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Review of "Countermeasures for pasture-associated laminitis in ponies and horses"

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Why was this paper written?

After colic, laminitis is the most common reason horses and ponies require veterinary care. The condition is painful, often chronic, and sometimes fatal. Many horses never return to their previous levels of use after developing laminitis. Because of the seriousness of the disease, most owners would consider taking precautions to prevent laminitis in their horses if such management steps could be implemented.

For horses that develop laminitis while out on pasture, removing the horse from fresh grass would seem to be a simple method of preventing problems. This step may not be practical, and eliminating all pasture turn-out can lead to other health and behavior problems. This paper concentrates on measures to prevent the development of laminitis in horses that are pastured at least some of the time.

What management suggestions are made?

The authors list management steps to prevent horses from getting laminitis and/or to limit the severity of tissue damage. They include:

- *Identifying animals predisposed to laminitis.* In general, ponies are somewhat more susceptible and Thoroughbreds are somewhat less susceptible than other equines, according to this article. Animals that have had previous bouts of laminitis, obese horses, and members of some breeds such as Morgans and Saddlebreds are at an increased risk. Other risk factors (poor pituitary function, abnormal peripheral blood vessel responsiveness, particular unknown genetic patterns, insulin resistance) are not as easily identified. More research is needed to designate at-risk horses and determine which physical and genetic characteristics add to the likelihood of a horse developing laminitis.
- *Limiting the development of insulin resistance.* There is some evidence that laminitis is more frequent in horses with insulin resistance, and/or in those that get little or no regular exercise. Are unexercised horses more prone to laminitis simply because they are obese, or because exercise triggers other metabolic processes in addition to controlling weight? The relationship between exercise and equine insulin resistance is unclear. In any case, measures to discourage the incidence of insulin resistance include replacement of a starch diet with a high-fat-and-fiber ration; regular monitoring of body weight and condition; adjustment of diet and exercise to avoid obesity; and development of simple, reliable tests to identify insulin resistance.
- *Avoiding high intakes of rapidly fermentable material.* Theoretically, sensitive horses could safely be turned out to pasture if owners restricted grazing when fructan levels are highest, and horses were put out only during low-fructan periods. This seemingly simple management step is not easily

followed, however, as research has produced no clear-cut guidelines. Some studies on season have shown May in the United States, and May and June in the United Kingdom, as months with a higher risk of laminitis for grazing horses. Other studies have not identified an effect of season on fructan levels. Fructan levels in pasture grasses are known to vary by location, time of day, grazing pattern, plant species, and field topography. In addition, individual equines have different tolerances. The authors of this paper state that the safest times to allow sensitive horses to graze are late at night or very early in the morning, with horses removed from pasture by midmorning at the latest. Avoid having horses graze mature stemmy grass; grass changing from the leaf growth stage to the seed/ear emergence stage, such as during late spring; during periods of sunny, cold weather such as late fall after the autumn flush of growth and cool, sunny winter days; or on recently cut stubble. Grazing timothy may be safer because this grass tends to have lower levels of fructans and may be fermented more slowly, therefore being less likely to cause hindgut acidosis.

- *Preventing/reducing formation and absorption of various "triggering factors."* Slowing or limiting the intake of fermentable carbohydrates is suggested, as is the use of hindgut buffers to prevent or reduce pH changes in the large intestine.
- *Reducing oxidative damage*. Although research has not produced complete answers, it is thought that blood vessel damage can be caused by increased free radical formation that occurs as a result of glucose/insulin metabolism. The authors suggest that more studies are required to determine whether antioxidant supplementation may be of value.
- *Preventing increased matrix metalloproteinase (MMP) activity*. MMP activation results in the breakdown of tissues that hold hoof structures together. However, MMP enzymes are essential for normal tissue remodeling throughout the horse's body, so complete prevention of MMP activity is not suggested. Cryotherapy (application of ice or cold water to the hooves) may be helpful in preventing episodes of laminitis, although the exact mechanism is still being investigated. Work is ongoing to develop and test agents that could affect MMP activity, and the authors feel this is a promising area that could lead to ways to avoid or treat laminitis.
- *Preventing changes in blood flow*. Many substances affect blood flow within the tissues of the hoof. Cortisol, serotonin, fermentation-related monoamines, various endotoxins, endothelin, L-arginine, and topical nitric oxide donors all have the potential to increase or decrease circulation. When actions, interactions, and varying levels of sensitivity within individual animals are considered, it is easy to see why definitive answers are elusive. As with other factors, further research is needed to provide specific management guidelines for horse owners.

What does this tell us about preventing pasture-associated laminitis?

The authors of this paper state that a great deal is still unknown about preventing laminitis in horses that are allowed some access to pasture. More research is needed in many areas to help veterinarians and horse owners understand the multiple factors involved in this disease. Monitoring weight, preventing obesity, seeing that horses get regular exercise, preventing intake of large amounts of easily fermentable carbohydrates, and limiting pasture access for sensitive horses are steps that can be taken at the present time.

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