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Bone and joint health

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Introduction

In today’s wellness market, bone and joint health appeals to consumers of all demographics, from everyday athletes looking to improve their performance to seniors who want to stay active. Products can address a wide range of concerns including improving bone density, strengthening ligaments, increasing flexibility, and reducing inflammation. Discover the innovative ingredients and emerging opportunities in today's bone and joint health category.

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Bone & Joint Health Report

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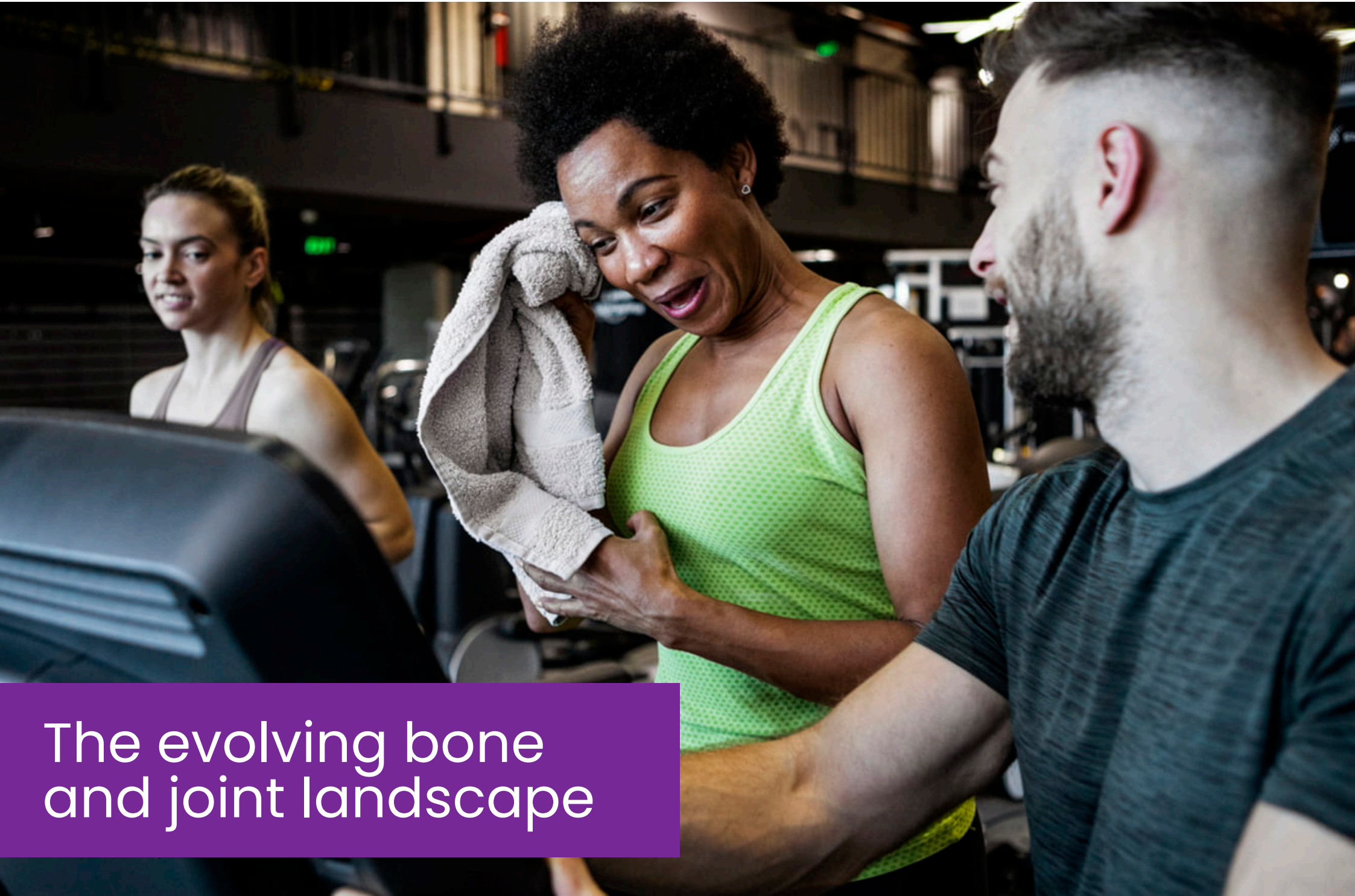

The evolving bone and joint landscape

Never has demand been higher for ingredients or products that effectively address bone and joint health. As the world revels in a post-pandemic recovery phase, the desire to be active again is stronger than ever.

This increased mobility requires solutions that are highly bioavailable and delivered in a convenient, cost-effective format that meets requirements at all ages, from baby boomers right down to generation Z.

For some consumers, good bone and joint health means more than playing sports pain-free. It means being able to continue in meaningful employment, remain independent, and maintain good overall health.

In today's health and wellness market, bone and joint health also includes optimising or maintaining muscle strength, strengthening ligaments, and increased flexibility.

