NEW FOOD

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The appeal of alternative

As consumers become ever more focused on choosing the most sustainable and healthy products, will the industry be able to meet demand without sacrificing taste, texture or quality?

Could insect protein be a game changer for the pet food market?

Learn about a family's campaign for improved allergen information in the UK

KFC's Jenny Packwood discusses tackling food insecurity

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global thought leaders, industry experts, and innovators to explore the latest technologies, ethical sourcing, and sustainability practices that are shaping the food industry.

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AWARDS & DINNER

The Awards and Dinner is back by popular demand! Following the success of last year, we are thrilled to be hosting The Apples again this year.

This exclusive event will bring together industry leaders, innovators, and decision-makers for a night of celebration, recognition, and networking.

The Awards and Dinner will be held on the first night of Food Integrity Global, **Tuesday 10th September**, and promises to be a night to remember.

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Food innovation unleashed

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Welcome to Issue 1 2024 of *New Food* – which is not only the first edition for this year, but also the first edition to be published since I took over from my predecessor, Joshua, as Interim Editor. My first steps into the food and beverage industry have been conscientious and curious, and I look forward to not only bringing you the latest innovations from across the sector over the coming months, but also working with you all in order to do so.

Now, back to this issue. For the latest instalment of the *New Food* magazine, we have focused on three pivotal areas that are shaping the industry's trajectory: food safety, ingredients and alternative proteins.

In an era defined by globalisation and interconnected supply chains, ensuring the safety and integrity of our food has never been more critical. From farm to fork, a myriad of challenges – ranging from microbial contamination to chemical hazards – underscore the need for rigorous quality control measures and robust regulatory frameworks. Despite advancements, the food and beverage sector continues to grapple with these challenges, and efforts remain focused on bolstering traceability, implementing stricter standards and embracing more new and innovative technologies. Within our Food Safety In-Depth Focus, learn from the SurfSAFE project, the sister of Owen Carey (of Owen's Law) and Stop Foodborne Illness about the latest advancements and campaigns that are impacting the food safety sector.

Elsewhere within this issue, the quest for novel ingredients drives culinary exploration to new heights, as companies push the boundaries of flavour, texture and nutritional profiles. But, as new products come to market, are companies potentially putting taste and quality at risk? For *New Food*, Luker Chocolate, Tirlán and Overherd offer their perspectives on the importance of quality ingredients that offer the consumer the best possible eating experience, without compromising in any other areas.

Furthermore, amid growing concerns over sustainability and resource scarcity, alternative proteins emerge as a compelling solution to meet the world's burgeoning demand for protein-rich foods. From insect protein to plant-based substitutes, the landscape of alternative proteins is rapidly evolving, offering a glimpse into the future of protein production. Within this issue, THIS™, Globe Buddy and TurtleTree share their insight into the different areas of alternative protein and discuss how they are innovating to offer consumers a range of alternatives that are more sustainable yet deliver the same nutritional levels as traditional proteins.

Thank you for joining us on this insightful journey through the world of food and beverage. We hope that you find inspiration and valuable insights within these pages. As ever, make sure to stay up-to-date with all of the latest food and beverage developments by visiting the *New Food* website, and don't forget to subscribe to make sure you don't miss out!

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Want to be published in *New Food*?

New Food is looking for authors for 2024 and beyond. If you are from a food manufacturer, university, association or research institute and are interested in submitting an article on alternative proteins, low/no or allergens, please send a synopsis to: **lhockley@russellpublishing.com**

Leaders' SERIES 2024

A conversation with **Richard Zaltzman,** CEO of EIT Food

For *New Food*, Richard Zaltzman, Chief Executive Officer at EIT Food, reveals what excites him about the facilitating role of EIT Food and the ingenuity that he sees in the future of our global food system.

ON 15 January 2024, Richard Zaltzman was appointed Chief Executive Officer of EIT Food, after working at the company as its Chief Impact Officer. Here, he sits down with *New Food*'s Assistant Editor, Grace Galler, to explain how his unique blend of technology expertise and commitment to creating a more sustainable food system makes him the ideal fit for this role.

Can you tell us about your previous position and what makes you a great fit for CEO of EIT Food?

RICHARD ZALTZMAN (RZ): Prior to becoming CEO, I held the position of Chief Impact Officer at EIT Food, and before joining EIT Food, my background was in consulting and technology, which led me to a nine-year career at tech giant Microsoft.

Working in the technology sector has really inspired me, as I've witnessed the positive impact that human beings can create in a very short space of time. In the last 30 to 40 years, technology has changed every aspect of our lives and will continue to do so at an even faster rate.

It has proven to me beyond a doubt that with the right people and the right mindset, we truly have the power to create positive change. And that's the energy that I want to bring to EIT Food – and why my ethos perfectly aligns with EIT Food's mission to accelerate innovation to build a future-fit food system. Our food system offers so many opportunities to deliver solutions to some of the world's biggest challenges, from health inequalities to the climate crisis. I really believe that building a strong, diverse network around cutting-edge innovation and entrepreneurship – and focusing on the impact that we're delivering – is how we will solve these challenges within my lifetime.

Do you have any areas of specific interest in the food sector? Why are you passionate about these topics?

RZ: I would say that my area of interest is the food system as a whole. Too often, I think we focus on specific areas of the food sector without stepping back to consider how they overlap and connect. And, often, we're thinking about the plate – because that's the most relatable touchpoint for most of us where we interact with the food system.

I have a deep interest in how we think about the whole food system, beginning in fields and farms and flowing all the way through manufacturing and retail to end up on our plates. I am passionate about this because we will only be able to transform our food system by understanding where it begins.

I'm proud to have farming in my family; my grandfather was a farmer in South Africa. It's not a career with a large financial incentive, so it is critical that we support our farmers, as well as help other actors across the food chain to strengthen their relationships with food producers – this will have a myriad of benefits across our whole food system.

As CEO, what are your main areas of focus?

RZ: In recent years, EIT Food has worked alongside its wider community – including our many fantastic partners – to build the foundations for Europe's food system to achieve Net Zero, enable healthier livelihoods, and become truly fair and resilient. I'm keen that we sharpen our focus and really commit to the end goal of transforming our food system.

Spending two years at EIT Food before stepping into this role has really enabled me to understand the organisation, to see where we've come from and the enormous potential of our whole community when we work together. I am absolutely committed to making sure that everything we do going forward creates impact at the food-system level.

This requires a fundamental shift in thinking, which we're starting to see as we reach out to our community and invite them to increase their ambition and bring us bigger, bolder ideas to deliver that systems change that we are all striving for.

You will be following in the footsteps of Dr Andy Zynga; what have you learnt from his leadership?

RZ: Under Andy's leadership, our wider community of partners, entrepreneurs, students and organisations has grown exponentially. I firmly believe that we are only as strong as our community, and I hope to continue modelling the ethos that we can achieve a far more significant change in the world by working collectively and collaboratively.

An exciting transition that took place during Andy's tenure was the development of our three core Missions: Healthier Lives Through Food, Net Zero Food System, and Reducing Risk for a Fair and Resilient Food System. Implementing a Missions-led approach has given EIT Food renewed focus, and supported us in prioritising our investments, funding, advocacy and interventions in ways that will make a real, tangible difference.

What is one news story regarding food that has stuck with you in recent months?

RZ: I have been closely following the recent stories of farmers around Europe taking to the streets in their tractors, in an attempt to make their voices heard (and I'd like to emphasise that this is many 'voices' – as Thin Lei Win highlighted in a recent article,[1] the protestors are not one homogenous group). It's crucial that we listen to these communities of people, who are often multi-generational and have intensely personal connections to the stewardship of their land.

While enormously damaging activities are

being subsidised to the tune of trillions of dollars globally, small-scale farmers are being denied far smaller investments which would enable them to de-risk the commitments needed to move towards a more sustainable food system. I want to see us develop a much stronger voice on this issue as a community, and to firmly stand behind farmers as they advocate for secure and sustainable livelihoods.

Is there any area of EIT Food's research that you are particularly passionate about?

RZ: I am thrilled about the recent launch of the Regenerative Innovation Portfolio, which has been established as a Food Innovation Hub Europe Initiative, developed by a coalition of EIT Food and Foodvalley, and supported by the Food Collective. Through the Portfolio, EIT Food will deploy €15 million over three years to leverage the potential of regenerative agriculture, by demonstrating tangible pathways and initiatives through new partnerships that we will build across agrifood value chains.

I'm particularly excited that the Portfolio is going to follow a landscape-based approach, meaning that we will work within selected regions where multiple stakeholders (including governments, investors and retailers) have mutual interests and complementary sourcing needs. Within these landscapes, the Portfolio aims to foster greater collaboration across sectors and value chains to help farmers to make the transition to regenerative agriculture practices. I feel very optimistic when I see how innovations implemented in a field can be truly transformative in a short space of time.

> *We're seeing early indications of companies really wanting to find these collective solutions – so I'm excited to be working in an area that will drive real impact*

We also have some incredible startups in our network at the other end of the food chain; one of my favourite examples is EIT Food RisingFoodStar, Agrain.[2] I met the startup a year ago at one of our events and learnt how they are using spent grain from brewing to produce several valuable products, including a flour and an ingredient that can be used as a substitute for dairy.

The most fascinating part of the model is that it utilises something which is effectively a waste product – spent grain – that the brewers either have to pay to dispose of or sell for small amounts of money. Agrain has transformed this waste product into other products with roughly five times the value of the original crop. This is a truly inspirational reminder of what we can do with waste, but it also opens the door for fundamentally different business models. Imagine if, instead of selling their grain to a brewery or a flour mill, farmers instead rented it out so that they could have the residual product returned to them to use as livestock feed on their own farm? This represents an opportunity to turn a linear process into a circular product, where value is extracted by multiple actors until it finally returns to the producer.

Can you name one thing you think needs to change in the food sector in 2024?

RZ: We're on a very long-term journey, which never really ends when you think about the food system and its critical role for humanity. In facing this perpetually evolving challenge, we've got to have a mindset of engagement and leadership that allows people to work in that space without getting burnt out.

I like to describe this as 'regenerative leadership', which draws from the trailblazing work that farmers are doing on regenerative landscapes. First, we must nurture the soil, which is the bedrock of what we do. Then we build up to working on the culture of our organisations, and then our wider community. As a sector, if we want to foster truly regenerative leadership and regenerative capability in people, we must nourish ourselves in the same way that farmers nourish the land.

What is one trend prediction you have for the year ahead?

RZ: Lots of companies are now realising that they need to commit to science-based, Net Zero targets. And many companies truly want to change their relationship with food producers and suppliers in order to achieve this. There's potential for this to go one of two ways: in the worst-case scenario, lots of corporates will make their own individual commitments on regeneration or Net Zero, which will trace back up the supply chain to the farmer. These standards can be crippling for farmers, forcing them to spend all of their time measuring instead of focusing on what they do best.

The ideal scenario – which our Regenerative Innovation Portfolio is supporting – is to encourage companies to work collaboratively on this, so that they can mutually support farmers and the value chain in their relevant landscape, rather than individually applying their requirements to farmers and hoping that the landscape transformation takes place as a result.

We're seeing early indications of companies really wanting to find these collective solutions – so I'm excited to be working in an area that will drive real impact.

Richard Zaltzman

Richard is an experienced board member and executive with a proven track record of business transformation and leadership through innovation, focused on addressing the global challenges that we face today. For the past five years, Richard has held different roles in the European innovation arena, and is now Chief Executive of EIT Food, Europe's largest food innovation community.

Creating a sustainable future is foundational to Richard's work. He has studied and worked on the complex systemic issues which need to be tackled if we are to achieve a sustainable future for people and the planet, and his work at EIT Food is focused on bringing innovation to tackle the environmental and societal challenges at the heart of the food system.

Richard has also had a long career in the technology sector, including 10 years with Microsoft, developing a deep understanding of the importance of technology-enabled change and fast-paced innovation. He has worked closely with startups as an Accelerator mentor, run his own business, and is on the board of Sussex University in the UK.

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NEW Food
IN-DEPTH FOCUS

Ingredients

Protein-packed for on-the-go

Luker Chocolate's Daniela Quintero discusses the careful balancing act of creating a protein-rich product that doesn't sacrifice taste, texture or quality

Cheese innovation

Michael Walsh considers the increasing demand for versatility in the cheese sector and shares his insight into Tirlán's innovative approach

Shaking up the plant milk market

As consumers continue to seek convenient alternatives to traditional dairy, Sandy Eyre shares how Overherd is shaking up what people think about plant milk

Functional snacking: why chocolate is the perfect carrier for protein

As more and more consumers opt for nutritionally packed diets, vegan foods and healthy on-the-go snacks, there's a growing demand for functional yet indulgent protein-fortified foods. Here, Daniela Quintero from Luker Chocolate explains why protein-enriched chocolate offers huge potential for this market, helping brands to achieve improved nutritional value with a better tasting, higher quality product.

IT IS NO SECRET that interest in better-for-you (BFY) snacking is on the rise, accounting for approximately 20 percent of the global snack market in 2023, as rapid changes in consumer lifestyles, a preference for healthier, natural foods and reportedly higher disposable incomes is driving growth.[1] In order to maintain good health, consumers want nutrient-dense, small-sized snacks to control food portions on-the-go. However, post-pandemic, they are searching for a balance between delicious indulgence and health benefits in their snack choices – and are unwilling to compromise on either.[2] In response, many chocolate brands and manufacturers are experimenting with new flavours, alternative and natural sugars, vegan ingredients and functional additives, like protein.

