

New Hyperinsulinemia Screening Test Promising (AAEP 2012)

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In a perfect world, veterinarians would be able to detect every horse afflicted with insulin dysregulation before the animal developed the painful and debilitating disease laminitis. Screening for insulin issues is typically cumbersome, because existing tests are time-consuming and often require a laboratory. A team from the University of Tennessee (UT) led by Nicholas Frank, DVM, PhD, Dipl. ACVIM, who now teaches at Tufts Cummings School of Veterinary Medicine in Massachusetts, tested the feasibility and effectiveness of an oral sugar test that can be administered on the farm.

Frank noted that the idea for this test came from a summer project performed by Amy Schuver, DVM, when she was a student at UT. He presented the study results at the 2012 American Association of Equine Practitioners Convention, held Dec. 1-5 in Anaheim, Calif.

Insulin is a hormone produced in the pancreas that regulates blood glucose levels. When glucose levels rise after feed intake, the pancreas releases more insulin. In the normal animal the insulin is taken up by cell receptors, signaling to the cell to metabolize glucose. However, in horses with insulin dysregulation, high insulin concentrations are detectable after feeding. These horses exhibit excessive insulin responses to starch or sugar intake.

Horses with insulin resistance (IR) consume an increased amount of sugar or starch, the high insulin concentrations they develop increase their risk of developing laminitis, explained Frank, who is a professor of large animal internal medicine and chair of the department of clinical sciences at Tufts. He noted that most horses with IR are diagnosed after developing laminitis. The goal of screening for IR, then, said Frank, is to recognize at-risk horses and prevent damage to the hoof. Typical IR testing is cumbersome and involves blood testing for glucose and insulin concentrations, fasting glucose and insulin levels, a combined glucose/insulin test, and/or an intravenous (IV) insulin tolerance test, and these tests aren't consistent with the natural conditions surrounding IR.

Frank described the technique developed by his group to screen for hyperinsulinemia via oral administration of sugar. This oral sugar test (OST) simplifies screening since veterinarians can perform it on the farm, causing the animal less stress than other screening methods. Corn syrup is used as the sugar source and is well-tolerated by horses, so a horse owner can administer the 15 mL/100kg dose to a fasted horse. The veterinarian draws blood samples 60 and 90 minutes after sugar administration. Frank said the test is considered positive if glucose levels are higher than 125 mg/mL and insulin levels are greater than 60 microunits/mL.

If a veterinarian is concerned a horse might develop laminitis secondary to high sugar intake, he or she can measure fasting insulin levels prior to performing the OST. If insulin levels are sky high, said Frank, there is no need to perform an OST. However, the OST "gets us as close as we can to what might be happening with that horse out on pasture." Frank explained that when glucose hits the intestine, the intestine sends out hormones called incretins that tell the pancreas to produce insulin. The "incretin effect" is thought to cause a greater insulin peak with oral glucose administration than with IV glucose.

"An OST-positive animal would be the one that if we do everything wrong with it will ... get high insulin levels and be at risk for laminitis," said Frank. The OST compared favorably with the intravenous insulin tolerance test, and it might provide a more convenient means of screening horses for hyperinsulinemia.

Disclaimer: Seek the advice of a qualified veterinarian before proceeding with any diagnosis, treatment, or therapy.