Such is its importance that these health considerations now extend to sports nutrition, healthy ageing, and weight management. There is the realisation that bone and joints play such a fundamental aspect in quality of life for every demographic.



This is showcased by the expanding range of ingredients currently on the market, from chondroitin sulphate, glucosamine, and collagen to emerging ingredients such as curcumin, soy isoflavones, and probiotics.

In this report, we will take a deeper look at these ingredients and the current state of the market, as well as trends, science, and innovation in the European Union (EU), United States (US), Asia-Pacific (APAC), and beyond.



Consumer and market trends

Healthy ageing is a broad concept, long associated with maintaining mental and physical faculties well into the advanced years. This can include cognitive and heart health, eyesight, and circulation.[1]

Of course, healthy ageing also includes fit and active seniors for whom muscle, bone, and joint maintenance is key to encouraging mobility.

Crucially, however, this is not restricted to the older consumer. Research conducted by the Natural Marketing Institute (NMI) suggests that an almost equal percentage of millennials (37%) and baby boomers (38%) are likely to be interested in joint health.[2]

The key differentiation here is the aspect of bone and joint health that certain demographics are focusing on.

While those aged 50 to 65 are concerned with maintaining flexibility, over-65s are likely to prioritise reducing joint pain and improving mobility.

Meanwhile, gen Z consumers, perhaps armed with more information than previous generations, seek solutions that support active lifestyles, where high-intensity workouts and achieving personal bests are common fitness goals.

Long-term considerations are at play here.

Consumers are now taking a more proactive approach towards health maintenance at an earlier stage in life, optimising their health potential until as late in life as possible, according to a survey by FMCG Gurus.[3]



READ MORE: Harnessing the nine hallmarks of healthy ageing

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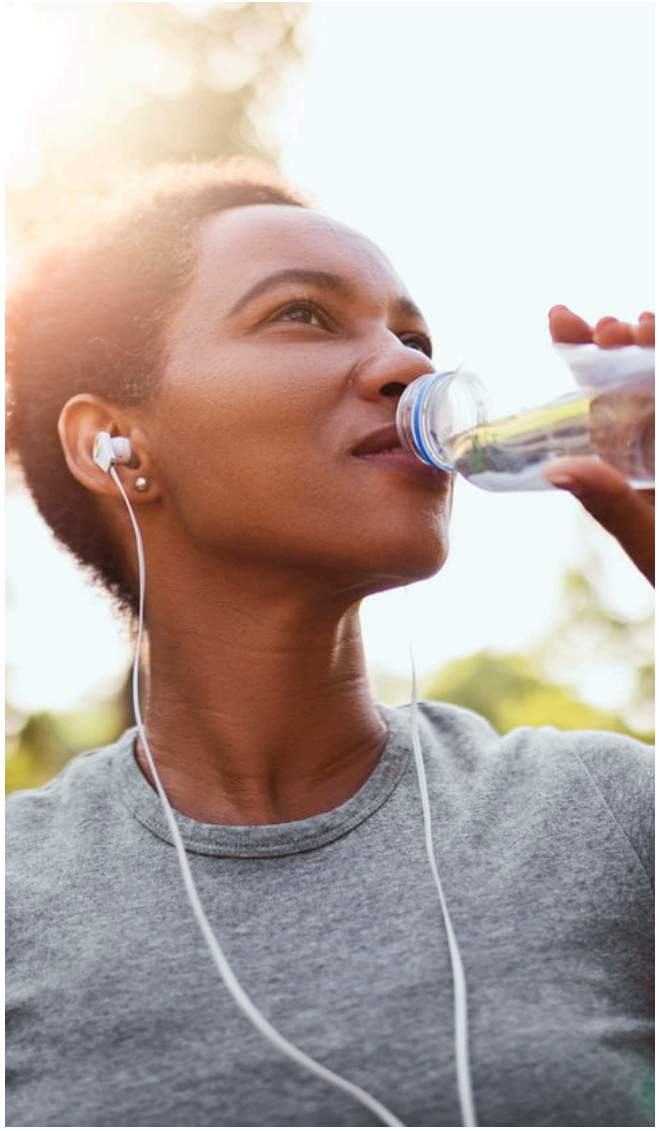
Bone and joint health in sports nutrition



The sports nutrition market has been a supplement industry success story in recent years. Research firm Fact.MR valued the global market at $34.8 billion in 2020, with a predicted $67.9bn by 2030. This amounts to a compound annual growth rate (CAGR) of 5.4% from 2021 to 2030.[4]

Its success may be due to the sheer product range that caters to everyone of all ages looking to improve their physical and mental health, with products offering optimal gains in weight training, faster recovery between workouts, reduced injury risk, and performance consistency.

However, bone and joint health now joins the ranks of categories that offer benefits to consumers taking an interest in a maintenance and preventative approach.

