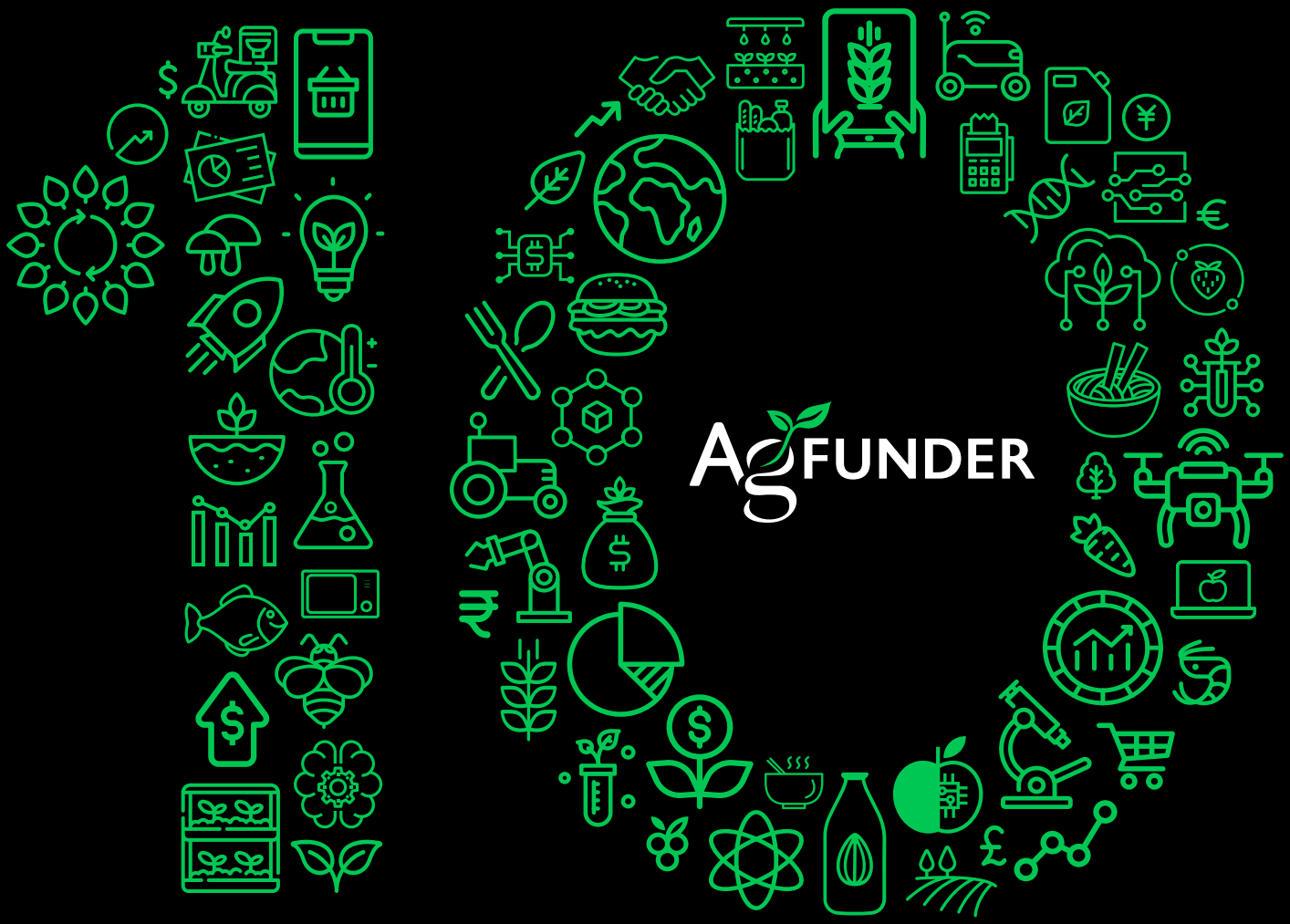
10 Years in Agtech and FoodTech



a celebration and potted history

Celebrating
10 years
in agrifoodtech

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Happy Anniversary AgFunder!

Welcome to our 10-year celebration special report.

A decade ago today, AgFunder was incorporated by Michael Dean and Rob Leclerc with a mission to bring more investment and innovation to the agriculture and food sectors. It was founded in the same year that the Climate Corporation sold to Monsanto for $1 billion, so this is also a celebration of that pivotal deal.

Dig in as we take you on a journey of investment trends, category timelines, OG founder interviews, VC views, and the history of AgFunder and its team.

At 85 pages it's still not exhaustive but hopefully a decent potted history of where this industry came from and where it's going. So sit back and enjoy the ride - we certainly did!

What's in a name?
Introducing AgriFoodTech

Words: Louisa Burwood-Taylor

AgriFoodTech. It doesn't exactly roll off the tongue, does it?

I'm afraid you have me to blame for that, as it turns out I coined the phrase in 2017 as a way of combining agtech and foodtech into one venture capital sector. Previously, the two categories were typically separated.

Image credit: Juicy Marbles

Agtech came first – arguably with the first tractor and certainly with the introduction of genetically modified crops. In the venture capital world, however, it was the soil sensors and software tools for farmers that first captured venture capital attention. (**See Climate Corp**.)

A few years later, foodtech came along with the explosion of food delivery tools and, a bit later, alternative meat and dairy startups.

AgFunder ruffled feathers for a couple of years by including food delivery technologies in its annual AgTech Investing report, because doing so inflated the totals. (And yes, the critics weren't wrong – funding to food delivery startups reached $1.65 billion alone in 2015, more than a third of the $4.6 billion raised in total that year.)

However, we stood by our belief that investing in agtech meant investing in anything transforming the way we grow, transport, and eat our food at any stage of the supply chain.

I first used the term "AgriFoodTech" with Rob Trice, a partner at The Mixing Bowl and Better Food Ventures, when he was driving me down to San Joaquin Valley in the spring of 2017. (I don't know if he remembers.) I said we needed to combine two increasingly indistinct categories — agtech and foodtech — into one term that encompassed what was happening across the entire food value chain.

Back then, there weren't many of us in the space, and we spent a lot of time talking about how to best showcase the opportunity to the outside world of investors and brilliant entrepreneurial minds. Foodtech has always been more appealing to the mainstream — and relatable. People don't always realize that eating is an agricultural act, but they do have a lot to say about their favorite restaurants, recipes and food brands.

Our then-small community also spent a lot of time discussing how consumers were going to change what happened on farms. I think I've lost count of how many times I've heard Sanjeev Krishnan of S2G Ventures say consumers are "voting with their pocketbook." (I've also always wondered if he is a time traveler from the 1900s because I have never owned a pocketbook!)

And with consumer influence reaching upstream, digitization was also effectively shortening supply chains, turning them into interconnected "supply webs," as my friend Danielle Gould of Food+Tech Connect likes to call them.

So the lines between foodtech and agtech were starting to blur: farm-to-consumer eGrocery companies were a good example, where companies worked directly with farmers to sell their produce online to consumers, creating value for both parties (albeit perhaps not the middlemen.)

Over time, building an investment thesis to encompass the whole of the supply web became increasingly obvious. This was not just because of that fundamental shift in how the industry was going to operate and the influences upon it, but also for the venture capital community that was trying to make a return on investing in it.

Consumer-facing foodtech was starting to return money to its investors — and generalist investors were getting in on the act. With just one or two growing seasons a year to iterate on their products, farm tech entrepreneurs were starting to talk about

needing a longer time horizon for exits, a theme we dig into further in this magazine. For VCs with a 10-year horizon and fiduciary duty to their LPs, it made a lot of sense to balance their portfolio across the supply web as well as technology types.

After I **introduced the term AgriFoodTech** in 2017, AgFunder launched its first fund. This wasn't a coordinated effort; AgFunderNews has operated very independently at AgFunder from the get-go, which is how we did so much with so few people for so long. AgFunder now invests in eGrocers and restaurant robotics all the way to soil analysis and farm robotics, and everything in between.

I wish I'd come up with a catchier word back in 2017, and I've always said to people please please give me an alternative; we tried – aftech, foogtech, afoodtech – as you can see, it's not easy.

Despite its challenging presentation, AgriFoodTech as a term is now used all over the place — you'd be hard-pressed to find just an "agtech" or "foodtech" VC these days. And I still wonder if some people still think the term is more about agriculture than about the entire food supply chain.

I joined AgFunder in 2015. This was after 18 months as the founding editor of Agri Investor, the first global publication focused on agriculture investment, where I mostly covered farmland funds — even regenerative ag funds — and some private equity. Agtech was a small piece of the pie back then. And so these conversations about the interconnectedness of the food and agriculture industries really blew my mind. It is without a doubt the most complex industry I've covered — and I kicked off my career in the structured bonds and MTNs industry so that's saying something!

But treating parts of the chain or web in siloes is clearly a mistake as the advent of new tech is slowly but surely disrupting that status quo. The lines are also starting to blur with other industries such as healthcare as we discover the impact of what we eat on how we feel.

Agrifoodtech is also increasingly considered climate tech – or at least many of its categories are – and in 2023, climate tech investment is, in many ways keeping the industry alive.

So perhaps we need a new term for the next decade? If anyone has something catchier than agrifoodtech to suggest, I'm all ears!

Image credit: Chinova

Reflecting on 10 Years of AgFunder

Words: Michael Dean - founding partner

Looking back on our AgFunder journey, it seems incredible that 10 years have passed and it still feels like we are just getting started. Back in 2012, during the demise of an emerging market agribusiness I established and we had built over four years, it became clear that there was a huge opportunity for new technology development and deployment across the food system.

At the coalface of agrifood production and manufacturing, particularly in a frontier market like West Africa, the challenges were immense. Digitization and a new wave of biotechnology, among other innovations, were coming to revolutionize the food system and we knew that the levels of investment required in innovation would dwarf anything the agrifood sector had seen before.

We had no track record of asset management, so we had to build our knowledge and our network and try to position ourselves to participate in the technology wave that was coming. AgFunderNews was our conduit to knowledge and it connected us to literally thousands of people globally who shared our passion for agriculture and food and the technologies that were emerging in the space. It allowed us to share information and to connect with startups and investors in a way that had not happened before. It then allowed us to raise our first, very small fund and to demonstrate that we had extraordinary access to the most valuable commodity in venture capital; deal-flow.

The US, in particular, is at the bleeding edge of technology development in most sectors and agrifood is no different, and for the first four to five years of AgFunder, I would say that around 90% of interesting agrifood technologies and startups emerged from the US. This is largely due to the well-established innovation commercialization pathways, the American entrepreneurial mindset, good quality accelerators, and the robust angel network helping fund startups through the "valley of death."

For this reason, our initial (and continuing) focus was primarily on US-based tech startups. Having said that, disruptive business models and the application of digital technologies to existing supply chain inefficiencies were also attractive, and a key reason for our early foray into the Indian and Asian markets.

Our emerging market investments and international expansion were driven by the recognition that Asia was going to be the epicenter of consumption and consumer growth well into the 2030s. This trend prompted the establishment of our Asia office and our desire to leverage our broad network and media platform to help accelerate the Asian agrifood ecosystem. If AgFunder was to be a truly global VC, we needed a presence on the ground in Asia and a channel for identifying and nurturing innovation in and for the region, as well as create a pathway for our global portfolio into the region.

Technology transfer into developing markets remains a large but nascent opportunity in agrifood.

We recognized very early on that our ability to generate and utilize the enormous amounts of data that we were receiving was going to be a key differentiator for AgFunder across the entire platform. Our AI-driven GAIA platform and the network effects generated from our ability to reach the 90,000 subscribers of AgFunderNews have allowed us to drive value to our portfolio companies and provide our Limited Partners with key insights into emerging technologies and trends globally.

I am so proud of how far we've come over the past 10 years, reaching over $280 million in assets under management (AUM) this year, with offices in San Francisco and Singapore and a new, European office opening in early 2024.

10 years on from Climate Corp's $1bn acquisition

David Friedberg reflects

Words: Louisa Burwood-Taylor

Ten years ago, Monsanto purchased digital ag company the Climate Corporation for $1 billion.

I started reporting on the agriculture industry just after this deal happened and remember the excitement that continued for years in its wake. It's also been said to have played a **driving role in Bayer's** subsequent acquisition of Monsanto for **$63 billion in 2018.**

In fact, you could argue that much of the excitement for the agrifoodtech industry at large comes back to this deal that put a spotlight on the potential for agtech to make entrepreneurs and investors money. Investment in agtech increased **exponentially in the years** after Monsanto's Climate Corp acquisition, and soon the industry was raising tens of billions of dollars a year (albeit with a dip here and there!).

But how did it come about? How did founder and CEO David Friedberg reach that valuation, which has proven pretty much elusive to our industry ever since? How has our industry changed in its aftermath? And what's coming next for agrifoodtech?

Friedberg and I recently reflected. Here's a snippet of our conversation, which you can watch in full above.

Louisa Burwood-Taylor (LBT): Was it an easy sell to Monsanto?

David Friedberg (DF): When we were first contacted by Monsanto, I knew nothing about [the company]. I thought they were just this evil company in St. Louis that did terrible things to the world and to people. [But then later] I'm like, "Oh my gosh, these guys reached so many farmers. They could be a great distribution channel for us." So I started reading about Monsanto online and really started to understand the business a little bit better. And several of them came in and we kind of talked about what we do, and I think it really fit a need that they were acknowledging themselves in the market.

Monsanto at that point had spent quite a bit of money on a service called Field Script, where they were trying to do seed prescriptions for farmers as a service. They used a lot of different third parties, and it wasn't very sophisticated. And so they said, "Look, maybe we could work on this together."

That kicked off our conversations about maybe we could be an investor too and put some capital in. And then we said, "If you're going to do that, we're really big into gathering data and using all this data to make our models better. Can you guys share all of your field trial data?" No one has more field trial data than Monsanto — all the hybrids that they've produced, all the seeds that they've produced, they know what the yields were, what fields those yields occurred at, what the dates were. We could match that with the weather and we could start to build better models using their dataset. And they came back and said, "If we're going to give you that data, we need to own the whole company."

LBT: Where is agrifoodtech 10 years from now?

DF: It really is astounding what we can do today that we literally couldn't do 10 years ago. Remember, the other big thing that happened 10 years ago that we don't talk about that was far more important and consequential to the world than the Climate Corp acquisition by Monsanto was the realization of the potential of CRISPR-Cas9.

Since then, hundreds of other gene-editing tools have come to market. The cost of sequencing has declined, which allows the scale-up of experimentation by several orders of magnitude. [That will increase as] digitization continues to ramp up.

So I could pick any one of those and I could tell you some extraordinary track for what's going to happen over the next 10 years. But the truth is, I don't know, because all of these tracks are intersecting with one another.

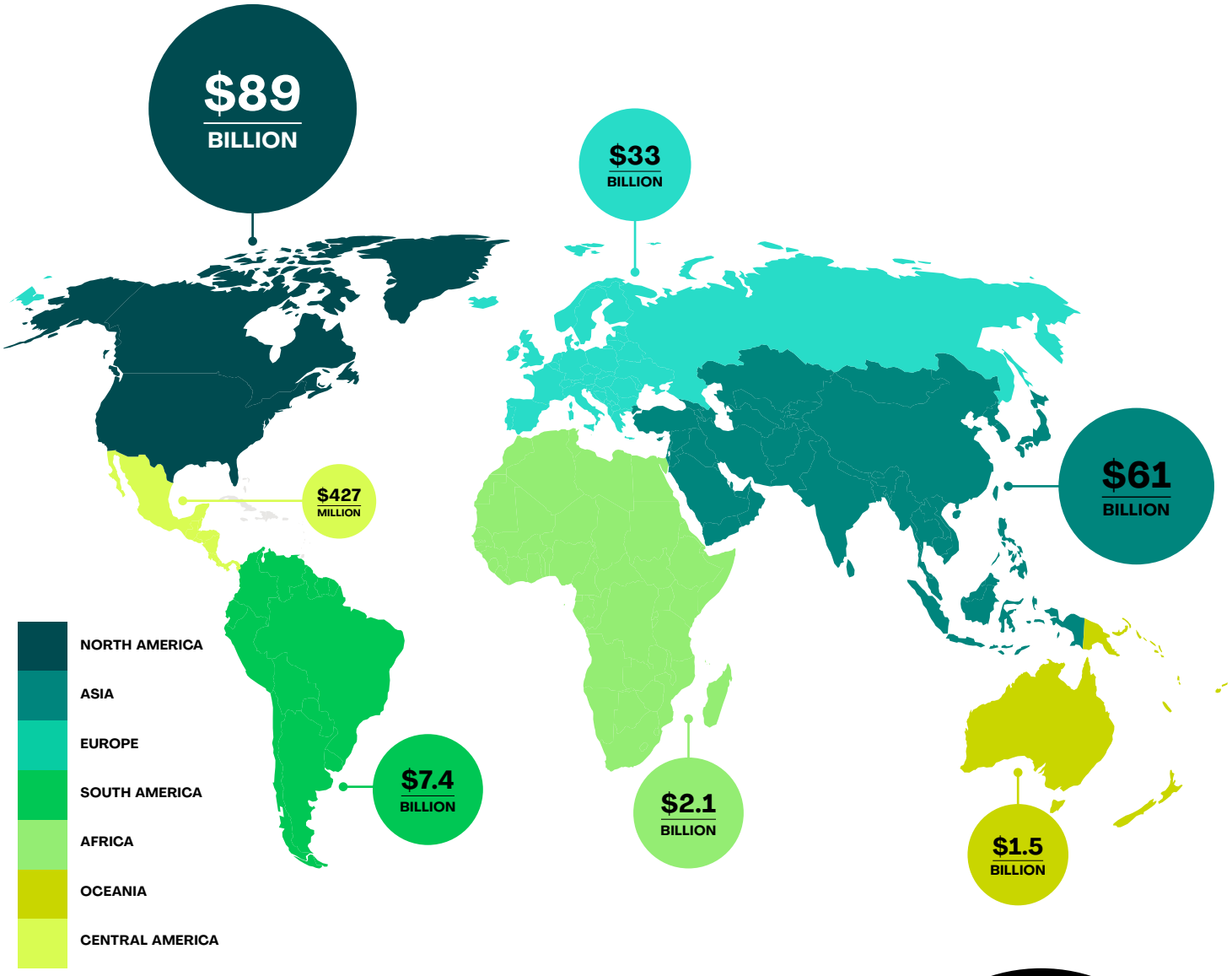
LBT: What keeps you up at night?

