FrieslandCampina Ingredients

Biotis™

Gut health

Solutions for a good gut feeling

This information is intended for B2B professionals only

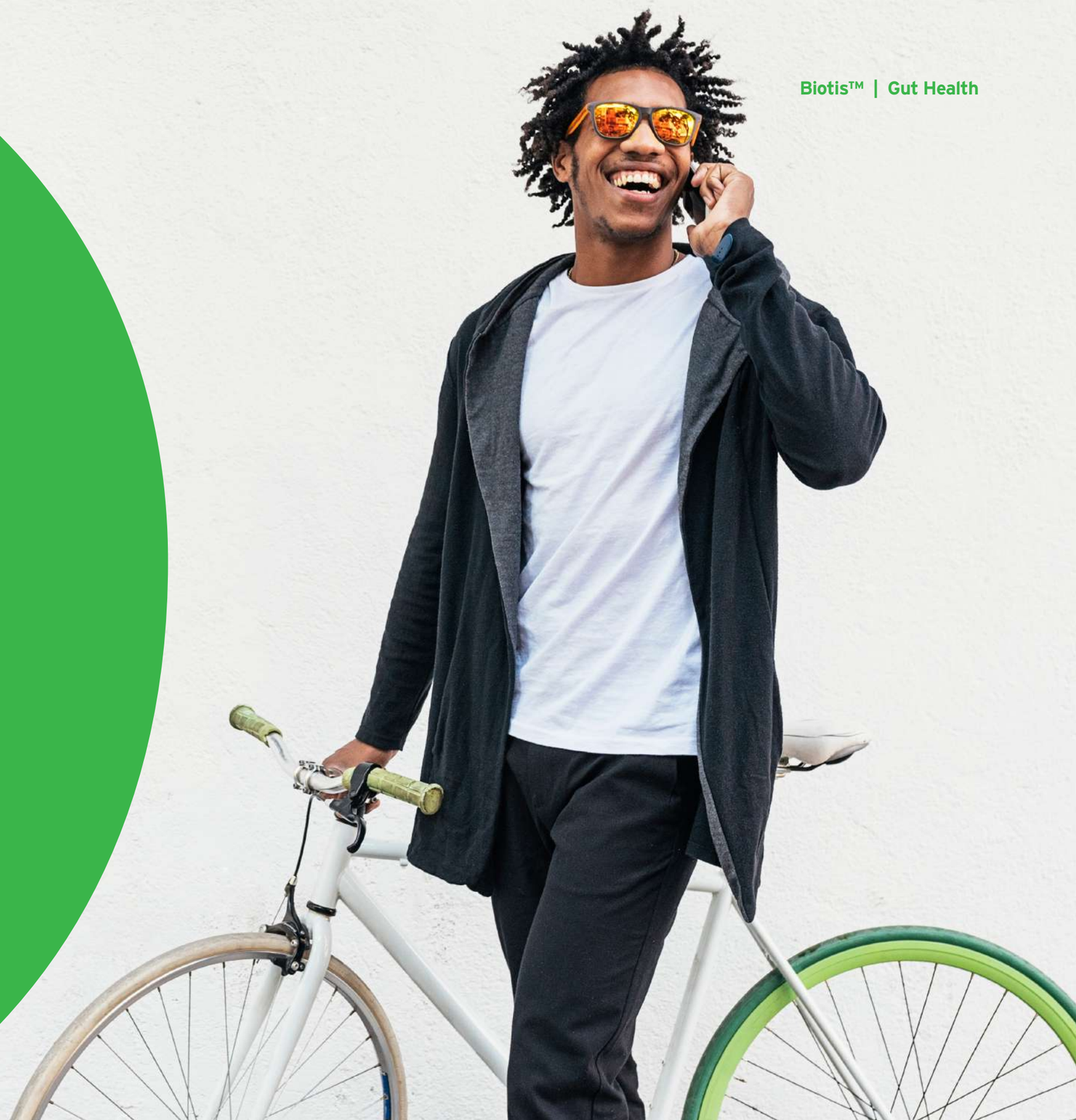
Health, wellbeing and the gut

Consumers are more health conscious and recognise that all elements of their wellbeing are interconnected.