“Traditionally, the bone and joint health category has been associated with older adults,” says Dr Elizabeth Thundow, vice-president of consulting for chemicals, materials, and nutrition at the global consultancy and research firm Frost and Sullivan.

“However, more recently, the category has been witnessing growing interest from younger consumers. For example, the demand is apparent among consumers aged between 25 and 35, particularly among customers who lead an active, healthy lifestyle.”

Products in this category are characterised by established ingredients such as collagen, vitamins, and minerals, with a recent shift to products containing botanicals such as curcumin and ginger.

Innova Market Insights identified a 47% average annual growth in supplements for joint health, tracked between 2017 to 2021, with key ingredients including turmeric, beetroot, and curcumin in sports nutrition launches.[5]

Examples of finished products in this space



include PeScience's TruRecover, a polyphenol-rich supplement that blends tart cherry powder and lemon verbena extract to support joint and muscle recovery in athletes.[6]

Finished products

UK-based fitness brand MyProtein sells its The Joint supplement, containing turmeric, *Boswellia serrata* (also known as Indian frankincense), black pepper, and vitamins B and C as active ingredients.[7]

In October 2021, US-based Life Extension added to its joint support range with the launch of Joint Mobility, a combination of turmeric and tamarind extracts that it says encourages a healthy inflammatory response, supports joint comfort, and promotes knee flexibility and overall movement.[8]

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Spotlight on ingredient innovation

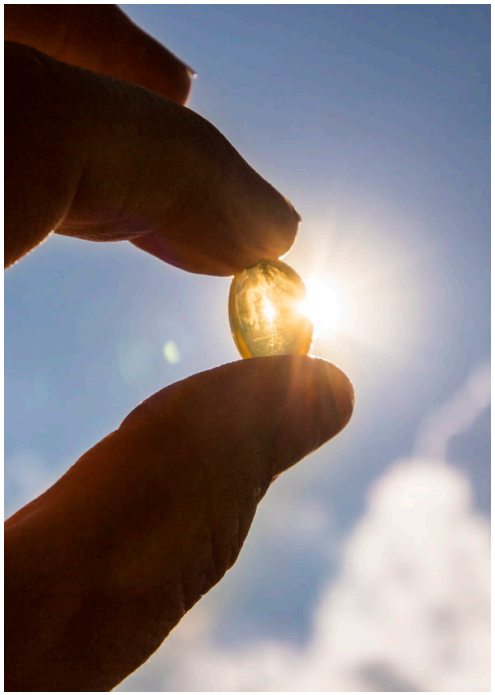
Long associated with strong bones and joints, vitamin and mineral supplementation is backed by scientific studies to remain active and thus maintain a better quality of life.[9,10]

Consumers may therefore be drawn to calcium and vitamin D3 blends for bone and joint health. A study commissioned and funded by Food Supplements Europe but conducted independently by Frost and Sullivan found that an intake of at least 1,200 mg of calcium and 800 IU (20 µg/day) of vitamin D from all sources for over-55s could reduce osteoporosis-related fracture incidences by around 15%.[11]

> “It has never been more important to leverage the substantiated benefits of calcium and vitamin D to help minimise the financial burden of [osteoporosis-attributed fractures]
>
> Ingrid Atteryd, chair of Food Supplements Europe

“Over several decades, a significant amount of clinical research has been conducted showing that the daily use of calcium and vitamin D food supplements is highly correlated to a lower risk of experiencing an osteoporosis-attributed fracture,” says Ingrid Atteryd, who chairs Food Supplements Europe.

“It has never been more important to leverage the substantiated benefits of calcium and vitamin D to help minimise the financial burden of this disease on healthcare systems across Europe.”[12]



READ MORE: Switzerland recommends vitamin D supplementation for older adults

Other blends of interest may be the pairing of calcium with vitamin K2 (as MK-7), as the European Commission has authorised a health claim for vitamin K’s use in maintenance of normal bone.[13]

MK-7 has been shown to have the highest bioavailability and the most significant effect on OC carboxylation in humans, demonstrating its use as a promoter of bone health.[14,15] “MK-7 increases bone mineral density and promotes bone quality and strength,” conclude the authors of one review.[16]

Glucosamine and chondroitin

Derived from the exoskeletons of shellfish, glucosamine is one of the most common dietary

supplements taken to support to the structure and function of joints. It is particularly targeted to people with osteoarthritis and is often paired with chondroitin sulphate, found in animal cartilage.

However, there are no EU-approved claims under the 2006 nutrition and health claims regulation (NHCR) for glucosamine or for chondroitin sulphate.

In February 2022, South Korea's Ministry of Food and Drug Safety (MFDS) announced it was to re-evaluate the safety and functionality of N-acetylglucosamine, among other ingredients, citing the need to update its 2012 approval off the back of new data on its safety and functionality.[17]

Botanical extracts: Ginger, curcumin, Boswellia serrata

Botanicals such as curcumin and ginger remain a popular choice for consumers seeking natural, organic solutions for optimal bone and joint health without the adverse effects.

