EIT Algae Podcast V1.mp3

Matt Eastland [00:00:06] Every second that passes, we add four more people to this planet, and that's another eight more mouths to feed right back. And to cope with this growing population. Our current food system is still focussed on an unsustainable model of production that prioritises scale. So catering for ourselves and our livestock without always thinking about the long term effects on our planet. Innovators have turned their attention to more sustainable sources of protein, but they're still coming up against the age old challenge of continuing to deploy our land and water resources. But a new solution is pushing its way to the market. Algae? Yes, algae. That green, slimy, unknown and perhaps unloved material could help us deal with many of our food systems problems. But how I'm Matt Eastland, and that's the exact question will be asking on this episode of the Food Fight podcast and to guide us through this world of algae. I'm joined by two aquaculture experts to tell us more about this interesting plant. First, I'd like to welcome David Bassett, who's the Secretary General of the European Aquaculture Technology and Innovation Platform. What a title. It is an international non-profit association, dedicated, developing, supporting and promoting aquaculture, technology and innovation in Europe. David is also at the forefront of the newest innovations going on in this space, so we're really excited to hear from you on this topic. Thanks for joining us, David.

David Bassett [00:01:32] Thank you.

Matt Eastland [00:01:33] And I'm also joined by the founder and chief technology officer of VAX. Isaac Bersin. Thanks to an aquaculture company building indoor farms which convert clean energy into omega three rich microalgae. And the best part is that the cultivated algae is used for both fish and human food, which is truly amazing. Isaac, it's a pleasure to also have you on the show.

Isaac Bersin [00:01:56] Thank you.

Matt Eastland [00:01:57] As I mentioned at the top of the show, we're still figuring out how to feed ourselves and our livestock sustainably. Looking at the research on this. Algae has existed for millions of years, so it likes high temperatures, high levels of CO2. It's a global planet that's worth different climates in freshwater and saltwater. It grows in the desert just as well as in the Arctic Sea. So with all of these positives, why are we only turning our attention to it now? David, maybe if we can start with you.

David Bassett [00:02:29] It's an interesting question. And the first thing I would say in response to that is we are often talking as if algae has only just been discovered and it's something that's brand new and we've never heard it before. Well, that isn't true. We've been using algae for thousands and thousands of years. Long before we had industrial fertiliser, long before we had commercially developed feedstuffs algae has been used in the past. As happens with scientific and industrial progress. We find alternatives to using algae in our own diets, in the diets of our farm animals and as a fertiliser. And we moved away from using that. We find synthetic products that we could use and we find less labour intensive, more cost effective ways of producing some of the benefits that algae could give us. And we're now in a situation where our knowledge and I'm not sure our understanding and our progression has advanced slightly further and we realise the benefits to the algae and alligator relative products that we perhaps in the past used to see. That's a very simplistic and very crude way of presenting the broader subject. But I think it's a case of returning to allocate re appreciating algae, really appreciating how we can integrate algae

into our food systems approaches on a number of different areas and levels and developing the subjects and the questions we're looking at from that starting point.

Matt Eastland [00:04:08] Got it. Thanks, David. That's super useful. And Isaac, do you agree that we're kind of falling back in love with algae, we rediscovering it as a world?

Isaac Bersin [00:04:17] I hear this. A lot of people say algae. We're not sure. We're like, it's kind of a weird thing to eat. And basically, if you think about it, we eat every day. We're just eating it. Second hand. For example, the omega three you find in fish oils are not produced by the fish. They're produced by the algae and their accumulated threw up the food chain. So you are eating algae made omega three every time you take a bite from your fish. Okay. And I think to David's point, I think we're right. If you look at human history, why do you want to grow bananas? That's a lot of work. Because you ran out of bananas. That's the answer. Okay. So as long as you can afford living like a pig without the risk of the pigs, you just going to do that? And I think what's happening to the humankind together, we took something that's called the agriculture. We're converting light energy to products we eat in the most horrific, horrendous way. Why? Because think about the inefficiencies of the system, right? The staple crops. Most of what you cultivate, the biomass, for instance, soybeans. What's the percentage of the bean from the total plant material? The stems, the roots, the leaves. It's a single digit.

Matt Eastland [00:05:30] Really?

Isaac Bersin [00:05:30] So what, you lifting all this fertiliser, all the land, all the water to mostly grow garbage? Answer is yes. Why? Because you can afford it. So I think we're at the time in which the reality triggers innovation and as humankind. That's what we did with the Detroit Times. If you look at aquaculture, that's a great example. 50 years ago, five zero, most of the fish were caught in the oceans, on the sea. Today, most of the fish on our plate cultivated by aquaculture. Why? Much easier to go and grab a fish. But guess what? If you're running out of fish, you're going to start to learn how to cultivate. And so I think it's a it's a very interesting moment in time in which the need is real. We're taking it seriously.

