

Health Benefits of Probiotics in Human and Animal Nutrition and Prospective Research

Youssef A Attia^{1,2*}

¹Professor, Department of Arid Land Agriculture, Faculty of Meteorology, Environment and Arid Land Agriculture, King Abdulaziz University, Jeddah, Saudi Arabia

²Professor, Department of Animal and Poultry production, Faculty of Agriculture, Damanshour University, Damanshour, Egypt

***Corresponding Author:** Youssef A Attia, Professor, Department of Arid Land Agriculture, Faculty of Meteorology, Environment and Arid Land Agriculture, King Abdulaziz University, Jeddah, Saudi Arabia.

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Abstract

This minimum review describes the beneficial effect of probiotics in animal and human nutrition. This is including manipulating and maintaining health of the gut and increasing digestive enzyme activity, modifying gut pH, modifying immunity, metabolic process and/or producing substances such as bacteriocins, organic acids, hydrogen peroxide, and short chain fatty acids to control gut pathogenic organisms. Besides well-known growth promoting effects of probiotics reported elsewhere, recent research findings demonstrate that probiotic treatments can be used for control different pathogens, detoxification, antipollution and promoting of health agent, cholesterol-lowering and anti-stress agent. It seems that probiotics have encouraging and bright future in human and animal nutrition. Thus, continue of research for the use of probiotics as alternative agent for antibiotic is essential, in addition advancement of research to study the impact of probiotic on human and animal health at molecular and cellular levels.

Keywords: Health Benefits; Probiotics; Human; Animal Nutrition

Introduction

A probiotic is a living microorganism belongs to yeast *Saccharomyces* or bacterial strains *Lactobacillus* and *Bifidobacterium*. Probiotics may contain a single strain of bacteria, or a combination of various strains, that can be supplied to human and animal to enhance health status. The term 'probiotics' was used firstly to describe substances and organisms that can improve gut ecology. The interest in intestinal microbiology and the use of dietary probiotics came about in the late 1800s and early 1900s, sparked by the isolation of *Escherichia coli*. The use of probiotics is almost 100 years old when fermented milk products were shown to increase beneficial bacteria in gut and promote health in animals and human. The probiotic microorganisms can have an effect only by surviving the digestive environments, involving bile salts, essential to facilitate their colonization of gut without any adverse impacts on the host. However, only some strains of microorganisms have these abilities, others not.

The beneficial effects of probiotics included either directly or indirectly impacts via manipulating and maintaining gut health by controlling harmful organisms and increasing digestive enzyme activity. Probiotics may also modify gut pH, or produce substances such as bacteriocins, organic acids, hydrogen peroxide, and short chain fatty acids to control gut pathogenic organisms. Probiotics also modify immunity, and metabolic process in subjects. Another mode of action is the competitive exclusion, which represents the colonization ability and adhering competition in the membranes of intestinal mucous to prevent pathogens adhesion and invasion. This is a key performance

parameter via inhibition of colonization of pathogens and replacement of adhered ones, which competing host subjects for nutrients and growth factors. Moreover, probiotics had non-immune actions, such as the maintenance of gut function via improving mucosal barrier, enriching secretion of mucus, increasing motility of gut, and consequently interfere with pathogens ability to colonize and infect gut mucosa.

Type of probiotics

The use of probiotics in livestock production can be applied using either heat-treated or inactivated of bacteria or yeast, bacteria and yeast live cultures, or degraded products resulted from bacteria or yeast incubation. Probiotics may contain mixtures or individual species of lactic acid bacteria and/or yeasts, or their end products [1].

Administration route

Probiotics are deliberated generally as safe product for animal and human consumption but may cause bacteria-host interference and undesirable side influences in rare cases. Probiotics can be administrated through food or feeds or in water or as tablets, pills or as syrups to produce their beneficial effects. However, this depends mainly on the right strain of probiotics and/dose of probiotics was must be adequate to induce the desire effect.

Mode of action

The mode of action includes challenge between beneficial organisms of probiotics such as strains of lactic acid bacteria or Saccharomyces yeast and harmful microflora in the mucosa of the intestinal for nutrient availability. The dominance of beneficial organisms over the pathogenic can be induce production of antibiotic-like compounds and organic acids [2].

The gastrointestinal tract (GIT) contains huge numbers and varieties of microbes than other organs of body [3,4]. The microbiota in the GIT of poultry can have two different origins and classified as autochthonous [5], or allochthonous (supplemented bacteria [6-9]). Depending on probiotic strain, the main mode of action most likely includes production of metabolites such as short-chain fatty acids, H₂O₂, stimulation of the immune system and competition for receptor for early occupation in the GIT [10,11].

The most common utilized strains of bacterial as probiotics are *Bacillus* (*B. subtilis*, *B. cereus*, *B. toyoi*, and *B. licheniformis*), *Lactobacillus* (*L. acidophilus*, *L. casei*, *L. rhamnosus*), *Bifidobacterium* (*B. bifidum*, *B. pseudolongum*), *Enterococcus* (*E. faecium*), *Streptococcus* (*S. thermophilus*), *Pediococcus* and *Lactococcus* (*L. Lactis*), and yeast e.g. *Saccharomyces* (*S. cerevisiae*). Many researchers established their profitable properties on productive performance and health status of livestock and human [12,13]. The influences of probiotics on livestock production depends on strains of bacteria and/or yeast, hygiene, other in feed additives, composition and nutrients profiles of feed, processing of feeds and feed hygiene, storage conditions and feed form [11,14,15]. Probiotics and phytogetic extraction have shown to affect GIT microbiota either indirectly or directly. The use of prebiotics as food for probiotics can enhance further beneficial microbiota in the GIT [16], thus control undesired pathogens [13].

A beneficial effects of probiotics on digestibility of nutrients may be induced by the action of probiotic enzymes, improve the gut health and boost of immunity and integrity of the GIT mucosa [4,8,9,11,13,16,17].

Specific application

Besides the well-known growth promoting impact of supplementation of probiotics on livestock production found elsewhere [18], probiotics have been shown to alleviate the adverse influence of Aflatoxins B1 contamination of animals feeds and resorted health and immunity [8,13,19] and detoxification of nitrate [9,11] and alleviate heat stress problems [4] and control infection of *Salmonella enteritidis* [15,16]. In addition, may be many others [20].

Conclusion

In conclusion, apart from different health benefits of probiotics confirmed in animal experiments, the application of different probiotics products in both human and animal nutrition are now in market under many commercial brands; thus, more studied is recommended as a treatment for different pathogens, detoxification, antipollution as well as health promoting, cholesterol-lowering and anti-stress agents to understand mode of action of probiotics at molecular and cellular levels.

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