DF: Right now, there's a real capital problem. These big projects that historically have been fundable are becoming less fundable. As they become less fundable, the seed investors don't want to invest in 'em because they're afraid the A investors aren't going to be there, who are afraid the B investors won't be there, and no one wants to come and pick up the scraps of the company that's now getting priced in a down round.

And that's the other problem. So many investors have been trained in the last 15 years to be momentum investors. You invest in stuff when it's going up. You don't invest in stuff when it's going down. That's the wall that everyone's starting to hit because the investors that would do late-stage investing are really nervous to fund a company that's now worth less than their preference stack. And you've got to go negotiate with the existing investors and recap and restructure.

It doesn't mean the companies are valueless; it doesn't mean that there isn't something good there. It just means that the value now with all public companies, public biotech and growth stocks is worth less than the cash that's gone in. There's a real kind of reset that's happening right now.

Watch the full interview on AgFunderNews



A 10 year look at funding

$195 BILLION TOTAL 2013-2022

Words: Louisa Burwood-Taylor

From a low base of just $2 billion in 2013, the agrifood venture capital investment landscape looks very different today.

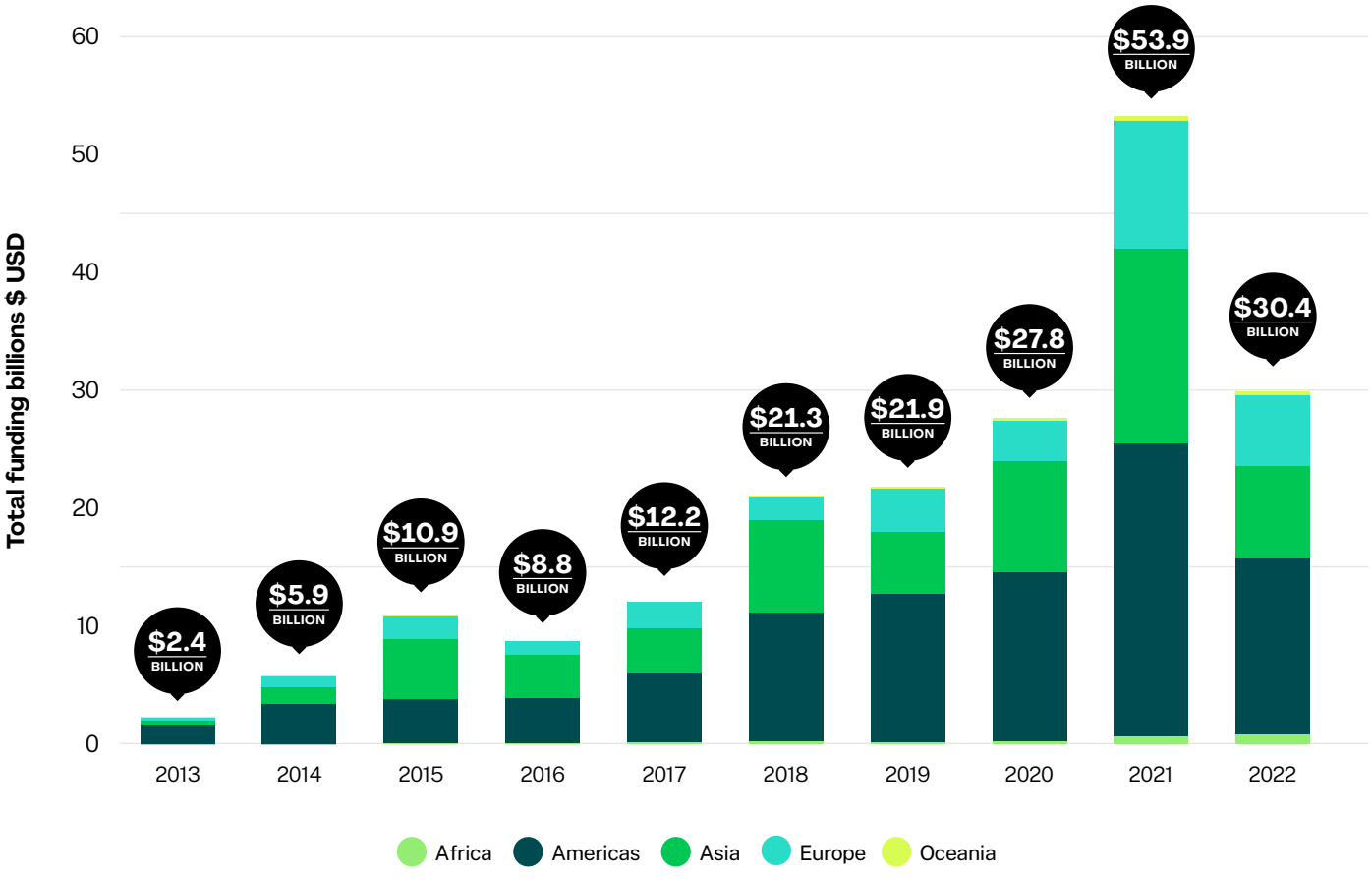
While total investment is far from its peak of over $50 bilion in 2021 today, macro venture capital and general market conditions have not stopped technological progress as increasing numbers of deep tech startups enter the industry alongside new funds focused on it. The next few pages offer a glimpse of funding trends over the past 10 years across geographies, technology types, funds created, exits, and a survey of venture capital funds.

David Pierson, managing director of Syngenta Ventures described the last 10 years well when responding to our recent VC survey:

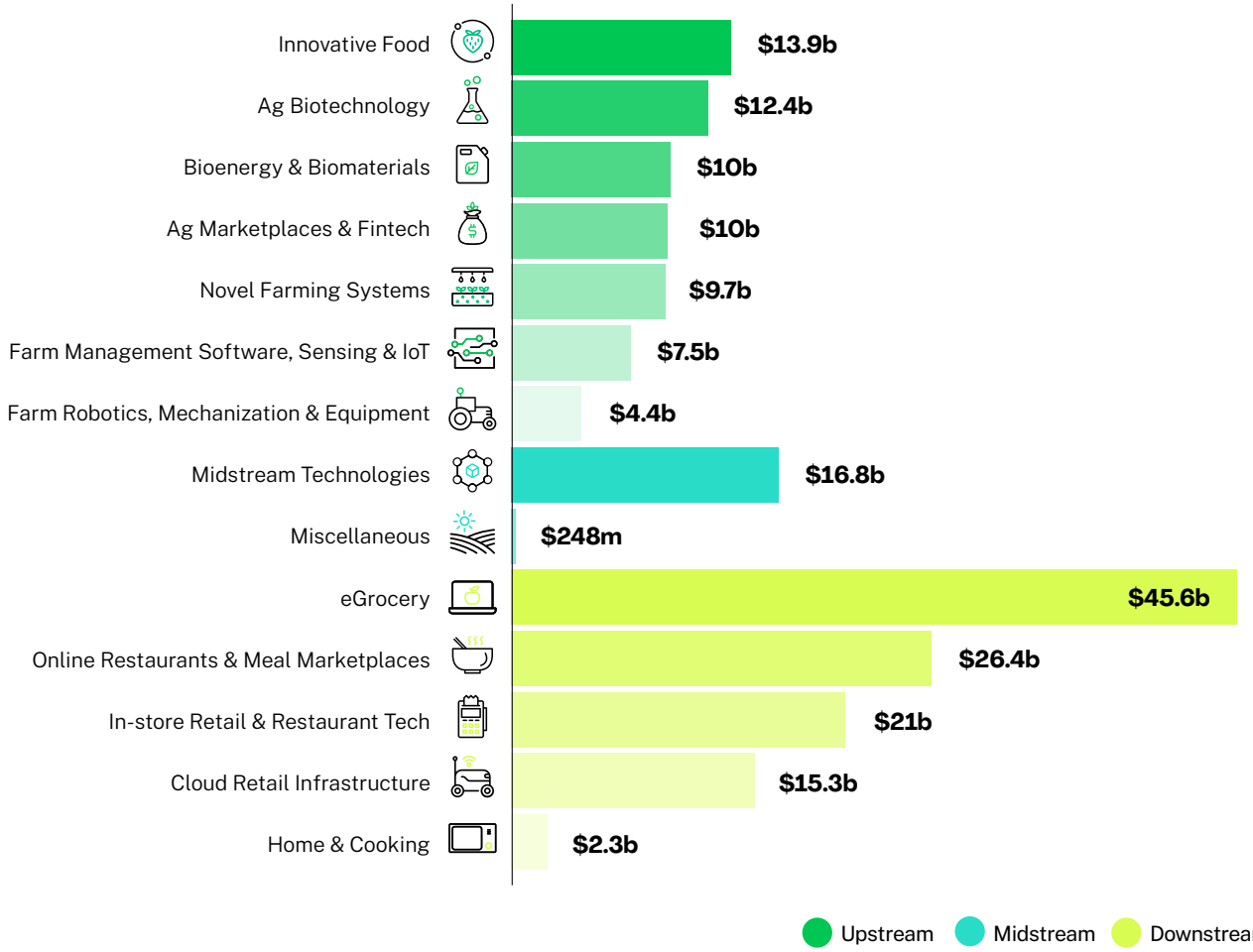
"The last 10 years have been enormously important for capital formation in the ag value chain and packed full of important lessons. We saw a 10X increase in the amount of capital deployed and the formation of thousands of new innovative companies. Multitudes of new entrepreneurs tried their hand at building companies. Agrifoodtech Investment expanded beyond the US and EU to the developing and emerging markets where novel technologies are having a huge positive impact. However, we also saw an overabundance of capital chasing deals that should not have been done caused by the prolonged period of "free money". This capital overhang caused valuations to surge. Once the Fed started raising rates and the rest of the world's central banks followed, the capital overhang turned into a hangover, financings slowed to a crawl, and valuations crashed. Weak companies are getting punished but the fundamentally strong will survive to thrive. GPs and LPs are learning what works and does not.

Despite the downcycle, I remain optimistic. VC is a cyclical business with long horizons. Agrifoodtech VC is on a long, slow growth trajectory and there are huge new markets waiting to be addressed."

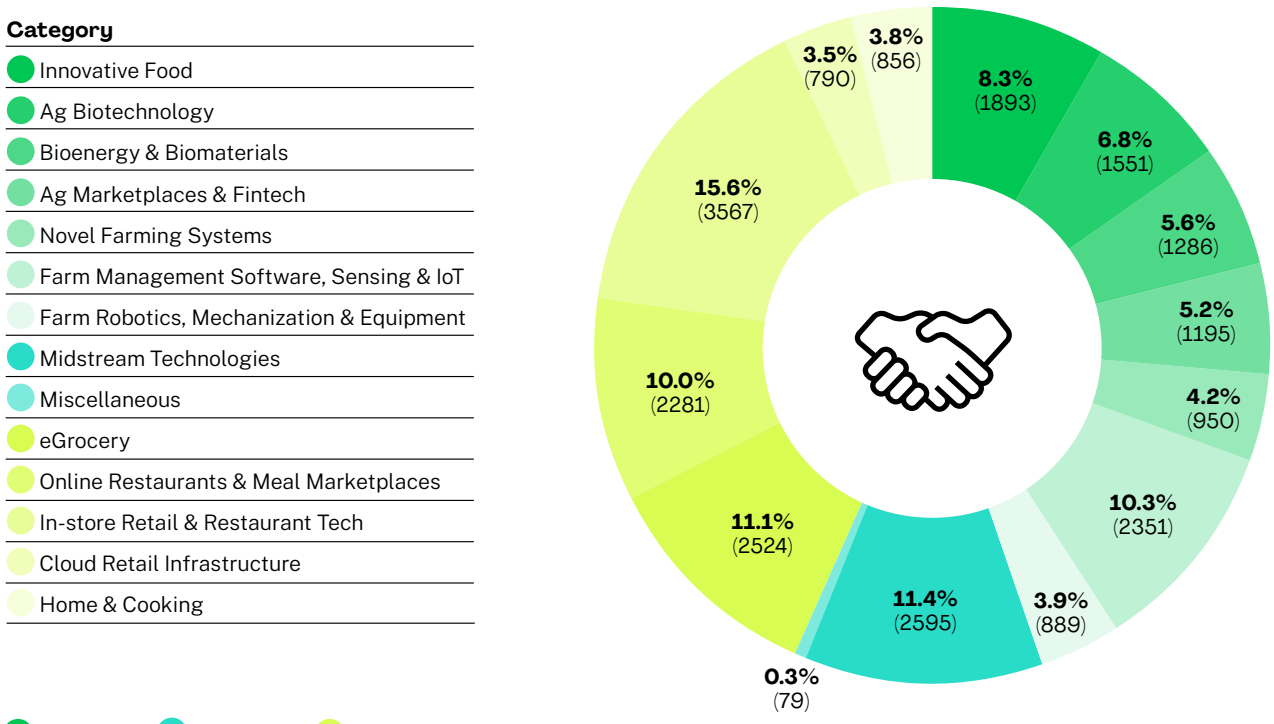
10 Years of AgriFoodTech investment by region



