

**December 2015, Essex Rider Magazine**  
**Insulin Resistance - Number One cause of Laminitis & Founder, Part 1**

The Number One Cause of Laminitis and Founder in horses is Insulin resistance. When the blood stream carries too much (*high levels*) of Insulin, it irritates blood vessels leading to poor circulation and Laminitis – eventually can progress to Founder. Insulin is an \*important hormone for distributing energy in the body for horses, just as it for ourselves. It is produced by an organ in the abdomen called the Pancreas. The Pancreas is located behind the girth line on horses, on the right side. It weighs approximately  $\frac{3}{4}$  of a pound on avg. 15hh horses. About 98% of the Pancreas produces enzymes to break down food in the gut and only 2% makes hormones such as Insulin. Insulin has many jobs and many targets in both horse and human bodies. It has direct action on all cells in the body (*except the brain*). Insulin helps in processing carbohydrate, protein, and fat products for entry into the cells. Its main job involves carbohydrate metabolism. Insulin release from the Pancreas is triggered by rising levels of high glycaemic carbohydrates in the bloodstream. High sugar intake is the primary cause of excess insulin. The carbohydrate that causes this Insulin outflow from the pancreas is called Glucose. Carbohydrates are often simply called “sugars” or “starches”. Normally, when Glucose levels rise, Insulin levels also rise. Then, as Glucose levels recede, less Insulin is released from the Pancreas and Insulin blood levels drop back down to normal. There are several ways for Glucose levels to climb and by far the biggest rise comes after your horse eats. However, that is not the only cause by any means. In hay and grass, carbohydrates are the main type of nutrient, with protein being second and fat third. Insulin is crucial in helping Glucose in the bloodstream move into the cells and Glucose is the major fuel used by cells for energy. Insulin has many target tissues but the most important are muscle, fatty tissue, and the liver. The transport of Glucose into muscle and fatty tissue is 5 to 20 times greater in the presence of Insulin. This highlights how important Insulin’s action is in obtaining energy for the cells. Too much Insulin will generally cause weight gain on your horse. A “warning bell” to remember is that when we do not allow our horses to graze or feed in an adlib fashion, as they are designed to do naturally. When not allowed to do so, they often develop a habit of “woofing down” their intermittent feed - which generates a “surge” of insulin in their system. This can generate up to 300% of normally required insulin when they eventually get to eat in this fashion and exceeds their liver’s ability to metabolize it completely, which leaves too much insulin residing in the bloodstream. In our human world, we are not easily able to deal with this problem as we are often at work and have little time to properly attend to our horses. Although spring is a typical time we notice the problem, *it is not the only time we should be aware*. As short winter days cuts our time with them shorter, often they are kept in their stables after dark, over night and when the weather is poor, providing little exercise. Box rest is another problem for them. One practice that can help to slow the rate of carbohydrates input (*somewhat simulating grazing*) is to use multiple hay nets with smaller openings, on an ad-lib basis. There are also new, more complex, feed disbursement products always being invented. Slow, steady eating helps protect your horse. Equine Insulin

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Resistance puts your horse on the edge of a cliff. Any stress such as surgery, vaccines, mild colic, diet change, weather changes, or infections can push them off the edge into Laminitis. Hay is essential in helping prevent Laminitis and "Soaking" it can lower Carbohydrate levels. Avoid Wheat hay, Oat hay, Barley hay as they all have huge starch content with. Wheat being the greatest culprit, just as it is for humans. Equine Insulin Resistance in horses is the correct term to use when they get pathologically high levels of Insulin. There are many other terms that have been used in the past that are inaccurate or confusing, such as: 1. Metabolic Syndrome, 2. Pseudo Cushings and Peripheral Cushings and 3. Hyperinsulinemia - to name some. Importance of Exercise: There are many benefits of exercise, all of which will decrease Insulin levels and help to prevent Insulin Resistance. Exercise, even just walking, will help lower Insulin. Walking burns 4 times the calories of standing. Walking also helps with circulation to the feet to help prevent Laminitis. Walking is also low impact on the joints. The best winter and poor weather equipment is Circular and /or Oval shaped "horse walkers" as often used at Stud Farms anytime horses are not out for normal exercise in the paddocks and fields. On average, in horse walkers, they should walk at varying speeds for 30 to 40 minutes on each rein for about an hour and a half total walk daily. This should be the general method for all horses. Specific benefits of exercise are: 1. the nervous system will lower Insulin output from Pancreas. In fact exercising at these minimum levels, for just one hour, can drop it over 30%. 2. Muscle has the largest number of receptors for Insulin and uses up much of the carbohydrates and efficiently lowers blood system levels of Insulin. 3. Exercise can increase blood flow by 700%. Better circulation causes Insulin to move to the target cells faster and Glucose is delivered faster. Due to the nervous system, normally horses (and humans) already have a small amount of Insulin in the bloodstream and with regular exercise, the circulation is better able to work efficiently and not cause the body to ask the Pancreas for too much Insulin when a smaller amount of Insulin could do the work. This is called "increasing Insulin Sensitivity". By increasing Insulin Sensitivity, this leads to lower and lower levels demands for more Insulin until you can return to normal levels. 4. By lowering the excess levels of insulin, exercise also helps prevent the irritation of blood vessels, which leads to poor circulation and Laminitis / Founder (*in humans diabetes*). 5. Exercise has the ability to keep blood Glucose levels slightly low for 6-12 hours. That is called "Hypoglycemic effect" and drops the levels of Insulin circulating in the bloodstream. The effect of exercise lasts much longer than the time exercised.

Try not to miss my January article for the continuation (*part 2*) of this information.

*Lewis aka Blackie Blackburn,*

www.blackburnnaturalhorsetraining.com, blackieb@btconnect.com,  
01799-543711, 0771-8317654