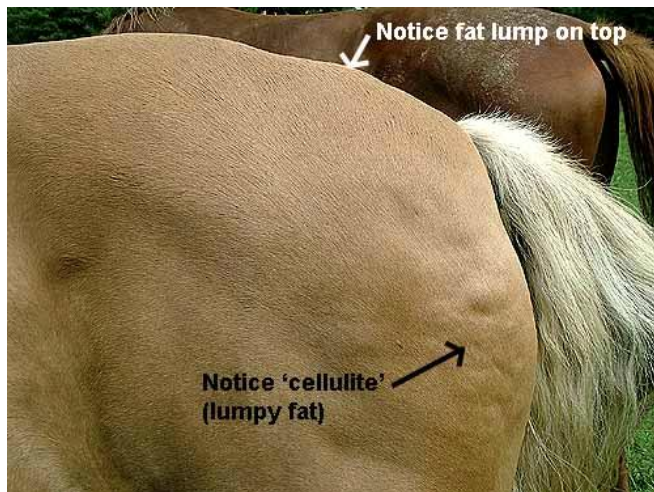


The cause of EMS is a combination of genetic and environmental factors but is often triggered by chronic overfeeding and obesity. Overfeeding of Non-Structural Carbohydrates (NSC= starch, simple sugars and fructans) results in increased uptake of glucose by muscles and adipose tissues. If this happens chronically, these excess sugars will exceed the fat tissues ability to use and store glucose resulting in a down regulation of the glucose receptors. This will result in the muscle and adipose (fat)

tissues to improperly respond to insulin. The body will then react by increasing its insulin levels (hyperinsulinemia) to compensate for the reduced insulin sensitivity within the tissue. Some theories on how high insulin levels can cause laminitis include that insulin helps blood vessel to relax and dilate to improve blood flow. High insulin levels alter blood flow and endothelial cell function causing vasoconstriction to the blood vessels and ultimately to the laminae (in the feet). High insulin levels may cause a subclinical "grain overload type-state" by altering colonic bacteria and increased endotoxins causing an inflammatory state. High insulin may also lower the laminitis threshold when heat and humidity rise. Insulin levels may also be affected by hormones (pregnancy), stress, change in diet, and disease which can trigger laminitis. Laminitis is the inflammation of the sensitive laminae in the horse's hooves. These laminae are important structures which

connect the hoof wall to the coffin bone inside the horse's foot. If these structures become inflamed and swollen, it can cause severe pain and lameness. This is a very serious condition. If your horse has both EMS and laminitis, both conditions need to be treated at the same time to have a positive outcome.

First, a blood test is taken to confirm the diagnosis of EMS and get accurate levels of your horse's insulin and glucose levels. Depending on your veterinarian's lab, most insulin levels > 35 uU/ml are consistent with insulin resistance. Normal glucose levels are 80-120mg/dl. In a non-stressed animal, glucose levels > 120 mg/dl may also indicate IR. Your horse needs to be off concentrates for at least 12 hours for an accurate test (hay is ok). Since EMS is commonly associated with Cushing's disease, it is sometimes recommended to have your horse's blood checked for Cushing's as well. Cushing's disease can be diagnosed by blood ACTH levels or a Dexamethasone Suppression Test checking cortisone levels. These two diseases are commonly diagnosed together, but your horse could have only one of the diseases. It is important to determine which disease your horse has because they are treated with different medications. ACTH levels vary throughout the year. In the winter, spring and early summer, ACTH levels > 35 pg/ml are positive for Cushing's. In the late summer and fall, ACTH levels are in the gray zone if they fall between 35-80pg/ml and should be repeated at a later date. Insulin levels may also be artificially high in late summer/fall due to seasonal variation. In the fall, ACTH > 100 pg/ml are positive for Cushing's.



EMS Treatment: EMS is treated primarily by a special diet. First, the horse needs to go on a restricted low carbohydrate diet. Grain and alfalfa should be discontinued. If your horse is eating lush pasture, grazing time should be either discontinued or limited to 1-2 hours per day. Since carbohydrates in pastures are lowest at night and early morning, pasture time should be limited to the time frame of 6pm to 10am. Ideally, the non-structural carbohydrates (NSC's) of your horses' diet should be less than 12%. If you want to know exactly what is in your forage (both pasture and hay), it can be analyzed for about \$30 at

a lab called Equi-tech (www.equi-analytical.com). You can get results in 4-7 days. The best way to analyze your feed is to take 10-20 samples throughout several bales of hay, or 10-20 sites in the pasture, approx. 1" long. Place samples in a large ziploc bag and label. If your hay's carb levels are still too high, the hay can be soaked in water prior to feeding. If hot water is used, 30 min of soaking is adequate. If cold water is used, 60 min of soaking is needed. The soaking process leaches out carbohydrates from the hay. Since your horse is on a restricted diet, a good vitamin/mineral supplement, such as Target IR by Vitamix, should be added. It is also recommended that your horse be fed pure vitamin E 2000-3000 IU/day (not a vitamin E/Selenium supplement). Vitamin E supplementation is especially recommended if your horse is restricted from pasture. If your pasture is too rich for turn-out, but you want your horse to have regular exercise, there are a few options. 1) Limit pasture time to 1-2 hours in morning or evening. 2). Turn horse out in arena, round pen or dry lot 3) grazing muzzle (ex. Best Friend Equine).