10 Years of AgriFoodTech investment by category

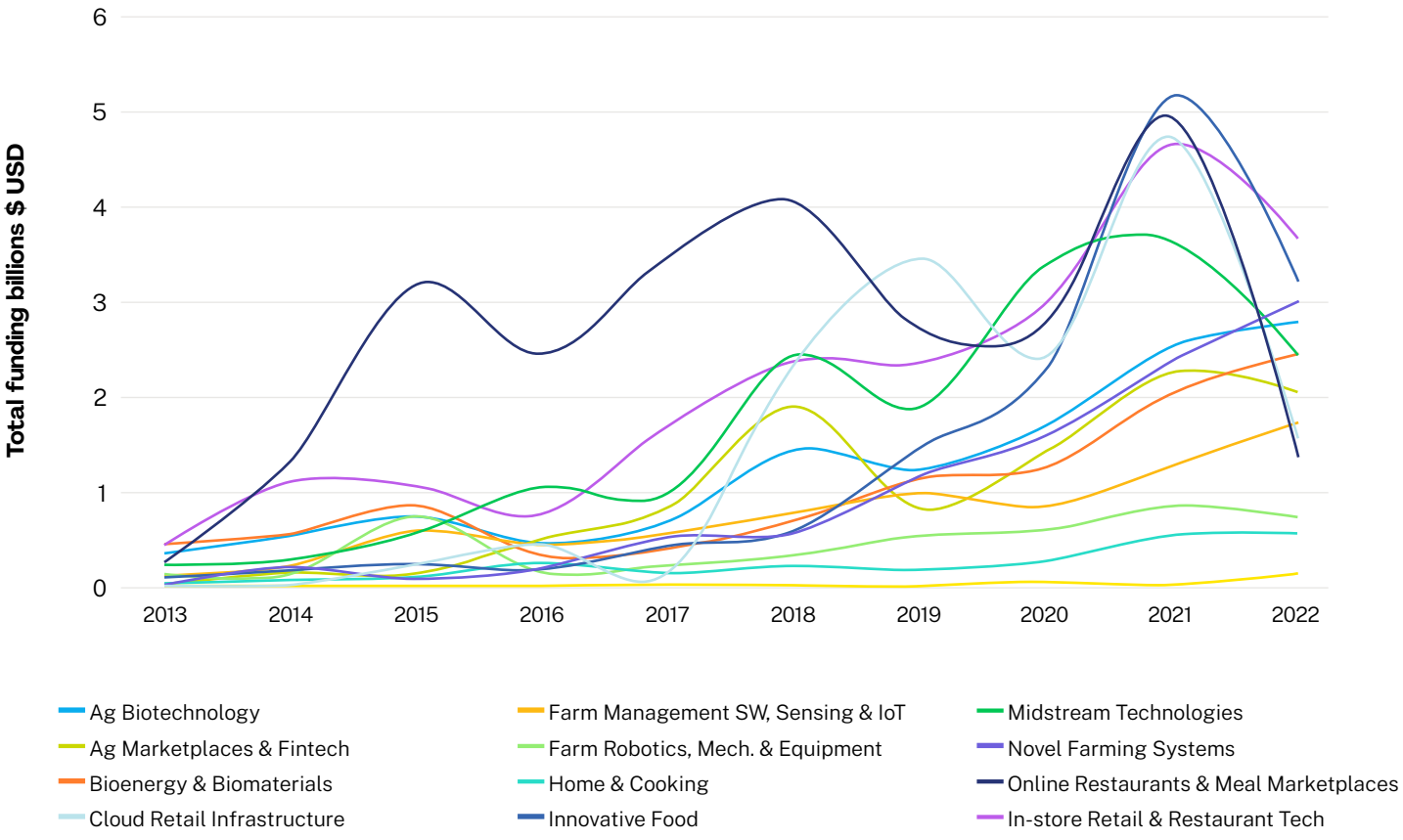


Investment by deal count

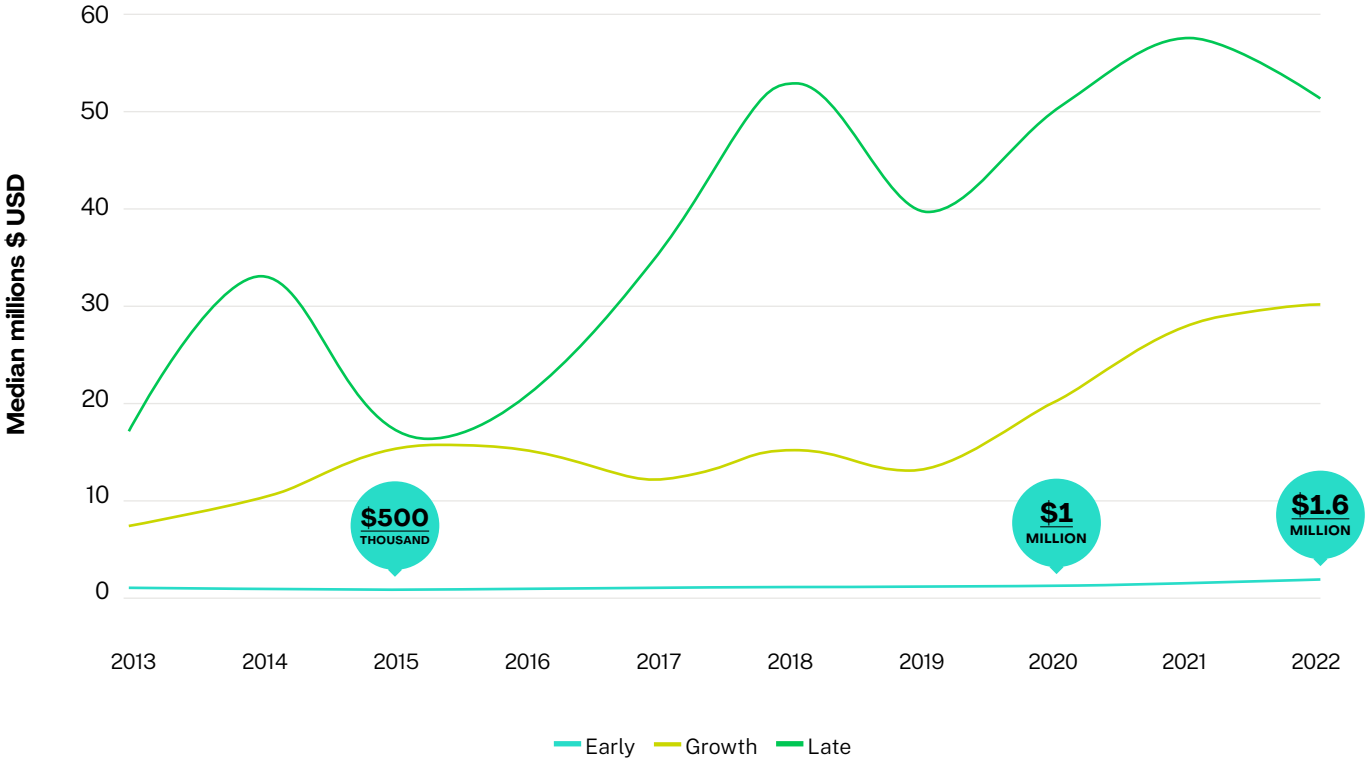


10 Year category moves

(excludes eGrocery)



Median deal sizes by stage



Top 30 AgriFoodTech funding rounds since 2013 (ex food delivery)

Upstream Downstream

Netafim	$500million	DEBT	2015	2015	BGI Group	$324million	LATE
Bianlifeng	$300 million	SERIES A	2017	2018	Meicai	$800 million	LATE
Zymergen	$400 million	SERIES C	2018	2018	Meicai	$450 million	LATE
Impossible Foods	$300 million	LATE	2019	2020	Samara	$700 million	LATE
Impossible Foods	$500 million	LATE	2020	2020	Dmall	$418 million	SERIES C
Toast	$400 million	LATE	2020	2020	Indigo	$360 million	LATE

Upstream Downstream

2020 **Karma Kitchen**

$316million | SERIES A

2020

2020 **Zymergen**

$300million | SERIES D

2021 **Trax**

$640 million | LATE

2021

2021 **Bowery Farming**

$321 million | SERIES C

2021 **Impossible Foods**

$500 million | LATE

2021

2021 **SpotOn**

$300 million | LATE

2021 **Pivot Bio**

$430 million | SERIES D

2021

2021 **Nature's Fynd**

$350 million | SERIES C

2021 **Perfect Day Foods**

$350 million | SERIES D

2021

2021 **Dutchie**

$350 million | LATE

2021 **Believer Meats**

$347 million | SERIES B

2021

2022 **LanzaTech**

$500 million | LATE

2022 **Memphis Meats**

$400 million | SERIES C

2022

2022 **Zhongxin Breeding**

$327 million | SEED

2022 **Plenty**

$400 million | LATE

2022

2022 **Gotham Greens**

$310 million | LATE

2022 **Xpansiv**

$400 million | LATE

2022

2022 **Little Leaf Farms**

$300 million | SERIES B

The VC by The Bay: My Journey to AgFunder

Words: Manuel Gonzalez-partner at AgFunder

Driving into San Francisco from the South Bay, there's a certain magic. You're on King Street, and suddenly, the Embarcadero opens wide before you. The Bay stretches out, with the Bay Bridge to your right, and the sky above Treasure Island is a brilliant blue.

This was my daily view on my way to the office near the Ferry Building. I arrived in the Bay Area in 2012, my world revolving around corporate banking, not yet grasping the essence of San Francisco and Silicon Valley, and not understanding how it would change my career and life trajectory.

Soon after my arrival, I felt a shift; a need to engage with this new world. On a pivotal morning in 2012, I was trying to read the news as I was having coffee in some forgettable coffee shop in the financial district when I looked around me; everybody was starting a company, pitching an idea, or arguing about some new technology. I thought, partially in awe, partly annoyed: who are these people? You are doing what? Changing the world?

I had been in food and agriculture for about two decades, and now I needed to research the world of agrifoodtech. Sometime in late 2013 or early 2014, an intern burst into my office, asking me to hurry and look at his screen. He showed me a website: AgFunder. It was a revelation: clear, concise, cutting-edge news on innovative technologies in food and agriculture and crowdfunding. I loved it. AgFunder represented a new, digital-first approach to agriculture tech financing, education, and thought leadership. I hadn't seen anything like it. I knew we had to connect with them.

Our meeting happened at the Press Club in the Yerba Buena area of San Francisco. The place feels like a modern speakeasy, with long tables, Scandinavian-looking furniture, wine bottles, little nooks and rooms, and dim light. Rob and Michael are the kind of people you want to hang out with: humble and unassuming, always game for a good beer. They are the kind who do not need to tell you they are brilliant; it's clear, it's evident. We spent the late afternoon there, discussing a wide range of topics. We clicked.

That night, I drove back home 40 miles south to Silicon Valley. When I got home, I told my wife, "I'm going to end up working with these guys." Their strategy of educating investors through thought leadership, creating a community around them, and building a financing arm was inspiring and exciting. Soon after, I joined them as an advisor, and our collaboration and friendship deepened.

As AgFunder grew, so did its team, and it became more than Rob and Michael. The AI-digital and thought leadership platform needed people to focus on those areas while Rob and Michael built the financing arm. Enter Louisa and Robin. I met Louisa soon after she joined the firm. She was brought in to improve and grow the thought leadership platform through AgFunderNews and research. Louisa is charismatic, funny, and very easy to get along with. She is the true face of AgFunder and a complete rock star. Today, AgFunder News is a powerhouse with more than 90,000 subscribers and a team of world-class journalists who inform and build our presence globally.

Crazy enough, but indeed fitting for the times, I have only met Robin through Zoom! He completely fits the rest of the team; he is low-key, brilliant, and a global leader in his field. Robin is building a monster, an AI powerhouse that gives AgFunder a hard-to-follow edge in the VC world. As for me, I left banking in 2019 and joined AgFunder in 2020.

Today, AgFunder is a formidable entity – thought leadership, AI, and capital. It started smart – digital, branding, deep tech, and science knowledge. Every day's a thrill. It's not just working with brilliant people; it's about hunting down the best answers, the deepest truths, and finding where asymmetric returns meet asymmetric impact.

The future is going to take us to new places. Biology and agriculture will always be our first principles, with technology and science as the tools to find the best way to solve the big problems of now and the future. We enjoy the never-ending process of asking questions, finding the best possible solution, and then looking again for new knowledge and an even better solution. Can we live longer and better? Can we control the climate, create biomaterials, produce green chemicals and abundant food? How can we accelerate R&D and discovery? Can we help farmers, entrepreneurs, and scientists access more capital with the right risk-return balance? How can we blend nature and human innovation and ingenuity? Can we engineer life with precision, safety, and integrity? Can we produce food in space? Should we even do any of this? Question everything.

The reality is that the only sure way to create a catastrophe is to stop creating the knowledge that we need to solve the problems of the future.

Our biggest risk is the push to stop knowledge and growth because "we are hurting the planet." The reality is that the only sure way to create a catastrophe is to stop creating the knowledge that we need to solve the problems of the future.

Humans are the only beings we know of who are concerned with understanding how things work, creating knowledge, and solving problems, and at AgFunder, we work on that every single day!

And that's quite the story. I am having too much fun; I will never retire.

DATA POWERED BY VALORAL ADVISORS

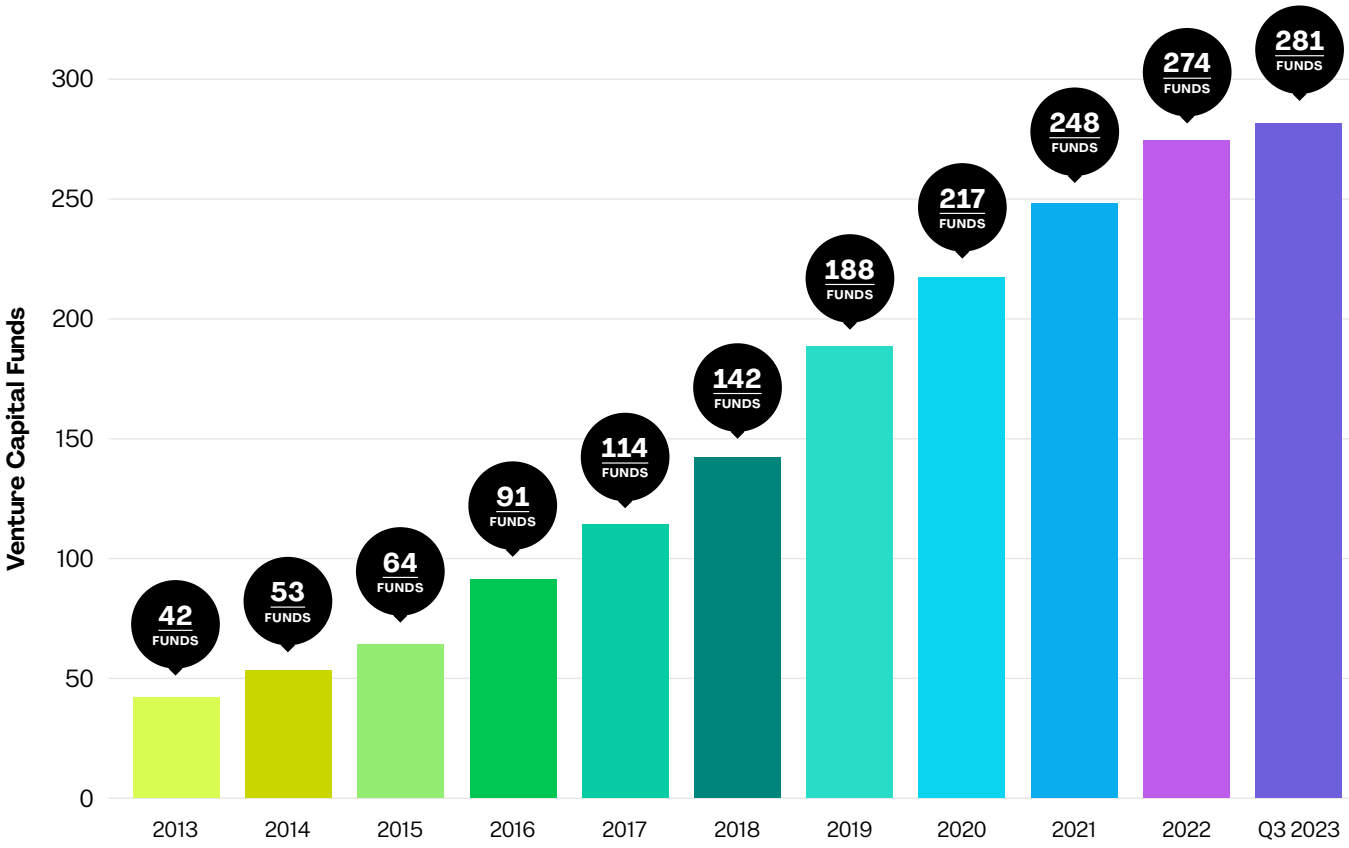
A 10 year look at AgriFoodTech Venture Capital Funds

Words: Louisa Burwood-Taylor

Our friend Roberto Viton at Valoral Advisors has been tracking the fund landscape across agriculture and food for over a decade.

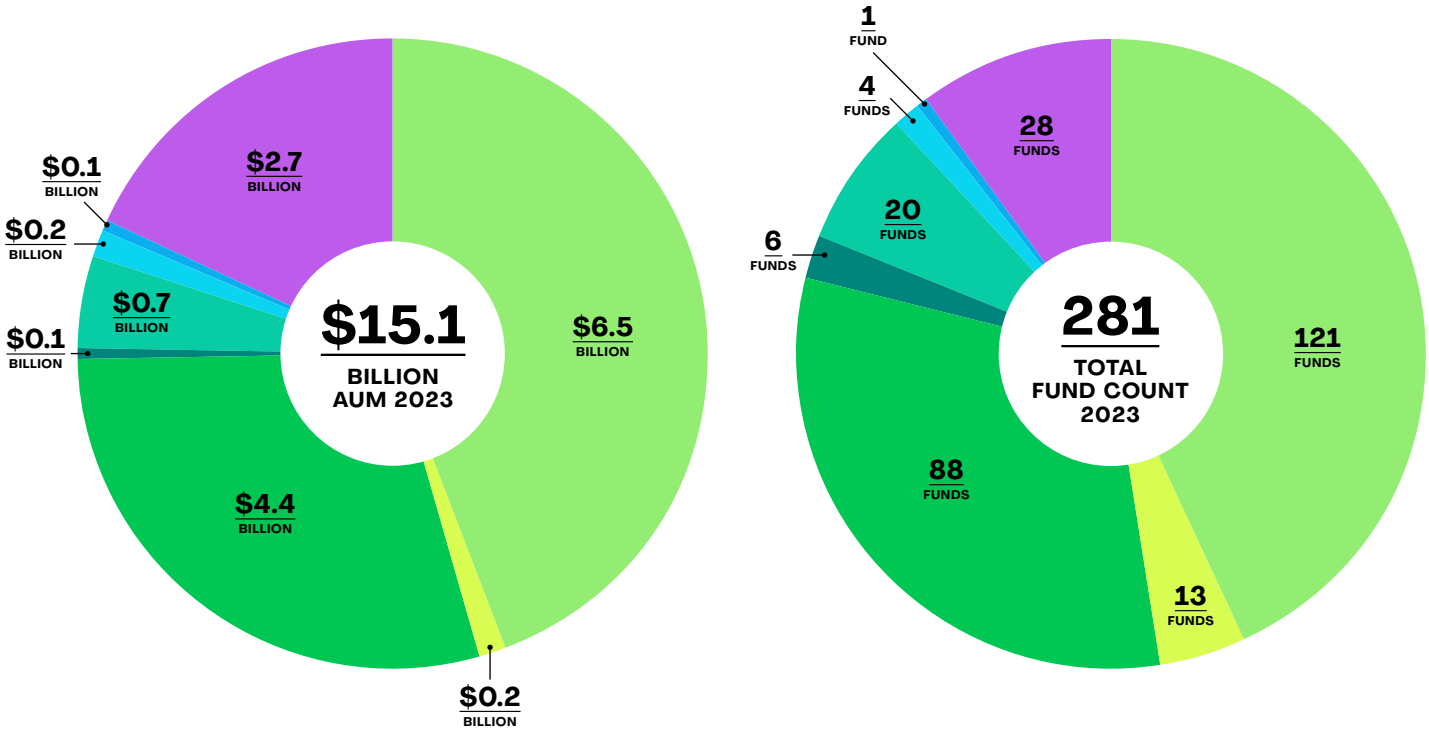
Venture funds are just a part of the overall agriculture investment landscape, which also includes farmland funds, listed equities, debt, commodities, water and private equity – they account for 11% of the $142bn of assets under management across all the funds he tracks.

