Functional Feeding and Equine GI Health

By Peter M. Bedding, PhD

Feeds are not medicines but good feed management is probably the best long-term solution to many digestive problems, including ulcers. Ironically, feed is also the main culprit in many of these disorders. This is because trainers often put their horses on hard feed in order to guarantee high energy concentrations for maximum performance. But in addition to giving them extra energy, hard feeds also allow large quantities of sugars to be released in the mouth.

Horses have evolved to eat large quantities of grass, and in the process they produce gallons of saliva daily. But when they are allowed to chew only small amounts of hard feed, performance horses don't generate enough saliva to buffer the high levels of sugars and acids that are produced.

As well as decaying their teeth, the hard feed adds to the acidity of the stomach, which in due course challenges the stomach wall. Together with stress and exercise, this can lead to stomach ulcers.

A natural diet supplies substances that support the integrity of the GI tract. However, in emphasizing performance, many manufactured feedstuffs end up being deficient in naturally occurring nutricines that are needed to maintain the health of a horse.

Vitamins and minerals are typically added in an attempt to correct these shortcomings. When various nutricines are compounded to address a specific function – such as immune response or tendon healing – it is called functional feeding, and the formulation is called a nutraceutical. But before any functional feeds can have an effect, the gut itself must be in good shape. Therefore, a nutraceutical that addresses the proper functioning of the gut provides a necessary foundation for all other functional feeds.

Such a gut-oriented functional feed would include specific prebiotics, amino acids, nucleotides, polar lipids and antioxidants. With a nutraceutical like this, the health of the GI tract can be actively managed, protecting the gut wall from attack by acids, pathogens and toxins and promoting the regeneration of intestinal tissue cells.

Pasturing a horse is a sure-fire way to improve its digestion, but it doesn't provide the energy density needed for a performance horse. In the absence of the ideal natural feeding environment, a functional feed is essential.

In today's high performance horse world, ulcers are ubiquitous and colic is the number one killer. But with the proper functional feeding program, the equine GI tract can quickly recover from insults even during strenuous training, allowing the horse to operate at the absolute peak of its abilities.

Important Prebiotic Nutrients

Prebiotics are often narrowly defined to be nondigestible food ingredients that selectively stimulate the growth and/or activity of beneficial microflora. A wider definition would include ingredients that are ultimately digested (due to the action of the target bacteria) and those that indirectly promote a healthy bacterial ecology.

Recent research has uncovered several new prebiotic ingredients that have great promise in the equine world. Some of these components act directly to feed beneficial bacteria and some act to inhibit the growth of pathogens. Others act indirectly by stimulating the immune system to help maintain the proper balance of hindgut flora and fauna. Here's a brief summary of these novel feeds:

Polar Lipids

Lipids represent a large class of molecules that include fatty acids, phospholipids (lecithin), galactolipids and triglycerides. They play a key role in the structure and function of cellular membranes and are found in much of the plant material already in equine diets. As a consequence of their ubiquity, lecithins and lipids are considered to be a GRAS (generally regarded as safe) supplement.

Oat oil is rich in polar lipids, particularly galactolipids. These dietary polar lipids are important in forming the tight junctions between the epithelial cells lining the gut. Cells connected in this fashion present a unified barrier against digestive juices, toxins and pathogens. Polar lipids are digested into galacto-oligosaccharides (GOS) which nourish the beneficial bacteria in the hindgut and discourage pathogenic species.

Beta-glucan

Beta-glucan is a polysaccharide derived from yeast, barley and oats that has several profound effects on typical animal systems. It has been difficult to culture bacteria from horse stomachs, but colonic bacteria are known to include a wide variety of pathogenic species. Beta-glucan serves an important role here as the most potent known stimulator of the immune system. It arouses macrophages, which have a specific beta-glucan receptor, to mount a full-blown immune system response to pathogenic microbes and helping to heal damaged tissue.[i] [ii] [iii]

Beta-glucan also creates a gel, slowing the transit of digesta through the gut and allowing starches to be digested earlier in the system, thereby reducing the negative effects of starch in the hind gut, particularly due to the growth of pathogens.[iv] [v]

Glutamine

Glutamine is a muscle fuel and also supplies nitrogen to the immune cells of the intestinal mucosa, which help to prevent pathogenic organisms from entering the circulatory system.

Threonine

Threonine is especially useful for wound healing and for treating stress, but it is also an essential link in the production of immunoglobulins, which help to control the balance of bacteria in the hindgut.[vi]

Nucleotides

Dietary nucleotides seem to have an important beneficial effect on the intestinal microflora, stimulating the growth of beneficial bacteria and inhibiting pathogens. This may be due to an effect of dietary nucleotides reported in a NASA study and elsewhere: stimulation of the immune system.[vii] [viii] In particular, lymphocytes and erythrocytes are not able to synthesize the purine-based nucleotides at all. For these cells, available nucleotides are essential to proper functioning.

Mannan Oligosaccharides

Extracts of yeast (saccharomyces cerevisiae) have been found to bind pathogens,[ix] perhaps because their mannan oligosaccharide (MOS) content mimics the carbohydrates in the enterocyte membranes. Pathogens are fooled into binding with MOS instead of the enterocytes, and are subsequently flushed out of the digestive system. Along with the pathogens go the toxins they would have produced.[x]

MOS can be digested by the enzymes of certain beneficial bacteria. So, in addition to discouraging pathogenic bacteria, MOS also promotes the growth of beneficial microbes such as lactobacillus.

MOS also stimulates the immune system[xi] and encourages the growth of intestinal villi, showing improved digestion and absorption of nutrients in various animal studies.[xii] [xiii] Mannans are also on the GRAS list.

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