Matt Eastland [00:06:12] Okay. Thank you both. That's very useful as a kind of a context setter. So, I mean, Isaac, maybe this is a really good moment to help define for our listeners what is algae microalgae macroalgae you know, what is it that people need to know about this?

Isaac Bersin [00:06:26] Okay. It's a great question, Matt, because it's one word and there's a lot of meaning for it or will make a little bit of an order here. First of all, it's water plants, generally speaking. And by the way, I'm an engineer, so I can be not correct biologically, but I'm going to be practical. Okay. So it's water plant. So big water plants are called seaweeds. Okay. You can see them in the ocean. We're not talking about those because nutritionally there it's a poor nutritional content usual. Okay. We're talking about microalgae, which are microscopic. They're few microns in their size and they grow usually by cell division. So there's no roots and stems and leaves. There's a very teeny tiny cell that divides over time and you can actually find them in a diverse set of conditions. You can find them in high salinity places, you can find in oceans and freshwater lakes everywhere. So this is a big spectrum. It's a big family. Okay? I just think we're lacking of words. So we call everything algae. But they look, if you have a microscope, you clearly see different shapes, different colours, different. Some of them are beneficial, some of them are toxic. It's sucks saying plants in general, you know, it's a big word. I would only

mention that out of the hundreds of thousands of strains existing on the planet, only a handful of algae strains, microalgae strains are allowed for food consumption by humans. So, for example, a known ancestor and it's actually cyanobacteria, but we're going to call it algae, too. The purpose of this discussion is this spirulina. Spirulina tried to make a splash as a superfood. It is a superfood from the nutritional point of view, but it has other limitations that we can talk about, I hope. But that's one example that people are aware of, the leading example of using microalgae in food, and we'll talk about why that was not that successful and what would make it successful.

Matt Eastland [00:08:22] Got it. Okay. Thank you. Let's talk about it from a bit of a consumer perspective and how algae is being treated at the moment. So algae and seaweed traditionally valued maybe more an Asian cuisine for its economy taste and its nutritional value. And slowly we're starting obviously to see it appear in Western cuisine as well. So David E tip is dedicated, developing, supporting and promoting technology, innovation, aquaculture sector in Europe, like I said. So what does your understanding of the European aquaculture market tell you about attitudes towards algae? So from a producer's perspective, all the way through to consumer, you know, how do people feel about algae at the moment.

David Bassett [00:09:01] With regards to market pull? Again, historically, algae is something that has been included in the European diet. I grew up in Scotland and seaweed was included in diets there. It was also increases in animal feed types, likewise in Wales, likewise in northern Spain and Galicia, likewise. So in many different coastal areas, seaweed was something that was included in diets. So it's perhaps the case that we're rediscovering algae, particularly in relation to the nutritional and health benefits associated with the product. As there is now a much greater emphasis on nutrition and health contained within the European diet and aspects. Looking at that, there are obviously other issues that come into that. But one of the trends we see is an increasing sophistication on the part of a certain percentage of consumers looking at nutritional content of their diet in terms of market pull for the sector, I think first of all, we have to talk about what market we're talking about. There are a variety of algae based products. So if you're coming at it from a foodie perspective, you could be talking about Dulce Flakes as an artisan greeting. You could be talking about seaweed burgers, you could be talking about sea grapes. There are actual direct products that people consume. Or you could be talking about derivatives from alligators in Nutraceutical. So included in supplements, included in products, it's not really how we might imagine the diet, but you could consider that Alligator River since are used a number of products. So if you clean your teeth in the morning and certain other pharmaceutical products you use, algae may be included there or it could be included as a feed ingredients for cattle or other ruminant animals. CCU seaweed just being included there. So we're looking at what might. Yes. It might be included in.

Matt Eastland [00:11:00] You know, I know that there is an EU Audi strategy and just from like a policy perspective, what are the ambitions for Audi cultivation in Europe? Is it that Europe is really throwing their weight behind Audi production?

David Bassett [00:11:13] Yes. At the moment, in terms of a policy context, the promotion of alcohol and other low traffic species within blue farming, as it's been called, there is a strong policy support for that and we're delighted to see that. However, policy support is all very well, but there needs to be a market pull. In addition to there being a policy level push, now certain things need to be put in place in order for that to happen. So the first one, whilst there is a highly educated and informed demographic on this topic, there is also