Number of AgriFood-focused Venture Capital Funds Since 2013

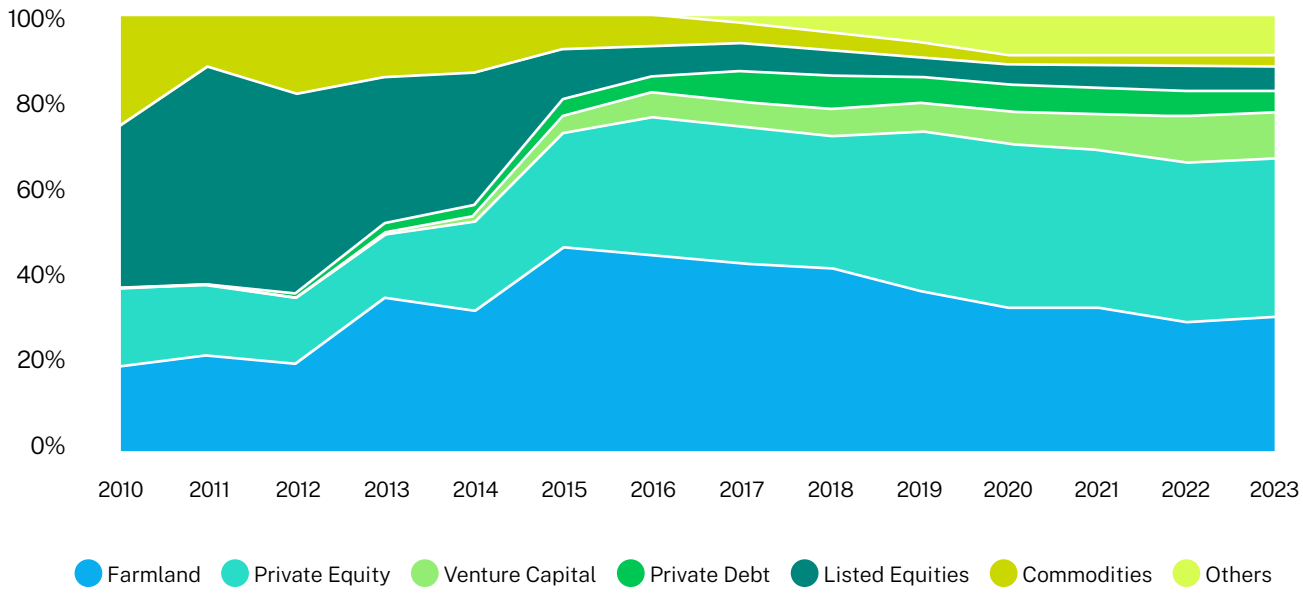


DATA POWERED BY VALORAL ADVISORS

Total AgriFood-focused Venture Capital Funds in 2023



The evolution of agrifood assets under management



Venture capital's views of the last 10 years

What the AgriFoodTech VCs are saying

What have been the biggest three trends in agrifoodtech over the past 10 years?

I believe it's important to not fall into a binary that we have to choose between industrialized factory farming v.s. organic farming, or GMO / non-GMO foods & ingredients. Even in the agriculture field, there is constant talk about biologicals, but chemistry is not going anywhere anytime soon. There are excellent synthetic products with unmatched control and sustainable environmental profiles. Looking forward, combining synthetic and biological solutions is the next frontier in our opinion. We believe they are complementary and not mutually exclusive. The next generation of bio-manufacturing unicorns would be the ones that can take a more integrated approach and can scale with a more affordable cost structure.

Matilda Ho - Bits x Bites

*WORD CLOUD BASED ON NUMBER OF MENTIONS FOR EACH KEYWORD IN VC RESPONSES

What were the standout deals in the past 10 years
(both winners and losers?)

Agbiotech continues to be the most robust and consistent sector; Digital and robotics still have a lot to prove. In general, we are in the early stages of the market in terms of fully demonstrating the impact in returns and planet wise that innovation in this sector has.

Camila Petignat - Yield Lab LatAm

To me, the standouts are the deals worth learning from – whether celebrated or not. Though several are worth celebrating, in recent years it's hard not to focus on some patterns seen in public exits and M&A exits. Without naming them, the SPAC and IPO exits, many of which didn't have the fitness to sustain value as public companies. Even still, many of those companies had promise. Not all of them, but certainly some. Having patience and staying the course in the face of liquidity was tested, and unfortunately the trajectory some were on is now lost. These were important lessons. Also, the deals that stand out to me are some of the acquisitions by incumbents. Though some are reasonably strategic, others seem much harder to justify. They sometimes resemble spreading bets or reacting defensively versus really seeking and waiting for the right platform purchases. What happens when the sector produces clearly dominant platform opportunities, but an incumbent already spent a billion dollars on a lesser version? How would the internal conversation go? Wouldn't executives question throwing more good money after bad? I hope early enthusiasm doesn't spoil the opportunity for the evolving landscape of quality companies and their investors.

Michael Lavin - Germin8

Winners: Biomaterials/biotech and innovative food. Both categories allow for up/recycling of biomass and this is essential for future sustainability needs. Innovative Food allows for a whole new category of production, so we are going to see massive transformation in the next 10 years now that a foundation has been set over the last 10 years from the likes of precision fermentation, CrisprCAS9 and cell-based meat production.

Losers: Super-speedy grocery delivery and vertical farming. In the case of vertical farming... the unit economics of a head of salad are not made for venture. In the case of super-speedy delivery, it is a niche for the ultra-convenience cash-flush consumers and not suited to market pressures.

Mark Durno- Rockstart

*WORD CLOUD BASED ON NUMBER OF MENTIONS FOR EACH KEYWORD IN VC RESPONSES

PitchBook

PITCHBOOK DATA COMBINED WITH AGFUNDER RESEARCH

Top AgriFoodTech exits since 2013

Upstream Downstream *STATUS AS AT DEC 7, 2023

Climate Field View

2013 OCT

EXIT VALUE	**$1.1 billion**
EXIT TYPE	M&A (Monsanto)
TOTAL VC FUNDING	$109 million
CURRENT*	Now Bayer Owned

Arcadia Biosciences

2015 MAY

EXIT VALUE	**$532 million**
EXIT TYPE	IPO
TOTAL VC FUNDING	~$91 million
CURRENT*	$3.3 billion market cap

Blue Apron

2017 JUN

EXIT VALUE	**$1.2 billion**
EXIT TYPE	IPO
TOTAL VC FUNDING	$194 million
CURRENT*	$100 million market cap

Granular Business

2017 AUG

EXIT VALUE	**$305 million**
EXIT TYPE	M&A (DuPont)
TOTAL VC FUNDING	~$30 million
CURRENT*	ERP unit sold off to Traction Ag in 2022

Grubhub

2014 APR

RESTAURANT DELIVERY

EXIT VALUE	**$2.7 billion**
EXIT TYPE	IPO
TOTAL VC FUNDING	$85 million
CURRENT*	$17.3 billion market cap

Iron Planet

2017 MAY

EXIT VALUE	**$776.5 million**
EXIT TYPE	M&A (Ritchie Bros.)
TOTAL VC FUNDING	$147 million
CURRENT*	-

Delivery Hero

2017 JUN

RESTAURANT DELIVERY

EXIT VALUE	**€4.5 billion**
EXIT TYPE	IPO
TOTAL VC FUNDING	$1.7 billion
CURRENT*	$8.4 billion market cap

Blue River Technology

2017 SEP

EXIT VALUE	**$300 million**
EXIT TYPE	M&A (John Deere)
TOTAL VC FUNDING	~$31 million
CURRENT*	-

Upstream Downstream *STATUS AS AT DEC 7, 2023

PitchBook

PITCHBOOK DATA COMBINED WITH AGFUNDER RESEARCH

Zomato

2017 JUN

EXIT VALUE
$12 billion

RESTAURANT DELIVERY

EXIT TYPE	IPO
TOTAL VC FUNDING	$1.8 billion
CURRENT*	$1 trillion market cap

Ele.me china

2018 APR

EXIT VALUE
$9.5 billion

RESTAURANT DELIVERY

EXIT TYPE	M&A (Alibaba)
TOTAL VC FUNDING	$3.3 billion
CURRENT*	-

Precision BioSciences

2019 MAR

EXIT VALUE
$784 million

EXIT TYPE	IPO
TOTAL VC FUNDING	~$200 million
CURRENT*	$49 million market cap

Woowa Brothers sth K

2020 APR

EXIT VALUE
$4 billion

RESTAURANT DELIVERY

EXIT TYPE	M&A (Delivery Hero)
TOTAL VC FUNDING	$484 million
CURRENT*	-

Freshly

2020 JUN

EXIT VALUE
$950 million

EXIT TYPE	M&A (Nestle USA)
TOTAL VC FUNDING	$107 million
CURRENT*	Closed

Dada-JD Daojia

2020 JUN

EXIT VALUE
$3.5 billion

FOOD DELIVERY

EXIT TYPE	IPO
TOTAL VC FUNDING	$1 billion
CURRENT*	$938 million market cap

DoorDash

2020 DEC

EXIT VALUE
$30 billion

RESTAURANT DELIVERY

EXIT TYPE	IPO
TOTAL VC FUNDING	$2.5 billion
CURRENT*	$38.5 billion market cap

App Harvest

2021 JAN

EXIT VALUE
$1 billion

EXIT TYPE	SPAC
TOTAL VC FUNDING	~$520 million
CURRENT*	Delisted in 2023

Deliveroo

2021 MAR

EXIT VALUE
£7.6 billion

RESTAURANT DELIVERY

EXIT TYPE	IPO
TOTAL VC FUNDING	$1.7 billion
CURRENT*	$2.1 billion market cap

Olo

2021 MAR

EXIT VALUE
$6.7 billion

RESTAURANT DELIVERY

EXIT TYPE	IPO
TOTAL VC FUNDING	$85 million
CURRENT*	$950 million market cap

Upstream Downstream *STATUS AS AT DEC 7, 2023

PitchBook

PITCHBOOK DATA COMBINED WITH AGFUNDER RESEARCH

Farmers Edge

2021 MAR

EXIT VALUE
C$835 million

EXIT TYPE	IPO
TOTAL VC FUNDING	~$100 million
CURRENT*	Distressed privatization offers in 2023

Ginkgo Bioworks

2021 MAY

EXIT VALUE
$15 billion

EXIT TYPE	SPAC
TOTAL VC FUNDING	$825 million
CURRENT*	$2.6 billion market cap

Dingdong Maicai

2021 JUN

EXIT VALUE
$5.5 billion

EXIT TYPE	IPO
TOTAL VC FUNDING	$1.3 billion
CURRENT*	$430 million market cap

Caribou Biosciences

2021 JUL

EXIT VALUE
$907 million

EXIT TYPE	IPO
TOTAL VC FUNDING	~$170 million
CURRENT*	$525 million market cap

Toast

2021 SEP

EXIT VALUE
$20 billion

EXIT TYPE	IPO
TOTAL VC FUNDING	$900 million
CURRENT*	$8.1 billion market cap

Zymergen

2021 APR

EXIT VALUE
$3 billion

EXIT TYPE	IPO
TOTAL VC FUNDING	$1 billion
CURRENT*	Closed

Prospera Technologies

2021 MAY

EXIT VALUE
$300 million

EXIT TYPE	M&A (Valmont Industries)
TOTAL VC FUNDING	~$30 million
CURRENT*	50% markdown announced

Missfresh

2021 JUN

EXIT VALUE
$2.5 billion

EXIT TYPE	IPO
TOTAL VC FUNDING	$1.6 billion
CURRENT*	$660 thousand market cap

Spire

2021 AUG

EXIT VALUE
$1.6 billion

AGROCLIMATIC RISK INTELLIGENCE SERVICES AND PRODUCTS

EXIT TYPE	SPAC
TOTAL VC FUNDING	~$360 million
CURRENT*	$130 million market cap

Benson Hill

2021 SEP

EXIT VALUE
$1.4 billion

EXIT TYPE	SPAC
TOTAL VC FUNDING	~$290 million
CURRENT*	$50 million market cap

Upstream Downstream *STATUS AS AT DEC 7, 2023

PitchBook

PITCHBOOK DATA COMBINED WITH AGFUNDER RESEARCH

Zhejiang Benli Technology

2021 SEP

EXIT VALUE
$609 million

EXIT TYPE	IPO
TOTAL VC FUNDING	-
CURRENT*	$348 million market cap

Jahez

2022 JAN

EXIT VALUE
$2.3 billion

EXIT TYPE	IPO
TOTAL VC FUNDING	~$40 million
CURRENT*	$5.2 billion market cap

GreenLight Biosciences

2022 FEB

EXIT VALUE
$1.2 billion

EXIT TYPE	SPAC
TOTAL VC FUNDING	~$215 million
CURRENT*	Distressed privatization by Fall Line Capital in 2023

Wolt

2022 MAY

EXIT VALUE
$8.1 billion

RESTAURANT DELIVERY

EXIT TYPE	M&A (DoorDash)
TOTAL VC FUNDING	~$820 million
CURRENT*	-

Plant Labs

2021 DEC

EXIT VALUE
$2.8 billion

AGROCLIMATIC RISK INTELLIGENCE SERVICES AND PRODUCTS

EXIT TYPE	SPAC
TOTAL VC FUNDING	$450 million+
CURRENT*	$750 million market cap

Satellogic

2022 JAN

EXIT VALUE
$850 million

AGROCLIMATIC RISK INTELLIGENCE SERVICES AND PRODUCTS

EXIT TYPE	SPAC
TOTAL VC FUNDING	~$143 million
CURRENT*	$143 million market cap

Shandong Sanyuan Biotechnology

2022 FEB

EXIT VALUE
$2.3 billion

EXIT TYPE	IPO
TOTAL VC FUNDING	NA
CURRENT*	$800 million market cap

Bear Flag Robotics

NA

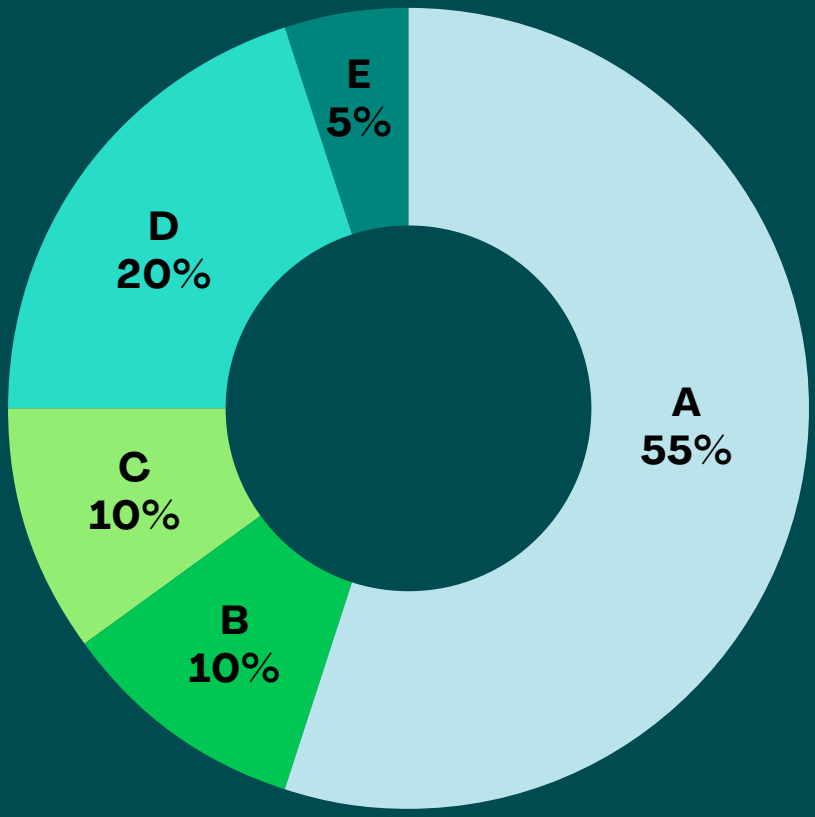
EXIT VALUE
$250 million

EXIT TYPE	M&A (John Deere)
TOTAL VC FUNDING	~$12 million
CURRENT*	-

Why haven't we had more agrifoodtech exits in the past 10 years?

We ask the leading AgriFoodTech VCs*

- The industry is still young - exits are coming
- The incumbent corporates are too defensive
- Startups haven't created good enough products/services
- Not all agrifoodtech can produce exit in venture timeframe
- Other



Katrin Burt
Grosvenor Food & AgTech

Combination of A and C. A young industry with attractive fundamentals provided a breeding ground for overvalued companies compared to their business progress. The quality of products and services is only getting better and the industry will more accurately identify and price value which will lead to exits for the best-run companies that can deploy their solution at scale.