They increasingly understand that nutrition, sleep and exercise are inextricably linked.

Research shows that as well as general longevity and vitality, people are particularly keen to improve their digestive health (37%) and their mental wellbeing (42%)[1]. This trend has seen a rise in demand for functional food and drink alongside supplements — healthy, on-the-go options in a variety of formats, like shots, bars and vitamin drinks.

[1]FMCG Gurus, 2019



A rapidly growing market

Gut health in particular has become an extremely hot topic, with scientists, medical professionals and consumers. As a result, the digestive health market alone currently stands at US$60 billion a year[1]. And it's growing rapidly.

Research shows that there is a real concern about digestive health out there, and therefore a real market opportunity[2].

1/3* **of consumers** believe they suffer from **digestive health problems**[2]

These are all uncomfortable, embarrassing and unpleasant conditions that many people have to cope with on a daily basis.

*globally

Digestive health issues

range from stomach discomfort to diagnosed issues such as Inflammatory Bowel Disease (IBD). Constipation is the main problem among seniors.

In the area of sports nutrition, (mainly endurance) athletes are also affected, with up to **50%** suffering from gastro-intestinal problems, which may impair performance and/or subsequent recovery[3].

While most people still look to medicine to remedy their immediate digestive problems, **healthy eating and fitness** are increasingly recognised as viable, longer term solutions.

[1]Euromonitor; [2]FMCG Gurus 2018 & 2019; 10,000 respondents globally, 1,000 in US; [3]De Oliveira et al., 2014

Introducing Biotis™ Gut health

Biotis™ is an exciting new brand from FrieslandCampina Ingredients, which represents a whole new era of ingredient science.

We're opening up new opportunities for our customers by tapping into our many years of experience in this sector. During this time, we've established ourselves as true world leaders in infant, performance and medical nutrition. Biotis™ Gut Health is 1 of 4 health benefit solution platforms launched under Biotis™.

The promise of prebiotics[1]

We're now building on our class-leading expertise in early life nutrition, where issues such as digestion are at their most important and most complex. As a result we have decades of experience in the science of prebiotics, as well as their development and application as ingredients.

Biotis™ Gut health is bringing all of this expertise to Health Benefit Solutions for adults. As the data presented here will show, our prebiotics show great promise in addressing a wide range of adult gut health conditions, for which consumers are actively seeking solutions.

Biotis™ Gut Health - Solutions for a good gut feeling.

[1]ISAPP (International Scientific Association for Probiotics and Prebiotics); Gibson et al., 2017; Substrates that are selectively utilized by host microorganisms conferring a health benefit

Unlocking the secrets of the microbiome

Interest in gut health is currently so high because recent scientific advances have begun to unlock how the microbiome, and in particular the microbiota, affects many health conditions, both within the digestive system and beyond.