Scientific support for botanicals remains flimsy, though, with the validity and relevance of traditional use often dismissed by today's modern analytical methods and scientific thinking.

Botanicals are also considered difficult to work with, being subject to multiple processes such as extraction, distillation, purification, concentration, or fermentation to extract maximum herbal efficacy. Regulatory agencies, too, are hesitant in awarding botanical ingredients specific health claims on this basis.

As a raw extract, ginger's (Zingiber officinale) strength stems from its anti-inflammatory and antioxidant properties,[18] and thus it can be used for the relief of pain emanating from joints.

Other botanicals linked to bone and joint health include curcumin (Curcuma longa),[19] green tea,[20] and *Boswellia serrata*,[21] a herbal extract taken from a tree that is native to India and Pakistan.



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A closer look at collagen



Better known in the cosmetic industry for its skin benefits, collagen has undoubtedly become an ingredient to support joint and bone health in the sports nutrition and healthy ageing categories.

Although there are no EU-approved claims for collagen's role in bone and joint health, its neutral taste profile, low dosage, and perceived health benefits make it an increasingly popular choice.

> “Consumers [are] less aware of the bioavailability or specific types of collagens. The challenge, as a result, is that brands need to communicate scientific information in the correct way
>
> Mike Hughes, head of research and insight, FMCG Gurus

Innova Market Insights data has identified an 85% increase in the number of new product launches with collagen for joint health in the past five years.[22]

Research suggests collagen may also be effective in looking after other parts of the musculoskeletal system, such as ligaments, tendons, and cartilage.

Native type II collagen (undenatured or non-hydrolysed type II) and hydrolysed (denatured) collagen are most commonly used in the nutrition industry due to their potency in supporting joint health.

“Awareness of collagen is high, and people associate it with aiding areas of wellness such as skin health, immunity, and mobility,” says Mike Hughes, head of research and insight at FMCG Gurus.

“However, consumers will be less aware of the bioavailability or specific types of collagens.

Instead, consumers can simply associate an ingredient with being good for them at the top-line level.

“The challenge, as a result, is that brands need to communicate scientific information in the correct way. Firstly, it needs to be scientifically proven and transparent. Secondly, it needs to focus more on the benefits, as this is something that is going to be more influential on purchasing behaviour compared to providing information behind the ingredient.



"As such, the crucial strategy is to offer reassurance around the efficacy of the product, whilst at the same time, providing evidence to support benefit claims made."

Some recent studies have pointed to fibrous collagen contained in eggshell membrane as effective in alleviating chronic pain and disability associated with knee osteoarthritis.[23]

Meanwhile, type II collagen combined with the herbal extract Boswellia serrata appears to reduce symptoms of osteoarthritis in five days[24] and boost knee joint flexibility in those with activity-related joint discomfort.[25]

"Ingredient combinations or blends are a good way to optimise compliance of solutions, especially for the elderly, who may already be on medication," says Grégory Dubourg, CEO of Nutrikéo, a food and nutrition consultancy.



READ MORE: Israeli startup Aleph Farms to produce cell-cultured collagen

"Combinations that have potential must link an anti-inflammatory effect – a goal of pain reduction – and a regenerative effect, [such as] collagen, glucosamine, chondroitin, and hyaluronic acid."

Collagen launches

Recent product developments in the collagen space include nutrition bars and a range of ready-to-drink (RTD) and instant drink powders.

The powder format accounted for 43% of collagen supplement launches in 2021 that were making a joint health claim, according to Innova data.[26]

"Combinations that have potential must link an anti-inflammatory effect – a goal of pain reduction – and a regenerative effect, [such as] collagen, glucosamine, chondroitin, and hyaluronic acid

Grégory Dubourg, CEO, Nutrikéo

Innova data also shows global collagen product launches in the gummy format have more than doubled, from 2% in 2020 to 5% in 2021.[27] Companies active in this area include US-based Herbaland, which makes available its vegan collagen-supporting gummy[28] enriched with vitamins A and C.

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The potential of probiotics

Probiotics have emerged as a dietary therapy with favourable effects on the skeletal system. They are considered affordable and have fewer side effects.[29]

Probiotics may have benefits for bone and joint health due to their inflammatory-reducing properties. Gut and systemic inflammation have been cited as a trigger for impaired immune, digestive, and brain health.[30]

This inflammation is thought to speed up the rate of bone loss by interfering with the formation of bone-resorbing cells.[31] It is thought that probiotics can restore the balance of the gut microbiota, allowing absorption of nutrients, especially in older adults.[32]

"As people become more educated on the products, they do recognise that these products can address wider areas of health such as skin health, mental wellbeing, and women's health," says Hughes.

"This is something that appeals, as consumers want multifunctional products that address a variety of areas in one go.