Rob Leclerc
AgFunder

B,C,D. Exits will come, but they also need to be of sufficient magnitude. We will need to focus on investing at the intersection with other sectors.

Jaap Strengers
Future Food Fund

Industry has an inherently different growth trajectory; mostly low margins, long R&D and sales cycles. Not a sector in which to get rich quickly! What also did not help is that government support has not materialized in a similar way compared to energy and mobility, for example. There, certain subsidy and tax regimes effectively created a wholly new playing field.

Ben Belldegrun
Aliment Capital

Commodity price swings have made the ag majors conservative; they don't want to buy high cash burn and non-commercialized businesses, but it is also a function of hte industry still being young and we still think it's underinvested.

* ACCORDING TO A SURVEY OF 27 AGRIFOOD-FOCUSED VENTURE CAPITAL FIRMS IN NOV/DEC 2023.

AgFunder exit review:

John Deere's $250m acquisition of Bear Flag Robotics

Words: Rob Leclerc - founding partner

John Deere acquired agtech automation startup Bear Flag Robotics in 2021 for $250 million. Bear Flag Robotics was an AgFunder portfolio company.

When our portfolio company Bear Flag Robotics announced the close of its **Seed round** in January of 2021, **I was quoted in their press release saying that** Bear Flag could be one of the most important companies in agriculture over the next decade. Today I'm doubling down on that claim.

Bear Flag is to tractors what $30 billion Cruise Automation is to cars, transforming everyday tractors into autonomous tractors. This is Deere's second major automation acquisition in the past four years after Blue River, a more mature robotics company, **that it bought for $305 million in 2017.**

Autonomous equipment will be as transformative as mechanized agriculture. It'll be the platform that will fulfill the promise of digital farming, which has struggled to drive value from insights alone. To create new value in digital-agtech, you need to connect insights to action and then run that loop at superhuman speeds. Robotics will be the key to unlocking this. Combining analytics with robotics and automation will allow us to monitor and grow each plant individually; it'll reduce labor costs and enable economically viable regenerative agriculture practices; it'll improve safety for one of the most dangerous professions on the planet; and it'll allow us to use fewer chemicals and fertilizers while reducing input costs. Robotics will benefit the small farmer, who will be able to focus on high-value de-commoditized crops, and it'll help large growers who will be able to do more with less while having less impact on the environment.

We first met Bear Flag's founders Igino Cafiero and Aubrey Donnellan in the summer of 2018, and we had an opportunity to spend quite a bit of time with them just before Covid-19. **When the pandemic hit,** it was a scary time for many founders, especially those who were working in the world of atoms and who couldn't easily work remotely. Raising capital in the middle of Covid wasn't easy. Still, to Iginio and Auybrey's credit, they closed an **oversubscribed $7.9 million Seed round** with us and several other intrepid investors, including **True Ventures, Graphene**, **Alexandria Venture Investments**, and **D20 Capital.**

When we invested, what I loved about Bear Flag was that they were solving the right problem. In robotics, I often see founders working on something too trivial and with no evident market pain. Or they're working on something too hard. They vastly underestimate the challenges of making a robust and reliable technology that can navigate the variability of biology and dynamics of the environment. Ag robotics is 100x harder than building a robot with a few degrees of freedom that's bolted to a floor in an environmentally controlled manufacturing plant performing a single operation on inert materials.

Bear Flag approached it the right way. First, they knew they didn't need to make autonomous tractors; they just needed to make tractors autonomous by co-opting hardware from the driverless car industry — hardware that would have been prohibitively expensive five years ago. This allowed them to simplify the problem, limit CAPEX (VCs tend to hate CAPEX), and focus on the software and application layer.

Second, although Bear Flag had enormous ambitions for autonomy, their go-to-market started with tillage for high-value crops like lettuce, which is farmed almost year-round in California. In comparison to planting or spraying, tillage may seem boring–but that's the genius part (and a lot of VC passed on Bear Flag because they only saw a small market and not the bigger picture). It's really, really easy to mess up a field planting and spraying, but tillage is something farmers are happy to hand over to a robot because you can't do a lot of damage, and it's tedious. And, unlike human drivers, autonomous tractors can run 24/7, which lets farmers get more turns out of their field, allowing them to grow more with the same land. Going from 2.4x rotations/year to 2.8x rotations from the same field can significantly improve margins for growers.

When we invested, what I loved about Bear Flag was that they were solving the right problem.

For farmers evaluating this solution, the risk is low while the benefit's high, which helps build trust and overcome adoption issues experienced by many agtech ventures.

And by initially focusing on high-value crops in California, Bear Flag could get lots of reps in with a few large enterprise customers like Church Brothers, who till parts of their fields almost every day of the year. This enabled Bear Flag to increase the learning rate and the number of iterations it could make to the technology.

But what got me most excited about Bear Flag was the feedback from the customer calls. One large enterprise client told us that Bear Flag was the only agtech startup they never had to worry about, and the team would turn around a new solution in weeks when the client expected it to take a year. They also told us neighboring farmers would see the Bear Flag tractor in the field and would come by to ask questions–it was going to be a product that would sell itself.

While companies like John Deere produce some of the best heavy machinery globally, developing robotic solutions takes different DNA. And while the initial progress of robotics startups may seem slow from the outside, the slog is precisely what will make them so valuable; fast-following is so hard because your systems need to learn on the job, and by the time people realize this, there will only be a few crucial players in the market. Bear Flag won't be the last significant acquisition we see in ag robotics and automation, and in a decade from now, I expect all the major equipment companies, first and foremost, to be automation companies.

Read the full story on AgFunderNews

John Deere's Heraud looks back on 10 years of leading ag innovation

Words: Jennifer Marston
Image credit: John Deere, Jorge Heraud

One could hardly discuss the last decade in agtech advancements without mentioning **John Deere** — a company that's been innovating since its namesake founder created a self-scouring steel plow back in 1837.

The last decade in agtech has been especially active, with more farmers going digital and the number of startups iterating on inputs, equipment and software proliferating. To find out where and how John Deere (the company) views itself in this age of endless technology options, I recently spoke with Jorge Heraud, the company's VP of automation and autonomy. Heraud moved over to the tractor giant when it acquired his startup Blue River Technologies for $305 million in 2017, one of agtech's most successful exits to-date.

AgFunderNews: What have been Deere's most important developments over the last decade?

Jorge Heraud: Some of the most important developments within John Deere could be categorized in three areas.The first category is our machine journey [with the] ExactEmerge planter technology and X9 combines.

The ExactEmerge technology is designed to put seed into the ground at speed with pinpoint population and spacing accuracy. This technology has resulted in up to a 9% increase in grain yields, showcasing the direct benefits of sustainable practices.

The X9 combine allows farmers to be more productive. The machine can harvest up to 30 acres an hour in wheat and up to 7,200 bushels an hour in high yielding corn. This helps farmers get more out of the machine's capacity and improve grain quality.

The second area is our automation journey. See & Spray technology is a game-changer in our Leap Ambition journey, helping farmers reduce their non-residual herbicide use by more than two thirds and maintain a hit rate comparable to traditional spraying. [This] can create an overall positive outcome for the farmer's economics as well as the health of the soil, waterways, and biodiversity.

Another example in the automation journey is our Combine Advisor package on combines. Combine Advisor automatically adjusts the combine's harvest settings to put higher quality grain in the tank and reduce the chance of grain loss. Cameras on the clean grain and tailings elevator help them make informed decisions on the crop that is flowing up and into the grain tank.

The third category is our digital journey. As these advanced machines pass through the field, vital sensor readings are being gathered in the John Deere Operations Center, enabling easy documentation and traceability of field practices, so farmers and their trusted advisors can easily evaluate productivity and agronomic outcomes.

What was ag's biggest challenge 10 years ago? Have we adequately addressed it?

Our customers continue to face many challenges. From labor challenges to trying to help feed a growing population amid raising input costs, we are helping them overcome these challenges by increasing the productivity of our equipment and solutions. We are automating more tasks and helping them do more with less with solutions like See & Spray, Combine Advisor and Operations Center.

What developments in the last 10 years have been fundamental to the broader ag industry's changes?

Smart technology in John Deere equipment helps farmers produce more with less, creating more successful crops while having a smaller impact on the land and environment. This includes GPS, automation and robotics which have been present on farms for decades, in addition to newer advancements in machine learning, AI, computer vision, autonomy and advanced sensors which work together to provide intelligence and precision at a scale on the farm today. Farmers can leverage the data collected using this technology to gain new insights and make better decisions year after year to grow more with less.

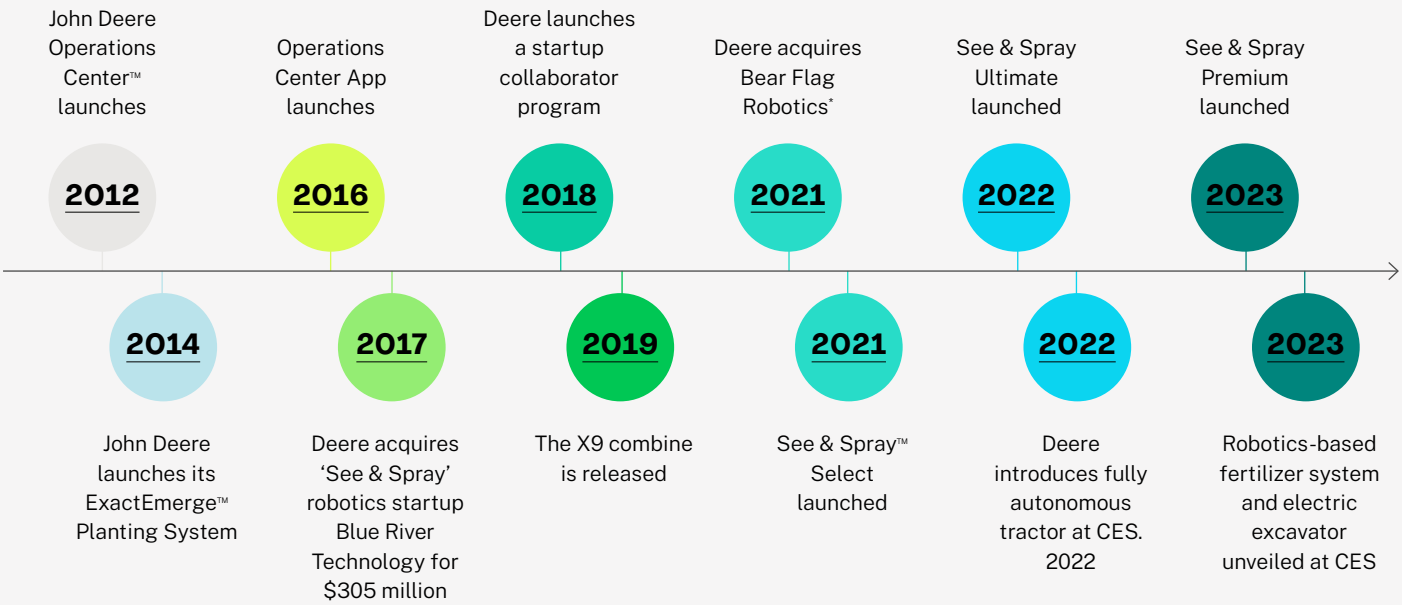
What's one thing you would have liked to see the industry do different in the last decade?

As an industry we need to work together to advocate and educate the public on the work our customers do to help feed, clothe, and fuel the world. We also need to educate the public and policymakers about the sustainable farming practices of our customers.

Where is the ag tech industry 10 years from now?

John Deere has stated we will have a fully autonomous corn and soy production system by 2030. I also see the industry continuing down the path of managing crops to their exact needs and reducing carbon emissions.

Timeline: a decade of innovations at John Deere



*Disclosure: AgFunderNews' parent company, AgFunder, was an investor in Bear Flag.

Meet our portfolio

Words: Quinten Eggink

Food and ag have always been one of the first market applications for many bleeding-edge technologies, which include CRISPR, synthetic biology, RNA, satellite imagery, robotics and automation, crypto, fintech, and AI, but these technologies often originate outside of food and ag.

For AgFunder and our LPs to stay on the cutting edge, our strategy is to vigilantly look for major technological advancements rapidly disrupting another market at an uncommon rate and where that technology might be *generalized* to crack longstanding problems in other markets. We then look to invest in the earliest opportunities we can find, *even if* those opportunities are quite distant from food and ag. We do this so to gain fluency with these technologies *so that* we can be prepared to bring them to food and ag. To stay on the cutting edge, we can't just *wait around* for a founder to translate these new technologies to food and ag, we need to go out and invest in them at their earliest stages as they are starting to translate to other markets.

Automation	Bear Flag Robotics, FYTO, Verdant Robotics
Decarbonization	NIUM, Klim., Eion
Food as medicine	brightseed, faeth
eCommerce Marketplaces	Jüsto, Aqua Connect, DeHaat Seeds to Market
Alternative Protein	Juicy Marbles, Umaro, Reel
Controlled Environment Ag	IGS, root AI, Singrow
Future of Food Service	Bite Ninja, TRAY, HYPHEN
Supply Chain /Logistics	phylagen, URB-E, HWY HAUL
Upcycling	Supplant Sugars from Fiber, ATOMO! Molecular Coffee, Chinova Bioworks
Farm Digitization	fieldin, SOLINFTEC, sentera
Biotech	Cromatic, KULA BIO, TRACE Genomics
Sustainable Materials	Mycoworks, modern synthesis

Why we invested in Atinary Technologies:

A glimpse into the future of chemistry R&D

Words: Manuel Gonzalez-partner

Image credit: Atinary Technologies. Atinary Technologies co-founders Dr. Hermann Tribukait (left) & Dr. Loïc Roch (right)

AgFunder recently led a **$5m seed round into Atinary Technologies,** a startup using machine learning to dramatically accelerate the materials discovery process. AgFunder partner Manuel Gonzalez explains why we invested.

While listening to a keynote by NYU professor and podcaster Scott Galloway, I was struck by one of his ideas: the most impactful and valuable companies are in fact time machines, reshaping our understanding of what's possible when time's ticking away.

The evolution of time machines in tech

Computers are time machines, and they have gone through various iterations:

Hardware and software: Reduced manual, time-consuming tasks.

The internet: Gave us the world at our fingertips, anytime, anywhere.

Mobile computing: Made information and connectivity ubiquitous, always, on-the-go.

Artificial Intelligence (AI): Set to redefine our understanding of time efficiency.

In each iteration people save time, reduce mindless, manual tasks, and increase the amount of time allocated to think and be creative. At the heart of this evolution, I recently stumbled upon what felt like the new time machine: Atinary Technologies.

A serendipitous introduction

Meeting Dr. Hermann Tribukait, one of Atinary's founders, was initially a casual lunch in Menlo Park, California. The twist? It was meant to be just a social interaction, as we are both from Mexico.

However, when Hermann began explaining Atinary's mission, I was captivated. The company's description resonates deeply with Galloway's concept of a time machine.

Revolutionizing chemistry R&D

Established in 2019, and founded by Tribukait and Dr. Loïc Roch, Atinary is a Swiss-American SaaS-based deeptech startup that aims to transform chemistry R&D. Its no-code machine learning (ML) platform streamlines research, optimization, and discovery processes in chemistry, accelerating progress by an astonishing 10X to 100X. This isn't just a leap forward for chemistry, but it paves the way for advancements across various scientific domains.

To grasp Atinary's disruptive potential, one need look no further than a **recent paper by ETH Zurich**. The results were staggering:

Objective: Optimization of catalysts for converting carbon dioxide (CO_2) into methanol.

Approach: A closed-loop data-driven methodology utilizing Atinary's **Bayesian Optimization** algorithm.

Outcome: In just 30 days, they replicated major development stages that traditionally spanned a century.

