Hindgut Acidosis

Equine Nutrition
Equine Science Certificate/Diploma
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Introduction

In the horse, the hindgut refers to the digestive area from the cecum to the rectum. It is characterized by high levels of fermentative microbial digestion. Fermentation means that a chemical process happens as a result of microorganisms, yeast and friendly bacteria. Acidosis is a term used to describe a condition of increased acidity in a tissue. The collective term in equine nutrition refers to a state of change in the pH of the hindgut and acid profiles impacting fermentation, thereby affecting digestion of the host. The primary function of the hindgut is for fiber digestion and conversion of this fiber into useable energy for the horse. (1, 2, 3) “Allowing acidosis to persist can lead to problems such as ceacal, and colonic ulcers, colic and laminitis”. (17)

This topic gained exceptional relevance for me with my horses in the past year, which has prompted me to take this Equine Nutrition course. This course is teaching me the core principles as to why hindgut acidosis is so prevalent, likely profoundly more prevalent than mainstream awareness. It is my goal to understand the physiology so that I may assist my community in making changes in their horse-keeping practices because Equines Matter!

Clinical Signs

A sign is an objective physical manifestation of illness, injury or disease. A rapid pulse, a high temperature, a low blood pressure, an open wound, bruising, etc. are all signs. A symptom is subjective from the patient point of view. A symptom is what the patient experiences about the illness, injury or disease. Symptoms can only be experienced, they are not able to be observed or measured objectively. Pain is a symptom. I do not know you are having pain unless you tell me. Subclinical disease: An illness that is staying below the surface of clinical detection. A subclinical disease has no recognizable signs- Yet!

Signs:

Anorexia, Colic, Laminitis (founder), Stereotypic behaviours (continuous, repetitive, and serving no purpose) (4), intermittent diarrhoea, joint inflammation, tying up (8).

Symptom:

Laminitis or more subtle: heat in the hoof

Laminitis: is characterized by inflammation of the digital laminae of the hoof found as heat at the hoof sole, wall and coronet band and severe cases with outwardly visibly clinical ‘signs’ are known by the colloquial term founder (camped back ‘founder’ stance and unwillingness to bare weight). I have added this in a separate category as the symptom can be a latent and/or a missed symptom in the shod horse yet a clear and early ‘sign’ in the barefoot horse (11, 12).
Subclinical:

Decreased appetite, decreased feed intake, mild to moderate signs of colic, poor feed efficiency and weight loss, loss of performance (6, 7)

**Latent Signs: Colonic ulcerations**

*Colonic Ulcer Symptoms*

In the last several years, a number of visible signs have been attributed to gastric ulcers. Some of these symptoms do not logically stem from gastric injury, but are more likely associated with colonic ulceration. Evaluating various symptoms in conjunction with our own observations of horses produces the following set of proposed symptoms of colonic ulcers:

Girthiness, sensitivity along the flanks (right side), “Tucked-up” abdomens, poor hair-coat and eye, diarrhea, fecal pH is 6.5 or less, difficulty bending or collecting. (15)

Early: mild intermittent or recurring colic episodes, lethargy and partial anorexia. Moderate: complete anorexia, fever and diarrhea. Latent: dehydration, ventral edema, weight loss. (16)

Any and all of these may be indications of colonic ulceration and may aid a practitioner’s diagnosis.

(Picture Courtesy: http://www.succeed-equine.com)
Cause(s)

Ideally, for optimal digestion, good bacteria prefer an environment with a pH 6.5-7.0 (5,6). 7.2 is pH neutral. When this pH drops below 6.0 (more acidic), fiber-loving bacteria become less efficient and begin to die off (7). The change in pH provides a hostile environment for some of the many beneficial and ‘friendly’ bugs that live in the hindgut and who are supposed to help in digestion and assist in many aspects of immunity to the animal. (1, 11, 12, 15, 17)

Conversely, to this positive process, lactate-producing and lactate-utilizing bacteria (bugs that cause issues) get really strong in an environment with a low pH. Certain bugs actually shift their metabolism and produce lactic acid rather than beneficial Volatile fatty acids (VFA’s: beneficial forage fermenting bacteria) when exposed to acidic conditions, making things much worse. This changes the microbial populations and acid profiles creating hindgut acidosis.