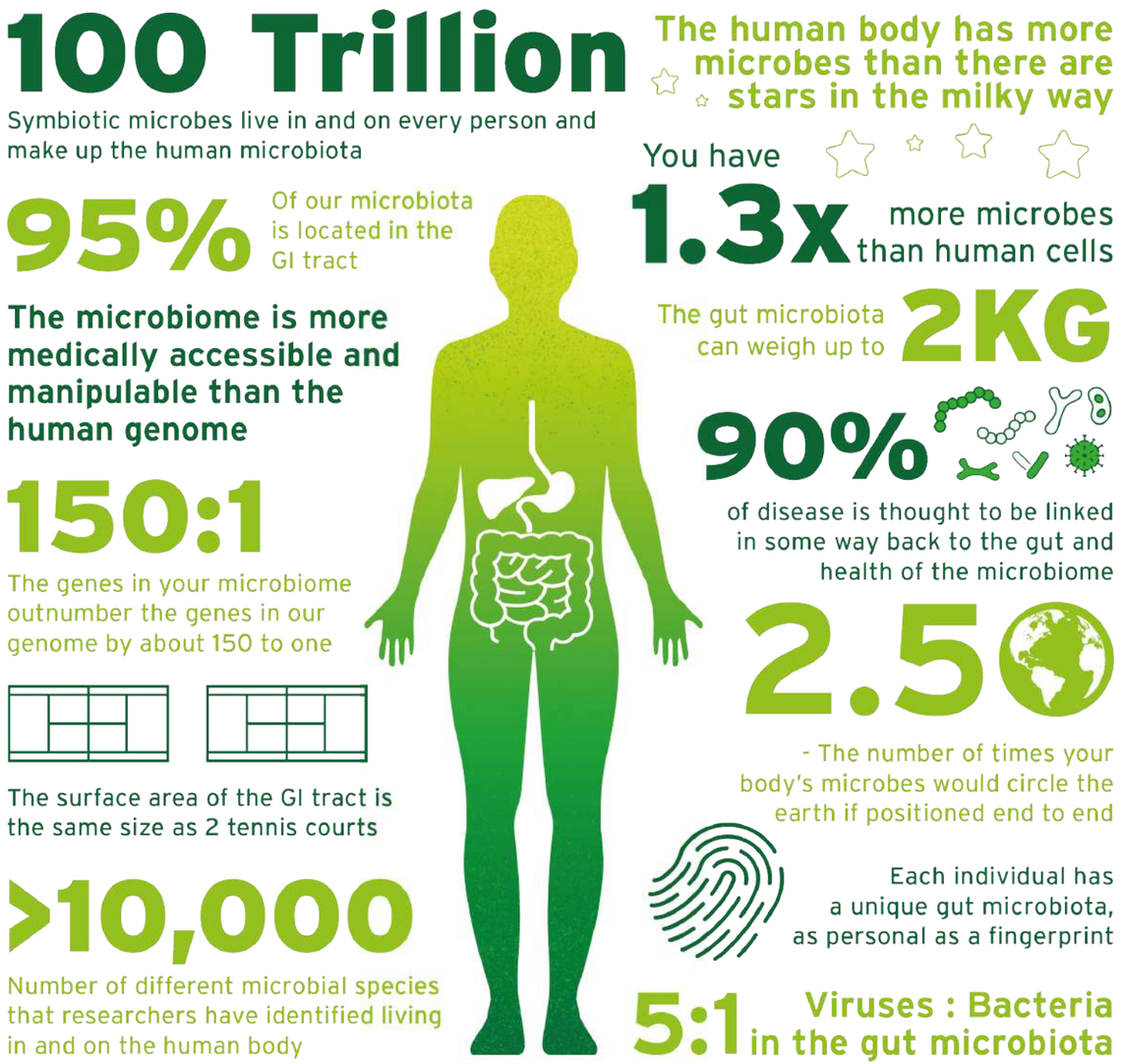
Consumers and the scientific community are starting to recognise that the gut can impact all kinds of health conditions: from obesity and diabetes, to heart and liver disease, to depression and immunity.

For now though, Biotis™ Gut Health will focus on improving digestive health, with products designed to address urgent consumer needs to tackle conditions like Irritable Bowel Syndrome (IBS), constipation and bloating.

The Human microbiome: trillions of symbiotic microbes & much more

The recognition that the microbes living inside us outnumber our body's own cells has led to a radical rethink of human health and its potential management. Humans have an estimated 100 trillion symbiotic microbes living in and on their bodies and 95% of these are located in the gut.

