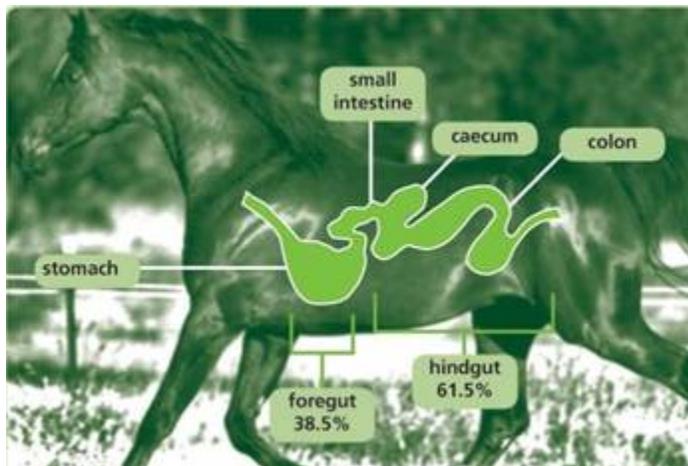


Health Solutions

Horses have evolved as herbivores over the past 3 million years, with the equine digestive system designed to derive nutrients from a variety of carbohydrates, proteins and oils found in plants, herbs and grasses. Having only a small stomach requires horses to graze for most of the day (approx. 14 - 18 hours a day). Consuming little and often and where possible, they select a wide range of plant species. For horses in the “modern” world, life may be very different. Some horses have restricted or no access to pasture, there is a necessity to supplement with a range of feedstuffs in order to provide the additional nutrients required. On top of this, pastures offered to horses have often been developed for ruminant livestock, which have a totally different digestive system.

Some of these pastures are unsuitable for horses, because they supply the wrong type and balance of nutrients (www.safergrass.org). As an alternative or addition to grazing, grain and grain by-products have been the lowest cost, most convenient and readily available feeds to supply the additional digestible energy (DE) required by horses. As a result of our busy lifestyles, it is convenient for most horse owners to feed these concentrate feeds twice daily (before and after work). Further, many horses are not worked to the same extent as they their ancestors, before mechanization. Consequently, horses are often grazing pastures designed for ruminants, are supplemented twice daily with large amounts of high NSC feeds, and as a result become overfed and underworked. Horses were not designed to thrive in this system.



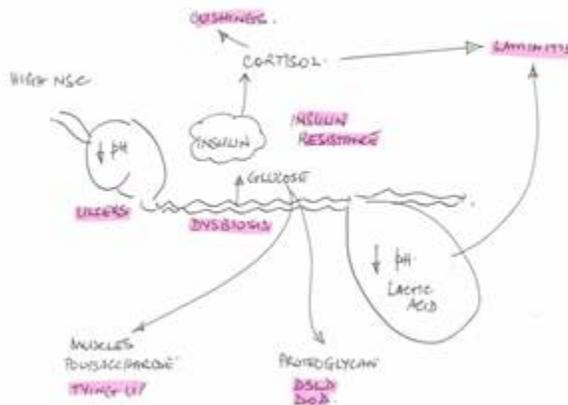
There is an increasing incidence of ailments in horses including obesity, colic, ulcers, lameness and laminitis, polysaccharide storage myopathy (PSSM), insulin resistance (IR), equine metabolic syndrome (EMS), Cushing's, and Equine Systemic Proteoglycan Accumulation (ESPA). Many of these ailments are treated by a range of veterinary medications and drugs. The increasing incidence of these ailments raises the obvious question, what is changing? It is inconceivable that the horse metabolism has suddenly changed over the past 50 -100 years. It is proposed that these ailments are symptoms of an underlying cause, and that how and what we are feeding horses has changed.

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These changes to feeding may be causing a range of Metabolic Chaos in many horses, as manifested in the symptoms listed above. Not all horses are affected equally, some breeds are more susceptible to some of these syndromes, and therefore knowledge of the breed, activity and dietary history is required. Refer to **Stance Equine Feeding System**. The amount and frequency of sugar and starch (NSC) intake, is suggested to be one of the major dietary factors contributing to Metabolic Chaos in horses is. It is well recognized that the amount and type of sugar and starch in equine feeds has changed significantly. Feeding these high NSC feeds twice daily will cause spikes and circulating levels of insulin and glucose. This can exacerbate the issues related to maintaining glucose homeostasis in the body, causing loss of insulin sensitivity leading to insulin resistance (IR), and consequently higher circulating levels of insulin and glucose.

How does the horse dispose of the increased circulating glucose? It can be stored as

- body fat causing obesity. Insulin causes partitioning of glucose into fatty acids, and accumulation in fat cells by stimulating the enzyme lipoprotein lipase, and suppressing the enzyme hormone sensitive lipase.
- polysaccharides in muscles (PSSM) in some breeds such as quarter horses, draft breeds, appaloosas
- proteoglycan in connective tissue causing swollen legs, tendons (ESPA).



In summary, high NSC feeds fed to horses can produce glucose with either directly from the intestines, or from the conversion of propionic acid to glucose in the liver. Feeding high NSC feeds twice daily will cause spikes in insulin and glucose (**Richards and Kempton 2012, AVJ**). It is proposed that feeding high NSC feeds causes the horse to produce high levels of glucose, increased secretion of insulin and in some cases insulin resistance. The effects of high levels of glucose and insulin cause metabolic chaos as manifested as a variety of symptoms in some horses.

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