

Equine Insulin Resistance

A reduction in the sensitivity to insulin that decreases the ability of glucose to be transported to body cells

Overview

Insulin resistance is a reduction in sensitivity to insulin that decreases the ability of glucose to be transported into the body's cells from the bloodstream. While the body can compensate for a short period of time by increasing insulin production and secretion to maintain normal blood sugar levels, the end result is abnormally high circulating levels of glucose. Insulin resistance has become a hot topic in the equine news front of late, but has likely existed (undiagnosed) for many years.

The incidence and/or prevalence of insulin resistance and the exact causes of this medical condition remain largely unknown. It is currently speculated that diet, breed, age, and body condition all contribute to the development of insulin resistance. Specifically, horses over 20 years of age that are either "easy keepers" or obese are more at risk than their younger, leaner counterparts. Horses fed diets high in sugar or starch (e.g., high-concentrate diets) rather than high-fiber/high-fat diets are more likely to be insulin resistant, even if they are not obese.

Some evidence exists that ponies and breeds prone to developing a "cresty neck" such as Morgans, Arabians, and Quarter Horses develop insulin resistance more often than breeds such as Dutch Warmbloods or Standardbreds.

Horses with Cushing's disease are also often insulin resistant.

One reason that insulin resistance is important in equine medicine is because of its strong relationship to development of laminitis.

Clinical Signs

The clinical signs of insulin resistance in horses are primarily related to elevated blood glucose levels (hyperglycemia). These include weight gain or loss, muscle loss, development of a cresty neck, regional deposition of fat in areas such as the tailhead,



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behind the shoulder, or over the loin, lethargy, and chronic (recurrent) laminitis. Insulin resistance in horses is often compared to Type II diabetes in humans.

In the past few years researchers have described a strong association between insulin resistance and laminitis in equines. They are working now on defining standard testing protocols and interpretations to identify insulin resistant horses at highest risk for laminitis.

It should be noted that not all fat horses are insulin resistant, and not all insulin resistant horses are fat. Typical body scoring parameters might not apply to some IR horses. Even horses with ribs showing might have insulin resistance. Even when they maintain proper body weight with dietary restriction, insulin resistant equines might still display subtle signs of regional adiposity, with fat pads that form behind the shoulder, around the tailhead, over the

loin, or as a slight crest with a dip in front of the withers. These abnormal fat deposits might be lumpy or dimpled in appearance.

Diagnosis

A quick and easy test to screen for insulin resistance is a blood test that measures blood glucose and insulin levels. Elevated blood insulin and/or glucose levels are highly suggestive of insulin resistance. In many horses blood glucose levels are within the normal range while the insulin levels are elevated. This is not unexpected as horses can initially compensate for the insulin resistance by increasing the secretion of insulin; hence, the increased circulating insulin levels in the face of normal blood sugar levels. It is only once the body is no longer able to compensate that both the insulin and glucose levels are elevated.

A better assessment of endocrine (hormone) function is the combined glucose-

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insulin tolerance tests (CGIT). This is referred to as a "dynamic" test and involves administering both glucose and insulin (intravenously) to the horse, then measuring blood glucose and insulin levels over the next several hours.

According to the experts in this field, glucose to insulin ratios are not useful for diagnosing insulin resistance in horses.

It should be noted that a number of factors can impact test results, such as feeding, stress of the horse, pain due to laminitis (or other condition), and choice of laboratory. Further, the CGIT test is not usually a practical test to perform by an ambulatory veterinarian. Instead, horses are generally referred to a local clinic.

Treatment

There is no specific treatment or cure for insulin resistance. Treatment is aimed at altering management practices, primarily diet and exercise, to limit the progression or worsening of the disease. Specifically, increase exercise and modify the diet to achieve and maintain an acceptable body condition score. Limit or even eliminate access to pasture (especially high-sugar

pastures), feed low sugar and low starch hays, and eliminating grain and other concentrates and high-sugar feeds from the diet. If extra fiber or energy is needed add beet pulp and low-starch concentrates to the diet

Hay can be analyzed for sugar content (i.e., hay containing more than 10-12% soluble sugars should not be fed). If the sugar content is known or suspected to be high, soak the hay in cold water for 60 minutes or hot water for 30 minutes prior to feeding (and discard the water) to remove some of the sugar.

Prognosis

If diagnosed early and with prompt and consistent treatment, insulin resistant horses can lead normal, healthy lives. Severe cases compounded by chronic laminitis will likely require more aggressive management. Recruiting a qualified equine nutritionist to help modify and monitor the diet might be necessary.

Prevention

According to researchers, it is not clear at present if insulin resistance can be

FAST FACTS

- **Insulin resistance** is defined as a decreased sensitivity of the horse's cells to insulin resulting in an increased blood sugar level.
- **Contributing factors** are thought to include diet, body condition, age, and breed.
- **Common clinical signs** include weight gain or loss; muscle loss; development of a cresty neck; regional deposition of fat in areas such as the tailhead, behind the shoulder, or over the loin; lethargy; and chronic (recurrent) laminitis.
- **Diagnosis** is challenging and involves measuring insulin and glucose levels in the blood.
- **There is no specific treatment** or cure for insulin resistance. Diet and exercise are important for limiting development and prevention of worsening of insulin resistance in horses.

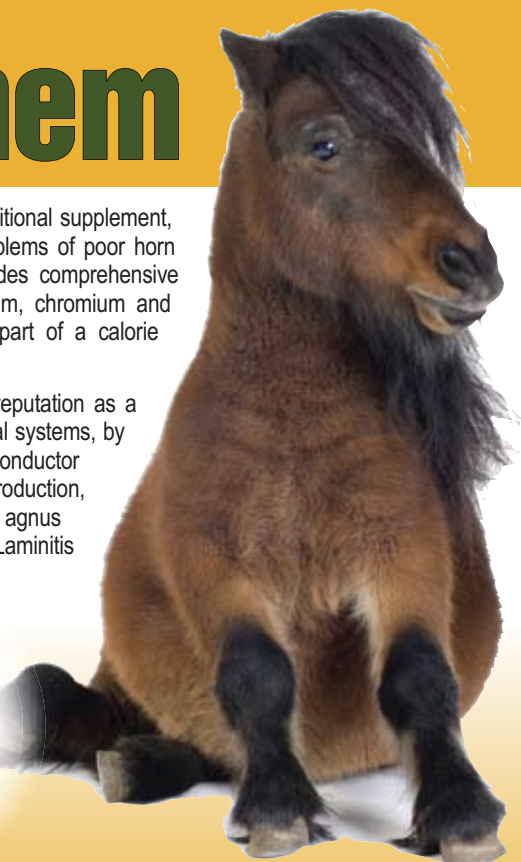
completely prevented; however, instituting the dietary and exercise changes described above in horses at risk for insulin resistance are encouraged. ♣

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