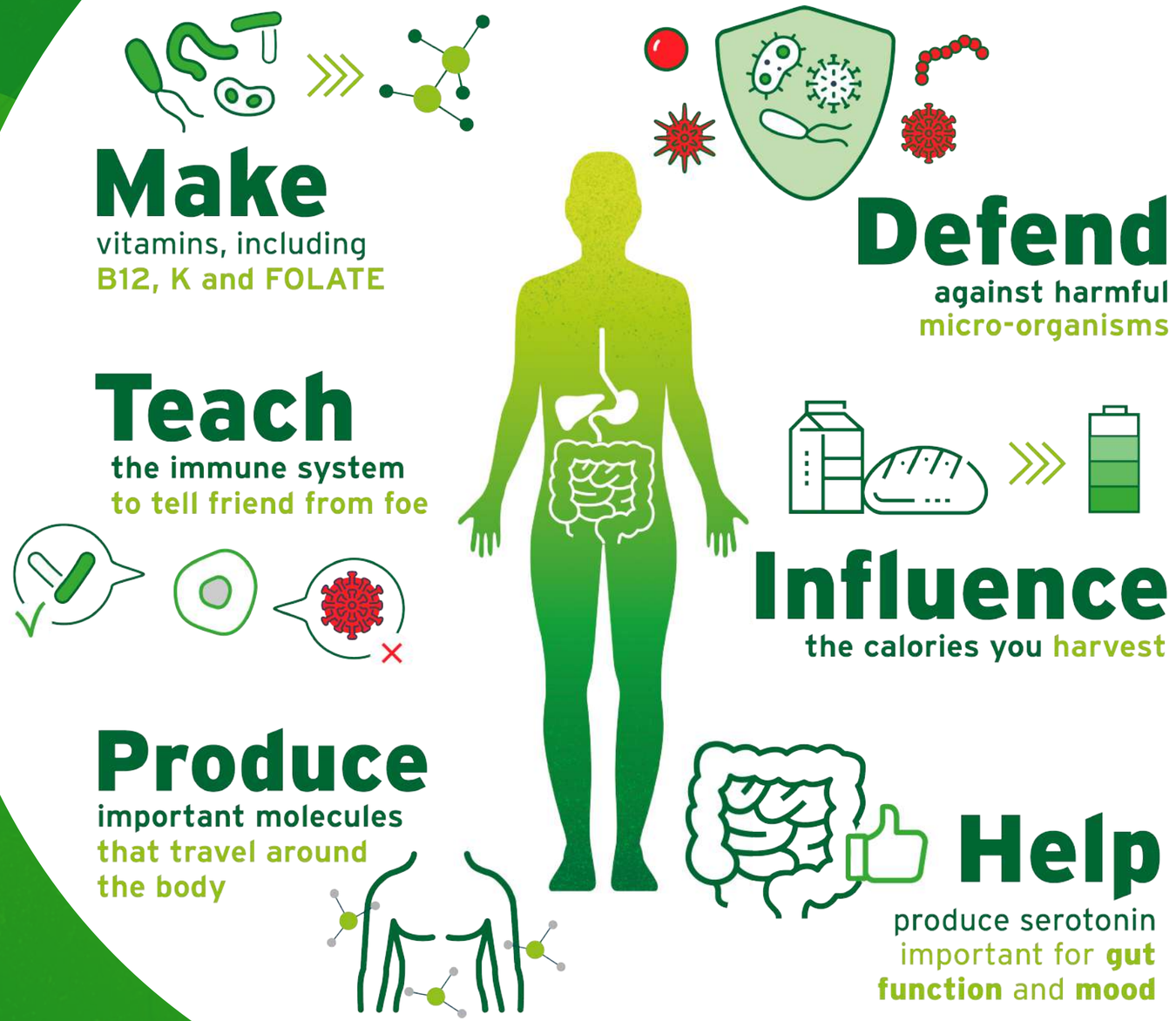
The microbiome is more medically accessible and manipulatable than the human genome, which could unlock the door to exciting new therapies[1].



[1]Adapted from worldmicrobiomeday.com

The importance of a balanced microbiota

It's important that the gut microbiota is balanced, diverse and stable, so that it can carry out its many beneficial functions effectively.



Adapted from Gut Microbiota for Health

It’s estimated that somewhere between 300 and 1000 species of bacteria live in the gut. But the two that are most critical to digestive health are *Bifidobacteria* and *Lactobacilli*.

Bifidobacteria:

- Produce metabolites by breaking down fibres like resistant starch into e.g. molecules called short-chain fatty acids.[1]
- Influence the immune system and fight against inflammation.[2]
- Improve gastrointestinal symptoms like abdominal pain, bloating, and slow transit times.[3]
- Protect the gut barrier.