According to Innova Market's global research, 42 percent of consumers cited 'protein' as the most important ingredient in better-for-you foods.[3] Time-poor, health-conscious consumers reach for protein-rich snacks to satiate hunger and provide a boost of energy to fuel the day ahead. When consumed as part of a healthy, balanced diet, additional protein can also aid with weight management and muscle development.

So, how can you create protein-enriched chocolate without compromising on taste, texture, quality or sustainability? What protein alternatives are available and how can brands and companies capitalise on this growing demand? As Head of the Research and Development (R&D) team at Colombian B4B chocolate manufacturer Luker Chocolate, these are all questions that we set out to answer when developing our new functional product, 44% Dark Chocolate with Pea Protein.

Creating a high quality protein-enriched chocolate

Protein chocolate is a chocolate couverture with added protein from a source like pea, soy or whey. From a new product development perspective, the difficulty in creating protein-fortified chocolate lies in maintaining the indulgent taste and smooth texture, as protein tends to add density to the overall mouthfeel. The challenge for chocolate manufacturers is to balance protein's grainy texture with chocolate, which can affect the overall taste and eating experience.

Why add protein early in the manufacturing process?

Due to the limited functionality and versatility of protein powders, it can be difficult to add protein late in the sweet-snacking production process – such as in bars and granolas. In addition, many protein-fortified products have a reputation for being excessively sweet, as they often use artificial sweeteners to reduce the calorific value. However, by using protein-enhanced chocolate in the formulation of

these products, you can reduce the amount of additional protein and sweeteners used, benefitting the product's sensory performance.

These formulation issues – coupled with the booming consumer demand – presented us with a unique and exciting opportunity to innovate and create an entirely new couverture.

Maintaining superior taste, texture and quality

After considerable experimentation, our R&D team were able to artfully balance taste, quality, texture and sustainability, creating a product as indulgent, smooth, rich and versatile as our other popular couvertures. This is what we discovered in our testing phase:

Taste and quality go hand-in-hand

Without the highest quality base ingredients, you cannot produce a truly delicious and indulgent product. In using a darker chocolate with a higher cocoa percentage, the most prominent flavour notes of our 44% Dark Chocolate with Pea Protein product are those of our locally sourced Cacao Fino de Aroma and delicately balanced sweetness. The same rule applies for all functional snacking products; pick the best quality ingredients – such as sugars, cocoa and fruits – and you stand a much better chance of delivering great flavour.

Texture is a little trickier

Proteins can be difficult to incorporate into a smooth formulation due to their chemical structure. We found that almost all protein sources produced a dry, chalky or 'sandy' mouthfeel – the result of the protein interacting with cocoa mass and creamy cocoa butter. To achieve a melt-in-the-mouth texture, it is essential to balance the protein content with overall customer experience, and to remember that indulgence is key.

Sourcing and sustainability

The final – but important – consideration when producing a functional ingredient is sourcing and sustainability. With increasing legislation around transparency and traceability, such as the European Union (EU) Deforestation Regulation (EUDR), brands must also consider where the additional nutrition is coming from. My advice is to use trusted suppliers with a high degree of traceability in their value chains; look for partners who use global positioning systems (GPS) and polygon mapping, and that can evidence price transfer at farmer level.

Why pea protein is perfect for chocolate and snacking

Plant-based protein is a popular choice for consumers, with the global plant-based protein market predicted to increase from $12.7 billion in 2023 to $19.32 billion by 2026.[4] Pea protein offers a high-quality, complete source of protein – containing all nine essential amino acids.

Naturally vegan and hypoallergenic, it is also a better fit for a range of consumer dietary needs. This is important when catering for consumers in Europe, with the number of vegans having grown in 2023 from 6.62 million to approximately 8.25 million, according to Statista.[5]

Using pea protein also appeals to environmentally conscious consumers. A survey conducted by IPOS for Yara in 2023 found that, when buying food and beverages, 58 percent of Europeans consider the environmental impact.[6] Being plant-based, pea protein requires less water and land compared to other protein sources. Additionally, research shows that pea protein's composition makes it one of the most easily digestible plant proteins for most people.[7] This makes it a favourable option compared to alternative protein sources when looking for a product with health benefits. Pea protein is also one of the most rigorously researched plant proteins, according to Functional Foods and Nutrition 2023.[8]

With growing demands for healthier snacking options, functional ingredients are an exciting territory to explore and discover new offerings to entice consumers

Credit: Luker Chocolate

New functional innovations like protein chocolate offer chocolate and snacking brands an effective way to boost the protein in their products without affecting the taste, texture or quality

The future of protein-packed snacking

With growing demands for healthier snacking options, functional ingredients are an exciting territory to explore and discover new offerings to entice consumers.

A protein-enriched chocolate couverture is versatile, indulgent and delicious. When executed well, it maintains the same functionality as a normal chocolate couverture, meaning that brands and chocolatiers can replace it like-for-like with dark chocolate in existing recipes. Our 44% Dark Chocolate with Pea Protein provides 5g of protein per 25g serving, has the same tempering curve as any other dark chocolate and can be used for a variety of applications, including:

- panning nuts, almonds or dried fruit
- enrobing granola bars
- moulding chocolate bars
- inclusion in granola or trail mixes
- making ganache.

This couverture can also enhance protein intake when combined with other ingredients, such as nuts. This offers brands a new avenue to boost the nutritional value of their products while increasing their flavour desirability.

It is worth noting, though, that baking or heating protein chocolate above 90°C can denature the isolated protein properties – so use it wisely!

With consumer demand shifting for indulgent, healthier snacks, the industry is facing new challenges, but genuinely exciting opportunities. New functional innovations like protein chocolate offer chocolate and snacking brands an effective way to boost the protein in their products without affecting the taste, texture or quality. Such ingredients can be healthier options that increase product appeal for lots of European customers, bolstering business revenue and diversifying portfolios in a crowded snacking landscape.

Daniela Quintero

Daniela, Director of Design and Product Development at Luker Chocolate, leads Luker's Design and Product Development team, and is a chemical engineer with more than eight years of experience in R&D for several industries. She has broad knowledge and skills in product design, food and sensory science, nutrition and manufacturing production and processes. Before joining Luker Chocolate, Daniela worked as a product designer for savoury and snacks and as a lab scientist for Halliburton.

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Credit: Tirlán

Meeting growing consumer demand for versatility in the cheese category

A prized source of nutrients and long-revered food across most of the world, cheese not only shines as a stand-alone product but as a vital ingredient in many dishes. Here, Michael Walsh, Category Manager – Cheese at Tirlán, shares his insight into innovation in the processed cheese category.

CHEESE IS ENTRENCHED in the food culture of many countries and is highly valued as a food source, given its healthy perception and highly nutritious profile. Valued at $158 billion globally in 2023,[1] cheese is the largest category in the dairy space, exceeding both milk and yoghurt. The continued popularity and growth of the cheese category is being driven by a combination of its valued attributes, such as versatility and nutrient content, alongside culinary exploration and product innovation.

Cheese is a versatile ingredient used in a wide range of dishes, from pizzas and burgers to sandwiches and ready meals. Renowned for enhancing the eating experience, cheese appeals to both home cooks, manufacturers and food service restaurants alike, and is prized for its many nutritional benefits. Despite its calorie and fat content, cheese is rich in protein, calcium and other nutrients, which drives consumers to continue to choose cheese as part of a healthy and balanced diet. These qualities have increased its exposure in diverse cuisines and markets where traditionally it has not been used. Consumers are exploring new flavours and experimenting with cheese in new dishes and formats, driving demand for cheese in new markets. What's more, it serves as a convenient and satisfying snack option that provides protein and staves off hunger; in fact, the growing availability of cheese snacks for on-the-go consumption has been a major driver of growth in the category.

Through growing an evolving cheese portfolio, Tirlán enables its customers to create the products that will provide consumers with the choices that they expect, delivering exceptional flavour and functionality.

Credit: Tirlán

Consumer needs and demands are changing rapidly and manufacturers need to be agile and respond quickly to these demands

As cheese manufacturers have understood these growing consumer demands, they have been innovating to create more cheese products in formats and flavours that consumers are seeking. This level of innovation has maintained excitement in the cheese category and ensured that consumers continue to buy the products.[2]

Tirlán – pioneers in cheese innovation

Tirlán has been at the forefront of cheddar cheese technology for more than 60 years, and our experience in developing award-winning cheese for international retail, foodservice and ingredients markets is globally recognised.

In recent years, we have been innovating strongly in functional cheese to support the development of new cheese products to meet growing consumer demand for greater convenience and snackable formats. By listening to our customers and tapping into consumer demands for flavours and convenience, Tirlán has developed CheddMax, a portfolio of cheese solutions that, when utilised in manufacturers' applications, such as natural formats or processed cheese, can impart significant functional, productivity, cost, flavour and nutritional benefits that will pass through to the end consumer. CheddMax can support our customers to overcome the challenges that they experience in creating cheese formats such as cheese slices, snackable cheese, grated cheese, pizza cheese, spreadable cheese and many more.

We produce 27 different natural cheese recipes, each one tailor-made to suit various customers' functional needs. In addition, we have the technical capability to support manufacturers in the development of their product recipes and customer solutions.

Technical benefits for developing solutions

The cheese category has diversified significantly over the past decade, and manufacturers have been innovating in new ways to bring the prized dairy format to consumers. Manufacturing processed cheese involves many challenges, and Tirlán has developed specific CheddMax recipes to overcome them.

Consistency in texture and melting properties are key attributes for processed cheese, and maintaining this consistency across batches is crucial.

One aspect of texture is viscosity. Viscosity is the tendency of the cheese to spread and flow when completely melted and is an important attribute for cheese manufacturing. The viscosity of the cheese during manufacturing can impact the pumpability

of the cheese during the process; it can impact the ability to hot-fill during packing; and it can restrict flow during food preparation. CheddMax Enhanced Viscosity (EV) is our functional cheese curd designed for use in a variety of processed cheese end-products such as individually wrapped slices, slice on slice (SOS), blocks, triangles and spreads. It ensures optimum viscosity of the cheese, providing excellent flowability and good pumpability during manufacture.

Firmness, brittleness and stickiness are features of cheese that can affect the product's machineability on a high-speed slicing line. Our CheddMax SuperSlice cheddar cheese solution consistently delivers exceptional slicing texture and functionality all year round. When used in the creation of SOS cheese applications, the solution will deliver a texture and firmness akin to natural cheddar cheese. A common challenge that manufactures encounter in the development of cheese slices is brittle texture that cracks when bent. CheddMax Super Slice provides a firm texture to cheese slices upon cooling, which can bend without breaking, are clean to the touch and not sticky, and have excellent melt and stretch properties when toasted or heated.

In applications such as Pizza Cheese, browning of the cheese can often be considered a colour defect.

Our CheddMax LB, or low browning, has been specifically developed to address issues of browning in processed cheese manufacture and the excessive colouration or over-browning of cheese in heated applications. It allows the level of browning to be controlled during heating and cooling, giving a visible benefit while also delivering consistent flavour, yield and texture. Even in processed cheese facilities where temperature control may be an issue, this solution ensures that no discolouration occurs, offering value to the business through minimising the downgrade of products.

CheddMax is manufactured from high-quality pasteurised milk from Irish family farms. Milk from grass-fed cows is naturally rich in Vitamin A and beta carotene, which provides a golden hue and a great natural taste, imparting excellent flavour and colour into any cheese application.

Innovation is key to continuing growth

Consumer needs and demands are changing rapidly, and manufacturers need to be agile and respond quickly to these demands. At Tirlán, we aim to lead the way in processing and technology while maintaining the nutritional integrity of our products. Through growing an evolving cheese portfolio, we enable our customers to create the products that will provide consumers with the choices that they expect, delivering the exceptional flavour and functionality demanded through changing lifestyles and taste preferences.

@NewFoodMag

Michael Walsh

Michael, Category Manager – Cheese at Tirlán, has 25 years of experience working in key senior commercial roles at Tirlán, within several business units globally, including UK, EU, Asia and MENA. Michael holds a BSc in Food Business and a Diploma in Dairy from University College Cork, and has held his current role at Tirlán since 2019.

The cheese category has diversified significantly over the past decade, and manufacturers have been innovating in new ways to bring the prized dairy format to consumers

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Q&A

Shaking up the powdered milk market

In this Q&A, *New Food* speaks to Sandy Eyre, Founder of dried plant-milk company Overherd, to learn about the emerging powdered milk market in the UK. Read about how the company is working to reduce packaging waste and transportation emissions, with the aim of creating a more sustainable alternative to traditional plant-based milks.

POWDERED MILK is gaining renewed popularity as consumers seek convenient and sustainable alternatives to traditional dairy products. Often referred to as 'milk powder' or 'dried milk', this product has evolved over the years, beyond its historical uses in baking and cooking.

As environmental concerns drive demand for products with a smaller carbon footprint, powdered milk's reduced packaging and longer shelf life may be increasingly attractive to consumers.

In this article, *New Food* speaks to Sandy Eyre, Founder of Overherd, a UK oat-based powdered milk company, to discover how the market has been shaping up in recent years and to explore how companies like Overherd are addressing consumer demands for sustainability, convenience and dietary flexibility, while delivering a quality alternative to traditional dairy milk.

What is Overherd?

SANDY EYRE (SE): Overherd is a UK-based plant milk challenger brand. We're shaking up (quite literally) how plant milks reach consumers. While traditional plant milk comes in liquid form and is packaged in bulky Tetra Pak cartons, Overherd is a dried oat-milk powder, with each compact pouch making up to eight litres of oat milk. To make on-demand oat milk, you simply add Overherd to water and shake. Or you can stir it straight into hot drinks as a creamer.

Why is there a need for powdered oat milk?

