A NATURAL WAY TO EQUINE HEALTH BY **LIVEBIOS**

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INTRODUCTION

Research in recent years has shown that probiotics added to an equine diet improved feed digestion and efficiency. It means that more nutrients in the feed are staying in the animal body to engage in functional activities rather than being excreted into the waste.

Horses have a small stomach and the rate of passage of their food is rapid. Therefore, horses should be fed frequently rather than given a large amount at a single meal. The digestion of simple carbohydrates, fats and proteins take place in the small intestine. Caecum and colon of the digestive tract act like the rumen of the cattle, serving as a chamber allowing the digestion of hays, grasses and pastures and in which microorganisms convert fibrous portions into usable energy and synthesize protein and Vitamin B complex to benefit the animal.

It is known that same species of microorganisms in the rumen of cattle and sheep are present in the horse's digestive tract. It is assumed that these microorganisms have similar over-all metabolism, using similar nutrient sources and producing similar end-products, particularly the volatile fatty acids (VFA) resulting from microbial breakdown of organic compounds of the feed. However, due to the structural differences of the horses' digestive system, the horse's natural microbial populations are not as effective in digesting fibers as are those of the cattle and sheep. Therefore, a delicate combination of various enzymes, yeast culture and other beneficial bacteria to serve as a feed supplement in the horse's diet is necessary for an efficient fiber fermentation and feed conversion.

LIVEBIOS is a dried product of high strength live **yeast culture** selected from three strains of highly fermenting Saccharomyces cerevisiae, blended with 1) active **Lactic Acid Bacteria** including microencapslulated **Lactobacillus acidophilus** and **Streptococcus faecium**, 2) active microencapsulated **Bacillus subtilis**, 3) feed digesting enzymes mixture of amylase, protease and cellulase, and 4) **Aspergillus oryzae** fermentation extract.

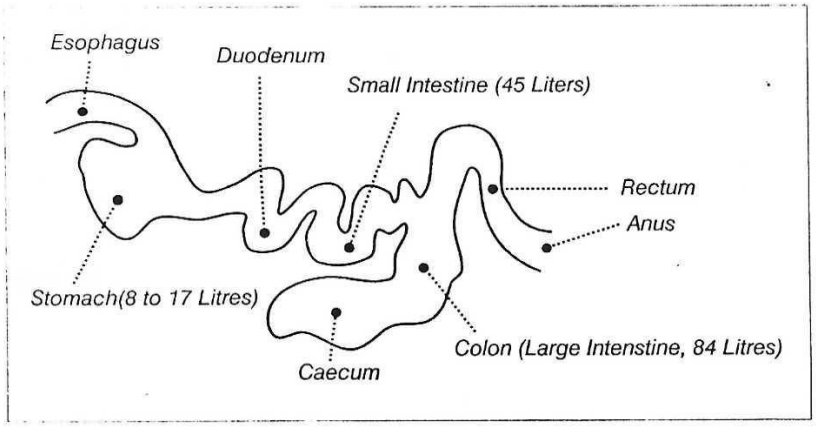

Figure: Anatomy of the Digestive Tract of the Horse

MODE OF ACTION

When consumed by the horse with its feed, LIVEBIOS passes rapidly through the stomach undigested. Then the microorganisms in LIVEBIOS becomes active when they reach the hind gut especially in caecum and colon. The functional activities of these microorganisms and other major components in LIVEBIOS are as the following.

1) Yeast culture can grow under anaerobic condition in the digestive tract utilizing or regulating metabolites produced by other microorganisms. The yeast can buffer the pH value and maintain a stabilized environment in the gut, indirectly encouraging an efficient fermentation.

2) Yeast culture is rich in enzymes (glucanase, amylase, lipase and protease), amino acids, fatty acids, vitamin B complex, and unknown growth factors which can stimulate the activity an numbers of cellulolytic bacteria, thus increase fiber digestibility.

3) Yeast culture can regulate metabolic hydrogen to prevent production of ammonia and methane, thus resulted in a better feed conversion ratio.

4) Yeast culture can improve the digestion and absorption of minerals including P, Mg, Ca, Cu, K, Zn and Mn by animal. Thus it can keep the animal in proper growth and bone mineralization, thus decrease the incidence of developmental orthopedic disease (DOD) in young growing horses.

5) Yeast Culture can aid the protein digestion in the feed, thus provide more amino acids or limiting amino

acids including arginine, leucine, isoleucine, glutamine, methionine and valine for the optimum athletic performance of the horse.

6) **Lactobacillus acidophilus** and **Streptococcus Faecium** have the ability to colonize the intestinal wall and proliferate to prevent pathogenic bacteria including Escherichia coli, Salmonela sp. and other pathogenic bacteria to adhere to intestinal wall. This induces a shift in the balance of gut bacteria, favoring those that are promising the animal a good health and helping stressed horses back to normal quickly.

7) **Bacillus subtilis** are spore-forming bacteria and can grow under both aerobic and anaerobic condition. Thus can produce large quantities of digestive enzymes (**alkaline and neutral protease, beta glucanase and alpha amylase**) to aid feed digestion. Besides, Bacillus subtills is also acting in a competitive manner with pathogenic bacteria for living space in the intestinal wall, resulting in reducing disease infection and enhancing health.

8) **Amylase** can easily split multi-glucosic chains of starch into simple glucose; **protease** can digest complicate protein molecules into individual amino acids; **cellulase** breaks down forage and grain fiber into simple glucose. Thus, a synergetic effect of these enzymes could enhance utilization of ingredients with low biological value to give a similar performance as ingredients with high biological value.

9) **Aspergillus oryzae** fermentation extract contains protease and alpha amylase to aid the digestion and to increase energy output from feed. In addition, it also contains lactase which can instantly convert lactose in milk to available sugars.

In general, LIVEBIOS increases:
- nitrogen retention time and amino acid profiles.
- dry matter digestion.
- fiber digestion.
- phosphorus digestion and availability of minerals including zinc, potassium, iron and magnesium.
- muscle and bone formation.

TABLE 1. EFFECT OF **LIVEBIOS** ON APPARENT NUTRIENT DIGESTIBILITY (%) IN YEARLING HORSES

ITEMS	CONTROL	CONTROL + LIVEBIOS	% INCREASE
Dry matter	70.2	76.6	9.1
Acid Detergent Fiber	59.5	67.8	13.9
Neutral Detergent Fiber	55.8	69.5	24.6
Hemicellulose	53.5	65.1	21.7
Total Nitrogen	52.9	55.3	4.5