

Insulin Resistance (IR) – What is it? Can Herbs help?

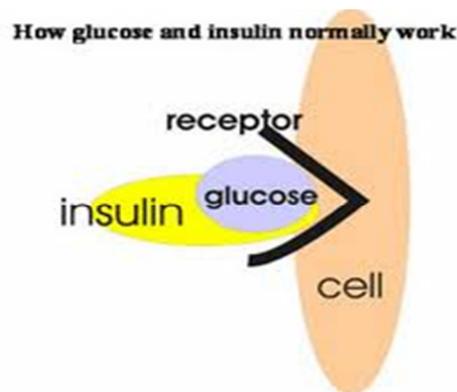
Experts believe Insulin Resistance mimics Cushing's disease in many ways, although the horse does not have the benign pituitary adenoma present in the Cushing's animal.

Diagnosis revolves around clinical signs (abnormal body fat distribution, abdominal fat, 'cresty' neck, fatty shoulders, geldings with swollen sheaths), in combination with blood tests. Samples are usually taken for insulin and glucose and sometimes triglyceride (a component of fat) levels.

Although affected animals may be overweight, it is not always so, but most tend to be 'easy keepers' or resistant to losing weight and they may have been overweight as youngsters. Founder is usually a feature at some point, with changes seen in the hooves such as founder rings, or expansion of the white line, suggesting some founder has occurred, even despite the absence of apparent foot pain.

So what exactly is IR and why do certain types of horses appear to be more susceptible to the condition?

Normally, when carbohydrates are digested, they are converted into glucose which is absorbed through the gut wall and enters the bloodstream. Here the hormone Insulin acts like a 'key', allowing glucose to enter cells where it is used as an energy source by the body and conversely, when glucose levels in the body drop, the production of insulin stops.



Body fat was once thought to be just an energy reserve and protector of vital organs. However certain types of body fat, especially those found in the abdomen, are now thought to be actively involved in a number of metabolic processes, including cortisol production. One consequence of increased body fat is that it can lead to an increase in the level of cortisol produced. Cortisol is a natural steroid hormone, that amongst its many functions, inhibits the action of the hormone insulin, and provokes the 'flight or fight response' to stress.

With high body fat stores cortisol production levels remain high and are not switched off, leading to increased circulating levels of cortisol. This then further inhibits the action of insulin, encouraging some of the cells to become "insulin resistant", preventing the normal uptake of glucose by these cells leading to high circulating blood glucose levels. The body

however still needs an energy source to function correctly, so to provide the body with the necessary energy the liver starts to break down stored fat reserves (gluconeogenesis).

So how do native horses and ponies survive in the wild?

This process of storing and then using up stored body fat, is believed to explain how tough breeds (native ponies, Iberian, Morgans, Paso Finos, Peruvians, Arabians) evolved, in order to survive the harsh winters.

During the late spring, summer and fall, when the weather is warmer, food more plentiful and higher in sugars, the horses build up their stores of body fat. This natural build-up of fat ultimately leads to an increase in circulating cortisol levels, 'insulin resistant cells' develop and as a consequence even more fat is laid down, resulting in the animal entering winter with a generous layer of body fat.

During the winter and early spring, when the weather is cold, food is scarce, and of low nutritional value the horse can draw on these fat reserves to provide the energy needed to help keep itself warm. When the fat reserves are exhausted at the end of the winter, cortisol levels naturally drop, insulin resistance is reversed, and the animal arrives lean, yet healthy, in the spring, ready to start the whole cycle again.

IR has arisen, perhaps partly due to genetics and breeding, but also due to the way in which horses and ponies are managed today. High levels of blood glucose, whether obtained excessively from the diet or because of insulin resistant cells, will eventually be converted and stored as fat, as seen in wild ponies. Unlike their wild cousins our pampered domesticated horses, are never required to go through the scarce food times of winter and we turn them out onto rich pastures where they have no need to expend any energy searching for food. We then exacerbate the problem by giving additional forage, providing inadequate exercise or activity, and then when the weather turns cold we cover them up with snug rugs, removing the need for them to expend energy to keep warm! No one wants to see their horse suffer but we have to realise that we are effectively turning them out onto a 'running buffet' 24/7, with little or no exercise to work off the energy generated.

A very different picture from wild ponies!

So how can herbs help an IR horse?

Firstly it is important to emphasise that any herbal supplementation should be used in conjunction with a steady gradual fittening/weight loss programme. Regular exercise is essential to encourage loss of body weight, and a greater muscle mass will help towards fat metabolism (muscles burn more calories). Daily turnout is vital, horses and ponies were designed to graze whilst on the move, which again encourages the burning of calories.

Many of the herbs that can be utilised are exactly the same herbs I would prescribe for an individual suffering from Type 2 Diabetes, a very similar condition to IR, which produces many of the symptoms we see in IR horses (obesity, lethargy, poor circulation, muscle wastage etc).