"If prebiotics and probiotics can provide scientific evidence on how they can address joint and bone health, it will enhance the appeal of products, especially [as] mobility problems become more common amongst younger people because of modern lifestyles."

Specific species of interest include strains of Lactobacillus



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(L. casei, L. reuteri, and L. gasseri) and Bifidobacterium (B. longum), which researchers believe could work best in tandem with such ingredients as vitamin D, C, or K, or folate.[33,34,35]

Early postmenopausal women were given a probiotic blend

consisting of three Lactobacillus strains (Lactobacillus paracasei DSM 13434, Lactobacillus plantarum DSM 15312, and Lactobacillus plantarum DSM 15313). Its administration appeared to offer protection against lumbar spine bone loss in these women.[36]

Additionally, the strain Limosilactobacillus reuteri (formerly known as Lactobacillus reuteri) ATCC PTA 6475 appears to offer benefits for bone health in an elderly sample population.[37]

Regulation and health claims

In spite of numerous applications submitted to the European Food Safety Authority (EFSA), there are no approved health claims for probiotics, let alone ones related to bone and joint health. Products claiming to be probiotics or have specific health effects cannot be sold in the EU, as use of the term "probiotic" is considered to be an unauthorised health claim.

As a result, probiotic strains contained in products must be referred to by their Latin name, which creates confusion rather than clarity.[38]

The probiotic regulatory landscape is similar in the APAC, where the region is currently undergoing extensive revision to keep pace with the new product development and probiotic strain approval.

The importance of consumer trust and convenience

According to Hughes from FMCG Gurus, transparency and providing consumer resources and opportunities for education are key in gaining trust.

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"One thing that must be factored in when evaluating consumer attitudes and behaviours in relation to functional ingredients is not to overestimate people's levels of awareness about the specifics behind an ingredient," he says.

He goes on to say that brands also need to offer reassurance that such high dosages do not create the risk of side effects. While efficacy is important, so is the delivery mechanism.

"Products need to be affordable, convenient, and ideally, offer sensory appeal," he says.

"This is something that must be factored [in] when developing formats such as gummies, powders, and liquid – how can the design make daily consumption as hassle-free as possible?"



Key takeaways

- **Bone and joint health concerns everybody, whether young or old, active or inactive, and extends towards optimising or maintaining muscle strength, strengthening ligaments, and increasing flexibility.**

- **Ingredients for bone and joint health are a mix of the old (glucosamine, collagen) and new (probiotics) to reflect the advancing science that also backs ingredient combinations to boost efficacy.**

- **Probiotic use to address bone and joint health is in its infancy. As insights into the microbiome's role in inflammation become more advanced, gut health could be leveraged for inflammatory bone and joint conditions such as rheumatoid arthritis and osteoporosis.**

- **Delivery systems and product formats are constantly evolving, with consumers prioritising convenience in products such as powders and gummies that boost ingredient bioavailability.**

- **Botanicals continue to garner interest as potent antioxidants in addressing bone and joint health. While research continues to validate the efficacy of these ingredients, brands need to consider possible limitations, such as multistep manufacturing processes, sourcing**



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Industry experts – Q&A

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Contact: Sue Finderup
Job title: Sales Manager
Company: Waitaki Biosciences
Contact: sue@ waitakibio.co.nz
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1 How has the consumer market and interest in bone and joint health shifted in recent years, and how has your company innovated to meet the whitespace opportunities?

Not so much a shift as an acceleration of those underlying market drivers that have been around for a while. The bone and joint health space has always been an important one for Waitaki, and we have a decades long reputation for supplying quality products that meet the needs of this market segment. Now, with a rapidly aging global population, this demand shows no signs of waning. There is a rise in age related chronic conditions such as arthritis and osteoporosis, so natural products that support those conditions remain incredibly important. In parallel with this "chronic condition" demand, we see an increased focus on wellness, an increase in life expectancy, and the expectation of aging well. Consumers have a strong desire to remain fit and active well into the later years of life. The Covid pandemic has brought personal health and wellness into sharp focus for many people too, and, not surprisingly, interest in pet products that address these same health and wellness concerns has been explosive. Finally, consumers are interested in sustainability, traceability and provenance just as much as efficacy. We are focused on ensuring our products meet this ever increasing need for efficacious and responsibly manufactured ingredients.

2 What ingredient(s) do you offer that support bone and/or joint health, and how are they differentiated from other offerings?