SE: Regular store-bought plant milk is typically 90 percent water. While this isn't a problem in itself, it means that producers are forced to use bulky cartons to package what is mostly water (and is cheaply, readily available in homes). In contrast, we concentrate on the... concentrate! With oat-milk powder, you add the water at home instead, which makes it 10 times lighter and less bulky, allowing us to use 90 percent less packaging and fewer lorries throughout the supply chain.

Its light weight and long shelf life also makes it more suitable for travel and helps to prevent food waste (the UK throws away 490 million pints of milk a year!).[1]

Where does Overherd compete in terms of other dehydrated oat milks?

SE: The dried plant-milk market is relatively new in the UK, and while other types of plant-milk powder exist, like coconut-milk powder and rice-milk powder, the issue with these is often solubility. The last thing you want is lumpy plant milk!

When I speak to people about oat-milk powder, the vast majority have no idea that it exists, so spreading awareness is a big challenge.

What are the nutritional benefits of Overherd? Where do these rank among other oat milks?

SE: Oat milk has been criticised for its oil content, typically sourced from rapeseed. We wanted to do things differently, so opted for cold-pressed coconut MCT oil to add creaminess. Yes, it's more expensive, but it's worth it and has some great health benefits, like improved energy levels and brain function.

The use of pesticides, specifically glyphosates, in oat production is another hot topic. This guided our decision to use exclusively organic and gluten-free oats in our plant milk, so we can guarantee no glyphosates.

Is oat milk missing any key dietary components that dairy milk can provide?

SE: Dairy milk is recognised for its calcium content, with a 200ml serving containing 30 percent of your daily recommended intake. While oat milk naturally contains calcium, it is present in much smaller quantities. Subsequently, several brands – including us – add additional calcium to oat milk to bring levels more in line with dairy. This is something to look out for.

Cow's milk is also typically higher in protein compared to oat milk, which is certainly a benefit for most. However, dairy contains more sugar and less fibre, so there are tradeoffs both ways.

How do you ensure the purity and quality of your oat-milk powder?

SE: The first part is sourcing the best ingredients. For example, using organic oats that are grown to strict standards.

The second part is frequent testing throughout production, starting with the individual ingredients, ensuring taste and conformance with all microbiological tests. Beyond this, processes like fine sieving and metal detection ensure the quality of the oat milk from start to finish.

How does Overherd ensure that its oat-milk powder is suitable for individuals with specific dietary needs, such as those with food allergies or sensitivities?

SE: One in three people in the UK lives with a food allergy, and we wanted to ensure that Overherd could be enjoyed by as many people as possible. Unlike most other oat-milk brands, we are proud to be gluten-free. While oats don't naturally contain gluten, they are frequently grown and processed alongside other gluten-containing cereals, which can cause contamination.

We also closely monitor the supply chain to identify potential contact points with allergens so that risks can be managed effectively.

How does Overherd ensure that its oat-milk powder is sustainably sourced and produced, and what steps does the company take to minimise its environmental impact?

SE: Sustainability is at the heart of why Overherd was founded: remove the water from oat milk to reduce packaging, transport emissions and food waste.

A common issue is the perception of sustainability vs. actual sustainability. One example is the rise of compostable packaging. While it sounds great, it can do more harm than good if not correctly disposed of. Our recyclable pouches aren't quite as glamorous sounding, but we are confident that they're a more sustainable choice. Our approach is transparency; if you can explain why you made a decision, that is what counts.

Sandy Eyre

Sandy is the Founder of Overherd, a UK challenger oat-milk brand. He hopes to 'shake' up the dairy alternative space by making plant milk even more sustainable, convenient and travel-friendly.

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Innovative strategies for product development and portfolio management

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WEBINAR 11 JULY 2024 · 15:00 BST

Staying ahead of the curve: harnessing informatics to meet changing F&B consumer expectations

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EVENT

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IAFP 2024

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CHARITY THROUGH CHICKEN: inside KFC and FareShare's partnership

KFC and FareShare shine a light on how their partnership is tackling food insecurity by redistributing surplus chicken to those in need, aiming to support struggling communities.

CURRENTLY, MORE THAN 11 million people in the UK are living in relative poverty, while over seven million people are living in food-insecure households,[1] meaning that they do not have reliable access to affordable and nutritious food. This reality has major impacts on those who experience it, often leaving them and their families hungry, isolated, and with declining health.

Food insecurity is driven by a range of factors, including, but not limited to, income, employment, and the unprecedented rise in the cost of living. The impact of this latter point is clearly illustrated by the latest data from the Department for Work and Pensions (DWP), which reveals that levels of food insecurity in households rose from 4.7 million in 2021/22 to 7.2 million in 2022/23.[2]

As more individuals and families find themselves unable to afford essentials, such as food, reliance on food charities and community kitchens has increased.

This is why KFC UK&I and FareShare, the UK's biggest charity tackling food waste, have been working in partnership since 2022. Together, we ensure that surplus fried chicken from KFC restaurants can be enjoyed by those who may be

> *Together, we ensure that surplus fried chicken from KFC restaurants can be enjoyed by those who may be going hungry, via FareShare's network of charities and community groups*

Kristoph Gibbon-Walsh

Kristoph is the Chief Operating Officer at FareShare. He helps to redistribute food through supporting FareShare's Network of Regional Centres, FareShare Go operations, food and people safety, logistics and coordination, and the amazing community of charities. He's also responsible for strategic external relationships with other charities and food redistributors. Before working at FareShare, Kris lived and worked in France, India, Croatia and Romania on a range of engineering projects after finishing a PhD in Environmental Chemistry and Engineering. Kris is also the co-founder and Chair of an international epidemiological society.

going hungry, via FareShare's network of charities and community groups. Our partnership illustrates the important role that big businesses can play in supporting communities and responding to social issues at a local level. It also unites us around a shared belief that good food, especially great chicken, should never go to waste.

From a KFC perspective, this partnership forms part of our ongoing work to be the most responsible and sustainable business that we can be. We have more than 1,000 restaurants across the UK and Ireland, so it's important for us to show up as a good neighbour in our local communities.

At FareShare, that sense of community is also at the heart of everything that we do. Our volunteers who use their time and efforts to support others in the local area are the backbone of our entire »

KFC and FareShare created a co-branded food delivery bike called 'The Bucket Bike', which replaced a traditional food storage box with a 2.5ft tall KFC bucket, complete with giant pieces of fried chicken.

Image credit: Joe Pepler, Pinpec

Jenny Packwood

Jenny is the Chief Corporate Affairs & Sustainability Officer at KFC UK & Ireland. She believes passionately in the vital role that business needs to play in tackling the environmental and social challenges that the world faces today. She started at KFC UK & Ireland in 2008 and, over the past 15 years, she has played a critical role in both the evolution of the brand and the focus the business has on sustainability and social impact. Jenny has been pivotal in kick-starting KFC's global focus on social purpose, spearheading KFC's partnership with Fareshare and the launch of KFC's ground-breaking youth employability programme, Hatch, which, in partnership with UK Youth, aims to help break cycles of disadvantage and unemployment for young people. Jenny also led KFC's journey to improve chicken welfare, culminating in the business being ranked top of World Animal Protection's The Pecking Order report in 2021. At COP26, Jenny led KFC's Net-Zero announcement, committing to becoming a circular zero-waste business in food, packaging and materials by 2035, as well as becoming a Net Zero carbon business by 2040.

operation. Many initially come to us driven by a desire to help others, but most stay due to the sense of camaraderie, belonging and friendship.

With community awareness of charities that provide food provisions and the propensity to volunteer being huge factors in our ability to deliver on our mission to tackle food waste, we together commissioned research to better understand them.

We found that one of the biggest barriers that keeps communities from accessing support is a lack of awareness of available resources. Through our research, we've found that just 10 percent of people would be able to confidently locate their local community kitchen, despite one in six of the UK population struggling to get enough to eat. This is in contrast with 88 percent of the population who can easily identify their nearest KFC restaurant.

> *We believe in the power of community and the importance of standing together to support each other, especially during challenging times*

Another challenge is recruiting the vital volunteers who make charity work possible. Our research found that over half of Brits are keen to offer their time to a local charity, and 32 percent would volunteer at a local community kitchen if there was one in their area. However, again, lack of information and limited awareness of local charities were identified as key reasons for why people have not volunteered more in the past.

For the most part, surplus KFC chicken is transported from restaurants to local charities and community groups via bikes, which are ridden by volunteers. We brought this process to life with our very own bucket bike, a KFC and FareShare cobranded food delivery bike, which replaced a traditional food storage box with a 2.5ft tall KFC bucket, complete with giant chicken.

The Bucket Bike was ridden by volunteers at FareShare Sussex and Surrey with a view to raising awareness locally of how more people can engage in volunteering and to showcase the resources that are available to those who most need them.

We believe in the power of community and the importance of standing together to support each other, especially during challenging times. In March 2024, we hit the huge milestone of one million meals redistributed through our partnership, and we're on track for another exciting milestone – to redistribute the equivalent of two million meals by the end of 2024!

We're inspired by the difference that we've been able to make so far, but know that there is still much more to do when it comes to ensuring that people in need can access vital support. Looking to the future, we're excited to continue our partnership, drive even greater impact, and help as many people as possible.

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NEW Food IN-DEPTH FOCUS

Food Safety

Sustainable and hygienic

Kathryn Whitehead offers her insight into the EU-funded SurfSAFE project, which aimed to sustainably increase microbial safety in the food industry

Passionately campaigning for allergen information improvements

Emma Kocher, sister of Owen Carey, shares a powerful account of her family's campaign to make Owen's Law official legislation

Advocating for everyone who eats

Stop Foodborne Illness' Mitzi Baum discusses the history of the organisation as it marks 30 years since its inception

Outcomes of the SurfSAFE project: sustainable and hygienic solutions for the food industry

Kathryn Whitehead, Professor in Microbiology at Interfaces, reveals the work of a recent European project aimed at increasing microbial safety in the food industry sustainably through surface modification.

The SurfSAFE project focused on surface modification and biofilm analysis to develop tailor-made antifouling, antimicrobial and non-toxic surfaces inspired by nature

THE EU-funded project SurfSAFE (Grant agreement ID: 952471), sponsored by the European Horizon 2020 programme, was developed to reduce critical zones of biofouling in food processing plants.

Surfaces used in food processing industries are typically colonised by microorganisms, even following cleaning and disinfection. Microorganisms grow in the form of biofilms, which are adhesive and potential contamination sources for finished food products, thereby reducing their shelf life and causing foodborne diseases.

Foodborne diseases cause morbidity and mortality, and they are a significant impairment to socioeconomic development. The gene transfer between microorganisms exacerbates this issue due to the increased resistance of bacterial populations to antimicrobial treatments. Safer food production entails high cleaning costs, but this can cause environmental impacts associated with high water and energy consumption and contaminated wastewater production.

The SurfSAFE project focused on surface modification and biofilm analysis to develop tailor-made antifouling, antimicrobial and non-toxic surfaces inspired by nature. In critical zones of food processing plants, where biofilms are an issue, surface modification may reduce biological fouling and facilitate the removal of deposits. This approach may help to guarantee safer

and higher quality products to consumers while minimising cleaning downtimes and, thus, enabling substantial cost benefits to food processors. Moreover, the consumption of hazardous chemicals will be dramatically reduced by minimising cleaning and disinfection processes. This project addressed Goal 2 (food security), Goal 9 (promote sustainable industrialisation and foster innovation) and Goal 12 (sustainable production) of the 2030 Agenda for Sustainable Development and is expected to contribute to the understanding of successful interventions and prevention technologies that could be utilised in the food industry.[1]

In SurfSAFE, biomimetic surfaces based on plant leaves were manufactured, characterised and tested, enabling a reduction in bacterial adhesion and biofilm formation. The effects of surface topography on gene transfer were also assessed and methods for biofilm imaging analysis were developed. SurfSAFE worked as a consortium to understand the application of antifouling surfaces to combat the complex problem of microbial contamination in the food industry, raise public awareness concerning this problem and train the research staff of the Faculty of Engineering of the University of Porto (UPORTO, Portugal) in innovative technologies and interface science areas. The consortium was complemented by the University of Copenhagen (Denmark), University Medical Center Groningen (The Netherlands) and Manchester Metropolitan University (UK).

The SurfSAFE team defined long-term research strategies in the scientific fields of surface modification and biofilm analysis. Following the Grant Agreement, 29 deliverables were submitted and 22 milestones were achieved. This strategy involved the exchange of knowledge and researchers between the consortium's institutions, active search for new funding opportunities and strong commitment to communication and dissemination activities.

The project consortium has organised different categories of events, including four brokerage events with industry, three scientific workshops, two hands-on practical training schools, training on 'Research Management and Career Development', two technical workshops on 'EU Proposal Preparation and Evaluation' and 'Intellectual Property Rights – The unitary patent system', and the Final Conference on Biofilm Detection and Control in the Food Industry to disseminate the project results and increase SurfSAFE's contact network. Consequently, several industrial companies and research groups have been »

The SurfSAFE project provided opportunities for knowledge and experience exchange through on-site training and theoretical workshops, empowering a new generation of researchers

Kathryn Whitehead

Kathryn is a Professor in Microbiology at Interfaces at Manchester Metropolitan University (UK). She has extensive experience in designing and characterising antimicrobial, biomimetic and anti-adhesive surfaces and decontamination systems for use in food industries. Her work also includes the development of antimicrobials and investigating the eradication of biofilms, and the development of new cleaning formulations to control microorganisms and/or organic fouling using a sustainable approach.

contacted to promote future collaborations and seek translation into the industry.