a much wider share of the population that doesn't know very much about this topic at all. They know very little about the farming of fish. They know very little about the farming of shellfish, their knowledge of fisheries and aquaculture products. Supply is not very nuanced. So the first area, if you're looking at market pull, is the sort of education and general ocean literacy of consumers and end users of the product. There are also, I would be the first to admit we can have ambition, but you have to be realistic and you have to be realistic as to what the attitudes of the general public are going to be. And this is something that we don't just see this with algae, we see it in a broader food systems approach. When you're talking about the inclusion, for example, of insects in the diets and things like that when we're looking at these novel areas. Is it realistic that all European consumers are going to be eating primarily seaweed products? So the seaweed burgers, the ideas I was talking about there, or will the move more be towards products containing elements derived from algae production included within them or seaweed as a garnish or seaweed, just an acid area. So it's understanding what the product might be. And in terms of developing the European market, remembering that there's also an international dimension. So we import in terms of our aquatic food consumption in the EU, we import between 70 and 80% of our aquatic foods, depending on what statistics you wish to use and which to look at. And algae is also included within that international trade balance. So you have to consider economies of scale of production. You have to consider the existing market dynamics that there are. You have to consider what company profiles are in the production of it. So there are a number of different issues there that feed in to the development and establishment of a European market for product.

Matt Eastland [00:13:50] Thanks, David. Yeah, I think we'll end up talking more about challenges as well in a second with regards to tech and and acceptance. So that's useful because it seems like there's obviously more that needs to be done. I think if I could just come to you for a moment, so you build microalgae farms, which sounds pretty incredible. So where did your actual interest in algae come from originally?

Isaac Bersin [00:14:13] Yeah, it's funny. I fell in love with them by mistake, actually. And I was a M.I.T. scientist working on a nice sponsored project to cultivate cells aboard the International Space Station. And. Right. Well, the algae cell I was working on were algae. That's how I fell in love with these little creatures. And the more time I spent with them, the more I admire them. Their ability to convert energy to nutrients is something that's astonishing. This was the beginning and I started with no idea and hopefully some wisdom accumulated. So I want to build on what David did, just explain that very truthfully about. And I would like to start with the user experience. Mm hmm. Okay. It's very hard to sell something disgusting. Okay. I'm telling you, no matter what the nutritional value is, if your user experience is not positive, it's a very short discussion. Okay. On the other hand. If the user experience is superior, then your mind opens to a lot of things. Okay, so I think what, what we're trying to do and again, if you grow algae is in open ponds, algae is something that you harvest every day unlike other crops to harvest. Moss this season actually is something that that's a daily harvest. And every day your growth conditions change, right? The light shines, doesn't shine and a bird then jumps into the water. A big jump. Every day is an adventure. It's very hard to have consistent quality and consistent taste and user experience as a result of that. So I think there was a technology gap, and once you cross this gap and you have consistent quality around, it opens the door to the following very interesting proposition, value proposition for both customers and food companies. Because again, between us and algae farmer and the end user, there's a food producer that heads to use the algae based ingredients into his food. So here comes the interesting news. Okay. In Europe and the United States as well in Japan as well, you had allowed claims based on certain percentage of the daily usage of certain many vitamins and

minerals. So for example, okay, I'm just going to do something crazy if you eat your pizza. Okay? But your pizza contains a certain amount of algae, spirulina based, you know, per serving in the crust even. Legally in Europe, you can claim that it's a source of iron or a source of protein or a source of it depends on the configuration. Okay, so it's the same pizza, but you just went from junk food to interesting, healthy, nutritious food. Okay. And if you close your eyes, it has no extra taste. That's unbelievable. So start with the user experience. Make it positive. Make it wow. Amazing. Like a blow shake or something. Unbelievable. If you close your eyes, your senses and your senses will be looking for something that looks like a blue shake. Like, that's weird, right? So you're going to try to find the extra taste is not going to find it. And then if you can attach health and nutrition claims to it. So it's a claim enabling ingredient that's a world of a difference than what was before. And what enables all of that is consistent year round quality because if you don't have it. Alan put this way, it's very hard to start this thinking on you. That's a hard.

Matt Eastland [00:17:47] Push. So you then get this consistent year round algae, which you speak about and cross that technology gap. What how is your technology doing this?

Isaac Bersin [00:17:57] So it took me a while. I have to tell you at the time that I'm going to mention I had that one of the largest algae farms in the world. It's still up and running in Texas. And I was invited to Iceland. I refused to come for several years. And they're really kind of it's okay, fine, whatever. I'm just going to visit there and then move on. Only then it dawned on me the potential. I think it's not only European potential. There are many places in the world that you have. A vast amount of potential clean energy. It could be hydroelectric, could be geothermal, it could be many sources. So if you can take this energy and convert it to food, that's super. That's amazing. And if you can do it in a controlled environment, then you get. So there was a technology gap. It took us several years to learn how to do that. It's kind of a vertical farming of algae entity based. But as long as your light is powered by clean energy, as long as your fertilisers are not produced by energy intensive processes, what you produce is a carbon neutral food. I've never heard of a carbon neutral food in my life. And I'm not I'm not talking about biomass because guess what? 100% of the algae biomass is food.

Matt Eastland [00:19:16] 100%.