Lactobacilli:

- Help maintain the health of the gastrointestinal tract (GI) and immune system.[4]
- Prevent bad bacteria invading the body through the gut.[5]
- Inhibit the growth of bad bacteria by producing anti-bacterial compounds and reducing gut pH.[6]
- Help lactose breakdown — live cultures in yoghurt can improve lactose digestion.[7]
- Help reduce gas, bloating, abdominal pain and stool problems in people with IBS.[8] Reduce the occurrence and duration of diarrhoea caused by antibiotics or illness.[9,10]
- Digest prebiotic fibre to produce beneficial compounds, including lactate and the short-chain fatty acid acetate, which both help maintain a healthy gut barrier.[11]

Adapted from: Gut Microbiota for Health; [1]O’Callaghan & Van Sinderen, 2016; [2]Picard et al., 2005; [3]Hungin et al., 2018; [4]Conlon and Bird,2014; [5]Mackowiak, 2013; [6]Moal and Servin, 2014; [7]EFSA, 2010; [8]Didai, 2015; [9]Newberry, 2012; [10]Gao et al., 2010; [11]Gong and Yang, 2012.

Microbiota balance changes with age

As we move through different life stages, the balance of microbes in our gut changes.

There are contradictory findings about what happens while babies are in the womb, but from birth until 24 months, the microbiome is rich and diverse, with a preponderance of *Firmicutes* and *Bacteroidetes*. As adults, the gut microbiota tends to be fairly stable, and finally in old age, there's less richness and diversity and a danger of harmful bacteria groups developing.[1]

[1]Arboleya et al., 2016; [2]Adapted from Gut Microbiota for Health

What shapes the gut microbiota?

The way you were born, your genetics, your age, your exercise regime and medications you take (particularly antibiotics) can all affect the make-up and therefore overall health of your gut. But the main factor under your control is what you eat and drink - your diet can impact your microbiota in the course of just a few days.

Meet the biotics:

Probiotics

A decade or so ago, probiotics dominated the gut health discussion. These are live microorganisms that when taken in sufficient amounts can provide health benefits[1]. They are still popular and widely available in yoghurt drinks and various other formats. Probiotics include *Bifidobacteria* and *Lactobacilli*.

Prebiotics

Today, prebiotics are changing the game. These are substrates that are selectively utilised by host microorganisms, conferring a health benefit[2]. Food for 'good' microbes, in other words. Prebiotics include inulin and fructo-oligosaccharide (FOS), which are extracted from chicory root fibre. And galacto-oligosaccharides (GOS), which are derived from the lactose in cows' milk.

Synbiotics

These are a mixture of live micro-organisms and substrate(s) selectively utilised by microbes, which confers a health benefit to the host[3]. So basically a combination of prebiotics and probiotics — for example *Lactobacillus* & Inulin.

[1]Hill et al., 2014; [2]Gibson et al., 2017; [3]Swanson et al., in press.

Prebiotics & fibre – what's the difference?

Fibre

can't be digested by humans, but some fibres are used by our gut microbes. Fibre is naturally present in many whole grains, fruits, vegetables and legumes and it comes in soluble (psyllium) or insoluble (cellulose) forms. It can affect some changes in the microbiome.

Prebiotics

also can't be digested by humans, but are used by microbes in our gut. They occur naturally in a wide range of plant-based foods e.g. chicory root, banana, vegetables and whole grains. Prebiotics are usually isolated from whole plants or synthesised from sugars (carbohydrates). Fibre prebiotics include inulin, FOS, GOS and resistant starch. Non-fibre prebiotics include lactulose.

Adapted from 'Gut Microbiota for Health'.

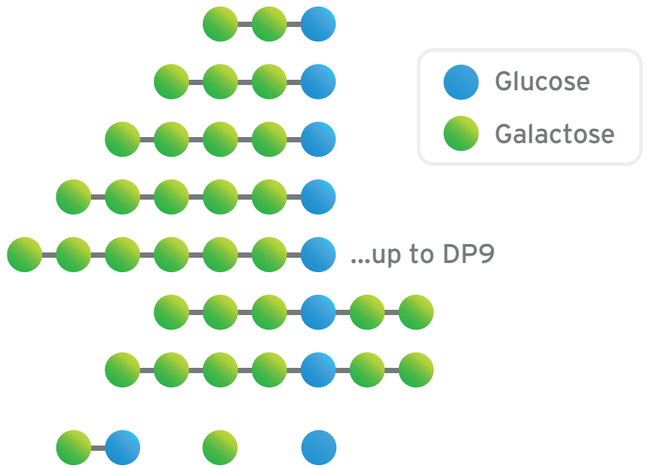
Leading the pack

We believe that Biotis™ Gut Health is ahead of the curve in its understanding of the gut microbiome, and how this intersects with the huge potential for nutrition throughout the course of life.

