

Probiotic Use in Equine Gastrointestinal Disease



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KEYWORDS

- *Lactobacillus* • *Bifidobacterium* • *Saccharomyces boulardii* • Microbiota
- Fecal microbial transplantation

KEY POINTS

- Mechanisms of action include modulation of the immune system, antimicrobial production, bacterial toxin inactivation, and an increase in colonization resistance.
- Probiotics are generally considered safe, and adverse effects are rare; however, adverse effects have been reported in foals and therefore should be used with caution.
- The quality control of commercial human and veterinary probiotics products is poor and the content of over-the-counter probiotics is often inaccurate regarding bacterial species and amount of live organisms contained in a product.
- The evidence behind efficacy of probiotics in equine gastrointestinal disease is weak and their beneficial effects are questionable.
- Future research on the use of probiotics should focus on using different strains, such as members of families with high abundance in the gastrointestinal system of horses, or a mix of many bacterial strains, similar to fecal microbial transplantation.

INTRODUCTION

Elie Metchnikoff¹ studied the longevity of a group of Bulgarians in the 1900s. He observed that these people ate large amounts of fermented milk and postulated that the bacteria responsible for fermentation had a positive effect on the health of the consumers. These bacteria were named *Lactobacillus bulgaricus* and the idea of probiotics was born. Metchnikoff initially defined probiotics as “live microorganisms, which exhibit a health promoting effect” in 1908.¹ Although research initially flourished and more probiotic bacterial strains were discovered, it then drifted to the fringe of medical practice and was rediscovered in the mid-1990s. The idea of probiotics exerting beneficial effects has since re-entered the humane medical field and achieved mainstream medical interest. The Food and Agricultural Organization and World Health Organization modified the initial definition to “live microorganisms,

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that when administered orally at adequate concentrations, provide a beneficial effect beyond that of their nutritional value.”²

GENERAL CONSIDERATIONS

Information regarding probiotics is accumulating rapidly and is widely available on the Internet and from various sources; thus, it is important to understand some practical aspects regarding formulation and labeling of probiotics that make it challenging to provide direct comparisons and interpret results of studies.

Several microorganisms, including yeasts and bacteria are used as probiotics (Box 1). Some bacterial families, mainly lactic acid producers, such as lactobacilli and bifidobacteria, are commonly used. Not all members of the same family have probiotic properties; for example, not all lactobacilli are suitable for probiotic use. Lactobacilli per se are often called probiotics or used as such, but not all lactobacilli have probiotic properties; therefore, the administration of commercial yoghurts is unlikely to be of benefit to the horse. Potential probiotic strains need to be evaluated for suitability of their probiotic characteristics.³ Potential probiotic strains should be able to survive the gastric environment, have antimicrobial properties, and adhere to mucus and epithelial cells.² Not all strains survive the extrusion and drying, which leads to low numbers of active colonies in the end product. The manufacturing process affects the ability of bacteria to maintain desirable traits. Manufacturing a probiotic strain under different conditions, such as varying culture media or coculturing with prebiotics or other probiotic strains, leads to expression of different traits and differences in the final product.^{4,5} It is crucial to remember, when comparing results of commercial probiotic

Box 1

Bacterial genera and yeasts typically used as probiotics

Saccharomyces (yeast)^a

Lactobacillus^a

Bacteroides

Escherichia coli

Enterococcus^a

Bacillus^a

Nitrobacter

Nitrosomonas

Streptococcus^a

Rhodobacter

Fusobacterium

Butyrivibrio

Rhodobacter

Clostridium

Eubacterium

Bifidobacterium^a

Genera are bacteria unless stated otherwise.

^a Evaluated as probiotics in horses.

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