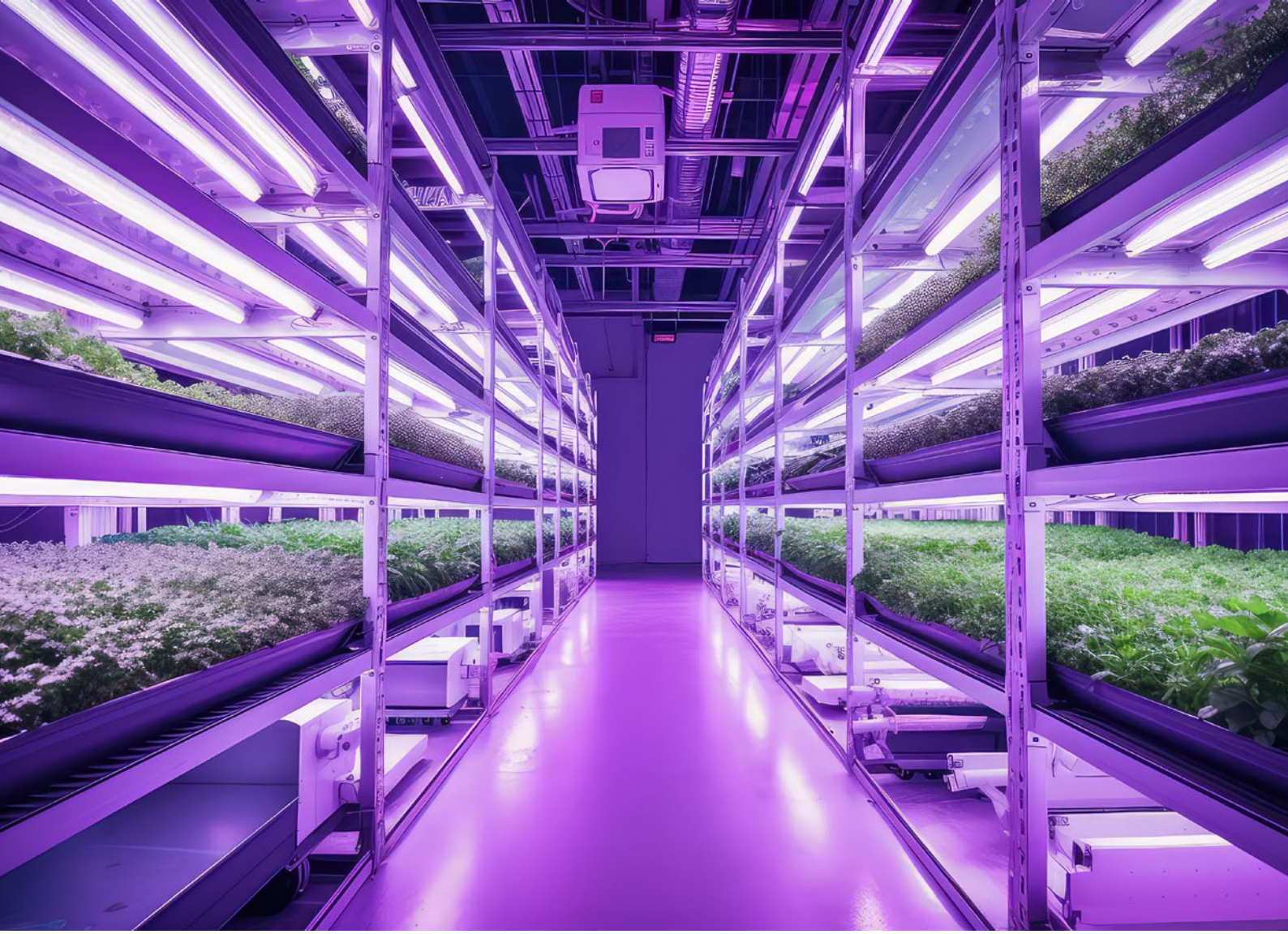
To put it bluntly: Atinary condensed 100 years of research into a single month.

A visionary investment

This is the kind of breakthrough that reshapes industries, and it's precisely why we chose to invest in Atinary.

In a world where time remains our most precious commodity, Atinary offers a glimpse into a future where we're not just keeping pace but leaping forward. This isn't just a time machine; it's the dawn of a new era in scientific discovery.

Read the full story on AgFunderNews



After a decade of tough lessons,

indoor ag nears the plateau of enlightenment

Words: Jennifer Marston

It would take a sizable book to rehash the last 10 years of indoor agriculture, not to mention the litany of troubles the vertical farming and high-tech greenhouse industries have seen over the past 12 months.

And yet, many believe examining what it was like and what happened is now a necessary exercise for indoor ag.

"Understanding the past is something that will help us prepare for the future,"

Agritecture CEO Henry Gordon-Smith **wrote in 2021**.

"Unfortunately most of the newer entrants to CEA [controlled environment agriculture], whether farmers or investors, know little about the history of vertical farming."

With that spirit in mind, AgFunderNews takes a glimpse into some of the highlights from indoor ag's last decade. And hopefully a look at what may come next.

2014

The year of the groundbreakers

Controlled environment indoor farming is niche — **associated with NASA** and the cannabis industry than the future of the food system.

AeroFarms was at the time planning its Newark, New Jersey facility, which the company said would grow 1.5 million pounds of lettuce a year — "enough to supply about 60,000 people without digging any earth or shoveling any manure."

Top VC deals: 2014

	COMPANY	RAISED	STAGE
	Sundrop Farms	$100m	Late
	AeroFarms	$36m	B
	Gotham Greens	$8m	A
	BrightFarms	$4.9m	B
	PodPonics	$4.5m	A

2015

Global ambtions take root

This was the year dialogue around the purported benefits of vertical farming — grow more in less space, 95% less water used, etc. — grew louder. AeroFarms itself said its facilities — for which it then had global ambitions — were 75 times more productive per square foot than a field farm, and 10 times more productive than hydroponic greenhouses.

Later in 2015, **Indoor Ag-Con attendees also discussed** the looming challenges the industry faced. Availability of funding was one. Others named finding talent as a major hurdle, and Viraj Puri of Gotham Greens **warned** that a lot of technologies being used lacked a commercially proven track record.

Top VC deals: 2015

	COMPANY	RAISED	STAGE
	AeroFarms	$20m	B
	BrightFarms	$16m	B
	Soli Organic	$8m	Late
	Crop One	$5.5m	A

2016

The greenhouse vs. vertical farm debate begins

"We are not convinced that the energy and labor costs are low enough for indoor, vertical farming at this time," Greg Oberholtzer, senior managing director at WP Global Partners, **told AgFunderNews that year**.

His commentary highlighted a lot of inefficiencies in the straight vertical farming model and helped kick off the greenhouses versus vertical farms debate **still alive and well today.**

Top VC deals: 2016

COMPANY	RAISED	STAGE
BrightFarms	$32m	C
Plenty	$24.5m	A
Soli Organic	$20.5m	Late
Solaris Farm	$11m	A
80 Acres Farms	$10m	Seed

2017

'You will see us around the globe'

In 2017, vertical farming company Plenty had "literally dozens of farms in different stages of development in different parts of the world," according to co-founder Matt Barnard.

"You will see us around the globe."

He wasn't the only one making global claims. AeroFarms said much the same thing that year at the time of its fundraise, though relatively new kids on the block, like Bowery, appeared to be more cautious.

"A rush to scale without being thoughtful can ultimately do more harm to a company than spending more time to make sure you're ready to effectively and efficiently scale," said Bowery CEO Irving Fain **told us at the time.**

Top VC deals: 2017

COMPANY	RAISED	STAGE
Plenty	$200m	B
AeroFarms	$40m	D
AeroFarms	$35m	C
Bowery Farming	$20m	A
Crop One	$13m	A

2018

Grower or tech company?

Mid-way through the decade, technology advancements meant startups no longer had to build everything themselves. Companies began to face a choice: grower or technology provider?

"In a gradually maturing industry, companies will necessarily need to focus on the primary scope of their business if they want to be successful. That means growers will grow and sell produce while their suppliers will develop and provide the required technology," Urban Crop Solutions' Pieter De Smedt **wrote on AgFunderNews at the time.**

Top VC deals: 2018

	COMPANY	RAISED	STAGE
	Bowery Farming	$90m	B
	BrightFarms	$55m	D
	Future Crops	$30m	Seed
	GrowForce	$29m	A
	Gotham Greens	$29m	C

2019

Year of the mega-round

By 2019, the days of struggling to find capital were long gone for indoor ag — a point solidified by the multi-million rounds leading VC funding.

Size was everything, it seemed, from **Kalera breaking ground** on the Southeast's 'largest' indoor vertical farm to AppHarvest's 60-acre greenhouse in the works.

The year also saw the rise of automation in CEA. Fifth Season **emerged from stealth** with its robotic vertical farm, promising to reduce labor costs via automation.

Elsewhere, **80 Acres debuted** its own automated vertical farm, and Iron Ox was gaining attention for a robotics-based indoor farming setup, too.

Top VC deals: 2019

	COMPANY	RAISED	STAGE
	Plenty	$175m	C
	Infarm	$100m	B
	AeroFarms	$100m	Late
	AppHarvest	$97m	A
	Sunens	$63m	Debt

2020

Vertical farming for the lock-down era

From Aspara's countertop farm selling in Home Depot to Natufia's $13,000 "kitchen garden," a **crop of startups promised** year-round produce grown pesticide-free and from the convenience (or safety) of one's own kitchen. Covid-19 supply chain delays and food security/sovereignty concerns fueled enthusiasm here.

Also that year, AppHarvest emerged on the scene, boosted by support from the likes of Martha Stewart and J.D. Vance of Hillbilly Elegy fame.

"We are willing to take a lower profit margin in order to pay a living wage, provide paid time off, access to healthcare, and give every employee a path to ownership in the company," **said AppHarvest founder Jonathan Webb.**

Top VC deals: 2020

	COMPANY	RAISED	STAGE
	Infarm	170m	C
	Plenty	140m	D
	BrightFarms	100m	Late
	Revol Greens	68m	Late
	Soli Organic	55m	C

2021

Year of the SPAC

Optimism ran high that year, propelled by more mega-rounds and a few players announcing plans to go public via special-purpose acquisition companies (SPACs), including **AeroFarms** and **Local Bounti**.

AppHarvest had arguably the highest-profile deal of the year, **completing its SPAC merger with Novus Capital** early in the year.

But what goes up must come down, as the old saying goes, and 2021 ended lower than it started when AeroFarms announced it was **terminating its SPAC deal**. Shortly after, Agritecture's Henry Gordon-Smith wrote that vertical farming was **headed for a trough of disillusionment**.

Top VC deals: 2021

	COMPANY	RAISED	STAGE
	Bowery Farming	$320m	C
	Local Bounti	$200m	Debt
	Infarm	$200m	D
	80 Acres Farms	$160m	B
	Edenworks	$122m	B

2022

The Trough of Disillusionment

Even casual observers of agtech know what happened next: a tech industry-wide downturn commenced, popping inflated valuations in the wake of war, inflation, lingering supply chain issues and myriad other factors.

Agricool went into receivership. Infarm **laid off half its staff** and exited markets. **Fifth Season closed up shop**. These are just a few among many setbacks that characterized the industry in the latter part of the year, despite the robust fundraises at the start of 2022.

"A lot of where we are today is because companies in many regards raised too much money focusing on scale, rather than focusing on how they were going to achieve profitability.," notes Citi's Bergman.

Top VC deals: 2022

	COMPANY	RAISED	STAGE
	Plenty	$400m	Late
	Gotham Greens	$310m	Late
	Little Leaf Farms	$300m	B
	Bowery Farming	$150m	Debt
	Goodleaf Farms	$150m	Late

2023

One man's Trough is another's S-curve

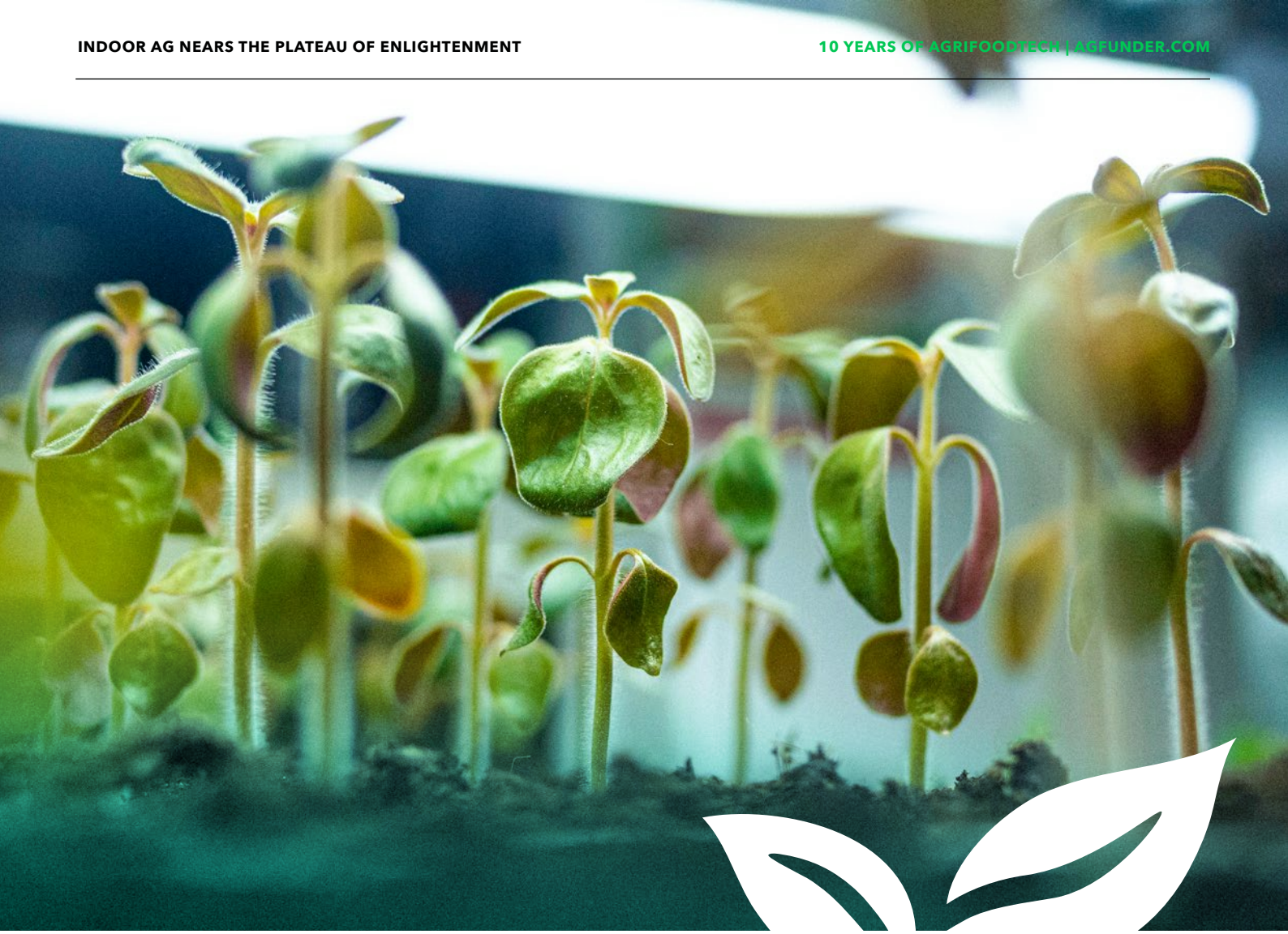
The market correction for indoor ag has been the central storyline of 2023. AppHarvest, AeroFarms and Kalera have all **filed for Chapter 11 bankruptcy protection**. Most recently, news of layoffs at Bowery surfaced.

But there are also those who believe we're in something more complex than a run-of-the-mill trough on the Hype Cycle.

"This is a bit of a bump on the S curve, not a trough of disillusionment, and we'll get past it," EY food & agribusiness leader Rob Dongoski says. (AeroFarms certainly thinks so as it recently **emerged** from Chapter 11 with a new CEO and grand plans for the future.)

Top VC deals: 2023

	COMPANY	RAISED	STAGE
	GoodLeaf	$78m	Debt
	Stacked Farm	$27m	A
	Planet Farms	$19m	Debt
	Future Gaia	$12m	A
	Babylon Microfarms	$8m	A



Now what?

It bears remembering that the so-called failures of the industry are one piece of a much bigger narrative about indoor ag and the food system in general.

Consider food security. Pandemic-era supply chain disruptions left us in no doubt about modern food production's vulnerability in the face of global crises. The Ukraine war and interest rate hikes affirmed this vulnerability.

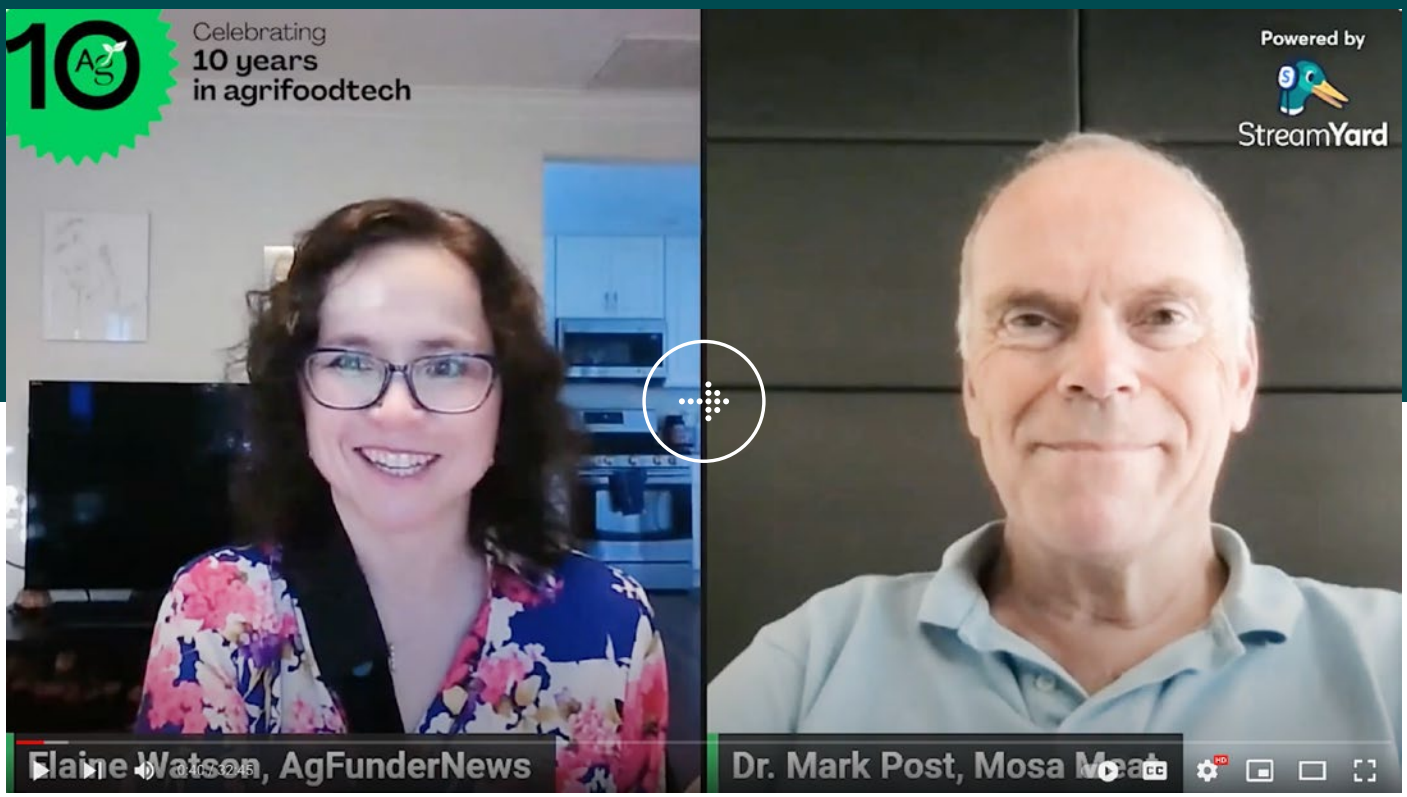
Meanwhile, climate change advances, threatening the planet's future ability to grow certain crops in the future — are leading many to wonder what kinds of research can be done through indoor ag that might better protect the food on which we rely.