Cresty Neck= overweight!



If your horse is unhappy about the restricted diet, some ways you can help them adjust... gradual change over 1-2 weeks (unless horse is severely laminitic and needs to be on restricted diet right away). Feed hay in hay bag to slow down eating. There is a feeder called "The Natural Feeder" which can slow down your horse's feed consumption so they have grass hay in front of them all the time and don't feel so hungry/deprived. It is available on-line. Purina makes a product called Wellsolve W/C (weight control for weight loss) and Wellsolve L/S (low starch) which can safely be fed to horse on a restricted diet. If your horse is losing muscle as well as fat, you can add protein supplement like Purina Enrich Plus to the diet to prevent muscle depletion during their weight loss program. The goal is to slow weight loss and not have your horse lose more than 2% of the horse's original body weight per week. Ideally, the goal is to have your horse's body condition at a 5-6. The AAEP scoring system ranges from 1(emaciated) to 9 (obese). The goal is having enough fat to visually cover all your horse's ribs so that you cannot see them but can feel them easily. If a weight-loss diet is prescribed by your veterinarian, the goal is to reduce the horse's feed by 20% over a 1-2 week time period.

If your horse is a thin and has EMS, there are many commercial feeds which have low starch but can help your horse maintain their body weight. Some other safe supplements for weight gain include soybean or corn oil, some rice brans, beet pulp, or a combination of these.

Some Low Starch Feeds which are ok to feed horse with EMS include:

- *Purina's Wellsolve L/S (low starch)- to maintain or add weight
- *Purina's Wellsolve W/C (weight control) - to lose weight
- *Triple Crown Lite
- *Nutrena Safechoice Special Care
- *Re-Leve (Kentucky Equine Research)- high fat and fiber/low carb to maintain or gain weight

Exercise is recommended if your horse is not actively laminitic. It has been shown that even just a few days of regular exercise can improve insulin sensitivity. It will also help your horse lose weight. During times of rapid pasture growth, EMS horses should be kept off pasture. In Arizona, EMS horses should be kept off pasture late June through September. During the winter and slow pasture growth, it is ok and encouraged for an EMS horse to be turned out for regular exercise.

Having your horse on a low carbohydrate diet should decrease your horse's insulin levels. If the insulin levels are extremely high, your vet may also prescribe a medication to help reduce these levels. Typically, we will prescribe Thyro-L, a thyroxin supplement, which helps lower insulin levels by improving insulin sensitivity. Thyro-L also helps by increasing basal metabolic rate and increased calorie burning. The initial dose is typically 4 tsp (48mg) daily for an average size horse. The horse's insulin/glucose levels should be rechecked in 1-2 months to re-evaluate your horse's progress and treatment plan. When your veterinarian determines that the insulin levels are adequate and wants to discontinue thyroxine supplementation, it should be done gradually over a 2 week time period. Another medication, metformin, commonly used in human medicine is also available for select cases of severe hyperinsulinemia which has been unresponsive to diet changes and Thyro-L. Extra-label use of Metformin at 15mg/kg orally twice daily in conjunction with levothyroxine at 24mg once a day orally has been used in some horses with persistent hyperinsulinemia. Metformin improves insulin action and reduces glucose production and metabolism. Preliminary research on the use of Metformin in horses indicates it may not be well absorbed orally and is not very effective in ponies.

Pony with Laminitis/EMS



There are other products out on the market with some anecdotal evidence indicating they help to reduce insulin levels. The research is still not 100% conclusive, but promising. These supplements include chromium at 2.5-5.0mg/day (1mg/ 200 lbs) and cinnamon. There has

been some evidence but not fully substantiated that magnesium supplementation may reduce insulin levels. Magnesium has been supplemented at 4-8 g/day and Magnesium oxide has been given at .5-1 TBSP/day (30mg/kg).

There are many supplement products which advertise to help reduce insulin levels:

- ~Equine Metabolic Support by Platinum
- ~ APF
- ~ EO.3 by Kentucky Equine Research (an omega 3 Fatty Acid)
- ~ Metaboleeze by Kentucky Performance Products
- ~ Smart Control IR (by SmartPak)
- ~ InsulinWise by Kentucky Performance Products

There are also some great vitamin supplements which can be given to horses on restricted diets to balance their rations. Some good IR vitamin supplements include IR Pellet by Kentucky Equine Research and Target IR by Vitamix.

In conclusion, prevention is the best way to avoid Equine Metabolic Syndrome. Don't allow your horse to become overweight. If your horse is obese, you should put your horse on a restricted diet with regular exercise and turn-out. If your horse does have EMS, the goal should be to correct your horse's obesity, improve your horse's insulin sensitivity, and decrease the risk of laminitis.