We have a broad range of solutions amongst our branded ingredient portfolio. PernaTec® Greenshell Mussel Oil Extract, manufactured from native New Zealand Greenshell mussels satisfies the need for a highly concentrated anti-inflammatory product. With high levels of marine phospholipids that encourage maximum absorption of the naturally occurring Omega 3 fatty acids while protecting against oxidation, PernaTec® Greenshell Mussel Oil extract provides potent joint support for those looking to maintain an active lifestyle. In the bone health space, StimuCal® is a deeply researched and tested product manufactured from 100% New Zealand prime beef bone. StimuCal®

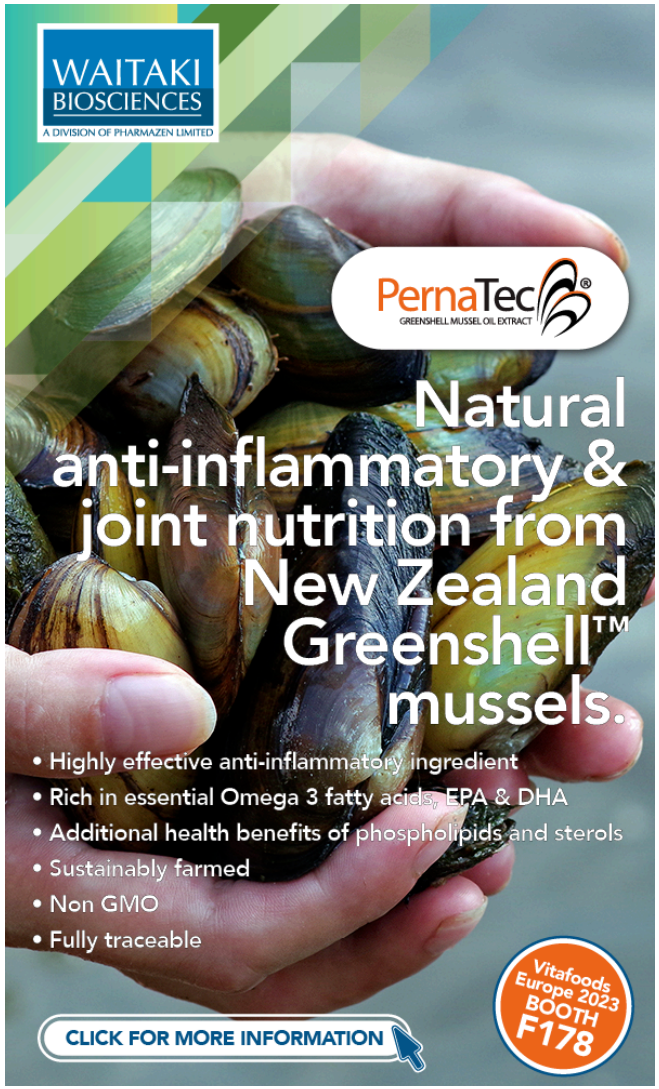
provides not just calcium but a whole biologically active matrix of bone supporting nutrients including collagen and other bone proteins. StimuCal® has been scientifically proven to promote the remineralisation of bone safely, without creating problematic spikes in serum calcium levels. CollaMex® focuses on the joint care category and has a unique profile with a high percentage of undenatured type II collagen as well as glycosaminoglycans to support joint comfort and to help protect joint cartilage from deterioration.

3 What type of applications can your ingredient(s) be used in, and what support do you offer around product development for this category?

Depending on the product, hardshell or softgel encapsulations, tableting and functional beverage premixes. There is also crossover into pet product applications, such as pet treats. We place a strong emphasis on technical support and have a highly skilled inhouse R&D team who are available to assist with any technical questions and work on product refinements with key customers.

4 How do you define your company's point of differentiation and advantages in the market?

We have direct access to high quality raw material streams with exceptional levels of traceability. As we manufacture everything ourselves, from locally (New Zealand) sourced raw materials, we retain the highest levels of control over product quality. Decades of manufacturing experience mean we have perfected the art of delivering efficacious products that are as close to the natural state as possible, retaining maximum levels of biological activity.





Contact: Jaume Reguant
Job title: Healthcare Director
Company: Bioiberica
Contact: healthcare@bioiberica.com
Visit us: www.bioiberica.com

1 How has the consumer market and interest in bone and joint health shifted in recent years, and how has your company innovated to meet the whitespace opportunities?

Consumers are increasingly thinking about their mobility within the broader context of general wellness and looking for solutions that address multiple health concerns. Two thirds of consumers recognise the direct link between mobility and overall health and one of the top reasons that individuals want to maintain good mobility is to improve their lifestyle, rather than solve a specific health issue, according to a survey by FMCG Gurus.

This means many individuals now think less about 'joint health' and more about 'all-round mobility'. This is reflected in their purchasing choices too, with multi-ingredient solutions leading the way. Additionally, consumers are savvier than ever – many (72%) say that clinically-proven ingredients are important to them, according to a 2022 survey by the Industry Transparency Center. This has put science-backed solutions at the forefront of purchasing decisions.

2 What ingredient(s) do you offer that support bone and/or joint health, and how are they differentiated from other offerings?

We offer several market-leading ingredients that offer benefits for joints, muscles and tendons respectively. They include Collavant n2 native (undenatured) type II collagen for joint health, and Mobilee® – our hyaluronic acid (HA) matrix ingredient for mobility. Collavant n2 supports joint health via a unique mechanism of action called Oral Tolerance – all at a convenient low dose of only 40 mg/day.