"The fundamentals behind CEA are still there," says Gordon-Smith. "Using water smarter, using less arable land, the mass of consumers that care about this subject and are willing to pay a little bit more — these drivers still exist."

"There are plenty of reasons to be skeptical of CEA's future but there are many more to be optimistic," he adds. "I predict that all of these drivers will push novel CEA out of the trough of disillusionment and into the plateau of enlightenment in late 2024. So, now is the best time to plan your next move."

Dr. Mark Post looks back on 10 years in cultivated meat

Words: Elaine Watson



Back in 2013, Professor Mark Post introduced many people to the concept of cultivated meat via a rather pricey burger introduced at a press conference in London.

A decade later, AgFunderNews caught up with Dr. Post, cofounder and chief scientific officer at Mosa Meat in the Netherlands, to talk about what progress there has been in the nascent cell cultured meat space since then.

We discussed:

- Are there still serious questions about the commercial viability of producing meat outside an animal at scale with current technologies?
- What will bring down the cost of cell culture media?
- Defining 'meat.'
- Bioreactor size: Is there a sweet spot?
- What are the biggest technical barriers facing the industry?
- Why hasn't anyone submitted a dossier to the EU?
- Sustainability and cultivated meat: How much do we really know at this stage?
- Funding: Does the cultivated meat industry need government funding to get off the ground?
- What is the attraction of cultivated meat for the consumer?

On viability:

"Is this a big endeavor with some level of uncertainty? Absolutely. Is it so unrealistic that you shouldn't even try? Absolutely not."

Does this industry need government funding to get off the ground?

"If you had asked me this question a year and a half ago, I would have said no. Now the situation has somewhat changed and when I look at the discussions about energy transition and other major changes in industry, where they're really looking at governments for support, I'm starting to think that we probably would require something like that as well."

Are you concerned that companies are going to run out of money before this technology has a chance to prove itself?

"Not really... because we see a lot of involvement of large meat companies like Cargill and Tyson and JBS. When small startups with interesting technology cannot quite make it, we will see that at some point they are acquired by large companies. I don't think the large meat companies can afford to let this dwindle and die, but for sure, there is an interesting and stressful period ahead."

Consumer messaging:

"The messaging really should be that we are replacing meat with meat, because we grow up with the idea that meat is a wholesome part of our diet. Actually the evidence is in the opposite direction, but that doesn't really matter. If the public has this idea, then it will be difficult to transition them to a plant-based diet because they feel that it's incomplete. One of the things that has been under-emphasized I think, is the underlying notion that a lot of people still have, wrong or right, that we need meat in our diet."

Investment:

"I would really like to see investment in setting up factory systems, setting up factory lines and working on scale up, as some of the equipment is not really tailored for this particular process. If you're just growing undifferentiated cells, not so much, but if you make tissues, you need specialized equipment to move from cell production to tissue production."

Costs:

"This has been debated, but let's say it's 50% consumables, 50% ingredients, 25% labor, and 25% building and bioreactors. If you increase cell density, you reduce the component of the bioreactors because you use them more efficiently, but it's only 25% of the cost. If you reduce the amount of medium that you need for [a fixed amount of] consumables to make that kilo of meat, that's where you have the big gain."

Are cultivated steaks ready for prime time?

"Not yet. There are two distinctive technologies. One is to make small pieces and glue them together with transglutaminase... That obviously is doable, but it's not desirable. The other, to construct let's say a ribeye steak, where you have fat and muscle and texture and a channel and perfusion system to keep everything alive ... that technology is not ready yet at a cost-effective level."

Sustainability:

"We have seen lifecycle analyses for the last 10 years, but they're all preliminary because you can only physically do this if you have a production system in place and supply chain and transport and so forth, so there are a lot of assumptions. But the value of the studies is that we can figure out which levers to pull to make a sustainability impact. The benefits are clear, I think, in terms of land use and water use, but on energy, the jury is still out."

Read the full story on AgFunderNews

Crunch time for cultivated meat

Words: Elaine Watson

On paper, cultivated meat might seem like a no-brainer. Unlike plant-based options, which **still don't quite hit the spot for many consumers,** it promises the allure of 'real' meat without the ethical and environmental baggage that comes with plundering our oceans and raising billions of sentient land animals for food.


Image credit: Beyond Meat

In practice, however, there's no playbook for biomanufacturing meat at scale. The funding environment has changed dramatically as investors have **soured on alt proteins**, and we don't know whether consumers will pay a premium once the novelty wears off.

The media narrative around cultivated meat, which was universally positive a few years ago, has also changed dramatically over the past year: Articles about innovations in the space now compete with headlines about **cancerous cells**, **greenwashing**, **vaporware**, and **business failures**, against a backdrop of **grim quarterly results from plant-based meat brand Beyond Meat.**

So can cultivated meat make the transition from a loss-making novelty **served at a handful of high-end restaurants** to a commercially viable alternative to animal agriculture?

First, the bloodbath...

Healthy skepticism is understandable given the momentous challenges facing first movers in any new field, observes Ryan Bethencourt at early-stage investor **Sustainable Food Ventures**, which has invested in multiple startups in the field including cell-cultured seafood company **Umami Bioworks** and cell-cultured fat company **Hoxton Farms.**

However, it seems somewhat premature to write off an industry that didn't even exist a decade ago because it can't immediately compete with a heavily subsidized industry (industrialized animal agriculture) and associated ecosystem that has been scaling up and driving efficiencies for decades, he remarks.

"Probably 70-90% of companies in this space are going to fail over the next year, but those that survive will build real businesses and will scale their technologies," Bethencourt tells AgFunderNews. "This is just a normal part of the cycle [for new tech].

"There's a lot of anxiety right now and unfortunately everyone looks at **Beyond Meat** and says, this 'future of food' space is dead. It's not. The money has dried up, but not fully. There are still companies that have been able to raise, but these are really the leaders in the space or those with unique technologies. And honestly, this [challenging funding environment] applies not just across the future of food space, but across almost every vertical except for maybe AI."

Read the rest of our deep dive here

Cultivated meat: a timeline

1931 Winston Churchill publishes essay, **Fifty Years Hence**: "We shall escape the absurdity of growing a whole chicken in order to eat the breast or wing, by growing these parts separately under a suitable medium."

1997 Willem van Eelen files patent for the **Industrial Production of Meat Using Cell Culture Methods**.

2001 NASA funds experiment on **producing fresh meat for space flight** by cutting strips of flesh from goldfish and submerging them in a nutrient bath extracted from the blood of unborn cows.

2005 Dutch government funds the **Dutch In Vitro Meat project.**

2010 Isha Datar publishes **'Possibilities for an in vitro meat production system'**.

2011 Andras Forgacs founds cell-cultured meat and leather company **Modern Meadow.**

2013 Dr. Mark Post **unveils cell-cultured burger at press conference in London**.

2015 Yuki Hanyu launches the **Shojinmeat Project** in Japan.

2016 Memphis Meats (now UPSIDE Foods) unveils **cell-cultured meatball.**

2020 GOOD Meat (Eat Just) **launches cultivated chicken in Singapore** becoming the first company to commercialize cell-cultured meat; **Aleph Farms unveils thin-cut cultivated steak prototype.**

2022 Believer Meats **breaks ground** on the industry's first commercial-scale plant in North Carolina, USA.

2023 **New Age Eats shut down**; GOOD Meat and UPSIDE Foods **secure FDA/USDA approvals, launch cultivated chicken in the US.**

Meet the AgFunder Team

in three words

Louisa Burwood-Taylor

Friendly,
multitasker,
karaoke enthusiast
—

Robin Chauhan

Complex,
unconventional,
early adopter
—

Sam Clarke

Persistent,
fast learner
—

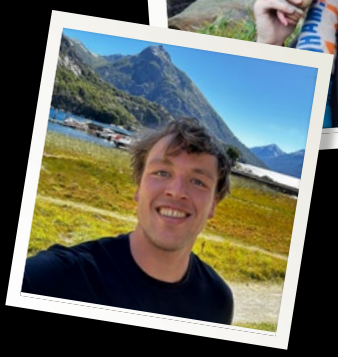
Michael Dean

Strategic,
practical,
resilient
—

Quinten Eggink

Direct, confident, humorous (to himself)

—



Andrew Finkelstein

Forward. No Breaks

—

John Friedman

Collaborative team player

—

Nathalie Gibson

Outcome driven strategist

—

Manuel Gonzales

Resilient, ambitious, curious

—

Rob Leclerc

Relentless, analytical, curious

—

Ryan Lee

Curious, problem-solving wizard

—

Jennifer Marston

Curious, willing, chaotic

—

Sofia Ramierez

Fast learner, curious, networker

—

Tom Shields

Raising, building, selling

—

Angela Tay

Methodical, meticulous, conscientious

—

Elaine Watson

Inquiring mind & experience

—

About AgFunder Engineering

Words: Robin Chauhan, Head of Engineering AgFunder

The genesis of AgFunder's engineering department was the vision of our co-founders Rob and Michael. They could see the importance of a data-driven approach to venture capital and research, and decided to hire a head of engineering early on. And so I joined AgFunder back in 2015, and Sam Clarke joined in 2019.

Robin Chauhan is a husband and father of two boys, originally from Ontario and northern India. A computer engineer and long-time AI aficionado, when he's not designing the next version of Gaia or interviewing AI professors for insight, he enjoys songwriting, matcha, and long forest walks with his wife and dog.

Sam Clarke is a father of two originally from the UK and permanent resident of Canada for the last 10 years. Sam has a background in Micro-and Marine Biology from where he transitioned into a career in software and data engineering. When he's not wrestling with data pipelines or building cloud services, you can find him performing as a DJ at local festivals and dance nights.

Some might wonder what an engineering department does at a VC firm? We take technical engineering approaches and tools, including machine learning, big data, artificial intelligence (AI), computer science algorithms, and software engineering methods – and we combine that with AgFunder's deep understanding of venture investing, to solve real VC problems that will benefit our investors. I call this approach "VC Engineering", and we call the VC system we have built with it "Gaia".

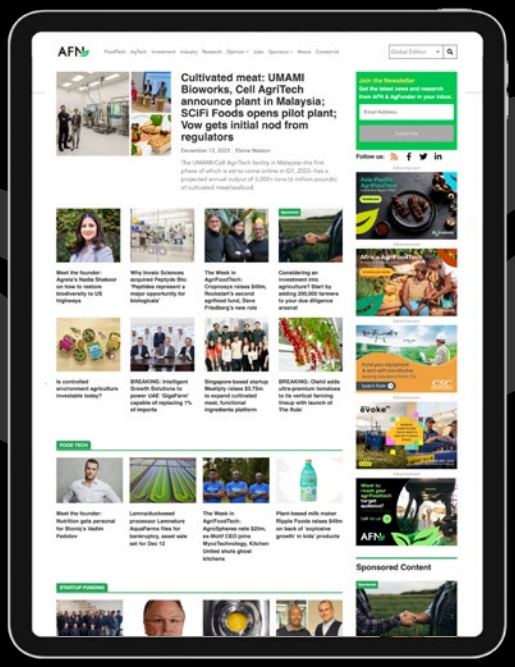
Gaia provides data-driven tools for our deal team and media team. Most importantly, it provides a constant, curated dealflow stream – this is above and beyond the excellent outbound and inbound dealflow AgFunder already enjoys via our team, our network, and our position in the market. Gaia also helps with due diligence, competitor searches, finding co-investors, and tracking investment trends for our research team.

Our approach is getting results: Gaia has assisted with sourcing three of the five new startups we've invested in this year. It has provided far more raw deal flow in 2023 than in any previous year. Gaia helps in countless other ways on a daily basis.

AgFunder is a remote-first firm, and the engineering team is no exception. Sam and I are located just outside Vancouver, Canada, in a charming seaside village named Roberts Creek. Same timezone as the Bay area, but a bit colder, a lot rainier, and much quieter. It is a wonderful place for clear thinking and focus.

Canada is home to the best AI talent in the world (two out of three AI Turing Award winners ain't half bad), and the Vancouver area is a legendary city for AI: the primary AI research conference NeurIPS has been hosted here for more years than any other city. And so it's fitting that AgFunder's AI is being built here.

AgFunderNews best read articles of past decade



01 After billions in investment, plant-based meat is a branding catastrophe

02 Bill Gates tells Reddit why he's bought so much farmland

03 He says it's not about climate. So why is Bill Gates investing in farmland?

04 What is precision agriculture?

05 The economics of local vertical & greenhouse farming are getting competitive

06 Regenerative agriculture is getting more mainstream. But how scalable is it?

07 These two women are taking the breast out of breastmilk

08 Impossible Foods CEO: 'I feel good about where we are, I do not feel good about where the category is'

09 8 Organizations Offering Grants in Agriculture Research and Development in the US

10 25 startups innovating with sustainable packaging solutions

11 Who are the Leading Insect Farming Startups?

12 Alphabet brings agtech startup out of stealth with data from 10% of world's farmland, 3 major customers

13 Israel Agritech Market Map: 400 Startups Putting The Tech in Agritech

14 What happened to those GM spider goats with the silky milk?

15 Keep calm and carry on: Navigating the trough of disillusionment for plant-based meat

Did you know

AgFunderNews published its first article on November 28, 2013?

More Africa agrifoodtech investment is critical

as climate change impacts and food insecurity worsen

Words: Louisa Burwood-Taylor
Image Credit: MercyCorps AgriFin

Africa seemed in many ways immune to the **downturn across venture capital markets in 2022**, when agrifoodtech investment on the continent **reached a record-breaking $636m**. Things looked less rosy in 2023, after AgFunder released its second-annual **Africa agrifoodtech investment report**.

Hopefully, it's just a delayed response to the tightening venture capital markets because investment in the region's food and agriculture industry is more critical than ever.

We've all **felt the impacts of climate change this season** but they're especially pronounced in Africa; of the 20 nations ranked as most vulnerable to climate change, all but four are African, according to the **Notre Dame Global Adaptation Initiative**.

Climate change is a key long-term contributor to the worsening food security situation across the continent that has spiked in the past year, **according to the World Food Programme**. Acute food insecurity – when a lack of food puts lives or livelihoods in immediate danger – increased by 60% in East Africa in 2022 after the region missed its rainy season for the fourth year running, contributing to the worst drought in 40 years.

Some 22 million people across Ethiopia, Kenya, and Somalia face high levels of acute food insecurity due solely to the drought, according to the WFP. The rate of food insecurity is only marginally better in West Africa where it still increased 40% in 2022. Local conflicts, heavy debt burdens following the COVID-19 pandemic, rising prices, and war in Ukraine have all contributed to food insecurity too.

Where Africa agrifoodtech investment can play a role

Technology is not the answer to everything, but bringing farmers, retailers and other players across the supply chain online can help increase efficiencies and make markets more accessible, which in turn will help bring more and better food to the region's populations. Investors are currently mostly excited about these types of technologies – marketplaces, and fintech – as they are scalable and certainly impactful, often having a direct impact on a farmer or informal retailer's wallet.

We're seeing a lot less investment for startups in the farm software, sensing, data analytics, and biological spaces, which is both surprising and not given the challenges of adoption and affordability among Africa's predominantly smallholder farming populations. But these are important areas to consider, especially for climate change adaptation, food security and livelihoods.

Agriculture makes up almost 20% of Africa's GDP and some **70% of Africans work in the sector**, according to The World Economic Forum. But most of this is subsistence farming and the region still needs to import staples including wheat, palm oil, and rice to feed its populations, according to the FAO.

While crop yields have increased, they remain the lowest in the world and are not keeping up with the continent's growing population, so agricultural production per capita is actually falling, according to the FAO.