Isaac Bersin [00:19:17] 100%. There's no waste. Everything has nutritional value. For example, spirulina. Okay. It came from a very crazy idea to something that. And I'll give you some of the feedbacks. So what did it do to us? And I think it's a very good indication for this. So if you think about the transition from agriculture, like production of ideas to biotech, like production of ages. What happened out of that is that long term contract. We have a 15 year contract with a large European company to buy algae ingredients. This is a first time in the history of algae cultivation that the large food company is giving you 15 years of take agreement. That's crazy. Why? Because you have consistency. Because it's a technology play. It's not an agricultural play. The amount of confidence is pretty high. So there is a benefit. There is a carrot to this effort. And again, no one is expected to chew on their idea. That's not the point. It's like soybean that no one is going to take the beans and chew on them. You have to have a food company between you and the market. You have to have partnerships in the food. Okay. So that's. That's your point, Matt.

Matt Eastland [00:20:32] Thank you. David, bear with me on this just for a second. I just want to ask Isaac one last question about because it's always quite difficult as a listener, I guess, to kind of project yourself into these places. But so Isaac, if, if you imagine I've just

walked into your plant in Iceland, what am I seeing? What am I hearing? What am I feeling? How big is the first?

Isaac Bersin [00:20:51] I'm going to take you to a chain of health and wellness. I would say sports bars in Reykjavik.

Matt Eastland [00:20:58] Okay.

Isaac Bersin [00:20:59] And we're going to have an amazing blue shake.

Matt Eastland [00:21:01] I'm planning my trip over.

Isaac Bersin [00:21:03] Spirulina and it's going to taste great and going to smell great, and it's going to give you all the vitamins and minerals and it's protein rich. And I'm going to be a happy camper. Then we're going to take you 20 minutes out of Reykjavik to one of the largest geothermal power plants in the world. And adjacent to this power plant. You're going to see a closed building going to go in and you're going to see something that looked like science fiction. It's vertical farming of algae. It's full of purple light because it's made out of blue and mainly blue and red. The combination of blue and red. So it looks purplish, many babbling things. And then you're going to see algae coming out of the Typekit. It's like cow, you know, like a million cow. It's continuous production and then you're going to smell the algae and they're going to smell like nothing, right? You're going to smell nothing. Okay. So it's a whole different experience. And man, I promise you, if you measure your happiness level before and after, you're going to see definitely an increase. It's measurable.

Matt Eastland [00:22:04] Amazing.

Isaac Bersin [00:22:04] Okay, so you're more than welcome. David is. Well, it's not it's not a maths only invitation. I think it's going to blow your mind.

David Bassett [00:22:11] I was about to say I hope I can come on this trip.

Isaac Bersin [00:22:15] And says.

Matt Eastland [00:22:16] Let's measure our kind of group wellness before we go in. And then I look forward just to even having a blue shape to as that just sounds amazing. So it will be a podcast from Iceland next, folks. Thank you both for that. Really useful to kind of get your stories and your perspective on these things. Let's just stay with the health benefits for a second because I think we're just kind of scratching the surface a little bit. So what would be the main health benefits for consumers of introducing algae into their diet? So we've spoken about, okay, you're not going to be having a pure 100% algae burger. There's a certain amount of realism we need to apply to this. But assuming that consumers we can get them to embrace this, what is it that they're benefiting from if we introduce algae into the diet?

Isaac Bersin [00:23:02] Okay. So I would say that the nutritional benefits, again, the assumption is that the user experience, the taste and the smell are super amazing. Okay. I think what happening is we're looking into decreasing our beef and meat consumption. Okay, because of the environmental issues with beef cultivation. So what's going to happen to you, Matt, if you're going to reduce your hamburger consumption by X percent, 20%, for example? Okay. What's lacking? Okay. What you're going to find very hard to get

from alternative or non plant based sources would be actually two things. One would be essential amino acids. Essential amino acids. Are those the building blocks of the protein that our body cannot produce? You have to consume them from external sources. Okay. So complete essential amino acid is something very rare in the plant kingdom, so you're going to have some of them lacking. The second thing is bioavailable Ira Iron is very important for human function and Aaron and meat. Basically beef is a very useful source for bioavailable Ira. So the good news is, although, for example, spirulina is very high in protein, it's over 70% protein. It's not about the quantity of protein. It's about the fact that this is complete, essential amino acid source, which is like, oh, my God. Okay. And then the amount of iron of bioavailable iron, which actually is more bioavailable than iron coming from beef is significant. Okay. So I see a huge value of telling someone, listen, the way to reduce your beef consumption is don't cook something that looks like meat because that can make a piece of plastic look like steak and good luck. That's not a meat substitute. Meat substitute is something that has a nutritional value. Okay, so that's the point. Don't give me something that pretends to be meat. Okay. Give me something that looks completely different. Give me a blue shape that I can measure. And a scientist I can measure the essential amino acids. I can measure the iron. I can measure the bioavailability of that. And can tell you, Matt, if you reduce 20% of your meat consumption and use this as an alternative, nothing bad is going to happen to you. And it's even tasty.