Meanwhile, Mobilee® contains three naturally-occurring components – hyaluronic acid, polysaccharides and collagen. Together, they work

synergistically to increase the endogenous synthesis of hyaluronic acid 200-fold; supporting joint and muscle health at a low dose of 80 mg/day.

3 What type of applications can your ingredient(s) be used in, and what support do you offer around product development for this category?

Our ingredients can be used in a range of applications – from standard dietary supplements to ever-popular gummy formats, as well as functional foods, ready-to-drink shakes and protein blends. In addition to providing high-quality ingredients, we support our customers every step of the way – from product concept to commercialisation.

This includes providing the scientific evidence that demonstrates the beneficial effect of our ingredients, giving advice on the analytical methods used to characterise them in the desired application, sharing market insights and supplying the necessary documentation and recommendations regarding regulatory pathways – all so they can successfully launch and differentiate their offering in the market.

4 How do you define your company's point of differentiation and advantages in the market?

We are the partner of choice in the joint health and mobility market, with 20+ years of experience in the space and a strong commitment to scientific research. Aside from our specialisation in identifying, extracting and developing molecules of high biological value – which are then transformed into quality products – our production capacity, supply chain model and vertical integration guarantee full traceability, security and sustainability.





Contact: Xavier Berger
Job title: Global Market Manager, Mobility & Joint Health
Company: Gnosis by Lesaffre
Contact: x.berger@gnosis.lesaffre.com
Visit us: www.gnosisbylesaffre.com

1 How has the consumer market and interest in bone and joint health shifted in recent years, and how has your company innovated to meet the whitespace opportunities?

The market is robust for supplements supporting bone and joint health. We are thankfully seeing younger consumers proactively working to support their health through supplementation, recognizing that obtaining proper nutrition can make a significant difference. In support of this insight, we reference a 2022 survey of 3,500 global dietary supplement consumers from the Industry Transparency Center.

• 63% reported, "I am proactive about my health and take steps to lower health risks," while 76% said, "I use/have used vitamins, minerals, herbs, or other dietary supplements to manage my health."

• 62% reported using Vitamin K2 supplements, ranking in the top 10 ingredients used.

• Bone and Heart Health ranked as the top reasons for using Vitamin K2, especially for regular users.

2 What ingredient(s) do you offer that support bone and/or joint health, and how are they differentiated from other offerings?

Gnosis by Lesaffre provides the most comprehensive Vitamin K2 as MK-7 offering on the market, with MenaQ7® K2 as our shining star. MenaQ7® is the only K2 as MK-7 clinically validated to support bone and heart health, with more than 22 published human clinical trials confirming safe and efficacious benefits. While other suppliers offer K2 ingredients, none have the body of evidence that MenaQ7® does, ensuring manufacturers will deliver promised health benefits to the end consumer.

Further, our award-winning Vitamin K2 Matrix is a proprietary protective technology that ensures the stability of the

menaquinone molecule in complex formulas. Matrix is a true clean-label protective technology – it comes with no coating, no additive, and no additional ingredient. It offers the shortest list of ingredients, limited to the active molecule and carrier, easing label concerns and the formulation process for our finished product partners.

3 What type of applications can your ingredient(s) be used in, and what support do you offer around product development for this category?

