



FACT SHEET

Department of Animal Science, University of
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Effective Horse Management – Horse Health Series

Insulin Resistance in Horses – Does It Matter?

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You may have heard some of the talk lately in magazines about equine insulin resistance. If so, you may be wondering what it's all about and how your horse may or may not be affected. This article will discuss insulin resistance including its causes, effects, diagnosis, treatment, and prevention.

What is Insulin Resistance?

Glucose normally functions to fuel many metabolic processes and is the primary energy currency of the body. Insulin is normally produced in response to elevated blood glucose and is key to the regulation of blood glucose concentrations and glucose utilization. Insulin promotes glucose uptake by cells and promotes formation of glycogen or fat. Insulin resistance is defined as a reduced sensitivity of the body's cells to insulin's facilitation of glucose uptake. In other words, the cells become resistant to the glucose uptake action of insulin. Initially, more insulin is needed ("hyperinsulinemia") to keep blood glucose concentrations within normal limits after a starchy or high sugar meal. If the condition is severe enough, even extreme insulin concentrations are ineffective and blood glucose may be abnormally high. The problem is that not only does this limit energy availability to the cells, but insulin also has other effects on the body that may be detrimental when it is higher than normal for prolonged periods of time. Unlike humans, horses rarely go into more advanced stages of the disease where the pancreas becomes "exhausted" and can no longer secrete adequate insulin.

Causes

Several causes of insulin resistance have been suggested, but the exact cause is still unknown. Possible causes include:

- **Diet** - In a recent study, horses had lower insulin sensitivity when fed high sugar/starch feeds compared to high fiber and fat rations, especially when they were not obese.

- **Obesity** - Overweight horses tend to be insulin resistant as are “easy keepers,” even if they are not obese.
- **Age** - Old horses (>20 years) seem to be more prone to insulin resistance, probably secondary to pituitary dysfunction (“Cushings disease”) which is extremely common, especially in mares.
- **Breed** - Ponies were found to have higher degrees of insulin resistance than Dutch warmbloods or Standardbreds. Breeds that are prone to developing cresty necks and obesity, such as Morgans, and some lines of Arabians, Quarter Horses and Thoroughbreds are also more likely to develop the problem.
- **Laminitis** - Horses with a history of laminitis and horses that develop laminitis without an obvious cause (grain overload, sudden access to lush, green grass) may be insulin resistant.
- **Exercise**: Physically fit horses have greater insulin sensitivity than inactive horses.

Effects of Insulin Resistance

Insulin resistance may result in:

- Loss of weight
- Loss of muscle
- Lack of stamina
- A condition similar to human Type II diabetes
- Laminitis

Diagnosis

Your veterinarian will be able to diagnose insulin resistance. A single blood sample drawn within 60 to 90 minutes of eating a meal of grain is a quick screening test for hyperinsulinemia. If the results are abnormal the veterinarian should perform a more reliable test by administering a glucose solution orally or intravenously and measuring the glucose/insulin response over the course of two or three hours. This is not usually practical in the field and the horse may need to be referred to a clinic.

Treatment

Treatment may consist of the following:

- Weight loss through diet and exercise if the animal is obese and not suffering from laminitis
- Addition of a minimum of 30 minutes of exercise
- Limiting carbohydrate intake through elimination of grain and high sugar feeds
- Soaking hay if the concentration of sugars are greater than >10 to 12%.
- Feeding warm season grasses such as Bermuda grass, or feeding beet pulp that does not have added molasses
- Not feeding fruit treats

Prevention

Ideally, horse owners would prevent this disease from occurring in the first place. Even though some researchers believe there is a genetic component, there are still many preventative measures that can be taken, including:

- Feeding a diet composed of primarily forages. If the horse is becoming obese limit access or reduce the quality. Easy keeping or obese horses do not require additional calories or grain.
- If concentrates are needed to maintain body condition feed products formulated to have a low glycemic index. For example oats are commonly used as the standard with an index of 100. Plain beet pulp has the lowest index in most studies and barley has the lowest index of the commonly fed grains. Other low index feeds include rice bran and wheat.
- Pastures and dry forages can be tested for amounts of carbohydrates present.
- High sugar hay may be soaked in hot water for 30 min or cold water for 60 minutes.
- Grazing time can be restricted.
- Fat and fiber can be added to the diet at 6-10% for fat and at least 12% for fiber.

Insulin resistance can be a serious problem. As with most equine health concerns, it is best to attempt to prevent the problem rather than have problems arise and have to treat them later. By paying careful attention to the diet and condition of your horse, you may be able to prevent insulin resistance from becoming a problem.

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