Our learnings and targeted science support new uses for existing ingredients that FrieslandCampina Ingredients is already known for in the Infant Nutrition space.

Biotis™ GOS is a versatile, stable, long shelf-life ingredient that's easy to incorporate into all kinds of formats. It has a clean sensory profile, and is available as a transparent syrup or white soluble powder. Its flavour is neutral to slightly sweet, allowing varied and many application possibilties.

Our main prebiotic ingredient: Biotis™ GOS

Ingredient	Galacto-oligosaccharides
Description	Mixture of complex sugars with different chain lengths (2-8 monosugars)
Building blocks	Glucose and galactose
Structure	
Produced from	Lactose
Produced via	Enzymatic reaction

Biotis™ GOS – the research

We have a growing body of evidence on the health effects of GOS for adults. Scientific studies show that GOS provides a superior prebiotic effect[1-5] and improvement in GI (gastro-intestinal) health[6].

We are also researching lactose-derived complex carbohydrates called Human Milk Oligosaccharides (HMOs), to sow the seeds for future innovations in gut health and beyond, such as Biotis™ 2'FL-HMO (2'-Fucosyllactose).

[1]Watson et al., 2012; [2]Stiverson et al., 2014; [3]Rada et al., 2008; [4]Rycroft et al., 2001; [5]Bouhnik et al., 2004; [6]Wilson et al., 2019

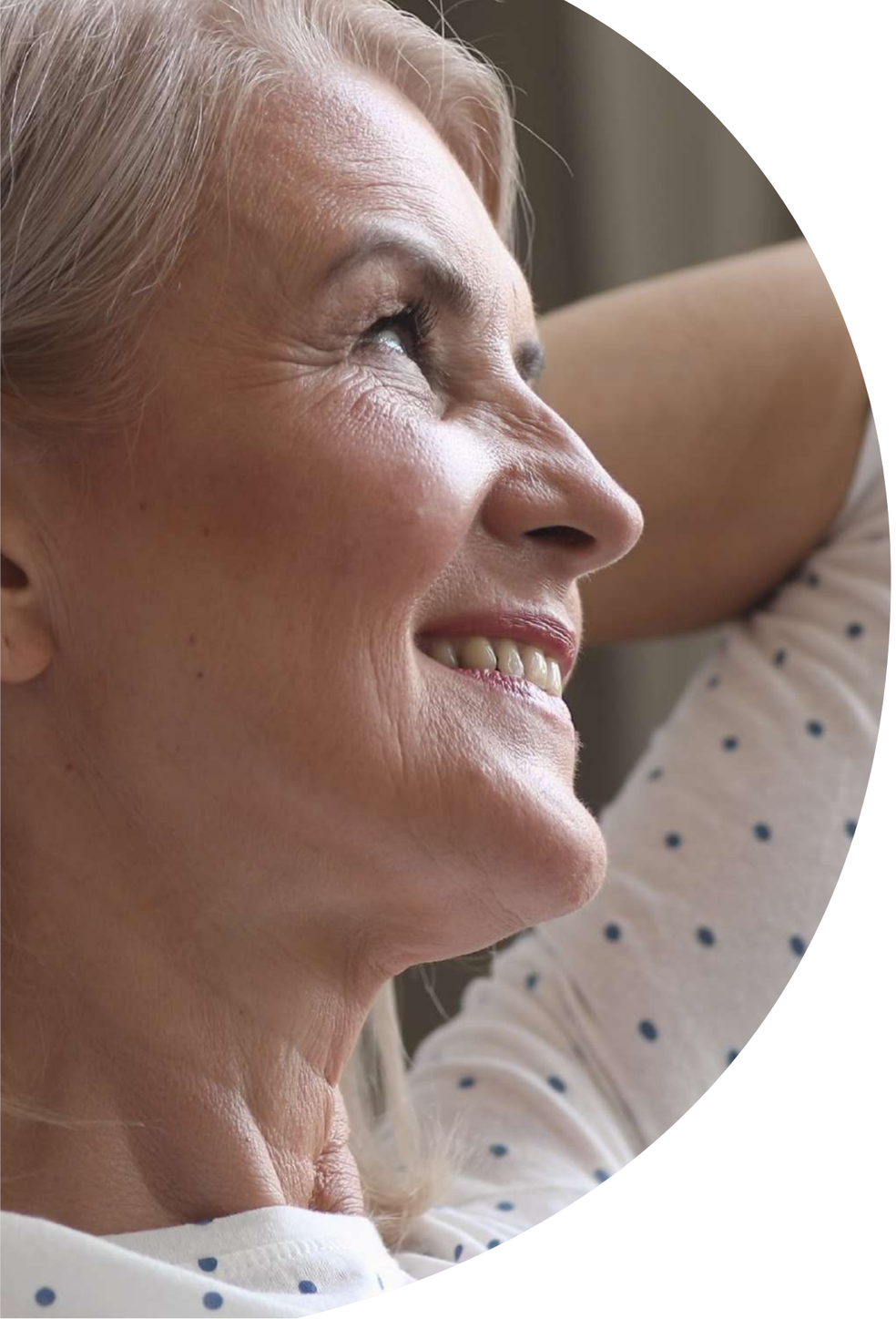
Clinical research reveals that GOS:

- Significantly increases *Bifidobacteria* in the gut of healthy adults with regular consumption[1].
- Has a positive influence on constipation in adults, with increased defecation frequency and easier defecation[2-3].
- Reduces GI-symptoms, like bloating, flatulence, abdominal pain and urgency[4].
- Reduces GI-symptoms in IBS patients, with less bloating and pain[5-6].
- Alleviates GI-symptoms in IBS patients, whereas inulin-type fructans aggravate these[7].

We're proud that our GOS prebiotics are the most researched in the world. They've been extensively trialled and tested in the context of both Early Life Nutrition and Adult Nutrition, where we've thoroughly investigated its potential health benefits, including digestive health and immunity.

FrieslandCampina Ingredients is the world's leading GOS expert and supplier, with our very own tried and tested supply chain. This means we have complete control of the quality of our GOS solutions and can ensure the highest standards every step of the way.

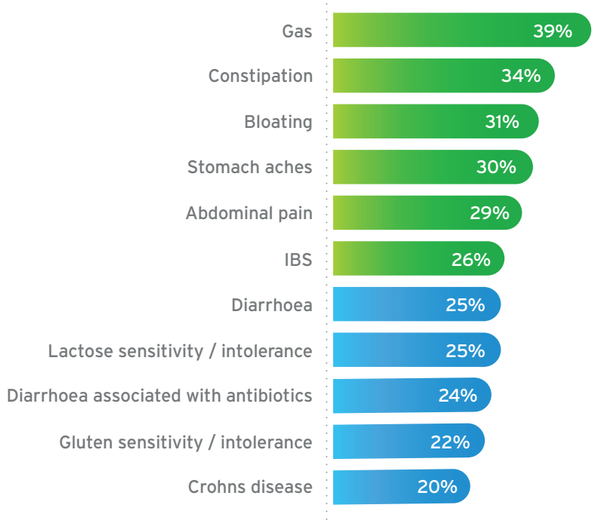
[1]Walton et al., 2012; [2]Teuri & Korpela, 1998; [3]Surakka et al., 2009; [4]Vulevic et al., [5]Huaman et al., 2018; [6]Silk et al., 2009; [7]Wilson et al, 2019;



In touch with the consumer

We use a wide range of research techniques and data sources to tap into what people are currently thinking about their health, diet and nutrition. These include social listening, focus groups, online surveys, consumer concept testing, quantitative and qualitative market research, customer interviews and consumer trials (both our own and via our partners). Much of this is ownable data that's exclusive to us, giving us a nuanced understanding of where the market is now and where it's heading.