Matt Eastland [00:25:26] Okay.

Isaac Bersin [00:25:26] That's the.

Matt Eastland [00:25:27] Message. Okay. Got it. So with all that in mind, then, you know. So, David, how do we translate that to consumers? You know, because it just I mean, everything I'm hearing is, well, firstly, it's blowing my mind. But how do we make sure that consumers in Europe and beyond are going to be ready to embrace this? And, you know, how do we get those health benefits across to them? Well, how do we get not even consumers? How do we get industry to embrace it?

David Bassett [00:25:50] It's been said before education, education and education is the basic way. And certainly for consumers, I don't say this in any pejorative sense, but the level of ignorance about our general food consumption is high. Many consumers do not know the source of their products. And by this I'm talking about milk coming from a cow or meat products on sale coming from certain animals. We have a disconnection between food that we buy and the source of what that is. So often in the world of aquaculture, we're talking to the already converted, as it were, because we're within our own bubble in our sector. And we need to remember that to the vast majority of citizens, the word aquaculture, they're probably not that sure what it means. Never mind the fact that it's talking about fish and shellfish and algae and the whole aquatic food production sector. So we have to improve the communication of what our game is, where it fits into a food systems approach, and what those health and nutritional benefits of the products are. Now, there will be some sectors of society that are already engaging in that, and that's where we're seeing the growth and development of the sector as it already is, and particularly with the current emphasis on plant based diets and the nutritional issues arising from plant based diets. Well, I'll get answers and can address many of those issues and many of those points. That sector of society, that market, that interest will continue to develop and grow in any case. But if we're trying to broaden it out and if we're trying to have a more wide scale increase in production, then we will require both targeting primary consumers, but also approaching retailers, chefs, people who influencers, meat influencers and those sorts of groups. There's a whole campaign to work on there and

improving generic ocean and food literacy from children up. You know, start young and educate people more into their diet and with the general commitments that are being given, at least nominally, to sustainability, to environment, to climate, to plant based issues, that is a general trend that we're witnessing and we need to capitalise and build on that in terms of promoting the sector.

Matt Eastland [00:28:24] So I mean, it this kind of flips us nicely into kind of the sustainability side of this. So staying with you that Davina, do you believe that algae cultivation can offer a like a genuine solution to some of the environmental challenges we face, particularly in the food system?

David Bassett [00:28:40] Yes, I definitely believe that there is a strong place algae within the broader aquatic and farming production that isn't only linked to the immediate outputs and products from algae cultivation, but the very exercise of farming algae can bring significant environmental and social benefits as well, be that in terms of algae acting as a carbon sink, be that in terms of algae acting to help support habitat conservation or diversification within the aquatic environment. We often talk in the aquaculture sector notice increasing emphasis on. Integrated multi traffic aquaculture and as a way how algae can operate along with other low traffic species in balance with higher traffic species. Also, if we don't want to broaden the even further integrating with other water users but you know, marine, renewable energy and so on and so forth, looking at an integrated, multi-use, varied blue economy sector. So there are many ways in which algae can operate and help drive the sustainability agenda. In addition to being a primary food source, in addition to being an animal food source, in addition to many of the key commercially viable products and high value products that are being produced. So here we're talking about the pharmaceuticals, the nutraceuticals, the preferred long term ingredient, things like that. That is important as well.

Matt Eastland [00:30:13] Thanks, David. So Isaac, from a sustainability perspective, you know, how sustainable is Aldi from your side? And I guess I'll be interested as well to get your views on how this can be used in like as fish food, for example. Does that have a real sustainability benefit too?

Isaac Bersin [00:30:29] So first of all, I can tell you as a scientist that algae is very misleading. I'll tell you why, because it's true that it's a carbon sink. And actually for each tonne of algae produced dry, you consumed two tonnes of CO2 still committed. The question now is how much energy and how much CO2 you created by feeding them? Okay, so then you have to look at two things. First is your energy usage and where the energy coming from, your pumps, you have to bubble area of compressors, all kind of activities, lights. Where does this come from? And then you have to look at the fertilisers if using energy intensive ammonia based fertilisers. So if it is a total mess, remember, two tonnes per tonne is what you absorbed, 77 zero is what you emitted because of the energy you consume. If it's not clean and because of the fertilisers you use, that's not environmentally produced good. So the answer to your question meant depends how you cultivate them. Another example you can actually grow algae on sugar in the dark. It's called fermentation. You just use sugar as a carbon source. But then you have to tell me how many tonnes of sugar have you used to create? One tonne of algae and where's the sugar coming from and how much water and land and fertilisers and pesticides were used to cultivate the sugar. And the result is horrific. Right. Okay. So it really depends on the manufacturing technology. And I'll tell you, I've tried it on and I've did the maths on all of them. It's very tricky and I think on that I'll give you one example just to tell how tricky this is. You grow marine algae in and brackish pond, okay? And you say, Great, it's brackish. I

