



A. Cary Hills, DVM Whitney Brown, DVM Claire Smith, DVM
5065 NE Lincoln Rd, Poulsbo, WA 98370
(360) 779-5557 Fax (360) 779-3142
www.soundequinevet.com

Insulin Resistance in Horses

Insulin resistance (IR) is important to the equine practitioner because of its association with laminitis. Older horses with pituitary pars intermedia dysfunction (PPID) are pre-disposed to both IR and laminitis, and it is likely that these conditions are related. Horses or ponies that exhibit delayed shedding of the haircoat or hirsutism, loss of skeletal muscle mass, or polyuria/polydipsia should, therefore, be tested for PPID and IR and managed accordingly.

There is also a second condition associated with IR in horses, and this syndrome is more challenging to define. Affected horses are described by owners as “easy keepers,” because body weight is maintained on a relatively low caloric intake compared with other horses. In our experience, this condition is most common in ponies, Morgans, Paso Finos, and Norwegian Fjords, but it also occurs in Arabians, Quarter Horses, American Saddlebreds, and Tennessee Walking Horses. Horses with this condition can often be recognized by their appearance. Some exhibit generalized obesity; others are thinner throughout the mid region of the body but suffer from regional adiposity in the form of a cresty neck or enlarged fat pads next to the tailhead. These horses were previously assumed to suffer from hypothyroidism because of perceived similarities between this condition and canine hypothyroidism and the detection of low or low-normal resting serum total triiodothyronine (tT3) and total thyroxine (tT4) concentrations.

However, it is now accepted that lower circulating tT3 and tT4 concentrations are a consequence rather than a cause of the horse’s metabolic state, and these concentrations can be attributed to secondary hypothyroidism (decreased thyroid-stimulating hormone release from the pituitary gland) or interference from drugs such as phenylbutazone. Therefore, alternative terms have been adopted to describe this condition in horses and ponies, including peripheral Cushing’s disease, equine metabolic syndrome (EMS),⁴ and pre-laminitic metabolic syndrome (PLMS). For the purpose of this discussion, we will use the term EMS to signify this condition, but we will require that all three of the following criteria be met before the term is applied: (1) insulin resistance, (2) history of laminitis or pre-disposition to the disease (presence of abnormal growth rings on the hooves), and (3) regional adiposity in the form of a cresty neck or enlarged fat pads.

Management of IR in Horses

The two principal strategies for addressing IR in horses are diet and exercise, but affected horses can be divided into three groups: (1) obese horses with IR, (2) non-obese horses with regional adiposity (cresty neck) and IR (many horses with PPID fall into this category), and (3) severely affected horses from either group that are currently suffering from laminitis.

Obese horses with IR should be placed on a diet containing fewer calories and an exercise program to lower body weight and increase fitness. Feeds that contain readily available sugar, such as sweet feed, should be completely eliminated from the diet. If the horse does not suffer from laminitis, it can be allowed to graze on pasture. Clients should be warned that horses with EMS can often maintain their body weight even when grazing is limited, and pasture-associated laminitis remains a risk if the horse is left out on pasture.

Strategies to limit the amount of grass consumed include limiting grazing time (1–2 h/day), enclosing the horse in a smaller area using a round pen or electric fence, or using a grazing muzzle. Hay should be the principal component of the diet along with protein and trace mineral supplements as needed. Analysis of hay is strongly recommended to ensure that the NSC content of the hay is low. Samples can be sent to the Dairy One Forage Laboratory, and the cost of analysis is ~\$25/sample.

Hay with a NSC level <12% should ideally be selected for affected horses. If only hay containing a higher level of NSC is available, soaking the hay for 30 min in cold water will reduce the sugar content. Be aware that this process can also leach out other nutrients from the hay. Horses should be exercised as consistently as possible (every day is ideal), and clients should be encouraged to exercise the horse on a lunge line or in hand even if it is lame (excluding those with acute laminitis).

Non-obese horses with IR should be placed on a similar diet and exercise program to improve insulin sensitivity but with more calories provided, particularly when the horse is being strenuously exercised. Many horses with PPID fit this description. High glycemic feeds such as sweet feed should be removed from the diet and replaced with fat and fiber. Up to 20% of calories can be provided by fat in the form of vegetable oil or rice bran. Low-starch or low-NSC commercial feeds are also available.

Severely affected horses with laminitis should be taken off pasture altogether. Grass hay with a low NSC content should be fed along with concentrates that primarily contain fat and fiber until laminitis has subsided. After the acute phase has passed, obese horses should be placed on a weight-reduction diet composed primarily of grass hay with a low NSC content. Hay should be weighed out to avoid overfeeding. Weight loss can be accelerated in these horses by limiting their caloric intake and administering levothyroxine at a dosage of 4 teaspoons (48 mg) once daily orally for an average-sized horse. Levothyroxine reduces body-fat mass and improves insulin sensitivity in horses that are kept off pasture and maintained on a controlled diet. Treated horses should be weaned off the drug after the ideal body weight has been attained by reducing the dosage to 2 teaspoons (24 mg) once daily orally for 2 wk and then 1 teaspoon (12 mg) once daily orally for 2 wk. Some horses that suffer from chronic laminitis in association with EMS must be kept off pasture indefinitely.