Equine Endocrine Diseases:

Cushing’s Disease and Equine Metabolic Syndrome

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The Endocrine system is an interacting system of organs that produce hormones which regulate many body functions. Some of the organs involved in the endocrine system include the pituitary, thyroid and adrenal glands. The two most common equine conditions associated with the endocrine system are Equine Cushing’s Disease and Equine Metabolic Syndrome. Although both disorders have very similar clinical similarities – such as a predisposition to the development of chronic laminitis – the biology of the disease is different and successful management requires a proper diagnosis.

Equine Cushing’s Disease

Equine Cushing’s Disease (ECD), clinically known as Pituitary Pars Intermedia Dysfunction (PPID), results from a tumor of the pituitary gland that causes hormonal imbalances, particularly insulin.

The hormonal imbalances cause a variety of clinical signs, including:

- long, wavy hair coat that fails to shed according to normal seasonal patterns
- excessive sweating
- lethargy
- poor athletic performance
- chronic recurrent laminitis
- infertility
- weight loss
- muscle wasting, especially along the topline (croup and rump)
- abnormal distribution of fat, with accumulations on the crest of the neck, tail head, sheath and above the eyes
- pot belly appearance due to weak abdominal muscles
- excessive water consumption and urination
- delayed wound healing
- increased susceptibility to infections and high parasite infestations

ECD tends to occur in middle-aged and senior horses and ponies, although horses as young as 7 years have been diagnosed with ECD. Ponies and Morgan horses are more susceptible to develop ECD. Diagnosis is difficult as several specific diagnostic tests have a high inaccuracy rate and are expensive.
PPID is not curable, but is manageable with treatment. Without treatment, symptoms tend to worsen over time; affected horses are at risk for disordered glucose homeostasis (a “pre-diabetic” condition) and many horses are euthanized as a consequence of laminitis, recurrent foot abscesses or complications related to bacterial infections.

**Treatment and Management**

Treatment includes a combination of medication to normalize the functioning of the pituitary gland and supportive care to address and prevent complications associated with the disease. Management will be life-long as there is no way to reverse the disease process. Medication may not be needed in the early stages and management measures, such as clipping to remove the long hair, a strict diet, careful attention to teeth and hooves may be sufficient to provide a good quality of life.

Since affected horses are often insulin resistant, feeds high in soluble carbohydrates (sugars and starch) should be avoided. Diets high in fibre and fat are recommended. Pelleted feeds designed specifically for older horses are strongly recommended, but those containing high levels of starch or molasses should be avoided.

Obese horses with ECD should be fed primarily hay, supplemented with a forage ration balancer to provide nutrients that may be deficient in the forage. *Equiline® Accelerator Plus Ration Balancer* is an excellent choice as it is a low-inclusion balancer that will maintain a low-glycemic diet that ECD horses require. ECD horses having trouble maintaining weight can be supplemented with additional calories from a high-fat, low-starch product. Shur-Gain’s newest horse product, *Equiline® Shine Supplement*, was developed to provide additional calories from fat, which is an ideal calorie supplement for horses with ECD.

Dietary supplementation of magnesium has been shown to be beneficial. Magnesium deficient diets can induce insulin resistance in humans, while magnesium rich diets may prevent it. However, horses fed balanced diets should not be deficient in magnesium. Horse owners also need to be cautious when supplementing with magnesium as too much can cause a negative effect on calcium absorption, especially if the horse is deficient in calcium. A calcium:magnesium ratio of 2:1 should be maintained in the horse’s diet. Consult with your Equine Nutritionist in creating a balanced ration for your horse if you are interested in supplementing magnesium.

**Equine Metabolic Syndrome (EMS)**

Veterinarians have recognized a related syndrome of obesity, insulin resistance and chronic laminitis affecting a younger group of adult horses. These horses were initially suspected to have a similarity to Equine Cushing’s disease, but these horses did not have long hair coats and had normal functioning pituitary glands. Affected horses did not respond to medications used to manage ECD.
Equine Metabolic Syndrome (EMS), also known as Insulin Resistance Syndrome, was recently classified in horses by researchers at the University of Missouri. It has several similarities to the human condition known as metabolic syndrome, which is characterized by the following symptoms:

- Obesity, especially involving accumulation of fat within the abdomen
- Fat pads near the tail head, fat accumulation in the sheath/near the mammary gland, “cresty neck”
- Elevated blood lipids and reduced concentrations of high-density lipoprotein (the “good” cholesterol)
- Insulin resistance and hyperinsulinemia (high blood insulin levels)
- Hyperglycemia
- High blood pressure
- “Easy keeper”
- Laminitis

Although affected horses are obese, insulin resistant and hyperglycemic, they usually have normal blood pressure and do not consistently exhibit elevated levels of blood lipids. EMS results in insulin resistance and an increased risk of pasture induced laminitis.

