

The equine intestinal microbiome is trending, and judging by interest in pre- and probiotics it's a rather longstanding interest too. Research has actually generated quite a lot of interesting information recently but we are light years away from really understanding how the teeming microbial population in the gut can interact with the horse's body at large.



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The composition of an individual's microbiome is as unique as a fingerprint, complicating efforts to try manipulating it in ways that are deemed to be healthful [electron microscopic image of bacteria]Some bacteria, like Salmonella, Shigella and certain strains of E.coli or Clostridia, are known to directly cause disease and we want to avoid them. For the vast majority though, their functions in fermentation of various types of equine foods is understood but any other effects are not well described and what's good for GI and general health in a dog or human might not be in a horse.

Research into the horse microbiome

Research to date has shown the three major bacterial phyla in the hind gut, in descending

order, are Bacteroides, Firmicutes (some studies show Firmicutes more abundant) followed by Fibrobacteria or Verrucomicrobia in most horses, with many different genus and species within them. However, there is tremendous individual variation by sex, breed, diet, geographical location, level of exercise and things like antibiotics. Because of this, it is extremely important that strict experimental conditions be used to minimize those influences when trying to determine any changes present in a disease state.

There is also limited information to be gained from manure. The microbiome of the cecum and ventral colon are similar but very different from the dorsal colon and small colon. Comparing information between studies and even samples within any given laboratory is hindered by alterations that occur due to sample handling [Beckers et al 2017].

Obesity and the equine microbiome

An area of high interest now is any connection with obesity since mouse and human studies seem to show a clearly different intestinal microbiome in the obese. A few studies detected some changes in horses but they used subjects not standardized for breed, location and diet. In two well controlled recent studies, Morrison et al 2018 from UK and Coleman et al 2019 USA showed no differences between normal weight and obese horses in their bacterial phyla. Unlike in humans and mice, bacterial diversity is higher in obese horses. Some studies showed an increase in isolated genera like Verrucomicrobia or Pseudoflavonifractor in obese horses but no two studies showed the same thing and others showed no significant differences.

What does all this mean? For one thing, it's complicated! Even when a pattern is found, as in people and mice, it is still unknown what is cause or effect, chicken or egg. It also means that services cropping up that claim to diagnose health issues in your horse from a fecal microbial profile have no solid scientific ground to stand on.

There are several companies I know of, in UK, USA, AU, offering fecal cultures or fecal genetic material profiling which claim to identify disease risk. Among the things claimed to be detected are influences on metabolism, gut wall renewal, dysbiosis/colitis, gut wall integrity linked to diet or "stress", inflammation/immune function and bloating. Claims are made that they can identify changes in your horse linked to disruption in those

functions, as well as outlandish advice such as supplementing your horse with vitamins and minerals will kill off beneficial microbes.

These tests are very expensive, as are the variety of prebiotics, herbs and anti-acidity products they sell to go along with them and cure the problems. Don't be taken in or your horse may suffer along with your wallet.

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Comment by Forageplus Talk

It is a common thing in the horse industry to find that no one is looking at the actual causes of an unhealthy state. We are not ever happy to treat just symptoms no matter how fancy or impressively 'sciency' the solution is claimed to be. What we want is to get to a root cause and enable horses to live in an environment which will support a state of healthy and robust resilience. This is the holy grail of horse management.

Many horses are kept on small areas of land which is never rested and grazed so the grass is permanently short. Other horses are kept on grass tracks which are no better in terms of soil health or grass health than the small areas which are never rested. Indeed the poaching that occurs on a grass track during times of wet weather is akin to a nuclear bomb going off in the soil microbiome. People forget or never realise that soil is living environment which needs to be kept healthy not just for its own sake but also for microorganisms living in it, the plants growing in it and the animals grazing those plants.

Eating dirty grass will affect horses microbiome

When horses are exposed to very short cropped grass and soil which is compacted, they are forced to eat dirty food which is close to the surface of the soil. They are exposed to all manner of organisms which are in their turn are affected by the environment in which they too are living. A soil which is constantly trampled, compressed and poached is going to be a very sick place for anything living within it. Compression changes the soil environment, reducing the oxygen available in the soil. This is ultimately going to lead to the over population of certain bacteria or moulds and fungus which take advantage of a sick, anaerobic situation.

You can liken this explosion of undesirable microorganisms to over grazed pasture where the grass becomes sparse and other plants such as clover and docks and thistles take over because they can exist in what is an impoverished environment. The exposure to undesirable and high populations of certain bacteria is inevitably going to affect digestion and this is where horses struggling with compromised digestive function.

Managing horses so they live in a clean environment

An approach to a state of ill-health which treats causes will always be far superior to one that treats symptoms. Take away the dirty grass, take away the always grazing close to the soil, take away the sick soil and reverse all this by managing the land so you work with rather than against nature. Clean up the grazing the horses are programmed to nibble at, no matter how short or sparse, and you change the health of the environment and turn everything on its head.

Keeping horses on hard standing areas for periods of time with access to clean hay, turning them out on to long, clean pasture which is never over grazed is the turning things on its head answer. It is treating the cause rather than the symptom of horses exhibiting failure to thrive and digestive issues.

This way of keeping horses means that the grass sward gets thicker and the horses are exposed less to the surface of the soil. Plant roots get deeper because the plant registers that it can't flower or set seed, so it spends time making better roots and more leaves. More leaves mean less sun on each individual leaf and that means less sugar in the leaf. The grass is not stressed so it has less sugar anyway and this is good news for all horses as too much sugar also affects digestion balance. More leaf and longer leaf means more fibre and more fibre is good for the microbiome population.

Balanced minerals in the soil with the right minerals for the soil organisms creates a healthy grazing environment. This environment will work symbiotically with the grass roots which flourish and thrive in a pH of 6.4. The best growth of grass for grazing horses occurs when the pH is 6.4 because it supports the correct environment for healthy soil organisms. The healthy pH is achieved by getting the right ratio of the major minerals for an individual soil and allowing the soil and grass time to be without grazing animals, just

as nature intended.

The solution to a healthy equine microbiome

The solution to equine digestive health and indeed whole horse health is staring us right in the face. Stop treating symptoms. Work with nature to promote healthy organisms in the soil. Those healthy organisms will be the ones which support healthy plant growth. Healthy plant growth will supply the vast majority of nutrients and a vast array of phytonutrients that grazing animals need to be truly healthy. Look after the soil and you'll be looking after your animals and your bank balance.

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