

MESSAGE FROM THE GRAYSON-JOCKEY CLUB RESEARCH FOUNDATION

EQUINE GASTRIC ULCER SYNDROME

Feeding matters (but not in the way
that we previously thought)

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It has long been recognized that diet is an important risk factor for equine gastric ulcer syndrome (EGUS). This is particularly true for lesions involving the squamous mucosa in the upper half of the stomach while recent work suggests diet plays little, if any, role in the development of disease in the glandular mucosa of the lower half of the stomach.

Instead it appears lesions in the bottom half of the stomach are affected by other risk factors such as breed, environmental stressors, and the number of days exercising per week.

Regardless, the importance of diet in squamous disease and the importance of roughage in hindgut health have led to the widespread recommendation for the provision of unlimited pasture or hay as a means of reducing the risk and severity of EGUS.

This recommendation is a cornerstone of disease prevention for both the squamous mucosa in the stomach, and the hindgut. However, recent studies funded by the Grayson-Jockey Club Research Foundation have highlighted that feeding, or more specifically overnight fasting, might impact treatment outcome when treating with omeprazole due to impairment of drug absorption.

These findings suggest the feeding management of horses during the therapeutic phase, and when omeprazole is used as a preventative, should differ from that when non-pharmacological strategies are being employed for disease management.

The poor healing response of glandular lesions and sub-maximal healing rates of squamous lesions with oral omeprazole have been known for some time. This has led to questions whether acid suppression is the most appropriate treatment of both forms of disease, espe-

cially glandular disease. However, recent studies with new generation, more potent acid suppressors have shown that very good rates of healing are observed for both the squamous and glandular mucosa when appropriate magnitude and durations of acid suppression are achieved. This has reinforced the need to maximize acid suppression when treating with oral medications such as omeprazole.

THE IMPACT OF DIET ON DRUG ABSORPTION

Until recently the role of diet on the efficacy of oral omeprazole has been understated and the potential for feeding recommendations to interact with drug efficacy largely ignored.

However, it has been shown that, when compared with the fasted state, feeding reduces the absorption of buffered omeprazole formulations by approximately 50-66%, meaning that two to three times as much drug would be required to produce a similar effect when the horse is eating unlimited roughage vs. being administered the drug after an overnight (10 hour) fast.

Consistent with this finding, it has been shown, in a study funded by the Grayson-Jockey Club Research Foundation and using indwelling pH probes in horses' stomachs, that the magnitude and duration of acid suppression achieved in animals receiving an unlimited hay diet is less than horses receiving a high-grain/

low-fiber diet used as a proxy for a race-horse/performance horse diet. The magnitude of this effect was pronounced in some animals with minimal, if any, acid suppression demonstrable in horses consuming unlimited hay even at the "full" omeprazole dose of four mg/kg once a day.

Considering this, the author believes current recommendations that do not distinguish between feeding management during pharmacological treatment and dietary prevention are inappropriate. Instead recommendations should be updated to include that, where possible, omeprazole be administered after an overnight (8-10 hour) fast and approximately 60 minutes prior to the morning feed. This small management change has significant potential to increase the efficacy of oral omeprazole in many patients. Once omeprazole treatment is completed the current recommendation for unlimited roughage as part of prevention management is appropriate, as long as ongoing oral omeprazole therapy is not required for prevention.

The idea of "starving" horses overnight is somewhat counterintuitive and flies in the face of previous recommendations for EGUS prevention.

However, several important factors in the recommendation should be recognized; firstly, horses naturally consume 70-80% of their roughage during the day with the remaining 20-30% consumed overnight. Studies have shown that horses stabled and fed hay from a single hay net typically cease eating around 10 p.m. (although some animals clearly don't subscribe to this rule!) and then spend the remainder of the evening/night resting. As

such, the proposed enforced fast does not dramatically alter the eating behavior of most horses beyond preventing them from accessing their breakfast the following morning until there is a chance to administer the medication. Secondly, a horse consuming unrestricted roughage takes eight to 10 hours to empty its stomach of roughage so it is only a narrow window that the stomach is empty, not the full eight-to-10-hour fasting window.

THE IMPACT OF TIMING OF FEEDING

Like the impact of feeding as a whole, to date little attention has been paid to the timing of feeding in regard to omeprazole administration. Although horses are constant acid secretors, there is also a significant effect of meal

feeding on acid secretion.

Proton pump inhibitors (PPIs), such as omeprazole, are prodrugs, meaning that they are absorbed in an inactive form that requires conversion to an active form following absorption.

For PPIs it is gastric acid secretion that is the stimulus for the drugs to be converted to their active form (in effect, and somewhat ironically, the acid producing proton pumps need to be turned on and producing acid to be inactivated and stop producing acid), and it is important the stimulation of pumps occur while drug concentrations are present.

Following administration of oral omeprazole maximal serum concentration occurs at around 45-90 minutes and it is important that maximal stimula-

tion of the proton pumps occur within this period. Further, the type of meal might be important as gastric distention appears to play a role in gastrin release, and subsequent acid production, in the horse. Larger amounts of gastrin, which stimulates acid production, are released more rapidly in response to voluminous, roughage-based meals when compared with smaller grain meals.

Considering this, the author recommends feeding a large, highly palatable, roughage-based meal (i.e. alfalfa hay) 60 minutes after administration of oral omeprazole followed by any required grain/supplement feeding. [BH](#)

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