Fifteen short-term staff exchanges (STSEs) were carried out at partner institutions (five secondments to each partner), to share and benefit from their expertise and technical capabilities. This type of exchange and training was continuous throughout the project, facilitating the manufacture, characterisation and testing of biomimetic surfaces based on plant leaves. Several joint applications for European and national calls were submitted during the project, and the UPORTO team was actively involved in two COST Actions, an interdisciplinary research network that brings researchers and innovators together to investigate a topic of their choice for four years.[2] One of the most effective means of disseminating the results of this project was through participation in various international and national conferences, and the preparation of joint scientific publications. To date, 10 international peer-reviewed papers have been published.
The consortium was also responsible for regular communication on social media platforms and the project's website with the intention of maximising SurfSAFE's impact, reaching not only the scientific community, but also the general public.

Overall, this project was innovative and exciting to work on

The twinning activities and increased cooperation between the SurfSAFE partners raised opportunities for competitive research funding at the European and national levels and innovation/entrepreneurship, as well as presentation in international conferences for engaging new stakeholders, and production of high-impact factor scientific publications. Efforts were made to find new funding sources that permit collaboration between the partners in the long-term, further enhancing the project's impact. In addition, the SurfSAFE project provided opportunities for knowledge and experience exchange through on-site training and theoretical workshops, empowering a new generation of researchers.

The SurfSAFE project is now complete, and to conclude this three-year project, an international conference was held on Biofilm Detection and Control in the Food Industry, from 27 September to 29 September 2023, in Porto, Portugal. The work performed from the beginning of the project to the end of the period was covered, highlighting the main results achieved. Conference topics included:

1. Biofilms and the food industry
2. Biofilms and surfaces/interfaces
3. Molecular mechanisms of biofilm formation
4. Biofilm prevention and control strategies.

Participants from nine countries and three national companies associated with the food industry attended the conference.

Overall, this project was innovative and exciting to work on, and there was a significant exchange of ideas and training. The feedback that we received was that it was well enjoyed by all participants.

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expertview

Josh Pringle
Executive Vice President, CO2Meter

What are the benefits of modified atmosphere packaging?

Modified atmosphere packaging (MAP) is a food packaging technology that has revolutionised the way we store and transport perishable food products. MAP works by modifying the composition of the air surrounding the food product, creating an environment that slows down spoilage and extends the shelf life of the product. MAP has become increasingly popular in recent years due to its many benefits, including improved product quality, increased shelf life and reduced food waste.

MAP works by creating a controlled atmosphere around the food product, which slows down or prevents the oxidation process. This is achieved by replacing the air inside the package with a gas mixture that contains lower levels of oxygen than the ambient air. The most used gases for MAP are carbon dioxide (CO_2) and nitrogen (N_2), which are used in varying proportions depending on the specific food product and the desired shelf life.

MAP only works if you can verify the gases inside the packaging and that the seal is not broken. To help verify modified atmosphere packaging protection, food packagers use handheld oxygen meters like the TecPen modified atmosphere packaging Oxygen Analyzer[1] or the TecPen modified atmosphere packaging sensor for oxygen and CO_2.[2] These analysers test the overall quality control for packaging. The gases inside the packaging are pulled into the sensor and tested as part of a quality control process. The TecPen can verify the level of oxygen inside the packaging to verify gas flushing or film barriers were used correctly.

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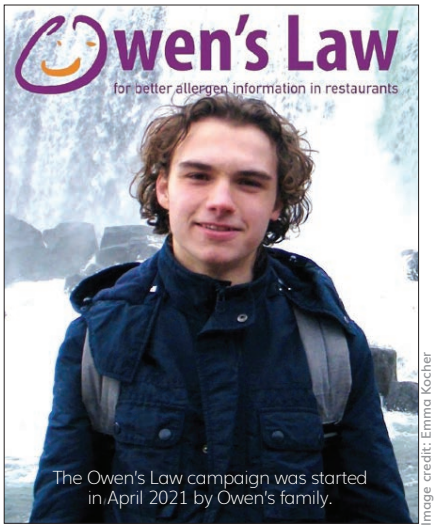
Owen's Law will save lives

Here follows an emotive account from the sister of a young man who lost his life due to an undeclared allergen at a restaurant several years ago. Owen Carey's sister, Emma Kocher, shares details of her family's campaign, calling for improvements to the display and communication of allergy information for non-prepacked food.

OWEN CAREY had just turned 18 and was celebrating his birthday with family members and his girlfriend on a day out in London on 22 April 2017. He had suffered with multiple food allergies all his life, including dairy, and was well used to ordering meals to fit his restricted diet when in restaurants. For lunch that day, Owen ordered a grilled chicken burger at a Byron Burger restaurant, which, having explained his allergies to the server and having no other information on the menu to the contrary, he was assured would be 'plain grilled' and therefore safe for him to eat. However, the chicken had in fact been marinated in buttermilk, to which Owen was highly allergic. He only ate a small amount as he could tell immediately that something was wrong. His breathing became increasingly restricted and he was using his asthma inhaler constantly on his journey away from the restaurant. Forty-five minutes later, Owen collapsed, having suffered a massive anaphylactic reaction, from which paramedics and hospital staff were unable to resuscitate him.



The Owen's Law campaign was started in April 2021 by Owen's family.

Image credit: Emma Kocher

We are calling for a change in the law surrounding how allergy information is displayed and communicated for non-prepacked food in the UK

Launching the campaign

Following multiple delays due to the protracted inquest process, COVID-19 and Brexit, we, Owen's family, launched a campaign in April 2021 on what would have been Owen's 22nd birthday. We are calling for a change in the law surrounding how allergen information is displayed and communicated for non-prepacked food in the UK. Primarily, this would make it a legal requirement for establishments serving non-prepacked food (restaurants, cafes, takeaways, etc) to list for each dish the 14 major allergens (as originally prescribed by the 2014 European Union (EU) directive) "in writing, at the point of ordering and without the customer having to ask". We also want improved allergen training for serving staff, including a mandatory requirement for them to initiate a conversation with customers regarding any potential food hypersensitivities.

We are a very small set-up with a personally funded budget, run by Paul Carey and myself, Owen's father and sister, handling the research/campaigning and PR, respectively. Supported by »

the wider family, who have attended conferences and helped with research etc, and various family and friends who have also undertaken fundraising activities for allergy charities, our collective efforts have served to gain media attention and raise the profile of the campaign among the general public.

While none of us have allergies, we do have first-hand experience of the tireless effort that goes into living with allergies and protecting someone from them. This includes paying close attention to ingredients lists in everything, preparing your own food to take for meals out, translating dietary needs into foreign languages for holidays abroad and the constant worry when your allergic child is away for a play date, school residential trip or when they leave home for university. We also sadly know the devastation that comes from losing someone so loved to something so easily preventable, and we are determined that no one else should have to experience this.

Campaigning for a vital change in legislation

Our father, Paul, identified the relevant legislation to determine how things currently stand, and planned what needs to be changed to meet our campaign requirements. Together, drawing on my experience working in the catering industry, we spoke with multiple professionals to understand how this could be achieved on a practical level.

The law currently allows information on the allergens in each dish to be provided verbally. Speaking to professionals in the industry assured us that it would be a simple procedure to have this information written by each dish variously on the face of the menu, chalk board or an app, etc, whether the establishment was a small independent cafe or a large chain restaurant. We also identified which other European countries already have tighter legislation on allergen labelling in place and, in September 2023, Paul, with Iain Ferris, an expert in food safety and legislation at the University of Birmingham, conducted a research trip to the Republic of Ireland. Here, they observed an excellent adherence rate and observed how easily 'Owen's Law' could be taken up and enforced/regulated in the UK.

A key step forward

In May 2023, we were extremely fortunate to have our petition debated in Parliament. Our petition, launched at the start of our campaign, reached almost 13,000 signatures and was debated alongside another calling for the appointment of an 'Allergy Tsar' – someone to champion the needs of people with allergies in government. My local MP for Winchester, England, Steve Brine, Chair of the Health Select Committee, championed our cause and not only spoke at length during the debate, but also arranged meetings for us with the then Health Minister, Neil O'Brien, and the Minister for Food, Farming & Fisheries at Defra, Mark Spencer, who would ultimately be responsible for changing the required laws.

> *We are confident that these simple changes in legislation will lead to low-effort improvements in allergen labelling and staff training in the catering industry. Doing so can help to prevent any more needless deaths of people with food allergies*

Gaining support from the FSA

The hardest battle, however, was always going to be convincing the Food Standards Agency (FSA), which is the body responsible for advising the UK Government on all food-related matters and providing guidance to the industry. Initially adopting a cautious approach, in due course, at their board meeting in December 2023, they formally supported the need for change and have since recommended to government that the law should be changed in line with Owen's Law.

The FSA considered that having the 14 major allergens listed in writing (by whatever means) at the point of ordering must be put in legislation, as they think it unlikely that all establishments would adhere fully to these rules if presented as merely 'industry guidance'. Incorporating these changes into legislation would also make it easier to monitor and enforce through the standard health and safety inspections performed by local councils. The demand for serving staff to initiate a conversation with customers about allergies was considered too difficult to police, so this requirement will instead be included in 'industry guidance' as best practice.

What the future holds for Owen's Law

Following the letter from Professor Susan Jebb, Chair of the FSA, to Mark Spencer of Defra, advising him to follow their advice and cement Owen's Law in legislation, the campaign's supporters have been contacting their MPs to apply pressure to Mr Spencer, and we're hopeful that our goals will be achieved before the next general election.

In the meantime, we have launched the Owen's Law Calling Cards, designed to be filled out by customers and left at food establishments as a simple and helpful way to educate them about the dangers of not declaring allergens in writing. They are already being used up and down the country, with positive feedback. Things are already progressing rapidly, with several big high street chains now providing allergy-friendly menus, and various catering apps already available that allow access to ingredient databases, making it quick and easy for kitchens to update their menus online with Owen's Law.

We are confident that these simple changes in legislation will lead to low-effort improvements in allergen labelling and staff training in the catering industry. Doing so can help to prevent any more needless deaths of people with food allergies. We think that Owen would be very proud of his legacy.

Emma Kocher

Emma is an allergy campaigner and the older sister of Owen Carey who lost his life to food allergies. Despite the 16 year age gap they were incredibly close and 'Uncle Owen' was her three children's favourite person in the world. Emma worked for a number of years as a Patisserie Chef & Event Manager for a catering company in her home town of Winchester, before switching to work in education while running a celebration cake business in parallel. She recently moved to Seattle USA with her family, but continues her campaign work from afar.

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Exploring the distinct roles of environmental and hygiene monitoring in food safety

Safeguarding health and safety in the food sector isn't just a priority; it's an imperative. Here, NEMIS Technologies' Stefania Cesarano discusses how environmental monitoring programmes and hygiene monitoring can ensure that every product is safe for consumption and interaction.

Environmental monitoring programme (EMP)

This approach thoroughly examines and manages environmental factors within a food production facility to ensure product safety and compliance with established standards and brings multiple benefits:

1. **Detection of contaminants:** EMPs play a crucial role in identifying potential contaminants in the production environment, including pathogens and spoilage organisms. It aids in targeting sanitation efforts and ensuring the safety of the product.
2. **Validation of sanitation measures:** EMPs verify the effectiveness of sanitation processes and training, ensuring that these critical safety measures function as intended
3. **Identification of root causes:** through EMPs, root causes of contamination can be pinpointed, leading to enhanced process controls and potential cost savings
4. **Collection of hygiene data:** EMPs gather essential data on the overall cleanliness of the production facility, providing insights for further improvements
5. **Equipment maintenance alerts:** EMPs can reveal equipment issues where maintenance is needed, allowing for early interventions to prevent more significant problems.

Adhering to industry regulations and best practices is vital when designing an EMP for food safety:

- FDA compliance: food and beverage manufacturers must follow the Food Safety Modernization Act (FSMA) and current Good Manufacturing Practices (cGMPs), focusing on risk-based preventative controls. EMPs are essential for validating these controls and maintaining cleanliness at various processing stages.
- USDA guidelines: USDA-FSIS guidelines recommend EMPs to verify sanitation processes for ready-to-eat meat and poultry, which is crucial for controlling pathogens like *Listeria monocytogenes*
- Almond Board of California: the Almond Board of California recommends a robust EMP for effective *Salmonella* control in almonds
- GFSI requirements: a GFSI-benchmarked certification showcases a commitment to food safety. GFSI standards mandate EMPs, underscoring their importance in the industry.

Effective EMPs designed to monitor and manage potential contamination sources:

- Pathogen monitoring: to minimise foodborne illness risks, focus on pathogens such as *Salmonella spp.*, *Listeria monocytogenes*, *E.coli* O157:H7 and *Cronobacter sakazakii*, particularly in ready-to-eat food facilities
- Spoilage organism monitoring: regular checks for spoilage organisms like yeast, moulds and lactic acid bacteria help to prevent food spoilage and reduce waste
- Indicator organism tracking: monitoring indicators like coliforms and enterobacteriaceae offers insights into the hygienic state of the production facility
- Allergen tracking: with rising allergen concerns, monitoring the FDA's 'Big 9' allergens is increasingly essential to ensure food safety and prevent costly recalls.

Hygiene monitoring

Hygiene monitoring is essential in food production, focusing on the environment, staff and products. Scheduled checks on cleaning practices and hygienic food handling ensure compliance with all necessary processes.

At the European level, hygiene standards are defined by the European Union (EU) Food Hygiene Directive 93/43/EWG, outlining basic hygiene requirements. The Swiss Food Law, Ordinance on Foodstuffs and Consumer Products, and Food Hygiene Regulation are vital regulatory frameworks in Switzerland. Swiss Cantonal authorities oversee compliance – adequate self-monitoring safeguards food company managers. Hygiene monitoring is a responsibility of all involved in food production, processing and distribution to ensure consumer and staff safety. This includes the food industry, producers like butchers and bakers, gastronomy and supermarkets.