use brackish water. Yeah, but it's a middle of the desert and there's huge evaporation. So if you want to maintain a certain salinity level in your pond, guess what you have to put in freshwater, right? Because freshwater evaporates, not the salt. So you do grow in a brackish pond, but you are the worst camel in the world because you drink all this water. Okay? So it's very tricky and misleading. So that's something I think that legislators have to put this in mind and look for a lifecycle analysis of different kinds ageing technologies, because not every algae that looks the same is carrying the same environmental characteristics. Not at all. Okay. So that's that's something that that hopefully answers your question. But the benefits are beyond carbon. You just have to understand it's about land usage, water usage, if it's a closed system and also not pesticides or herbicides usage, that's huge. Okay. So so the environmental benefits are quantifiable, but they're lovely. Absolutely.

Matt Eastland [00:33:21] Thanks, guys. I mean, it seems like there are, as you say, huge benefits, but there are limitations here. And I think we kind of hark back to the early conversation. We talking about, you know, how realistic is it to go big with algae? I mean, David, you know who the main EU algae producers, if you know. And what is it that you're hearing? What is it that people want to make sure that they can cultivate algae in the best possible way?

David Bassett [00:33:45] It's an interesting one, isn't it? Because our case is everywhere we look at the moment, or at least in our world and in the meetings and conversations we're having, it's everywhere we look. It's one of the most popular, positive images of belief farming that there is, and there's only really a positive press and a groundswell behind it. So why is there not our gate everywhere we're looking and why? One of the common industry questions we would have across our members, across all of the EU member states and including Norway in the UK as well, is why is there not more traction in the sector and why are we not seeing an increase in the growth in production that you would expect to be seeing, given the high level support that that's being given and initiatives such as the European Commission, EU for ALC strategy? Well, there are a number of things we need to look at from there. The first one, as is the case with everything to do with aquaculture, is access to sites and planning and licencing. So there is a competition for aquatic resources and not that algae isn't. Also, there's lots of obviously land based production as well, but from a marine perspective, you have to consider where it's actually going to be done. Mindful of the fact that there are other water users for ocean production, then you would need to consider ocean modelling to identify the potentially most productive sea areas to look at where you're doing it. Moving away from the practicalities of location and site and licencing and permissions to do it, there is a requirement for market led growth as a requirement for investment in the sector. So you actually need to be demonstrating it to be so crudely commercial that there is money to be made from doing this and that the market is going to be there. We have to acknowledge that EU production is within a global market. The majority of algae is produced elsewhere in the world that's currently used in our sector. And we have to remember that global trade and these economies of scale, if we're looking at low traffic aquaculture, we have to think how that is going to be balanced and with existing high traffic, aquaculture and other users. And we need to get to a point where we look beyond what is technically possible. So there have been many demonstration projects and interactions with other water users with renewable energy, with other sectors. We need to move beyond what is technically possible to what is technically and commercially possible and viable in order for that to develop. And there are things that may affect that. So yes, the products, you know, we're aware of them and we know what they are. But for example, a microalgae production, there's a very high energy demand that can be related to that. In terms of optimising the

scale of production, you need to look at seeding and operation and harvesting. You need to look at increased mechanisation. You need to look at more automated solutions. At the moment, the sector isn't at that level, so there are some practical and cost based issues there in terms of aquaculture production, historically and national aquaculture plans and strategies that's focussed on finfish and shellfish mollusc production. And we would need to look at building algae into that and being used. Now that's happening and we see through organisations like Cuiaba, the European ALK Biomass Association, that the EU for ALC strategy, it's being included in the European Commission Horizon Europe Research Framework Strategy as a priority area for research. So there are all sorts of areas where it's being included. But we need to look at joining up some of that thinking in order for things to be developed. And a final observation I would make potentially, at least at this stage in the cycle, the need for incentivisation into diversification into algae production or the inclusion of algae production. So as I said earlier, what is technically possible might not be enough. We might need to look at some sort of commercial incentivisation to get things going. And here we're talking about issues like environmental offsetting measures or tax breaks and incentives, ways of encouraging companies that maybe currently are not producing or using algae to include it within their production. And in the same way in terrestrial farming, you could see rewilding being used as one way of sort of offsetting terrestrial agricultural production. There is a similar balance that could be struck with algae as well. So there's a number of different tools and areas that we could look at working with to help promote and develop that sector.

