

# Microalgae in the mainstream

**Microalgae are making waves in the food industry. From blue hues to a plant protein boost, players are tapping into the potential of these aquatic organisms to bring new formulations and product innovations to market. FoodBev takes a closer look.**

To the uninitiated, the fermentation vessels at food tech company Aliga's facilities in Denmark and the Netherlands might look much like traditional beer-making equipment. However, these tanks, some of them 10,000 litres in capacity, house something of a very different nature. Contained in every ml of water are billions of unicellular microalgae.

Aliga was founded in 2016 with the aim of expanding the application of algae-derived solutions in the F&B market, and today the company fields several calls a week from prospective customers around the world.

So how did an ingredient relegated to animal feed and dietary supplements first gain a foothold in the food industry, before going on to be seen as one of the most promising sources of alt-protein on the market today?

The answer has a lot to do with scientific advances and shifting consumption behaviours, while underpinning all of this is a scramble to find more sustainable ways to feed a population projected to reach 9.7 billion people in 2050.

According to Angus Keech, chief commercial officer at Algenuity, many of the benefits of microalgae "have been known for decades or even centuries," but the taste and colour have limited viable applications.

Like Aliga, UK-based Algenuity has created white, neutral-tasting strains of *Chlorella* using non-GM plant breeding methods.

"In essence, we treat *Chlorella* like any arable crop and apply the same techniques that have been used to create the fruit and vegetables we enjoy in our supermarkets today," said Keech. "We have successfully improved protein content, colour, digestibility and taste."

For its part, Aliga says that the company's white microalgae strain shares 99.97% of its DNA with its green counterpart. However, the transformative impact the absence of the chlorophyll gene has on taste and colour opens up the ingredient to a host of application opportunities.

"It is much more neutral in taste; it doesn't taste like algae," said Aliga's co-founder and sales director, David Erlandsson, who added that "the taste of chlorophyll is really strong". ▶







### True blue

While some companies have been innovating to produce more neutral-hued strains, in other cases the vibrant colours associated with different species of microalgae have been their appeal.

Israeli marine ingredient start-up Yemoja stumbled across a microalgae formulation that “resembles blood in appearance and texture” while working on a solution for cosmetic applications.

The company says that its red microalgae ingredient, Ounjé, can be used to add “authentic ‘bloody’ juiciness” to plant-based meat products.

Meanwhile, Netherlands-based Ful Foods’ sparkling drinks derive their vibrant hue from spirulina – a blue-green algae that grows in mineral-rich waters. Delivering a ‘natural blue boost,’ the beverages also stand out in nutritional terms as a source of antioxidants, protein, vitamins, carotenoids, and more.

“In a crowded food and drink market, the conspicuous colour is indeed a powerful tool because it sparks curiosity...which drives initial trial,” said Ful’s co-founder and CEO, Julia Streul.

She added: “But curiosity and compelling appearance aren’t enough to inspire repeat purchase...To build a long-lasting relationship with consumers, spirulina has to deliver on benefits around how it tastes and how it makes you feel (indeed the blue colour comes from a protein pigment complex with antioxidant effects).”

### Plant powerhouse

It took Ful more than two years working with food scientists in the Netherlands to develop a process that addresses spirulina’s more ‘challenging’ properties – from its distinctive taste to stability and solubility issues.

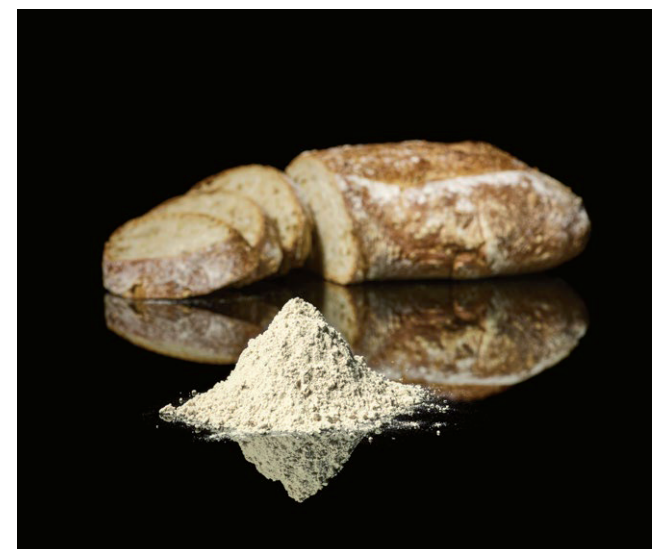
By Streul’s account, it was worth the wait. “Spirulina is one of the most nutrient-dense substances on earth,” she said. “It’s packed with...vitamins, minerals and high-quality protein (complete amino acid profile) – and has been linked to antioxidant, detox, immune support, energy and anti-inflammatory benefits.”

It is perhaps in this key arena of nutrition that the most compelling case for microalgae can be made.

“Our *Chlorella* is a whole food providing a complete source of protein (PDCAAS > 0.8)...while being high in insoluble fibre,” Keech said. “It contains notable micronutrients such as the B vitamins, including B12, vitamins C, K and choline...[as well as] zinc, calcium, iron and manganese.”

Aliga’s Erlandsson is equally keen to point out that microalgae are a whole food ingredient, as compared with plant protein isolates.

“[Our ingredient] has the minerals, it has the fibres, it has the vitamins,” added Erlandsson, who told *FoodBev* that it is being used to enrich products as diverse as pasta and plant-based seafood.



“Spirulina is one of the most nutrient-dense substances on earth”

### Eco potential

When Aliga launched, most of the algae on the market, according to Erlandsson, was being grown in open ponds, where he says, you get “a very low yield for every litre of biomass you produce”.

The company also started out cultivating microalgae phototrophically – using sunlight and CO<sub>2</sub> – before switching to using fermenters in 2018. This latter, heterotrophic method offers a much higher production yield and can be easily scaled to meet the demands of major food manufacturers.

“We have a factory in the Netherlands that we just bought. It is around 3,000 square metres in size, but it has the potential to produce around 1,000 tonnes of powder per year,” Erlandsson said. “So you really need a small land area to produce a lot of food.”

He continued: “It’s very often industrial land as well, so we’re not competing with crops like wheat or pea. We are not saying that we’re

going to solve the whole food crisis just with our ingredient, but this is one of the keystones for a more sustainable food production chain.”

Ful’s Streul also highlights how, produced using the right methods, microalgae have the potential to provide a particularly sustainable source of nutrition.

“Spirulina needs carbon to grow and we recycle CO<sub>2</sub> waste streams from other industrial processes and use this as the mainstream feedstock to produce our spirulina,” she said, adding however that “most spirulina is still produced in open ponds, which use unsustainable chemicals as a main carbon source rather than CO<sub>2</sub>”.

As the search for sustainable, plant-based sources of nutrition continues, microalgae are having an outsized impact across diverse food and beverage categories. With industry players cottoning on to the potential of these microscopic organisms, you can expect the wave of algae-powered innovation to gain further momentum in the coming years. ●



Fermentation vessels at food tech company Aliga