In this instance I would select herbs that can help:

- Reduce glucose (hypoglycaemic) and insulin levels in the blood. This is the same action as Metformin, one of the main drugs used in IR.- **Artichoke, Fenugreek, Garlic, Nettle**
- Reduce absorption of glucose from the gut – **Psyllium, Goats Rue**
- Assist in the absorption of excess glucose in the blood stream – **Psyllium, Fenugreek, Artichoke, Garlic, Goats Rue,**
- Promote cellular uptake of glucose – **Goats Rue**
- Support liver function and regeneration – vital for efficient fat metabolism and removal of blood toxins. – **Milk thistle, Artichoke**
- Support bile salt production – **Artichoke, Milk Thistle, Nettle**
- Support digestive process and gut health – **Psyllium, Mint, Fenugreek, Artichoke**
- Normalise Insulin sensitivity – **Psyllium, Goats Rue,**
- Reduce blood lipid levels – **Artichoke, Garlic, Psyllium, Fenugreek**
- Improve blood circulation - **Ginger, Nettle, Mint**

Artichoke Leaf – *Cynara scolymus* - is *hypoglycaemic* (reduces blood sugar levels), and *hypolipidaemic* (reduces serum lipid levels). Artichoke significantly reduces serum cholesterol and triglyceride levels. It is why we eat it at the beginning of the meal as an appetizer, with its 'bitter' action, it encourages the production of digestive juices and bile salts which are critical for digestion and absorption of fats and fat soluble vitamins. Artichoke is also a *prebiotic* that will help encourage production of 'good' hind gut bacteria, and improve liver function necessary to help break down stored fat.

Psyllium husks - *Plantago major* – contains a constituent known as *mucilage* (a plant polysaccharide). Mucilage is very hydrophilic (water-loving) and when ingested traps water in its cage-like structure, forming a gel and swelling to many times its original volume. Mucilages are a class of soluble fibre and Psyllium in particular has been well studied and shown to be effective at lowering blood cholesterol, insulin and glucose levels. Soluble fibre helps to retain glucose in the gut and to reduce blood insulin levels after eating. The plant has also been shown to have an anti-inflammatory and healing action on the digestive tract, as well as acting as a 'prebiotic' so enhancing levels of beneficial bacteria in the gut.

These actions are particularly relevant as it has been suggested horses may struggle to absorb nutrients from their food if the integrity of the gut is compromised. Lack of nutrient absorption has been linked to the onset of some forms of founder.

Trials undertaken at the Montana State University on a group of horses would appear to confirm these actions. Over a 2 month period 16 horses of normal weight were given their usual daily ration along with various dosage levels of psyllium. On the final day of the study each horse had a series of blood tests to determine blood glucose and insulin responses immediately after meals. The data showed that horses receiving a daily psyllium supplement had lower blood glucose levels after eating, and on the higher doses of psyllium also had lower insulin concentrations after meals, indicating greater sensitivity to the hormone. In humans the plant has been found to be effective in lowering blood cholesterol levels by up to 9.8%, and helping to regulate blood sugar and blood lipid levels.

Fenugreek – *Trigonella foenum - graecum* – *hypoglycaemic and hypolipidaemic* – reduces blood sugar levels and blood cholesterol levels in diabetes. It contains the constituent galac-

to-mannan which aids with fat digestion. Fenugreek is also excellent for overall digestive health as it is an internal demulcent reducing inflammation, soothing and healing to the mucosa of the stomach and intestines. Poor gut function has been linked to poor nutrient absorption and the increased risk of founder.

Milk Thistle – *Silybum marianum* – *cholagogue* (stimulates production and flow of bile) aiding digestion of fats. Milk thistle is hepatoprotective and has a strong antioxidant action (offering 10 times the antioxidant action of Vitamin E). Constituents in the seed also help to reduce the permeability of the liver membrane, helping to protect the organ from damage by excessive circulating corticosteroids. The plant has also been shown to enhance the synthesis of RNA and proteins and consequently cellular regeneration, speeding up the renewal of damaged liver cells.

Garlic – *Allium sativum* - *hypoglycaemic and hypolipidaemic* – effectively reduces the levels of glucose in the blood stream as well as lowering blood lipid levels and total cholesterol. Garlic has been shown to help clear fats accumulating in arteries, and it is used extensively for diabetes. Garlic also acts as a 'prebiotic' enhancing the production of beneficial bacteria in the hind gut and as a *cholagogue* increasing bile salt production.

Ginger – *Zingiber officinale* – contains *gingerol* which has been shown to have a prolonged hypoglycaemic activity. Ginger is also a vasodilator and strong circulatory stimulant, that will help encourage healthy blood supply to the vital organs and limbs.

Goats Rue – *Galega officinalis* – is hypoglycaemic and like the Psyllium inhibits the absorption of glucose from the gut, thereby reducing the levels of sugar in the blood stream. The herb also potentiates the effects of insulin, promoting uptake of glucose by the cells.

Kelp – *Fucus vesiculosus* - Anti obesity, rich in organic minerals, biotin and methionine needed to ensure healthy hoof growth, magnesium (low levels of magnesium have been linked to IR), plus high levels of other minerals, trace elements, amino acids and vitamins.

Mint – *Mentha piperata* - Digestive carminative, soothing to the digestive system. Mint is also a good source of potassium and magnesium, low levels of magnesium have been linked to IR.

Nettle – *Urtica dioica* – Circulatory stimulant, rich in Vitamin C, iron, sodium and dietary fibre. Cleansing and anti-diabetic, will stimulate blood supply to vital organs and in particular to the limbs and feet.

I hope that this has given an indication of some of the key herbs that can be used, in conjunction with dietary and exercise programmes to help support horses with IR.

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