Do you suffer from any of the following health problems?
Global respondents who answered some, most, or all of the time 2018[1]



12% of people worldwide, approximately, **suffer from self-defined constipation**[1]

580 million

people worldwide **suffer from IBS, many undiagnosed** and without finding effective solutions for their challenges[2]

[1]FMCG Gurus 2019, [2]Official Statistics United Nations

A selection of our applications

For a good gut feeling.

Our applications for the launch of the Biotis™ Gut Health portfolio are all powered by Biotis™ GOS, the most researched expression of GOS in the world.

The products are designed to fit easily into the lifestyles of their target consumers: seniors in the case of our medical shot to address constipation; athletes who can benefit from our prebiotic protein water; and active adults with IBS symptoms for our digestive health shot or cereal bar.

Medical shot

Supports **Digestive comfort.** Natural & convenient drinking solution **(60ml shot)**. Compact formula to increase compliance w/ **5g Biotis™ GOS.**

Target consumers: Elderly and patients who are looking for a natural solution for constipation.

Digestive health shot

Convenient shot **(60ml)** With **5g Biotis™ GOS. Refreshing** Ginger-Lime taste.

Target consumers: Active females looking for everyday products that support their digestive comfort (e.g. IBS symptoms).

Health bar

Tasty, cereal & nut bar **(40g)** With **5g Biotis™ GOS. <200KCal** per serving Only natural ingredients.

Target consumers: Active females looking for everyday products that support their digestive comfort (e.g. bloating, IBS symptoms).

Prebiotic protein water

With **5g Biotis™ GOS, 20-50g Nutri Whey™ Isolate Clear** per serving. Various opportunities in Ready To Drink Protein Water.

Target consumers: From **athletes** to **active sports** and **lifestylers**, seeking products with protein for recovery plus digestive benefits.

[1]FrieslandCampina own data; [2]International benchmark. fao.org

Sustainable working

At FrieslandCampina Ingredients we believe in a more sustainable future for the dairy industry.

For over 20 years, we've been leading the field in sustainability through monitoring, control and transparency. Our cooperative spirit puts us in a great position to partner with others — farmers and customers — creating a better industry for a better world.

We are committed to reducing greenhouse gas (GHG) emissions throughout the full value chain, and lead by example. In fact, we have an excellent track record: our farmers reduced their greenhouse gas emissions by 12% from 2015 to 2020. And we are the only dairy company in the world to provide complete and credible greenhouse gas emissions data.

94% of all the energy used in our production locations comes from renewable sources — we're aiming for 100% next year. We generate our own power too: 3,000 of our member farmers have installed solar panels or compact windmills[1].

Our milk has a particularly low carbon footprint — 52% lower than the world average and 13% lower than the average for Western Europe[2].

We're working steadily towards a sustainable, circular dairy industry. Partnering with FrieslandCampina Ingredients can help your sustainability ambitions and benefit your business.

Partner with us

Working side by side with our co-operative of dairy farmers for 150 years has taught us plenty about the strength of working together.

We collaborate directly with our customers, helping them to deliver exciting new products and innovations to market. We make things happen — connecting our customers with the right research partners and third party manufacturers to fully realise their ambitions, advising them all the way from concept to prototype to full product launch - a total solution.

We believe that food and drinks should not only do you good but should also be enjoyed. As ingredient experts, we know all about texture, flavour and other key factors that your consumers care about.

This is reflected in our market-ready applications, such as prebiotic health bars, shots, RTDs (ready to drink), yoghurt drinks or any other convenient lifestyle format our customers want to develop.

Human nutrition is a vast and multidimensional subject. Our knowledge, exploration and ongoing learning is supported by a network of research partners, who share their findings and expertise with us. We work closely with specialist universities and science centres, as well as influential associations, with one aim: to be your ideal partner for the development of Gut Health benefit solutions.

ISAPP
INTERNATIONAL SCIENTIFIC ASSOCIATION FOR PROBIOTICS AND PREBIOTICS™

GLOBAL PREBIOTIC ASSOCIATION

CCC CARBOHYDRATE COMPETENCE CENTER

WAGENINGEN UNIVERSITY & RESEARCH

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To keep up to date with developments in the Biotis™ story, please visit our website www.biotis.com and subscribe to our newsletter.

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