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Stop Foodborne Illness: 30 years of advocacy for everyone who eats

The arc of a life provides many opportunities for reflection. In the case of the thirty-year commemoration of Stop Foodborne Illness, there are specific milestones to review, as CEO Mitzi Baum now shares.

As food safety grew to become part of the consumer's expectation, consumer advocacy continued to rise

IN 1994, Safe Tables Our Priority, or STOP, was founded by frustrated parents, and became a national public health non-profit. The creation of STOP was precipitated by the four deaths and hundreds of illnesses associated with the *E. coli* O157:H7 outbreak associated with Jack in the Box hamburgers in 1993; each of the deaths were children under the age of five.

Parents across the country were angry and incredulous that the meat regulatory system in the US did not protect their children from such a deadly pathogen. Through their grief, the families banded together to call upon federal lawmakers and regulators to modernise the almost 90-year-old meat inspection system – one that had been in place since the filth of the American meat industry was exposed in Upton Sinclair's novel, The Jungle, published in 1905.

Lawmakers and regulators got an earful of how loved ones (children) had experienced unimaginable pain and suffering. They heard that the children were healthy one day, then on life support and fighting for their lives within days. In one case, the parents of a child who was not going to survive asked for their son's organs to be harvested and donated, only to learn that it was not possible – the bacteria had liquified all vital organs, including his brain.

The stories of the children who perished would be the impetus for change in 1994. The transition from the so-called 'poke and sniff' method of inspection was updated by the declaration of

E. coli O157:H7 as an adulterant in ground beef and the introduction of compulsory testing. In 1996, President Clinton signed new regulations into law for the meat and poultry inspection system, with members of the STOP family as invited guests.

This was the beginning of a food safety advocacy journey for the organisation that is today known as Stop Foodborne Illness (STOP). Sadly, the STOP family continued to grow in the 1990s due to outbreaks associated with foods that children consume, like fruit juices and school lunches. However, when these outbreaks occurred, consumers knew that they had advocates that were working on their behalf. In 1997, STOP fought for mandatory warning labels on unpasteurised juices. Subsequently, in 2001, pasteurisation for bulk juices became mandatory.

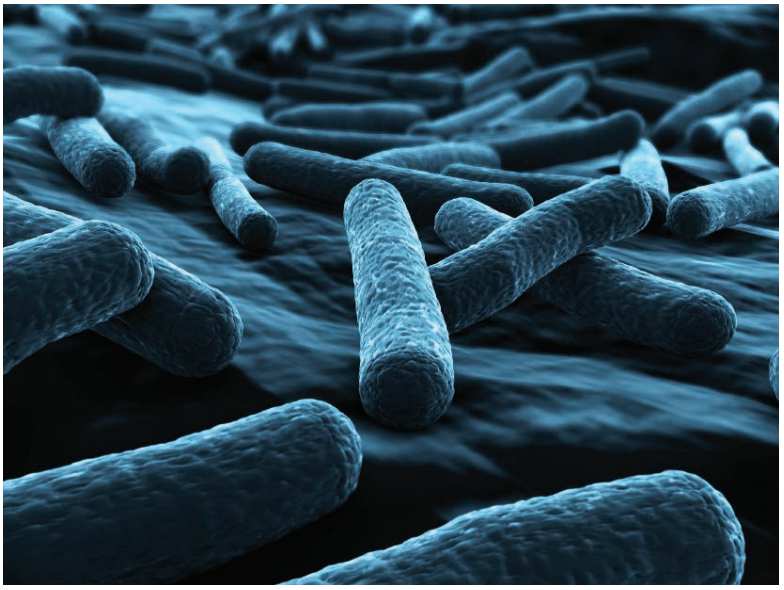
As food safety grew to become part of the consumer's expectation, consumer advocacy continued to rise. Information became readily available and better pathogen surveillance provided insight into more outbreaks. STOP continued working on these issues and pushed the food industry and regulatory bodies to do more. We continue to carry the baton today, as most foodborne illnesses are preventable.

The Food Safety Modernization Act (FSMA) was to usher in a new prevention-oriented approach to reducing illnesses and deaths associated with food. STOP's brave constituents travelled throughout the country to share their stories in support of passing this transformational legislation. Like those before them, STOP's constituents relive their harrowing experiences with each new audience in a bid to prevent others suffering as they have.

On 4 January 2011, President Obama signed FSMA into law. It represented the largest overhaul of food safety laws in the US in over 70 years. The promise of FSMA was to introduce a novel approach to food safety in the form of prevention rather than reaction. While we wait for the full implementation of FSMA, STOP continues to focus on issues and initiatives that can improve food safety for all.

At STOP, we know that the safety of food in retail settings is assumed and that the regulatory structure that ensures public health is not necessarily in the public's consciousness every day. Consumers purchase foods with the expectation that the items that they choose are safe. We work to ensure that this is the case and focus on what more can be accomplished to guarantee continuous improvement of the safety net.

As a consumer advocacy organisation, we develop collaborative relationships to take on issues that impact public health. In 2021, STOP, along with five of its constituents, signed and filed a petition with other consumer advocacy groups, urging the United States Department of Agriculture's (USDA)



Food Safety Inspection Service (FSIS) to develop, implement and enforce standards that are risk- and science-based to reduce the presence of harmful *Salmonella* and *Campylobacter* in poultry.

The initial accomplishment of this work came on 1 May 2024. FSIS published the final determination that *Salmonella* in Not Ready-To-Eat *Breaded Stuffed Chicken Products* at levels of one colony forming unit or higher are adulterated. This progress represents a first step, as we continue to work through a collaborative and transparent process with industry, academia, industry associations and FSIS.

STOP has also been focusing its efforts on internal food safety culture with food manufacturing, retail, food service and industry associations. STOP's programme, the Alliance to Stop Foodborne Illness (the Alliance), brings competitors in the marketplace together to build tools for any size enterprise to work on its internal food safety culture and provides these tools for free. Recently, the Alliance Toolkit became the 2024 International Association of Food Protection's (IAFP) Innovation Award recipient.

In 2022, President Biden hosted the first White House Conference on Hunger, Nutrition, and Health, in which one of the established outcomes was to encourage Americans to consume more fresh fruits and vegetables to institute healthier diets in order to reduce chronic disease. STOP agrees that more fruits and vegetables should be eaten. However, almost 50 percent of foodborne illness outbreaks are associated with fresh produce in the US, which has severely impacted consumer confidence.

For the past 18 months, STOP has been consulting with stakeholders to build a fresh-produce safety initiative to help assure that consumers have access to the safe fruits and »

As a consumer advocacy organisation, we develop collaborative relationships to take on issues that impact public health

vegetables that they need for healthy diets. STOP is taking a two-pronged approach for driving change:

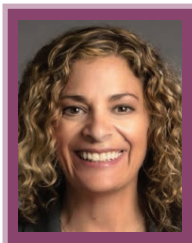
1. Collaboration with government and industry through a new coalition to better support produce growers in implementing and verifying best practices
2. Independent advocacy and coalition building for a One Health approach to mitigating the single largest produce safety hazard: the proximity of animal agriculture to growing fields.

The work in which we engage is essential, because food safety is not static

As fresh produce remains the riskiest food category, the status quo is unacceptable to STOP and its constituents, as it is to the wide range of experts that STOP has consulted.

Though I have provided several examples of the work that a small but mighty team of seven undertakes, the list is not exhaustive. The team is composed of individuals who are deeply committed to the mission of reducing the incidence of illness and death due to something as fundamental as food. We are passionate on behalf of all those that we work with and represent. We approach our daily work with compassion and knowledge, so that we carry with us the voices of those impacted.

We proudly acknowledge our history of collaborating with consumers who inspire change; this is our origin story. There are many that have laid the foundation for our current work and, for all those individuals, we are grateful. The work in which we engage is essential, because food safety is not static. Science continues to evolve, as do pathogens. We will continue to voice our concerns, engage in conversation, push to do better, and work together to develop solutions to issues that at times seem insurmountable. But, as humans, we have a common bond – we all need to eat. We at STOP will continue to work for everyone who eats.



Mitzi D Baum, MSc

As Chief Executive Officer, Mitzi is focused on expanding the impact of Stop Foodborne Illness (STOP) by concentrating on STOP's three strategic areas: families and individuals impacted by foodborne disease; company culture and practice; and food safety policy.

Prior to her tenure at STOP, Mitzi cultivated a 23-year career at Feeding America, rising to the senior level position of Managing Director of Food Safety. She earned a Master of Science in Food Safety and a certificate in Food Law from Michigan State University. She received her Bachelor of Science degree from Bowling Green State University and has obtained certificates in Non-Profit Management from the University of Chicago, Quality Management from DePaul University, and Food Safety Management from Cornell University.

Mitzi is the 2021 Joseph Leiter Lecturer of the Medical Library Association and National Library of Medicine, an adjunct faculty for Michigan State University's Online Food Safety Program, a certified seafood HACCP instructor, a certified PCQI, serves as the consumer representative on Council I for the Conference for Food Protection, and is a member of the National Restaurant Association's Food Safety Advisory Council.

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PAT to optimise the cost, consistency and yield of cultivated meat production

Hamilton Process Analytics highlights the vital role of PAT in optimising processes to bring valued 'new foods' to market faster and more efficiently.

Summary

By 2050 the global population is expected to approach 9-10 billion[1] leading to an expected doubling of the global food demand.[2] As food demand continues to rise, new technologies and food production processes will become increasingly necessary to increase the production of high-value proteins, while simultaneously reducing their environmental footprint. 'New foods', including cultivated meat produced through cellular agricultural processes, could be one solution to address the challenge of sustainably supplying sufficient, nutritious protein sources to future generations. Although 'new foods' present many benefits and fulfill many of these concerns, they face challenges: financing, R&D, regulatory processes, and consumer acceptance. Currently, there is an appetite for investing in cultivated foods[3] and enduring the regulatory processes that vary in timelines between regions and countries.[4] At the time of writing, two companies have been approved in Singapore and the US, however high production costs limit the affordability of cultivated meats for consumers. As a process reliant on reproducibly producing high-quality, viable-cell-dense cultures in large volumes, their biggest challenge is reliably and efficiently optimising production processes during scaling. It takes about 2.9 x 1,011 muscle cells to produce one kilogram (2.2 pounds) of cultured meat,[5] in a process that takes two to eight weeks to complete[6] at a predicted cost of $63/kg.[6]

This raises the important question: how can the cultivated meat industry cost-effectively optimise their processes to improve consistency and yield during production? At Hamilton Process Analytics, our expertise lies in the application of innovative sensor technologies to cell culture challenges. As we partner with some of the top innovative companies in the sector, we developed this whitepaper to outline common technical challenges faced by the cultivated meat industry. It features case study examples from complementary cell culture applications to demonstrate how some of these challenges could be overcome through process optimisation procedures aiming to cost-effectively improve the consistency and yield of cultivated meat production.

Challenges in the cultivated meat industry

The process of cultivated meat production can generally be divided into two main phases: (1) establishing solid protocols for cultivated meat production, and (2) scaling processes for commercial production. For both phases, the main technical cost drivers limiting production success are (1) growth medium, (2) bioprocessing equipment, and (3) labour;[6] with additional challenges including cell lines; scaffold (and microcarrier) materials and production protocols; increasing biomass yield and how to scale production; and end-product considerations including taste, texture and smell for both raw and cooked products. The principles of many cell-culture processes aiming to produce large volumes of high-density cell cultures are readily applicable to the cultivated meats industry;[7] therefore, it is not illogical to conclude that process controls could be similarly adopted by this emerging industry to improve process performance. Process analytical technologies (PAT) are tools that could be used to measure and control critical parameters and key process indicators during cultivated meat production processes in real-time to ensure high-quality, high-volume yields are achieved during process optimisation.

PAT in the context of cultivated meat production

PAT tools are encouraged by the US Food and Drug Administration (FDA) and other regulatory bodies for food manufacturers to optimise the efficiency, reproducibility and reliability of their production processes.[8] By using PAT throughout production processes, manufacturers gain a better understanding of their processes, enabling improved control and regulation of critical process parameters and monitoring of key process indicators for improved consistency of attributes in the final product. PAT can therefore be key to accelerating process optimisation by reducing timelines for commercialisation and can be used as gateway tools for process documentation in preparation for submission to regulatory bodies. For the cultivated meat industry, implementation of PAT can help to build a complete, accurate picture of the processes occurring in bioreactors, tanks and other apparatus, and could ease the transitions between milestones in a product's lifetime (eg, during scale-up from R&D to large-scale production). It can also improve the overall reliability, reproducibility and cost-efficiency of processes during production. Utilising control measures early in the production workflow, as far upstream as possible, can help to minimise if not alleviate downstream problems, increasing the reliability of end products having the desired critical quality attributes.

PAT measuring methods

Process analysers can be implemented in different positions along production. The differences between these methods in the context of the bioreactor will be the focus of this white paper, and are discussed below.

In-line (and to an extent, online) measurements are the preferred choice as they offer direct monitoring of processes in real-time for data-driven adjustment of critical process parameters. Although they may incur higher costs initially (compared to at-line and off-line measurements), this is quickly off-set by the reduced running costs considering fewer down-times (and associated loss of expensive resources and products) due to continuous, direct monitoring of processes. And when we think about the implementation of automation (only possible with in-line and modified online measurements), further cost reductions are possible due to the redundancy of personnel and manual handling and analysis, in addition to increasing efficiency of processes by reducing the frequency of process delays. Including automatic in-line controls in cultivated food production processes, as opposed to offline controls, can lead to significant cost savings and waste reduction, including:

1. Efficient quality control: In-line control systems can continually monitor production parameters, ensuring that the product quality is maintained throughout the production process, reducing the need for end-of-line inspections which can be costly and time-consuming.
2. Waste reduction: By monitoring production in real time, in-line control systems can quickly identify and rectify issues, reducing the amount of product that is wasted. For example, integrating in-line measurement instrumentation can reduce hold times and the risk of off-spec product, aiming for waste reduction to less than 1 percent as compared to common figures of 5 percent or more seen in conventional setups.
3. Increased throughput and plant availability: In-line controls can greatly improve production check steps, increasing throughput and reducing hold times. This translates to higher plant availability and potentially more revenue generation.
4. Real-time adjustments: Automatic in-line controls allow for real-time adjustments to the production process based on the data collected, thereby reducing the likelihood of errors, and minimising waste caused by production changeovers, recipe errors, or production delays leading to raw material degradation.
5. Resource optimisation: Effective cost control, facilitated by in-line controls, prevents waste and helps to maintain healthy profit margins. This could be achieved through optimal utilisation of raw materials, energy and labour.
6. Automation and technological advancements: Engaging automation and advancements like neuro-fuzzy controllers, as a part of in-line control, can lead to optimal food process control, furthering the cause of cost savings and waste reduction. The exact cost savings and waste reduction figures would depend on the specifics of the technology implemented, the scale of operations, and other contextual factors within the food production facility.

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Setting pass/fail criteria in sports drink quality testing

Presenting the application of UV-Visible absorption spectroscopy to determine the quality of sports drinks.

IN MANUFACTURING, quality testing ensures product consistency and identifies contaminants. Contaminants cause issues, from minor appearance changes to the formation of unwanted byproducts. Analytical techniques, including UV-Visible absorption spectroscopy, are commonly used for these quality checks.

In this technique, UV-Visible light interacts with the sample and is either absorbed or transmitted, producing an absorption spectrum unique to the analyte (eg, flavour additives, dyes). The absorbance at a given wavelength can be related to its concentration using Beer's law (**eqn. 1**).

$$A = c l \varepsilon \qquad (1)$$

This equation demonstrates the linear relationship between absorbance and analyte concentration. Highlighting the use of this technique for quantitative analysis, UV-Visible spectroscopy is non-destructive, allowing for additional testing or downstream processing.

In this study, the Thermo Scientific™ GENESYS™ Smart QC Software and GENESYS 180 UV-Visible Spectrophotometer were used to assess the quality of sports drinks. UV-Visible spectra of the drinks served as standards, enabling the creation of equations to determine if a sample's concentration fell within an acceptable range and to detect product contamination. These findings emphasise the efficacy of the GENESYS Smart QC software in evaluating product quality and delivering prompt pass/fail evaluations.

Experimental

Two sports drinks, green apple (GA) and strawberry lemonade (SL), were obtained from a local supermarket. GA and SL standard solutions were prepared by adding 0.5mL of the respective stock solution to 2.0mL of DI water, resulting in a final concentration of 20 percent v/v. The absorption spectra of GA and SL were measured in triplicate using the GENESYS 180 from 350nm to 700nm, with a slow scan speed and a 1.0nm data interval.

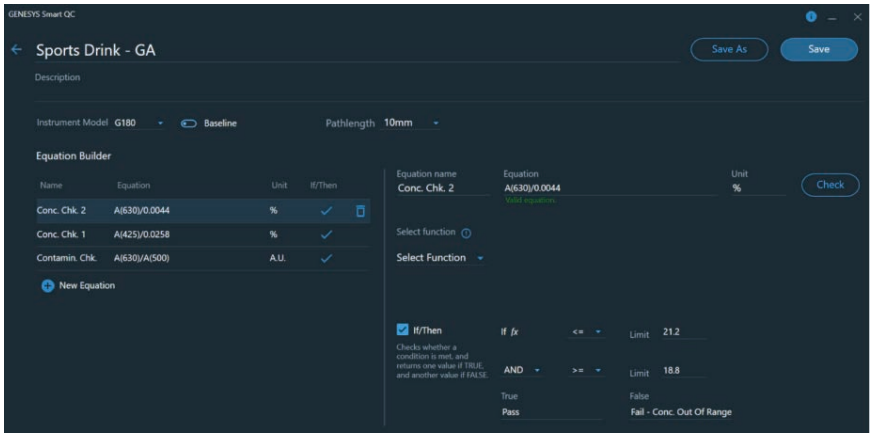


Figure 1: GENESYS Smart QC PC software interface – "Sports Drink – GA" method.

To determine the extinction coefficient (ε, units: $\%^{-1}\ cm^{-1}$), a standard curve was generated using solutions of 4%, 10%, 20%, 30%, and 40% v/v GA in water. The absorbances at 425nm and 630nm were monitored and used for the standard curve analysis. The absorption spectra were collected in triplicate, following the same measurement parameters described above.

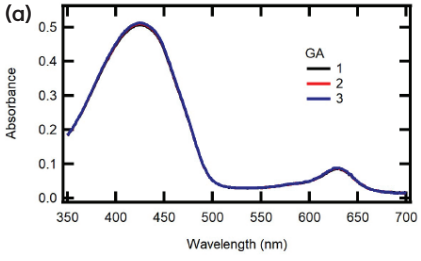
Four samples were prepared using the appropriate stock sports drink and DI water for analysis using the GENESYS Smart QC software (**Table 1**).

The Smart QC method, Sports Drink – GA, was created using the GENESYS Smart QC PC software (**Figure 1**). Three equations with pass/fail criteria were established (**Table 2**): one for detecting contaminants (Contamin. Chk.) and two to assess sample concentration (Conc. Chk. 1, Conc. Chk. 2). The ε values at 425nm and 630nm, estimated from the standard curve measurements, were incorporated into the respective concentration equations. The method was transferred to the instrument's local control. The Sports Drink – GA method was then used to analyse all samples, with each sample analysed using a 1.0cm glass cuvette.

Results/discussion

Setting acceptance criteria

To perform a quality check, a method was developed to determine the GA sports drink concentration and detect the presence of a contaminant, SL sports drink. This scenario reflects a manufacturing environment where multiple products are handled using the same equipment. Note that UV-Visible techniques can analyse various substances beyond the sample's colour (eg, caffeine, flavourings). However, this experiment focuses on analysing absorption features related to the dyes present in the beverages.



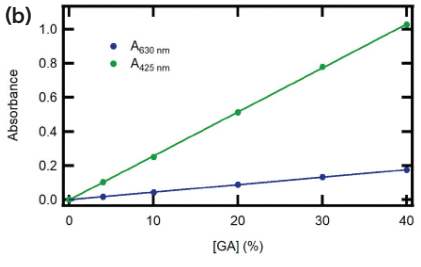


Figure 2: (a) UV-Visible spectra of 20% v/v GA. **(b)** Standard curve of GA samples of varying concentration, including error bars.

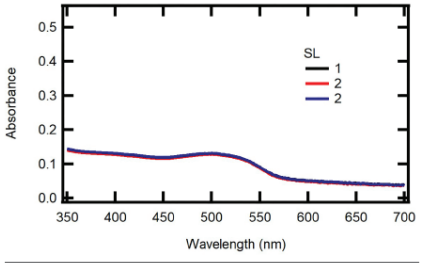


Figure 3: UV-Visible absorption spectra of 20% v/v SL.

Table 1: Sample solution volumes used for GENESYS Smart QC analysis

Sample	Volume GA Stock (mL)	Volume water (mL)	Volume SL Stock (µL)
GA-1	0.50	2.00	–
GA-2	0.25	2.25	–
GA-3	0.50	2.00	50
SL-1	–	2.00	500

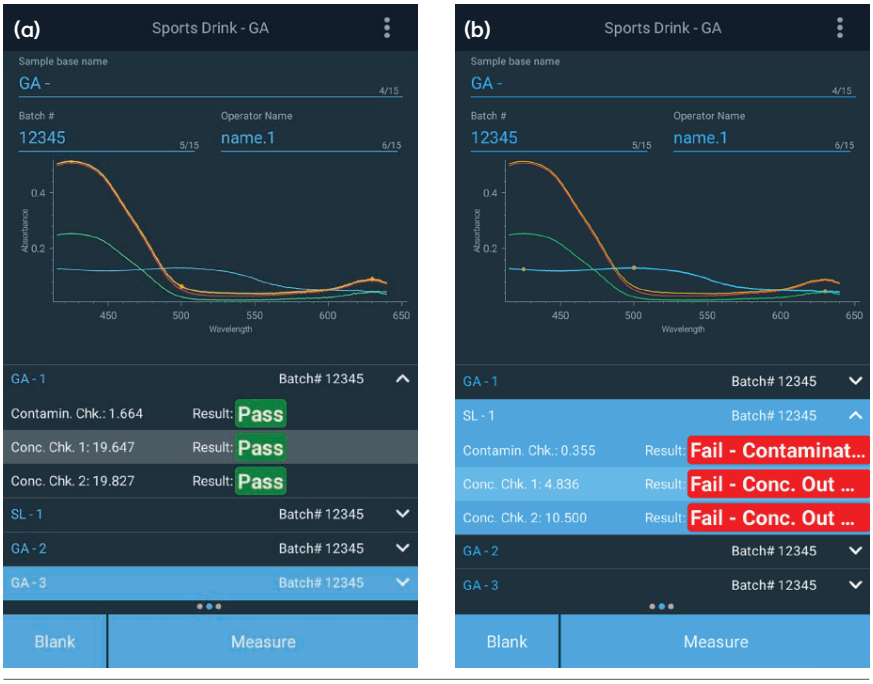


Figure 4: GENESYS Smart QC "Sports Drink – GA" method results for **(a)** GA-1: 20% v/v GA standard and **(b)** SL-1: 20% v/v SL standard.

Figure 5: GENESYS Smart QC "Sports Drink – GA" method results for GA-2: 10% v/v GA.

To develop the method, triplicate spectra of 20% v/v GA (GA standard) were collected, revealing absorption maxima at 630nm and 425nm (0.087 and 0.50, respectively). According to Beer's law (**eqn. 1**), absorbance is directly proportional to the concentration of the absorptive component in solution. Hence, the absorbance values at these maxima were adopted as standards. Additional information is necessary to establish pass/fail criteria for the concentration of GA.

To determine the concentration from absorbance, ε is required according to Beer's law (**eqn. 1**). Standard curves were generated using absorption measurements of GA samples with varying concentrations (**Figure 2b**) to determine this value. At 425nm and 630nm, ε was found to be 0.0258 ± 0.0001 $\%^{-1}$ cm^{-1} and 0.00438 ± 0.00003 $\%^{-1}$ cm^{-1}, respectively. Equations were created to convert absorbance at these wavelengths to concentration. Pass/fail criteria were established using a concentration range of 18.8% - 21.2%. A failed test would be reported as "Fail - Conc. Out Of Range."

Spectra of 20% v/v SL (SL standard) were collected to assess its absorption spectrum overlap with GA. A broad absorption feature between 475nm and 550nm was observed, along with a baseline artifact, potentially due to scatter (**Figure 3**). The absorbance in this range is used to indicate contamination with SL. To test for this contaminant, a ratio between the absorbance at 630nm and 500nm was used (**Table 2**), with a failed test reported as "Fail - Contaminated."

Table 2: Equations generated for the "Sports-Drink – GA" method

Equation Name	Equation	Pass/Fail Criteria
Contamin. Chk.	$\frac{A(630)}{A(425)}$	$1.4 \leq \frac{A(630)}{A(425)} \leq 1.8$
Conc. Chk. 1	$A(425)$	$18.8\% \leq \frac{A(425)}{0.0258} \leq 21.2\%$
Conc. Chk. 2	$A(630)$	$18.8\% \leq \frac{A(630)}{0.0044} \leq 21.2\%$

Analysis with GENESYS Smart QC

Four samples were tested against the established pass/fail criteria (**Table 2**). The GA standard passed all tests, while the SL standard failed (**Figure 4**), indicating a contaminant and possible concentration deviation. A 10% v/v GA sample was prepared to simulate improper mixing or dilution. Both Conc. Chk. 1 and Conc. Chk. 2 failed (**Figure 5**), indicating an unacceptable concentration. Notably, the ratio between the absorbance at 630nm and 500nm still passed, indicating no contaminant. Note, if a contaminant does not absorb in the UV-Visible region, additional tests are needed.

A sample intentionally containing a UV-Visible-absorbing contaminant, SL (2% v/v), was prepared. While visually similar to the standard GA (**Figure 6a**), small variations were observed in the spectrum (**Figure 6b**). The GA concentration fell within the acceptable range, but presence of the contaminant was detected, resulting as "Fail – Contaminated" (**Figure 6b**).

Conclusion

UV-Visible absorption spectroscopy is a valuable tool for product quality checks. The GENESYS Smart QC software enables the establishment of acceptance criteria, facilitating a rapid pass/fail assessment based on the measured absorbance. In this example, equations were utilised to detect potential contaminants and ensure the sample concentration fell within acceptable limits. While this study focused on samples with different colourants, UV-Visible techniques can be applied to a range of solutions for quality assessment.

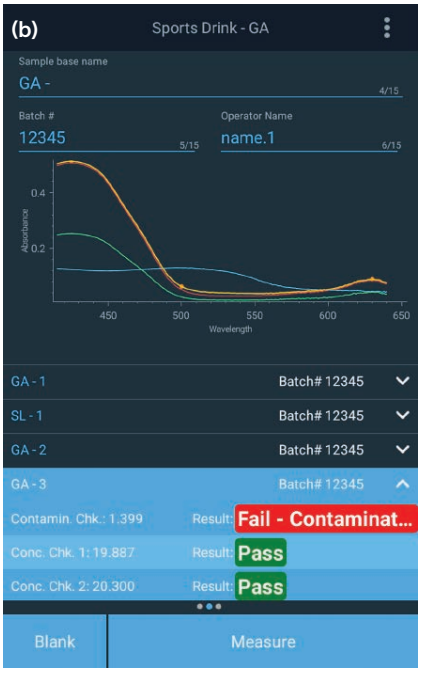


Figure 6: (a) Images of GA samples with (left) and without (right) SL contamination. **(b)** GENESYS Smart QC results for GA-3: 20% v/v GA spiked with SL (SL concentration = 2.0 %).

NEW Food
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Alternative Proteins

Plant-based innovation

THIS™'s Husni Abboushi discusses how the company is working to ensure that its plant-based products are worthy of space on consumers' plates

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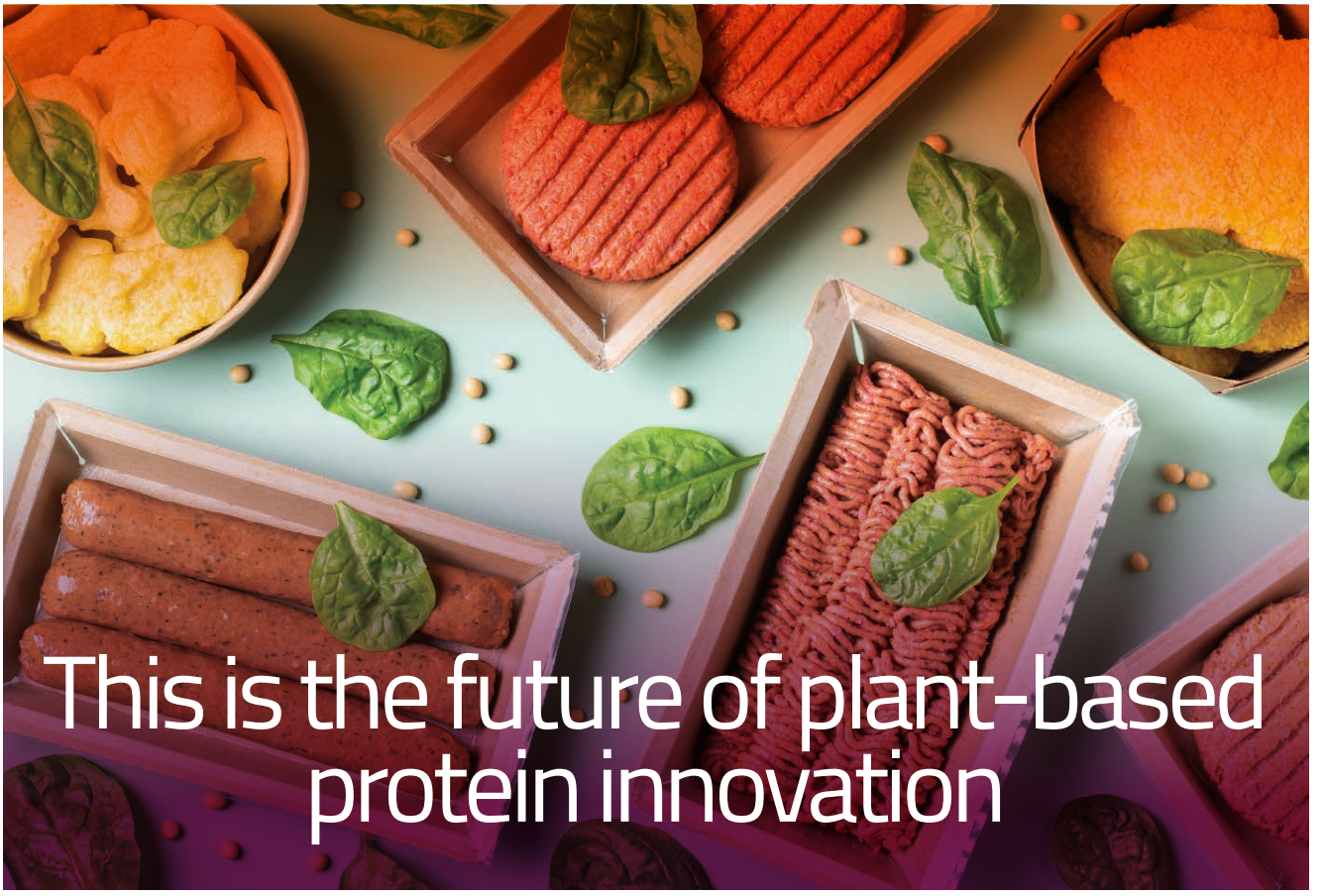
Bjarne Gravesen Jensen considers insect protein and its potential to drastically change the pet food sector

A dairy-free revolution

How can alternative dairy compete functionally and nutritionally with traditional dairy products? Vanessa Castagna of TurtleTree shares her insight



This is the future of plant-based protein innovation

In the ever-prominent plant-based sector, one UK company seeks to set itself apart. Husni Abboushi, Senior Innovation Manager at THIS™, shares the company's progress in creating products that deserve a space on our plates.

We want to question how meat came to be, and what plant ingredient could perform the same functions at a molecular level

IT FEELS LIKE DECADES since I was working at Unilever, inventing the next big Twister ice lolly or Cornetto cone. Today, I spend my commuting time pondering how to turn a mix of beans into a healthy, delicious and hyper-realistic plant-based 'back bacon rasher'.

Three years ago, I joined the plant-based food company THIS™ – an enterprise founded by Andy Shovel and Pete Sharman, who had previously flipped and delivered animal-based meat burgers at their burger company, Chosen Bun. While travelling, the pair were inspired by plant-based Beyond Meat and Impossible Foods burgers in the US. It was there that they found all of the proof they needed to know that, if done correctly, plant-based meat could become virtually indistinguishable from its meat counterpart. This led them to create THIS™, which today is the UK's fastest growing food business and largest independent brand in the meat-free category.

Ensuring continuous progress

The UK plant-based landscape was a very different market five years ago. Brands like Quorn and Linda McCartney did a good job in bringing products to consumers' plates, but it was understood that the collective quality of products on the shelf didn't come close to achieving its mission. They were the initial pioneers that paved the way for the plant-based explosion in 2019/20, which saw many challenger brands wanting to ride the wave of plant-based by launching products fast.

However, this perceived rush to market came at the expense of quality, and insufficient care and attention to detail. Thus, products fell short of the expectations of new consumers entering the market – ie, great-tasting and nutritious products that made an impact. What was obvious, however, was that plant-based options that were healthy, genuinely delicious and able to cater to lots of meal occasions were generally hard to come by.

Taking on this challenge wasn't a new idea; many brands have come and gone with their fresh take on how to approach the market. We wanted to do things differently and, to this day, always push the boundaries when it comes to innovation and the quality of our products. Taking

a scientific and inquisitive approach, we didn't want the structure of our plant-based chicken product to just be similar to the real thing – we wanted to understand why and how animal chicken is structured like it is in the first place, in order to emulate it as closely as possible.

Likewise, with our sausage products, our scientists studied the structure of real animal fat to find out how we could make an olive oil-based structure to deliver the same texture, resulting in Fat 2.0™, which we submitted a patent application for in 2021. With our 'streaky bacon', we weren't just trying to create a great tasting product; we wanted the product to look and cook the same as real bacon. We want to question how meat came to be, and what plant ingredient could perform the same functions at a molecular level. It may sound like a simple strategy in essence, but it was painfully challenging to execute. The final result, however, was as remarkably rewarding as it was addictive. The whole team was, and remains still, totally committed to the innovation challenge.

'Streaky Bacon' by THIS™ was made "to look and cook" the same as real bacon.

Credit: THIS™

The importance of functional ingredients

Our strategy at THIS™ greatly depends on the effectiveness of our ingredients. While we're proud to be considered pioneers in this space, in reality, it means we spend a lot of time researching and iterating through the extraordinary library of ingredients that are available. Finding functional ingredients that behave the way we want is a challenging step in itself; but, when you throw in the need for a strong and clean nutritional profile, sustainable sourcing, and factor in the cost of ingredients, suddenly shopping around feels like a series of interviews with a restrictive tick-box list. The products need to be high in protein to be considered a viable meat replacement, and soy quickly became the global go-to due to its nutritional value and great functionality. Primarily, the industry has had to use ingredients like soy, which is also cheaper due to its widespread use in animal feed and Asian cuisine; however, this has brought limitations.

Pea protein has gained prominence in recent years as a primary protein, but was held back by its pronounced off-note flavour. Fava is probably the latest source to rise in popularity, though it also suffers from similar issues to pea in terms of flavour. At THIS™, we elect to use all three; carefully researching our soy protein suppliers while offsetting with uses of pea and fava. It's a balancing act to ensure that we produce the best possible products for consumers while working hard to avoid contributing to unsustainable global practices. Over-reliance on any single resource is always likely to cause problems, so designing our products with a balanced variety of different bean or plant sources is our base approach. Meat protein, after all, is spread across beef, chicken, pork and fish, so it makes sense for plant protein to do the same.

Adapting to structural differences

Protein is also only one piece of the puzzle, albeit a significant one. While we have managed to apply our science knowledge and technology to create fibrous textures, many products require a different kind of structure. Sausages and burgers are a prime example. I have already mentioned the fat system that we designed and patented, but there are also the binders that hold everything together. Methylcellulose is one of those highly debated ingredients that is used both in the plant-based and meat-product industry alike. There are startups growing globally with the sole focus on replacing this one ingredient. While it is clearly a very competitive environment, there is, however, a growing sense of community within the industry that perhaps sets this space apart from other technologies and sciences.

> *Over-reliance on any single resource is always likely to cause problems, so designing our products with a balanced variety of different bean or plant sources is our base approach*

New horizons

We at THIS™ delight in seeing other brands push the boundaries with a new discovery and are actively pushing our portfolio of ingredient suppliers to expand their horizons, too. This collective effort is, in our humble view, the only way to really move the global diet to one that is cleaner and more sustainable – but just as high in quality as it needs to be.

Until now, however, it feels like we've all been cheating. How can we call ourselves true innovators if we are all copying something that we already know consumers love? What about bringing something completely new to the category that is super clean and full of nutritional firepower? Something that has a new, yet familiar, texture, that isn't trying to replicate any particular meat and is just recognised as 'good'. Something that is tasty without having to drown it in an embarrassing amount of sriracha or soy sauce, and that actually looks tasty when cooked up for our midweek meal. Wouldn't that be an impressive innovation, indeed. From all the team at THIS™, we say: watch this space!

Husni Abboushi

Prior to working at THIS™, Husni held a Process Engineering role at Unilever R&D for four years. One of the first members of the Innovation team at plant-based food company THIS™, he currently leads the technology function, which focuses on developing new technologies and implementing them into full scale manufacturing.

Insect protein will turn the pet food market upside down

Bjarne Gravesen Jensen, CEO at Globe Buddy, one of the new sustainable startups on the European pet food scene, discusses how insect protein is set to be a game changer for the market.

Among veterinarians and pet nutritionists, insect protein is gaining popularity as a nutritious and sustainable alternative to traditional animal protein sources

CAN WE FEED our dogs without heating the planet? Some pet food pioneers are working on finding ways to make pet food production more sustainable. At Globe Buddy, we were born green, with the purpose of producing premium quality dog food without compromising environmental sustainability.

The challenge is clear: pet ownership is rising globally and the environmental 'pawprint' of traditional meat-based pet food is substantial, with livestock farming being a major contributor to greenhouse gas (GHG) emissions, deforestation and water pollution.[1]

The twofold effect

Sustainability is a strong motivation for many pet owners and is one of the key trends playing out in the pet space. In the last five years alone, we have seen at least 30 pet food startups bringing insect-based products to market, and a growing number of larger players are chipping in, as well. These products are heavily marketed as sustainable and planet friendly, in addition to being high quality. Therefore, the use of insect protein has a twofold effect: we reduce the carbon 'pawprint', and create high-quality pet food.

But, with sustainability in mind, why not use up by-products that would otherwise go to waste, instead of diving into something as new and alternative as insect protein? Obviously, more of the same old meat industry by-products will not make any difference, as these help to keep intensive animal farming operations running. Instead, we are looking to lower carbon protein sources, and insects are the obvious choice for the eco-hero role.

Among veterinarians and pet nutritionists, insect protein is gaining popularity as a nutritious and sustainable alternative to traditional animal protein sources. In particular, black soldier flies and mealworms have been elevated to 'hero' status in the world of proteins, and with good reason.

The prerequisite for using a new protein source is a high nutritional profile; only then is it interesting to assess its sustainable potential. Insects deliver on both nutrition and sustainability. They provide a varied amino acid profile and nutrient-dense diet. Insect protein is also highly digestible, which has a positive impact on pet performance and health.[2]

A win for the climate

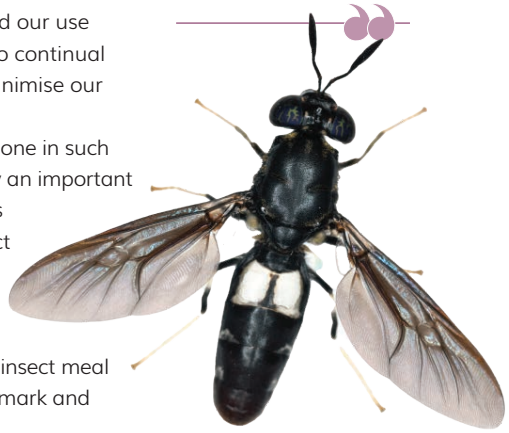
The environmental benefits are plentiful. Farming insects for protein considerably reduces greenhouse gas emissions, land use and water usage compared with other pet food sources.

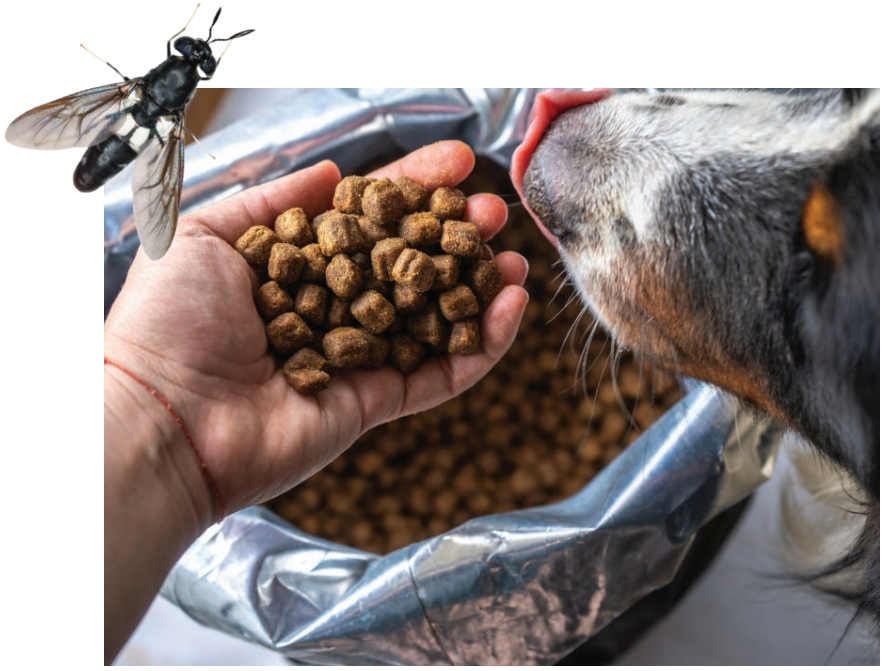
Let's dive into an actual example. The carbon footprint of the ingredients in Globe Buddy's new dry dog food, Brown, is just over half that of the ingredients used in the market's average dog food. This is largely due to the inclusion of insect meal in the product. The product, ingredient-wise, has a climate impact of 1.6kg CO_2e per kilogram of product, while the market average dog food is 3kg CO_2e per kilogram of product. If we expand the comparison to include premium products claiming to use 'human grade' and 'real' meat, they are causing a staggering climate impact of 7kg CO_2e per kilogram of product.[3]

The calculation shows that our new insect-based product is performing well, and we see it as a validation of our business model and our use of insect protein. We are committed to continual product innovation, so that we can minimise our environmental footprint even further.

It is good to know that we are not alone in such an endeavour. Breeders of insects play an important role in decarbonising pet food. There is a growing number of suppliers of insect meal for pet food production, and many of them are true, innovative frontrunners. For our Globe Buddy products with insects, we are sourcing insect meal from Enorm (Hermetia illucens) in Denmark and Ÿnsect (Tenebrio molitor) in France. »

> *We know that consumers want to be green, but we have to help them get there*





Dog food will always have an impact

Not too many years ago, buying dog food was primarily about nutrition, but now there is this extra element of sustainability. We know that consumers want to be green, but we have to help them get there.

Backed by science, we can educate today's pet parents on the need to lower the environmental impact of owning a dog. It's an eye-opener when we present them with the facts. They seem to understand that every aspect of pet ownership has some environmental footprint; whether it is the food that they eat, the toys that they play with or the faeces that they produce. When it comes to food, protein is the most expensive and ecologically demanding macronutrient. Not surprisingly, protein is a key factor in a dog owner's selection of pet food products.[4] This presents a challenge for pet food brands that need to source sustainable protein while keeping the price of the food at a competitive level.

At Globe Buddy, we do not beat about the bush. Producing dog food will always have an impact; let's be honest about that. However, minimising that impact and striving for continuous improvement is central to our business and purpose. We put emphasis on sustainable ingredient selection, meaning focusing on the use of insect protein as a key ingredient in our formulations.

Beware of the buzzwords

In pet food marketing, 'sustainability' is a buzzword that is thrown around like never before, yet the definition remains elusive to many. In the absence of a better term, let us use it with caution. The same goes for 'eco-friendly', 'planet-friendly' and 'green', to name a few keywords used to promote insect-based pet food products.

The elephant in the room is greenwashing. It comes in many different forms – including 'greenwishing'. This is the act of expressing desires or intentions to be environmentally friendly without taking concrete action; or when companies are focusing more on communicating their green efforts than on the efforts themselves.

It can be tricky to navigate the greenwashing landscape, but cutting corners will only lead to consumer scepticism and, ultimately, halting the acceptance of insect-based pet foods.

Nevertheless, we should not succumb to 'greenhushing'. The choice of using insect meal as an ingredient in pet food formulations is a concrete action. Next up could be a product carbon footprint along with target-setting as a starting point for the journey towards sustainability. That's the path that we are following.

It must be noted that sustainability represents a greater task than a green product line; therefore, the use of insect protein alone does not necessarily make a product the most sustainable dog food in the world.

True sustainability has four major components: environmental, social, economic and cultural. The components are interrelated. Translated into pet food, we could say that insect-based feed helps to save the planet, nourish our furry friends, create prosperity and foster sustainability awareness.

The new normal of the market

In terms of creating a more sustainable pet food industry and shaping the market, we cannot ignore insects as the obvious choice.

Pet parents want to embrace sustainability, but still need some guidance in turning intentions into actions. First, they must be reassured that insect-based pet food is of high quality. Second, it must be clear why insects are considerably more sustainable than conventional animal food sources.

While pet food based on insects still attracts only a minority interest, the global sustainability movement will continue to gain ground, and products with insect protein will become the new normal of the market.

Translated into pet food, we could say that insect-based feed helps to save the planet, nourish our furry friends, create prosperity and foster sustainability awareness

Bjarne Gravesen Jensen

Bjarne is CEO and Co-Founder of Globe Buddy. The Danish pet food brand introduced its first product in 2021 and, in Summer 2024, the startup will launch semi-moist dog treats based on mealworms sourced from Ÿnsect in France. Bjarne has worked in the pet food industry since 2015.

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Transforming dairy: the future of milk without the cow

Conscientious consumers are well versed in the necessity to curb their consumption of dairy, but questions remain on the nutrition front. Here, Vanessa Castagna from precision fermentation company TurtleTree shares how technological innovation is bridging the nutrient gap.

IN THE REALM of modern dairy production, a revolution is underway. The need for this transformation has never been more critical, with global leaders stressing the urgency of achieving Net Zero emissions by 2050. Dairy production is a significant contributor to greenhouse gas (GHG) emissions, with the Food and Agriculture Organization (FAO) estimating that it accounts for four percent of all human-made greenhouse gas emissions.[1] This staggering figure underscores the pressing need for a more sustainable approach to dairy production.

Traditional dairy farming also places enormous pressure on water and land resources. With millions of dairy cows being milked annually in the US alone, the environmental impact is undeniable. Moreover, modern production methods can deplete the nutritive and functional value of conventional milk proteins. With the global population expected to reach 10 billion by 2050,[2] finding sustainable solutions to ensure an adequate supply of nutritious foods is paramount.

Transitioning from traditional animal-derived dairy to alternative dairy is a critical step in »

TurtleTree was founded by Lin Fengru (pictured) along with Max Rye.

Photo credit: TurtleTree

addressing the current climate crisis. One study suggests that, if the global population shifted to a plant-based diet, greenhouse gas emissions from food production could decrease by up to 70 percent.[3] A widespread transition from animal-derived to alternative dairy would, therefore, reap substantial benefits for the environment.

The alternative dairy industry is rapidly evolving, with various technologies, products and key players all working towards providing nutritious and sustainable alternatives to animal-derived dairy products. While the current landscape of alternative dairy products is promising, it still falls short in competing functionally and nutritionally with traditional dairy products, especially in protein content.

With the global population expected to reach 10 billion by 2050, finding sustainable solutions to ensure an adequate supply of nutritious foods is paramount

Nutritional innovation: bridging the gap with precision fermentation

To truly create alternative dairy products that are on par with traditional dairy in taste, texture and nutritional content, technologies like precision fermentation must be implemented. Achieving nutritional equivalence is crucial not only for market adoption at the individual level, but also for acceptance in government programmes like the Women, Infants and Children (WIC) and school lunch programmes in the US. Nutritional equivalence gives these programmes a reason to treat alternative dairy as interchangeable with traditional dairy. Currently, only soy milk fortified with Vitamin A, Vitamin D and calcium is considered nutritionally equivalent to dairy milk by the United States Department of Agriculture (USDA) Dietary Guidelines.[4]

Improving the nutritional content of plant-based milks is critical to the success of alternative dairy. Precision fermentation can drastically improve the current shortcomings of plant-based products, delivering a new generation of alternative dairy that truly functions as an equivalent substitute to traditional dairy. TurtleTree, along with a bright cohort of precision fermentation companies across the world, is working diligently towards this goal.

Companies like Perfect Day, ImaginDairy and New Culture are making ingredients like whey and casein that can add to the protein nutrient content and recreate the form and function of dairy – giving plant-based dairy products the exact same creaminess, and cheese the same stretch, as conventional animal-derived products. However, conventional cow's milk is not just made up of the essential macronutrients like protein, fat and carbohydrates that are needed to support growth and the basics of life. It also provides a wealth of highly beneficial micronutrients like minerals and vitamins, and functional ingredients like lactoferrin, that have tremendous positive effects on metabolism, immune health, weight control, cardiovascular

health, mood and behaviour, and more. The focus at TurtleTree is on the richness and robustness of what milk can provide.

Our unique approach harnesses precision fermentation to produce powerful functional dairy ingredients that can help to bridge the gap between plant-based milk and animal-derived milk. Specifically, TurtleTree's recombinant bovine lactoferrin, LF+, can deliver functionality to plant-based dairy products, as well as a wide range of foods and beverages.

Lactoferrin: the 'pink gold' of dairy nutrition

There are over 200 proteins found in milk, and lactoferrin is one of the most powerful, offering significant benefits for immunity, iron regulation and gut health. However, it occurs in minuscule quantities, requiring 10,000 litres of cow's milk to extract just one kilogram of the purified protein. This scarcity contributes to its high market price, which fluctuates between $700 and $1,500 per kilogram. Referred to as 'pink gold' due to its high value and iron-rich pink hue, lactoferrin is naturally present in cow's milk. However, the low concentrations and resource-intensive extraction processes limit access for many.

Comparing lactoferrin's value to other dairy proteins like whey, which costs approximately $1 per kilogram, highlights its premium price. While lactoferrin is already used in supplements and infant formulas, supply scarcity restricts its availability for other segments like sports nutrition, where its iron-regulating benefits could enhance physical performance. For the average consumer, it can be hard to ingest sufficient quantities of lactoferrin solely from consuming cow's milk, as pasteurisation removes up to 90 percent of the protein.[5] Additionally, conscious consumers switching to plant-based diets will have no access to lactoferrin, as it's an animal protein and not naturally present in plant-based dairy products.

TurtleTree's use of precision fermentation, harnessing microbes as tiny factories for lactoferrin, eliminates the need for high methane-emitting cows and provides an abundant, sustainable and affordable source of this valuable nutrient. This breakthrough enables the fortification of plant-based dairy products and other foods, making lactoferrin accessible to all. By bridging the nutritional gap between conventional and plant-based products, TurtleTree showcases how precision fermentation-derived proteins can enhance product nutrition and drive market adoption.

TurtleTree's breakthrough and future plans

One of our most significant breakthroughs came with the approval of LF+ for commercialisation in the US. This milestone paves the way for us to ramp up production of LF+ and bring the functional benefits of lactoferrin to a variety of food and beverage products, including both dairy and non-dairy products like plant-based milk, and adult nutrition products targeted at athletes, women, the elderly and general consumers. Furthermore, we recently became the first precision fermentation dairy company globally to obtain vegan certification for LF+, positioning us well in the growing market for ethical food choices.

Women's nutrition is one of the most significant applications for LF+, with numerous studies substantiating lactoferrin's benefits for the health and well-being of women.[6-8] Products would include nutritional and meal replacement drinks, mostly in the form of protein powders and ready-to-eat protein shakes. Other product applications for LF+ could include supplements, sparkling water, confectionery, and functional beverages that address the need for 'better for you' products for consumers.

With plans to scale up production significantly in the coming years and exciting partnerships with top global food and beverage companies set to be announced, TurtleTree is poised to make a powerful impact on the dairy industry. By harnessing the power of precision fermentation, we are paving the way for a more sustainable and nutritious future for dairy-alternative products around the world. The future of dairy is changing, and precision fermentation is leading the way.

The alternative dairy industry is rapidly evolving, with various technologies, products and key players all working towards providing nutritious and sustainable alternatives to animal-derived dairy products

Vanessa Castagna

Vanessa is Director of Clinical & Scientific Affairs at TurtleTree and a leading expert in nutritional biology. With a PhD from UC Davis, Vanessa has 15 years of industry experience focusing on the interactions between milk proteins, gut microbiota and human health. With her post-doctoral research focused on the valorisation of dairy waste streams and seven years of experience studying milk bioactives and their impact on human health, Vanessa possesses the precise skillset required to develop the preclinical and clinical programme for TurtleTree's fermentation-derived dairy bioactive product portfolio.

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