**Clinical Symptoms**

Obesity is the main problem in horses suffering from metabolic syndrome. Body fat (especially stored within the abdomen, liver and skeletal muscle) contain cells that are very active metabolically and hormonally, and when present in excessive amounts they can trigger metabolic disturbances leading to insulin resistance and persistent hyperglycemia. These abnormalities negatively affect the cardiovascular system, cartilage and bone. Increased cortisol synthesis may account for the predisposition to laminitis in affected horses.

Recurrent chronic laminitis in obese horses that lack other founder triggers is the common symptom for the diagnosis of metabolic syndrome. Horses are often extremely obese, with excessive fat accumulations in the crest of the neck (cresty neck), over the rump, around the tail head and in the sheath of male horses. These horses are “easy keepers”; they can easily become obese on poor quality forage. Laminitis usually occurs right after a dietary change (i.e. horse is turned out on lush pastures in the spring). An oral sugar test can be used to examine the horse’s insulin response to elevated blood sugar levels. Horses with EMS will have higher insulin concentrations than normal horses. If the horse is older, ECD should be ruled out first.
Treatment and Management

Treatment of Metabolic Syndrome focuses on the reduction of body weight and insulin resistance through strict dietary modification and an exercise program. Horses suffering from laminitis cannot be exercised until founder has been brought under control. Strict limitation of dietary soluble carbohydrates (sugars and starch) is the most important component in the treatment and management of this disorder.

Since affected horses are often insulin resistant, feeds high in soluble carbohydrates (sugars and starch) should be avoided. Diets high in fibre and fat are recommended. Horses with EMS should be fed primarily hay, supplemented with a forage ration balancer to provide adequate protein, vitamins and minerals that may be deficient in the forage. **Equiline® Accelerator Plus Ration Balancer** is an excellent choice as it is a low-inclusion balancer that will maintain a low-glycemic diet that ECD horses require. Forages should be fed at 1 to 1.5% bodyweight to encourage weight loss, but extremely obese horses may need further restriction before significant weight loss is achieved. Lush pasture intake (spring, early summer, after a “bloom” or frost) should be restricted with the use of a grazing muzzle or limited turnout to reduce high soluble carbohydrate intake. Other high soluble carbohydrate sources, such as grains, sweet feed, carrots and apples, should be eliminated from the diet.

Preventing obesity can reduce, if not eliminate insulin resistance. Horses displaying signs of EMS often return to normal once they have dropped the weight. If a horse fails to respond to dietary management the forage should be analyzed for its soluble carbohydrate content. The soluble carbohydrate (starch and sugars) varies significantly in forages, depending on the grass species, geography and environmental conditions during growth, drying and storage. Studies show that soaking hay can remove up to 38% of the soluble carbohydrates, reducing the NSC levels to less than 12%, which is recommended for horses with insulin resistance.²

As with Equine Cushing’s Disease, dietary supplementation of magnesium has been shown to be beneficial. A calcium:magnesium ratio of 2:1 should be maintained in the horse’s diet to prevent calcium deficiency. Increased dietary mineral intake of other macro and micro minerals is also recommended. Consult with your Equine Nutritionist in creating a balanced ration for your horse if you are interested in supplementing higher levels of minerals.

Cinnamon has been proven to provide beneficial effects in humans with type 2 diabetes, but there is currently little scientific evidence to support the claims made in the management of EMS. It’s “insulin like effect” increases glucose metabolism 20-fold, which significantly improves blood glucose control. The recommended daily equine dose is 4 teaspoons for a 500 kg horse.
If more energy is required once the horse is at an ideal bodyweight and an exercise program is in place, grain should be avoided. Instead, beet pulp (molasses free) or a high fat supplement, such as Equiline® Shine Supplement, can be fed to supply extra calories.

Summary

Veterinarians sometimes detect insulin resistance in horses with ECD. It is thought that horses and ponies with EMS are predisposed to Cushing’s disease, and insulin resistance becomes worse when EMS horses develop ECD later in life. Horses with ECD should be checked for insulin resistance and put on a low carbohydrate diet for management. Low calorie diets are not recommended for underweight horses; rather a low starch, high fibre and fat diet can be fed. Horses with EMS should be on a strict weight loss plan and fed a diet low in soluble carbohydrates. Consultations with your Equine nutritionist to develop a diet for your horse with ECD or EMS are highly recommended.

References:
