



Nutrition
Centre

By TATE & LYLE

GOSYAN[®] GOS

Health Benefits of GOSYAN[®]

Galacto-oligosaccharide (GOS)

Health benefits of GOSYAN®

Galacto-oligosaccharide (GOS) from infants to older adults

Our unique gut microbiota is developed at birth and evolves throughout our lives, particularly at weaning and older age¹. The lactic acid bacteria (LAB), Bifidobacteria and Lactobacilli sp, are important for normal gut health across the lifecycle, helping to repel pathogens and producing short-chain fatty acids (SCFA) as a by-product of their metabolism².



Research suggests that SCFA have supportive effects across many aspects of human health including gut health, immune function, mineral absorption, and brain and mental health^{3,4,5}

We can support our gut microbiota by consuming prebiotics, such as GOS¹



Introducing GOSYAN® (GOS)

GOS are prebiotics, defined as
“a substrate that is selectively utilised by host
microorganisms conferring a health benefit”^{6,7}

GOSYAN® GOS is made enzymatically. GOS can be
synthesised from lactose by microbial β -galactosidases
that catalyse the transfer of galactose residues to lactose,
its hydrolysis products galactose or glucose, or newly
produced oligosaccharides.



Potential benefits:

GOS are resistant to digestion, which enables them
to reach the colon intact, where they can have
beneficial effects⁸. GOS are non-digestible
oligosaccharides characterised by a mix of
structures that vary in their degree of
polymerisation (DP) and glycosidic linkage
between the galactose moieties or between
galactose and glucose¹⁰. Several studies have
demonstrated the prebiotic characteristics of GOS.^{8,9}
GOS has been widely used in milk powders, infant
foods, functional foods, and dairy products.



Benefits for infants, children, and adolescents

One reason for the superiority of breastmilk over formula milk is the presence of naturally occurring GOS, which support the infant's gut microbiota and healthy digestion¹¹. GOS can also be manufactured, and several studies have demonstrated the positive health effects of these types in infants and children^{9,12,13}.

Promoting lactic acid bacteria (LAB) in the gut

A gut microbiota rich in LAB is more favourable to human health. Studies in infants have associated the presence of Bifidobacteria with the inhibition of pathogens, prevention of diarrhoea, increased SCFA, anti-inflammatory activity, immune development, and brain development¹⁰.



Research findings:

In a study of newborn term infants, those not receiving breast milk were randomised to receive a standard formula or one with 0.24g GOS per 100mL¹⁴.

Breast-fed infants acted as a reference group.

After 3 months, gut levels of Bifidobacteria and Lactobacilli had increased in the breast-fed infants as well as those receiving the GOS-fortified formula, compared with the standard formula.

Another trial in infants aged 4-6 months compared a standard formula with one containing 0.5g GOS per 100 mL. The results after 6 and 12 weeks showed increased Bifidobacteria levels in the GOS formula group compared with standard formula¹⁵.

Similar effects on Bifidobacteria and Lactobacilli in infants were confirmed in a systematic review of the evidence, which also reported a lower stool pH and lower levels of Clostridium (a potential pathogen)¹².



Digestive health and comfort

Stools are typically harder and less frequent in formula-fed infants compared with breast-fed infants, which can lead to discomfort¹⁶.

Adding GOS to infant formula can help soften and regularise stools in formula-fed infants according to the findings of clinical trials^{13,17,18,19}. This may be because SCFA produced by the increased levels of LAB stimulate gut peristalsis and draw water into the faeces⁸.

Calcium absorption

Almost all the calcium in our bodies is stored in the bones, making it a critical mineral for normal bone development²⁰. GOS resists digestion, allowing it to be fermented in the large intestine, in particular by Bifidobacteria, to produce SCFA². These lower gut pH which may improve calcium absorption in the gut^{9,21}.

A clinical trial examined the effect of consuming two GOS-fortified smoothies (5g and 10g per day) in 31 healthy girls aged 10-13 years⁹. The results showed a significant improvement in calcium absorption over three weeks, equivalent to an extra 130 mg/day or 49 g/year of calcium being available for deposition into bone. According to the International Osteoporosis Foundation, approximately half of bone mass is accumulated during childhood and adolescence, making these critical periods for bone development²². Maximising bone mass before adulthood helps lower the risk of osteoporosis later in life.

Tolerance and impact on growth

According to systematic reviews, GOS-supplemented formula supported normal growth in infants from 0-12 months of age, while gastric tolerance was good at intakes of 0.15 to 0.8 g/100mL^{13,19}. This indicates that GOS can be added safely to infant formula. In adolescents, 10g of GOS per day was well tolerated with no adverse gastrointestinal effects⁹.



Benefits for adults and older adults

GOS offers benefits across the lifecycle, which is relevant as many countries now have aging populations.

Promoting lactic acid bacteria (LAB) in the gut

Studies in adults have confirmed that adding GOS to the diet stimulates LAB in adults^{6,23}. In one trial, 5-10g GOS per day added to confectionery significantly increased gut levels of Bifidobacteria²⁴.



Digestive health and comfort, research findings:

Several studies report that GOS can help alleviate constipation in adults²⁵ and elderly populations²⁶.

GOS may work by bulking faeces and drawing more water into the gut, as well as by promoting intestinal peristalsis via the actions of SCFA⁸.

In one trial, constipation severity and quality of life were improved in healthy, sedentary adults following 30 days of gummies containing 10g of GOS per day²⁷.



Research also suggests benefits for the prevention of travellers' diarrhoea when GOS is taken prior to overseas travel^{28,29}, and for the alleviation of bloating and flatulence³⁰.

Research^{31,32,33} also suggests that adding GOS to the diet can help improve tolerance of lactose, a dairy sugar. The worldwide prevalence of lactose malabsorption is 68%, with symptoms including diarrhoea, flatulence, nausea, gut distension, and abdominal pain³⁴.



Immune health

Both LAB and SCFA benefit the gut barrier, which is our first line of immune defence.³⁵ Studies show that GOS indirectly acts on immune function via its prebiotic effects⁶.



Research findings:



Two studies in older adults found positive changes to immune markers after a daily GOS intake of 5.5g per day for 10 weeks.^{36,37}

The results showed increased activity of specific immune cells, such as natural killer cells, and a shift towards anti-inflammatory markers. The authors concluded that GOS: "could be of importance in the elderly as an attractive option for enhancement of both the microbial and immune systems."



Calcium absorption

Calcium remains important for bone health across the lifecycle, especially in the post-menopausal stage, when it helps to reduce the risk of osteoporosis³⁸

Calcium absorption was improved by 16% in post-menopausal women who consumed 20g of GOS daily in fortified yoghurt³⁹. As the authors concluded, this would be expected to lead to better uptake of calcium by bones since there was no increase in calcium excretion in urine.



Tolerance

Studies providing 5-20g of GOS per day report good tolerance in healthy adults^{23,26,39}.

The prebiotic benefits of GOS in adults include metabolic health, urogenital health, digestive function,^{25,26} immune function, and travellers' diarrhoea⁶.



Health benefits of Galacto-oligosaccharide (GOS)



Adults and older adults

- Digestive health
- Lactic acid bacteria
- Immune health
- Calcium absorption



Adolescents and children

- Calcium absorption
- Lactic acid bacteria



Infants

- Lactic acid bacteria
- Softer stools



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