Matt Eastland [00:38:39] Amazing. Thanks, David. I can see Isaac. Well, you've been talking just nodding along. And just briefly, I. I'm interested from your side, given that you are doing this and it's obviously a certain scale that's working. What challenges are you facing? And I guess what would make your life easier to try and increase your scale of production and multiply your plants, etc., etc.?

Isaac Bersin [00:39:01] So I continue. I think David reflected the reality in a brilliant way. That's exactly the challenges. But even if you you can demonstrate a scalable technology and you can demonstrate access to market, in the end of the day, it's a large capital investment. You need to build a new industry. So access to capital is, is, is one of the limiting factors. And I think David is correct. If you can combine the environmental value that you bring, for example, your carbon credits, right? If carbon credits from algae would be allowed, I'll give you that. We just talked about the equivalence between beef meat and algae, certain algae strains. Right. If you can actually equalise, I tell you, one kilo of algae is a specific algae equals nutritionally, it equals one kilogram of beef. Okay. So if it's a beef replacement, it could be a blue shake. Okay. But the nutritional value is the same. Then why can't you get the carbon credit? Because you're replacing beef. Right. Beef is 100 kilo of CO2 per kilogram of beef. Okay, so you grow one kilogram of algae and you get 100 kilograms of CO2 equivalent credit, CO2 credits, something you can sell you can sell ten years upfront. So that is a mechanism to sponsor your capital investment that you have to do. So my point is, I want to build on what David said, and I want to suggest actually a practical solution that will allow you. Again, it's measurable. You need to show me that your carbon negativity to show me that your nutrition value is there. But if the answer is yes to both, then they should be included in the capital mechanisms of Europe. Because I'm telling you, that's a reasonable way to sponsor the rollout. Otherwise, if you have to include return on investment in your spreadsheets beyond the operational profit, it's very hard.

Matt Eastland [00:40:56] Yeah. Okay. So lots of potential limitations there. But you know, I always like thank you for offering up one potentially very practical, very valuable solution.

Both of you, thank you very much. I mean, we're actually coming to the end of the show now. So I I'd like to kind of wrap up just with a last couple of questions, if that's all right. So I'm interested, particularly now and where you both expect the algae market to be in the next 5 to 10 years. So, David, I'd be interested where you think this will be from, you know, the aquaculture sector's perspective. And and Isaac, I'm also interested from your perspective, where where do you think you will be and where do you think this market will be? So, David, maybe let's start with you. 5 to 10 years time, how big will algae be?

David Bassett [00:41:41] I never like to answer questions with specific numeric parameters that were taught or targets.

Matt Eastland [00:41:48] In the future.

David Bassett [00:41:50] In the future. I can find it sometimes unhelpful to take it seriously. We will have x number of tonnes or we will have x value of the sector. I don't necessarily like to put metrics and parameters like that. So in the immediate short term, what we are seeing is the greater inclusion of allocate within the European policy context for developing a sustainable European aquaculture to 2030. And we see that with the strategic guidelines for European aquaculture and we see that in the blue economy communication, there's a clear commitment to the development of algae. How that actually how successful that is and how effective we all are in our work to try and deliver that inclusive approach remains to be seen. But in the immediate short term, that's something that's being worked on, as is continuing research into the development of the sector within initiatives like the Horizon Framework Strategy. So there's ongoing research, there's ongoing technical innovation, there's ongoing development of production expertise, and there is ongoing promotion of the desire to increase the sector relatively easily. Additional measures to incentivise the industry could be there with carbon credits, with tax credits for things that would be relatively simple to dovetail and integrate these into the aquaculture development strategies that we're also talking about. And that's something that certainly my organisation and others will continue to talk on. Innovation isn't purely scientific or technical. Innovation can also be economic. Innovation can be an education. Innovation could be in consumer education. There's a number, a number of other social areas where we need to consider innovation within the sector. And all of those are measures and steps that are in action. I cannot predict what the commercial application of that will be, as that's for individual investors, for their backers, for their risk profiles. These are their questions, but they will certainly with current commitments to environmental and sustainability targets, everything is right to continue the development of the sector and with current consumer and certainly informed consumer wants and demands everything is right to continue to develop the market. So I would expect to see a significant growth, but I'm reluctant to put a number on that. But in terms of economic value, but certainly exponential growth in the sector in the short to mid-term is likely.

Matt Eastland [00:44:38] Perhaps like to David and excuse the pun, Isaac, but do you expect to see exponential growth of algae in the next 5 to 10 years? And where do you expect Vaxart to be?

