



AIS SPORTS SUPPLEMENT FRAMEWORK

PROBIOTIC SUPPLEMENT

What is it?

- > Probiotics are live microbial food supplements that may have beneficial effects on intestinal microbial balance and associated impact on health. The two main species used in commercial preparations are *Lactobacillus acidophilus* and *Bifidobacterium bifidum*.
- > Microbes have been used for many years in food preparation – for example, the manufacture of yoghurt and cultured dairy foods, kombucha and alcoholic fermentations. In recent years, a number of different probiotic formulations and supplements have been scrutinised in scientific research (primarily in infants) to examine their impact in modulating gut bacteria or microbiota. The gut microbiota performs several vital functions, including regulating mucosal immune activity, modulating host metabolic activity and protecting against intestinal infection. Dietary manipulation may enhance gut bacteria composition and metabolic activity and promote optimum immune function.
 - Dietary modification, and in particular increasing grain or fibre intake, should be recognised as the primary factor in enhancing gut microbiota diversity, and this can occur within a few days of dietary manipulation. Only after this has been optimised, should consideration be given to probiotic supplementation.
- > Beneficial effects of enhancing the gut microbiota diversity may include improved intestinal tract health, enhanced immune system¹, greater bioavailability of nutrients, reduced lactose intolerance, lower prevalence of allergy in susceptible individuals, and improved mental health.²
- > Apart from gut and respiratory health³, the purported benefits of enhancing gut microbiota diversity in a sporting context include improved body composition and lean body mass, reduction in stress hormones such as cortisol, attenuating age-related declines in testosterone levels, and increased concentration of neurotransmitters that might enhance cognition and mood.⁴
- > The mechanisms of action of probiotic supplementation are largely unknown, but may involve altering the makeup of gut microbiome, modifying gut pH (acidity), producing antimicrobial compounds, modulating gut permeability, stimulating immunomodulatory cells, preventing pathogen infection through 'competitive exclusion', or limiting the GI tract surface area available for colonisation.⁵
- > Issues with dosage, viability of probiotic strains, lack of industry standardisation and potential safety issues, are being further investigated in the food additives industry and research studies. Applications of probiotics in sports nutrition and medicine are still emerging.⁶
- > Although most studies in active individuals and athletes report positive effects on health, there is little evidence showing improvements in sporting performance. The general consensus is that probiotics may confer small variable benefits in performance and recovery, but further laboratory, clinical and field-based studies are required to provide definitive guidelines for athletes.

What does they look like?

- > Probiotics can be obtained from both foods and commercial supplements. Foods such as yoghurt and cultured milk products, and fermented drinks such as kombucha and kefir are a good choice given synergistic effects between food compounds and probiotic cultures. Supplements may be purchased in shell-stable (dried) format for easy use at home or when travelling, or as products that need to be refrigerated.
- > Most studies report effective dosages of 10^9 - 10^{10} organisms per day (i.e. – 1-50 billion bacteria). This concentration corresponds to about one litre of acidophilus milk (formulated at 2×10^6 colony forming units/millilitre (cfu/ml)). Some commercial preparations available in 2020 have up to 25 – 50 billion bacteria per dosage. Studies and clinical experience at the AIS have shown that most athletes will safely tolerate dosages of up to 35 – 50 billion in the commercial preparations that are currently available. Lower levels may benefit some individuals. Daily consumption is recommended as probiotics will pass through the intestine.
- > The shelf-life of most probiotic products is about 3 – 6 weeks when kept at 4° C. The shelf-life of dried supplements is about 12 months, but levels of probiotics may drop significantly over this time.⁷ The concentration of bacteria in food products varies substantially and some research indicates that commercially available products contain no live bacteria.



How and when do I use it?

- > Only after manipulation of diet to facilitate an increase in gut microbiota diversity, should probiotic supplementation be considered.
- > Athletes with a prior history of gastrointestinal problems during periods of heavy training or around the time of competition might benefit from a course of probiotics.^{8,9}
- > The AIS research on probiotics points to benefits in reducing the effects of respiratory illness.¹⁰⁻¹⁵ Given the reasonable likelihood of athletes experiencing symptoms of gut and/or respiratory illness at some point in a training and competitive season a prophylactic approach before specific periods of training or major competition could be useful.
- > Irrespective of whether the application is targeted or prophylactic an individual needs to commence daily supplementation approximately 14 days before domestic or international travel, competition or elevated training load, to allow for colonisation of bacteria in the gut.

Are there any concerns or considerations?

May cause GI side-effects

- > Some individuals report mild symptoms of stomach rumbles, increased flatulence or changes in the stool during the first week of supplementation as the gut microflora changes to accommodate the newly introduced species. These symptoms may be reduced by a gradual introduction of the probiotic protocol, building up to the recommended dose over a week or two.
- > Individuals with a prior history of gastrointestinal tract problems such as coeliac disease or irritable bowel syndrome may be at greater risk of side effects such as an upset stomach or bowel problems.

Some products may not provide sufficient numbers or types of probiotics

- > Several studies have reported low viability for commercially-available probiotic formulations and supplements with insufficient numbers of species, and in some cases the presence of species different to those declared on the label.
- > Individuals are advised to obtain probiotics through a reputable source such as a sports dietitian or their sporting organisation/program. Priority should be given to evidence-based probiotics that have been tested independently under controlled conditions.

Evidence for benefits is still lacking certainty

Benefits may be highly specific to certain individuals and scenarios of use. Although most studies report positive health effects in athletes and active individuals, there is still no substantial scientific evidence to suggest that probiotics play an important role in improving an athlete's performance. Further research is needed before definitive protocols can be established to identify the likely health and performance benefits, supplementation protocols around training, travel and competition, and interaction with other targeted dietary practices.

Where can I find more information?

Gatorade Sports Science Institute

secure.footprint.net/gatorade/prd/gssiweb/sf_libraries/sse-docs/west_sse_179_v4.pdf?sfvrsn=2

Supplement safety information

www.sportintegrity.gov.au/what-we-do/anti-doping/supplements-sport

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The Australian Institute of Sport (AIS) Supplement Framework is an initiative of the Australian High Performance Sport System. The AIS acknowledges the support of members of the National Institute Network (NIN) and National Sporting Organisations (NSO) and their staff in delivering content expertise. This information is intended to help athletes, coaches and scientists make evidence-based decisions about the use of supplements and sports foods. Before engaging in supplement use, we recommend that each individual refer to the specific supplement policies of their sporting organisation, sports institute or parent body, and seek appropriate professional advice from an accredited sports dietitian (www.sportsdietitians.com.au).

Athletes should be aware that the use of supplements may have doping implications. Athletes are reminded that they are responsible for all substances that enter their body under the 'strict liability' rules of the World Anti-Doping Code. Some supplements are riskier than others. The Sport Integrity Australia (SIA) app is a useful resource to help mitigate the risk of inadvertent doping by helping to identify supplements that have been batch-tested. The SIA App provides a list of more than 11,000 batch-tested products. We recommend that all athletes consult the educational resources of SIA regarding the risks associated with supplements and sports foods.. While batch-tested products have the lowest risk of a product containing prohibited substances, they cannot offer you a guarantee that they are not contaminated (www.sportintegrity.gov.au/what-we-do/supplements-sport).

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