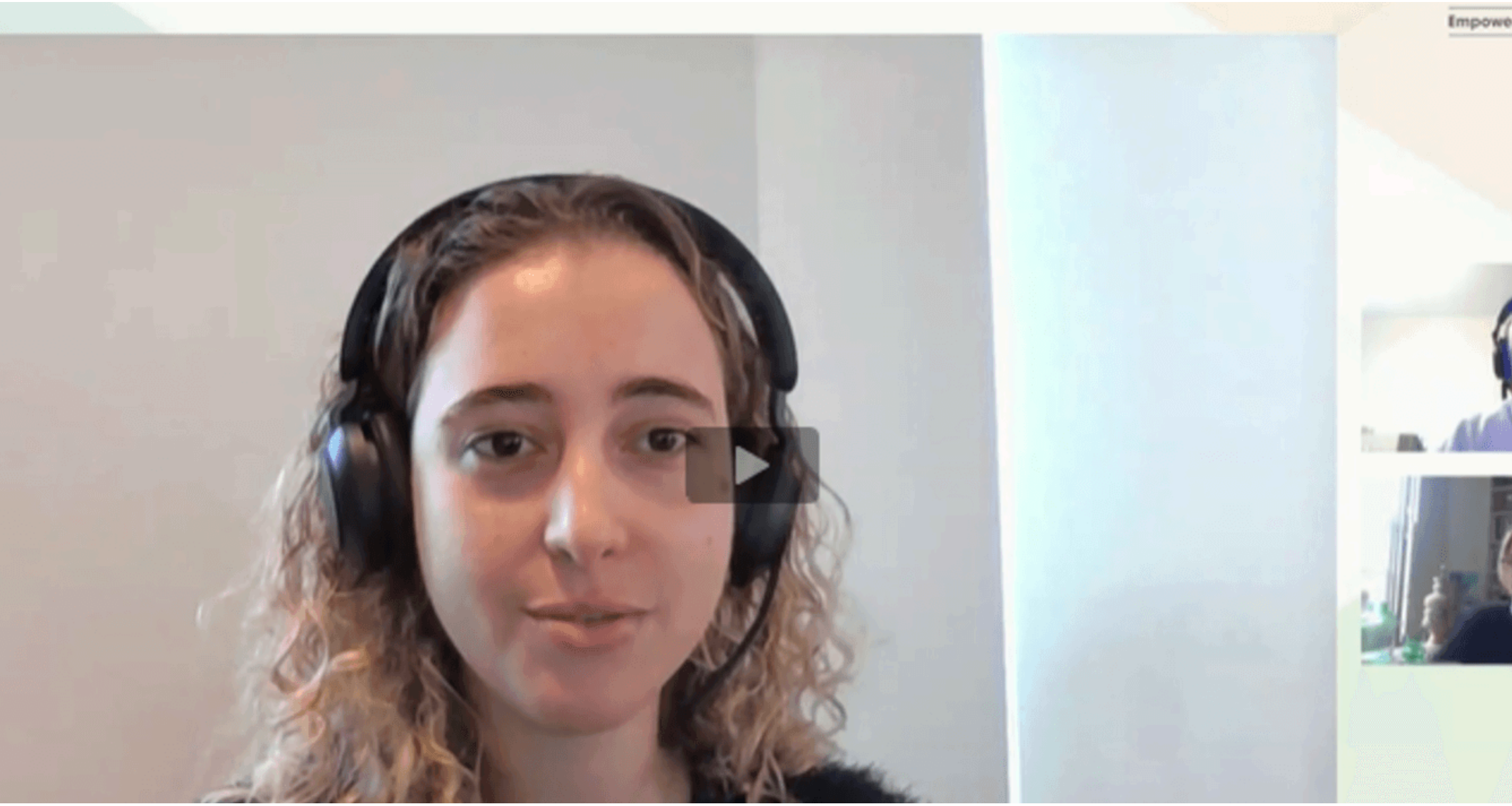
Our Vitamin K2 Solutions Platform offers a variety of dilutions and solubilities. Regardless of your desired final delivery format – tablets, soft gels, liquids, gummies, soft chews, ready-to-drink powders, dairy, etc. – we offer a K2 Solution that will allow manufacturers to bring those products to life.

Regarding product support, our team is dedicated to guiding our commercial partners through the formulation process all the way through helping them effectively market those products to the end consumer. A partnership with Gnosis by Lesaffre does not end once kilos are delivered – we are genuinely invested in our partners' successes.

4 How do you define your company's point of differentiation and advantages in the market?

We believe in science, service, and sustainability. No other company offers the level of clinical substantiation we do for our MenaQ7® K2. No other company has driven education about the importance of Vitamin K2, increasing the demand for our partners' products. And it is essential to nurture the planet's health, which drives our sustainability initiatives, particularly using fermentation and biotransformation as the cornerstone of our company-wide offer.





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Biographies

Our expert contributors

Dr Elizabeth Thundow, vice-president of consulting for chemicals, materials, and nutrition, Frost and Sullivan

Elizabeth has almost 20 years' chemical research experience, including more than 15 years in market research and growth advisory services focusing on bespoke projects for a wide range of clients.

Her particular expertise is in qualitative market research, analysis, and presentation of insights and strategy implementation, including organic (portfolio diversification, geographic expansion, etc) and inorganic (M&A) market entry.

Akheela Dhiman, industry analyst, Frost and Sullivan

Akheela is a market research professional with seven years of experience in tracking the food and beverages and nutritional ingredients industry. Her expertise includes identifying key trends and insights on the ingredient market across different sectors with a focus on strategy development, market size assessment, forecast modelling, competitor analysis, and value chain analysis.

Grégory Dubourg, CEO, Nutrikéo

Grégory Dubourg is an agro engineer, specialised in agri-food and nutrition, who graduated from AgroParisTech. After 10 years of experience in marketing and innovation in the agri-food and nutraceutical industries, he founded Nutrikéo in 2009. Since then, he has managed this nutrition strategy consulting agency, whose expertise covers studies, innovation, marketing, and communication strategies across the entire supply chain: food, nutraceuticals, and health.

Mike Hughes, head of research and insight, FMCG Gurus

Mike Hughes has more than 13 years' experience analysing consumer trends, attitudes, and behaviours, and currently heads up the research and insight division at FMCG Gurus. Mike has a particular interest in highlighting how consumer attitudes and behaviours can often differ and what the true meaning of trends are for the industry.

Thank you for reading

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