Isaac Bersin [00:44:47] You know, I'm not objective. Right. But nevertheless, nevertheless, I'm going to give you a scientific input because I have a research group. It's all my kids. So I have three daughters that are from the ages of 30 to 17. And I can see how and again, David's right, we're talking about food innovation here. Okay. And customer demand. So I can see how excited they get because it feels different to them actually, you know, in contrary to things that they want to be like fake meat, right? They

want to pretend to be something that's known, actually. And the representative of the young generation. I can see they're excited, but something that looks different. Don't pretend to be a state. Be different. Be who you are. And I can I kind of have a lot of their hopes from the actually young generation that they kind of get it and it's cool and it's tasty and that builds a brand. So that's my hope. My hope is the young generation would just feel it's right. Taste it right, smell it right. And they would be the propelling forces to propel it forward. Because many times I've seen that traditional industry, they want to talk about change. They want to be involved in something they can call it, but really they want to keep business as usual. Change is risk. It's unknown. It's right. So you have to have, as David rightly said, the consumer demand. You have to have their. And then. Yeah. Listen, we've witnesses changes in our life. I remember the world without iPhones or without. You know, we've seen it in our lifetime. So why can't we have the canned food?

Matt Eastland [00:46:27] Absolutely. Okay. So the final question. Based on what you've just said, let's try and sell this and say in one sentence, is algae the new superfood and why? You know, if you were to sell besides that, what would you say?

Isaac Bersin [00:46:42] So first it was delicious. You enjoy having them. It's colourful and glows your mind. Secondly, it's beyond protein, although it's a it's a basket of full essential amino acid, their vitamins and minerals. So on the nutritional level, it's compared to nothing, nothing else, especially from the plant kingdom. And you know exactly where it's coming from. So shady, you know exactly what's coming from. You can measure how sustainable it is. So you can eat something with a lot of confidence. Wouldn't you want to have your food coming from a place that is a GMP facility rather than a field that is using who knows what then? And so I think that the confidence level is different in what you eat. So I think there are many good reasons to think differently about food.

Matt Eastland [00:47:32] Thanks. So sustainable, healthy and production process transparent seems to be the benefits. And David, what would you say is algae the new superfood and why?

David Bassett [00:47:42] Yes, I think I'll but rather than being the new superfood, the first thing I would say, as I said right at the beginning, I think what we're actually doing is rediscovering the benefits of something that we've overlooked for far too long. I think the health and nutritional and taste advantages of the products are clear and demonstrable to me as any race. It's a product I like without being too conceited. I would like to think of myself as one of the informed consumers of aquatic food products, and I do consume algae in a variety of different ways, and I think perhaps less as a marketing strapline, but as a concept to consider in a world where we're continually discussing sustainability, but we don't really have a definition of what sustainability might mean, but it's a word we do like to use. If any product is going to score highly on being able to demonstrate it's a sustainable product. I think algae products are there and where we're going to see a trend emerging in the future, where the products we consume are certified and judged against their lifecycle analysis in their product environmental footprint. We're already beginning to see LCA and scores being represented in products. And whilst the criteria for measuring that and demonstrating that are varied and some people will dispute them and argue them across the boards, our products will continue to score highly and will be able to, with much more confidence, claim a sustainability title than certain other products in our supply chain. And I have every confidence in the continuing development and expansion of the sector for that reason.

Matt Eastland [00:49:28] What a fantastic way to finish. Thank you for that, David. That's great. And thank you both for everything that we've been discussing today. Fascinating area. Definitely one that I'm going to be looking more at. I can't wait to taste the blue shake. So, Isaac, take you up on that. Thank you both for all your contributions today. Where can listeners go to find out more information about what you do? Isaac Where can people find out more about you and your company?

Isaac Bersin [00:49:54] So if you go to two websites, you can go to the company website, which is called Bucks Adult Life. You can see some images of how this thing looks like and feels like. And if you want to try some of that products and it's already some of them are launching in the US so you can go to all nutrition here dot com and there you can see our brand of omega three based products and also immunity booster products made from aspirin actually. So you can give that a try and more to come.

Matt Eastland [00:50:29] Fantastic. Thanks, Isaac. David, what about yourself? What can people find out more about you?

David Bassett [00:50:34] If you wish to find out more about E tip, the organisational website is WW tap dot you tip AT&T IP dot EU. But in the spirit of a multi-stakeholder platform, which is what we are, I will also give you two other points of reference that would be interesting. I think two listeners to this podcast and people who are interested in our production. The first is to look up again at both online, either the European ALK Biomass Association and you'll find lots of information there. And the second is to look up the EU for ALC Forum. That's EU number four on a forum, and you'll find out some of the cross-cutting work that a number of my organisation's a number of organisations, including my own, including Yapa, including individual producers, are all collaborating in that ALC forum. So these are three links I would encourage people to look up.

Matt Eastland [00:51:28] Fantastic. Thanks, David. So that just leads me to say a big thank you to Isaac and David and thank you all for listening in. This has been the Food Fight podcast as ever. If you'd like to find out more, head over to the EIT Food website. WW dot EIT Food dot EU and please also join the conversation via the hashtag EIT Food Fight on our Twitter channel at EIT Food and don't forget to hit that follow button so you never miss an episode. Thanks, everybody.