Certain situations trigger the pH of the hindgut to drop sharply. The two most common causes are the overconsumption of high-starch concentrates or pasture grasses rich in fructan; fructan is the main storage sugar in growing grasses. The demands placed on horses— as pets, as athletes and as breeding animals—means that substantial quantities of energy-rich feeds are being consumed. It is these ups and downs that bring on subclinical acidosis. Many other conditions impact the pH namely stress which inhibits prostaglandins by stress induced release of endogenous corticosteroids or the actual use of corticosteroids (i.e. NSAIDS) (16). Stress for horses can be either physical (i.e. training and performance) and/or emotional stress (i.e. separation anxiety, trailering) (10)

When these feeding conditions occur, it is impossible for the stomach and small intestine to sufficiently digest and absorb the massive intake of starch. As a result, some starch proceeds into the hindgut without being adequately digested. As digestion of starch progresses in the hindgut, the production of volatile fatty acids (VFA) and lactic acid increases, causing a significant decrease in the pH. When the hindgut endures this several times a day, it borders on becoming overwhelmed with acid. Additionally, because lactic acid is stronger than VFA, it can cause serious damage to the intestinal lining. “PH levels of < 6.0 results in the fiber digesting microbes become less efficient and start to die off. Long-term exposure to acid environment <5.8 will result in serious effects on the epithelial lining of the colon and impacting its ability to absorb nutrients from food sources”. (8)

Microbes (good and bad) do not distinguish between age, breeds, performance levels or reproductive function (8). In a study of 545, up to 63% of horses had colonic ulcers. (9)

Hindgut acidosis is a largely a nutritional condition and one that is preventable with awareness and diligence on the part of every horse owner.
Management Strategies

1. Acknowledge your horse’s risk.

Review your horse’s risk for gut imbalances, assess for gastric and/or colonic ulcers and treat if required. This is a difficult strategy, as with many illnesses, controversy exists between veterinarians, and other practitioners as to the risk and interventions. In many cases submitting your horse to an investigative endoscopic will cause a higher risk of possible gastric ulceration- horses are required to have food withheld for 12-15 hours. This practice is contraindicated in horses with possible gastric ulcerations. However, if an ulcer is suspected- this causes a lot of pain to the horse. Many clinicians will recommend a trial treatment and confirm the improvement of symptoms to complete the treatment.

The positive diagnosis for colonic ulcerations would be colonoscopy. Colonoscopy is not practical with a live horse. (15) And thus confirmation of colonic ulcerations is unlikely. Presumptive diagnosis is made on history, clinical signs, some blood work (mild anemia, toxic changes in PMNs, left shift, hyperbriringenemia, hypocalcemia, hypoalbuminemia), ruling out other differential diagnoses and possible use of abdominal ultrasound (16). Positive diagnosis is on necropsy (12).

2. “Ideally, we would revert to feeding practices of 100 years ago.” (15)

- Free choice forage: ensures that the horse’s digestion is functioning all the time
- Any feed changes must be done slowly over time to allow the microbes to adjust
- Access to fresh clean water: access to water, in abundance
- Unlimited movement: this is required to assist in normal physiology peristalsis and aids in caloric use
- Social environment (not alone): horses are herd animals. Their inability to groom one another, protect each other creates an intrinsic stress.
- No grain or simple carbs (even the smallest amount of grain will lower pH): numerous references are made in the literature about the damaging effects of grains on the hind-guts ability to process the fibrous digesta. Many other sources of nutrition are underutilized as a first line option in increasing caloric supply preferring the historical benefits of grains.
- Limit and manage environmental stress: stress in equines is sadly not well explored and not well managed. Stress, whether physical or mental, affects the horse’s immune system. (1)
- Appropriate balanced dentistry: appropriate mastication will ensure the size of the particles of digesta for its travel down the digestive tract.
3. Review these alternatives to minimize the side-effects of all modern feeding regimens:

- Help normalize the digestive flora, eliminating an excess of pathogenic bacteria and endotoxins. The use of prebiotics (14) and probiotics have clinical validity at impacting microflora and enhance fiber/residual startch digestion. There are many variations on quality of these products to consider. (8, 11, 12, 17, 18)

- Feeding to provide buffering to the hindgut i.e. beet pulp, soyhull husks and use of products intended to buffer the hindgut: quick acting and long acting (Equishure by KERx, Promin). (8, 11, 12)

- Provide the nutrients to strengthen and preserve the integrity of the gut wall (both stomach and hind-gut) B vitamins and minerals

- Enhance the immune system for self-repair. Remove the cause of the ailment, and any insulting interventions to the immune system, and rebuild with nutrients (antioxidants). (1)

**Take Home Points:**

- Watch what and when you feed you horse- are you feeding your horse in such a way that it is easier for you, yet not good for your horse?
- Hindgut acidosis is a nutritional problem. You feed your horse; that makes it your problem.
- Forage all the time
- Clean water
- Replenish friendly bacteria in the gut- Saccharomyces cerevisiae , Biosaf sc 47
- Supplements/Mineral to balance the forage-ask for help
- Be aware of the risk and effects of captivity on your horse; he can’t choose what he needs to eat.
- Consider where your horse came from that would affect his digestion: ex-track race horses, rescued horses, performance horses or simply grain- fed at any time in his/her life will have higher risk
- All horses, even those never grain fed, are at risk of hindgut acidosis- from conditions poorly supportive of microbial digestion. (Review 2. Feeding practices)

**References**

(1) Getty, Juliet M. (2010). Feed Your Horse Like a Horse. Indianapolis: Dog Ear Publishing. 2010