At the very least, data analytics tools can help farmers respond to increasingly erratic weather patterns and farm more productively. Biological and biotech tools could help increase yields with better inputs while at the same time reducing greenhouse gas emissions. And African agrifoodtech entrepreneurs have barely scratched the surface in other AgFunder investment categories such as Novel Farming Systems or Robotics.

Sure, it may be a business model challenge for entrepreneurs to get these tools into farmers' hands, but it shouldn't be insurmountable and, we've seen startups offer financing to purchase their tools (I'm looking at you **SunCulture**!)

The good news is that there are at least 300 investors engaged in the sector, according to our count, and we are noticing increasing attention placed on it with new funds, resources, and international investors emerging.

Read the full story on AgFunderNews

‘It’s different in every single place’

attempting to define regenerative agriculture

When AgFunder launched in 2013, “regenerative agriculture” was a relatively unknown term. Fast forward to 2023, it’s so widely used it’s in danger of becoming just another piece of boardroom jargon.

There's no definition for regenerative agriculture, the concepts of which have existed for millennia amongst indigenous populations. Some relate it to soil health, others to carbon; still others to investment assets. Few mention regenerating communities and cultures along with the land. To get a sense of how the industry is thinking about "regenerative agriculture" in 2023, we polled a number of agtech industry folks at a recent event.

Vonnie Estes, vice president of innovation @ The Fresh Produce Association

One of the ways I look at it is through a "climate smart" lens and making farming really sustainable for the producer. Making sure that whatever we bring in for the producer, they can have a sustainable farm and don't go out of business.

Number two is being able to adapt and react to climate change. When we're having all these changes, what do we need to do to react to that change and the way we're growing, so we can produce what we need to produce?

Number three is, How do we lessen the amount of emissions?

In regen ag, there's a lot of focus on the soil instead of focusing on the plant. How can we make a healthier substrate for growing crops?

Antony Yousefian, partner @ The First Thirty & VP Climate & Circularity @ Wiliot

I would say this is the problem in the food system: trying to define regenerative agriculture. You can't do that. It's different in every single place. There's a growing narrative that we need to stop trying to define it and it's all about looking at outcomes.

Florian Richter, founder & CEO @ Muddy Machines

If I read my books correctly, regenerative agriculture is all about disturbing the soil as little as possible: getting rid of the plow and introducing cover crops and using as little fertilizers and other chemicals as possible. To really enrich the biodiversity of the soil and organic matter and therefore be less dependent on fertilizer and have the soil be more healthy and able to suck up water, reduce droughts and be overall more productive.

Mark Durno, managing partner agrifood @ Rockstart

It's a mindset towards a regenerative philosophy. So it's not just about improving our soil health. It's not just about integration of livestock, it's not only about cover crops. It's also about society and community and really making space for the important parts of the farm and nature and how they can restore themselves to a healthy balance.

Amir Zaidman, chief business officer @ The Kitchen Hub

It's a very wide space that any technology or development that is helping to preserve the agricultural field and not depleting them of natural resources is part of regen ag.

10 years of FBN

Words: Jennifer Marston

In 2014, Charles Baron and Amol Deshpande were concocting an idea that was practically unheard of in agriculture.

"The goal was to put the world of agriculture at the farmers' fingertips and empower them through information, technology and a network," Baron tells AgFunderNews.

Farmers Business Network, commonly known as FBN, was born of that goal.

FBN started out as a farmer-to-farmer sharing network to provide growers with analytics about things like seed performance and price transparency on products. At the time, such information was often obscure for the average farmer.

"There were so many parts of agriculture that seemed fundamentally unfair for farmers," says Baron, who cofounded FBN along with Deshpande. "FBN fought very, very hard to make those practices better for growers."

"Fought" is an apt word; in the early days, FBN butted heads with many in the industry over the idea of cutting out the middlemen, in this case ag retailers, and letting growers purchase products directly.

A widely circulated CropLife article from 2016 called it a "nasty body blow" for retailers and referenced "the devil known as 'price transparency.'"

"[It] painted images of growers storming into retailer's offices with price sheets and demanding lower input prices," **AgFunderNews wrote at the time of the CropLife piece.**

More recently, rumors have circulated through the industry that FBN has closed a significant down round --as much as a 95% decline in valuation. FBN declined to comment on the rumors.

Baron says the company addressed these and other controversies "by focusing on the customer."

"FBN was born out of farmers' pain points on transparency and the desire for more competitive markets. Farmers were especially frustrated by opaque pricing, the lack of alternative suppliers and financial options. FBN has provided an alternative way of doing business that has won the support of tens of thousands of growers by providing the most transparent, convenient, and high ROI experience to our members."

Today, FBN is a major online provider of crop inputs and offers a number of other resources to farmers including marketing support, access to insurance programs and credit, and tools for participating in sustainability programs.

To date, the company has raised over $900 million from the likes of Kleiner Perkins, Google Ventures, Temasek and others.

Below, Baron (CB) discusses the company's origins, Big Ag's initial reaction to the business and what's in store for the next decade.

AgFunderNews (AFN): Why did you start FBN?

CB: Farmers were dealing with very fundamental frustrations in the agricultural market, what felt like very real imbalances in purchasing power, a lack of price transparency and market access.

We started from the question of, "How do we use technology, networks and community to make farming better and more profitable, more sustainable for growers, and help them make sense of the world of information that a farmer has?"

The goal was to put the world of agriculture at the farmers' fingertips and empower them through information, technology and a network.

When we started analyzing pricing data as a young company, we saw enormous disparities in prices. Then farmers started asking us to go buy those products. That turned into being a full end-to-end e-commerce and logistics and input supplier with our chemical business and crop nutrition products.

The goal was to put the world of agriculture at the farmers fingertips and empower them through information, technology and a network.

We eventually got into farm finance and marketing and sustainability, to be able to design them in such a way that they could work together synergistically and benefit the farmer. We always let the customer be the guide.

AFN: What was the agriculture industry's initial reaction?

CB: FBN started by providing growers with analytics about seed performance, price transparency for products, etc. Many companies were very, very open to that and many were not.

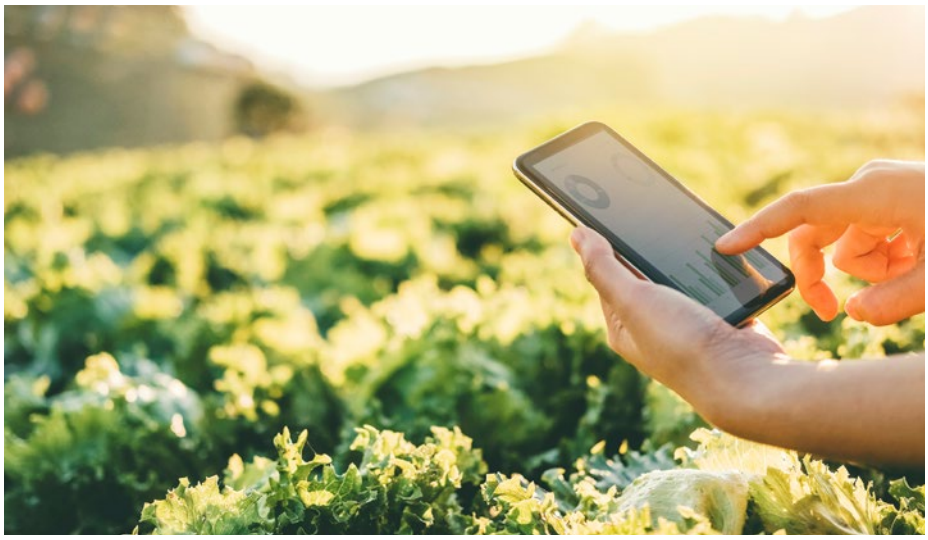
As we matured and scaled, people got increasingly nervous about what that could mean for their business. Now I think people have figured out how farmers use technology, the places where they'll be very consistent with use of the product. But at the advent, there was tremendous fear and uncertainty about FBN for many people that caused a lot of resistance to the business model. I think we've really seen that change over time.

Now we have major partners like ADM and Farmer Mac and others that have embraced what the technology can do and be for farmers. On the animal health side, we work with all of the major animal health companies.

AFN: What's been ag's biggest challenge in the last decade? Has the industry solved it?

CB: There's ag's challenge and there are farmers' challenges.

For farmers, it's an age-old problem: they are naturally experimental, but they have to get real business benefits on a quick timeline. Technologies have to be able to show that benefit very quickly. Farmers need to be able to build confidence and say this is going to be the future and become a core business practice in their operation.



Then there's the agriculture industry's challenge, which is still a work in process.

The lack of competition in the industry is really a core issue that negatively impacts farmers. There's the amount of consolidation in the industry among the major suppliers, the consolidation among the routes to market, the channels and the retailers. That means fundamentally, farmers' choice and competition is inhibited.

FBN has always sought to make ag more competitive, to open up more product offerings to farmers. We welcome working with major brands and branded products as well — but to do that in a way that farmers now want to, using technology, buying online, working in ways maybe they didn't five or 10 years ago.

But it's still a work in progress. We still have the conventional retail world figuring out how far to go online. There's the conventional supply chain (e.g., big biochemical companies) figuring out how far they can go in reaching growers directly.

AFN: Name a couple key developments over the last decade.

CB: One of the most important is the open platforms around data sources. John Deere probably gets the most credit for that. The John Deere API enabled more companies and technologies to help growers use information than almost any other platform out there.

Then there's the shift of just farmers' increasing willingness to do business online and with technology — getting more comfortable with digital grain marketing, for example. And that may not be due to any one platform.

That increased digitization of the business, and how it complements in-person, businesses, is really the future of how farmers will get goods and services.

AFN: Where is agtech 10 years from now?

CB: I think that the machinery side will see see increasing uses of autonomy, computer vision and artificial intelligence. We've seen that through our partnership with Green Eye's sprayers, a tremendously exciting technology.

Some aspects of farming will probably look very similar 10 years from now, but we hope fundamentally that the market is more vibrant with more products, and that it's easier for farmers to purchase them. And a more dynamic supply chain.

When we started bringing agriculture online, there was a lot of resistance from the industry in figuring out exactly how this would work.

What we've seen is increasing confidence and comfort in the ability for farms to do business online throughout more and more parts of their business.

That's both from the development of the technology and from the generation now running farms that is used to their life running online.

For example, the integration of digital grain marketing with sustainability with inputs that you're able to do now in a system like FBN's. We do everything from primary product development to inputs all the way to sustainability program management and customer development. That's unlike anything that existed 10 years ago. Technology allows you to put those pieces together.

We'll continue to see more and more combinations and permutations of risk management technology with finance technology, with input buying technology, with logistics, with grain marketing. It's going to be a tremendously exciting future for farmers.

Why AgFunder invested in Kula Bio

Words: Rob Leclerc - founding partner
Image credit: Kula Bio Bill Brady, Co-founder Kula Bio

Rob Leclerc is a founding partner at AgFunder, which invested in biofertilizer startup Kula Bio's seed round in 2021.

You can discover a wonderful soil microbe in the lab, and it can show great promise in the greenhouse. It may even be effective at improving crop growth in your field trials. But these microbes tend to be unacceptably unreliable in the real world when they're forced to compete with many other microbes and perform in many different soil types and environmental conditions.

This is why, for five years, AgFunder did not invest in any soil microbial solutions until we met Kula Bio.

Kula Bio solves this problem by effectively giving microbes batteries, and with these batteries, the microbes can still do their job even in harsh and resource-poor environments. Developed from over ten years of research by cofounders Robert Nocera and Pamela Silver at Harvard, Kula discovered a naturally-occurring microbe that evolved the ability to build up energy stores under certain conditions, fattening themselves up with a kind of bioplastic as it were. Kula thought this feature could help solve the long-standing problem with microbe-based soil amendments and developed a strain that could sequester nitrogen as a fertilizer alternative. Now, instead of having microbes that can survive for only a few days, Kula has microbes that can survive and thrive for weeks, giving plants a slow-drip of nitrogen to maximize growth.

Nitrogen is an essential ingredient in modern agriculture. Globally, nitrogen fertilizer is a $100 billion market. Nearly all nitrogen fertilizer is made synthetically from the Haber Bosch Process, which uses about 5% of the world's natural gas and contributes significantly to the fertilizer industry's 2.4% contribution to global greenhouse emissions. And this says nothing of the nitrogen run-off that pollutes waterways and oceans, leading to algal blooms, eutrophication, and ocean dead zones. Climate considerations aside, farmers are today clamoring for alternatives as soaring natural gas prices and weather-related production disruptions in the US have pushed fertilizer prices to record highs.

The invention of the Haber Bosch process may have been one of the most significant discoveries of the 20th century, and Kula Bio may prove to be one of the most important discoveries of the 21st.

Read the full story on AgFunderNews

What is ‘the next big thing’ for agtech?

Words: Seana Day
Culterra Capital partner

As the economic uncertainty of 2023 continues, I find myself reflecting on the last decade of investment in agtech and wondering what comes next?

Overall, the basic farm support structure has not changed much in the past decade. People still either sell ag products (e.g., machinery, equipment, inputs) or ag services (e.g., financial, insurance, custom farming) to farmers to help them run their business and bring their goods to market. But there is a finite wallet to share across these products and services.

Where we’ve been, where we’re headed

Over the last decade, I’ve seen thousands of agtech companies focused on optimizing products, primarily by improving machines or crop/feed input performance. In fact, by looking at AgFunder’s annual investment reports, we can clearly see that innovation and investment has been defined by technologies focused on products, with a scant few focused on optimizing services or service delivery segments.

One reason is that machinery manufacturers have been natural integrators of innovation because it improves machines by making them better, faster, and cheaper. A great example is John Deere’s Blue River acquisition in 2017, which accelerated its game-changing See and Spray capability.

And within the inputs segment, there are well-established relationships between manufacturers, distributors, and advisors like agronomists or veterinarians. Advisors may sell inputs as part of their service, which gives innovation an efficient, trusted route to market.

Manufacturers, dealers, and distributors have all provided a vibrant network to filter and integrate new technologies such as vision systems, automation, variable rate, or biological discovery.

Conversely, we see there has been less innovation among service providers. To date, the services category has overall failed to meaningfully harness data automation, analytics, or productivity technologies to make their services better, faster, and more profitable to deliver (cheaper).

Accordingly, as we look to the next decade, I believe there is still a big, underserved tech-driven opportunity that is under the radar for many founders and investors alike: serving the ag service providers.

What is "the next big thing" for agtech?

In the proverbial search for "the next big thing" in the coming decade of agtech investing, I am looking at business model innovation as a result of shifting or changing value pools. A value pool calculates the theoretical available potential in the market for new revenues and avoided costs. Digital transformation will unlock and create entirely new market value across the $15 trillion food and ag global ecosystem, but don't think this value transformation will only happen in the field.

Two great examples of this are Bushel and Milk Moovement. Both are compelling because they each initially focused on solving one big pain point: for Bushel, digitized scale tickets, and for Milk Moovement, digitized milk tickets. Both created immediate value by reducing workflow friction, data entry errors, and processing times but clearly the long play is the new value they can unlock with production datasets that can be analyzed and acted on by their customers.

To capitalize on this opportunity more broadly, the services sector needs to address some foundational barriers. I see scarcity in talent pipelines to feed the ag professional needs (finance, HR, data analytics), a lack of interoperability between management information systems, and general difficulty accessing and analyzing business data. Furthermore, I see first-hand that these shortfalls are making it infinitely more difficult for professionals to model scenarios, plan, forecast, or manage assets and risk which are all becoming table stakes as the business of agriculture gets more competitive.

What is at stake in the next decade?

- The aggregation of trillions of data points is leading to an unprecedented understanding of risk, pricing, and value but the development of a skilled workforce to provide context and insight continues to lag, even current demand
- A rapidly aging professional and office workforce for which little has been done to transfer knowledge
- The cost and complexity of maintaining legacy systems and technical debt will continue to stymie progress
- Siloed data across ag value chains will continue to lead to limited visibility into cost drivers and missed revenue opportunities.

How are we going to unlock the digital solutions to meet ag's challenges and upend value pools?

To address ag's complexities: investment in vertical software designed for food and ag-specific data sets (and integrates seamlessly with horizontal financial reporting software). This also means it is fundamental to overcome adoption barriers by providing consumer-quality UX/UI, as well as interoperability.

To address the talent pipelines: S.T.E.M. and business programs and certifications for ag-specific finance, HR, machine mechanics/ robotics, IT management, data analysis skills. It should be noted many strong public-private partnerships across the country have emerged to advance local and regional programs that are more responsive but we need to start moving from talking to doing.

To address the change management that is required: a more nuanced approach to organizational design in ag and agribusiness. Business as usual will struggle to survive this generational transfer.

To address the ecosystem: better alignment of training and business models between agtech start-ups and channel partners. A shift from transactional relationships to collaborative where the partners can use tech to create value in their own businesses, not just as a means to get tech to the farmer.

Building a strong middle-market vertical stack

When I ask myself how it started, how it's going ... and where it's headed, I see the progression from inputs to machinery to services. And when I look at other industries and how much digitization has moved the needle over the last decade, it gives me tremendous optimism and hope for the progress of the ag industry. There have been digital transformations across construction, education, finance legal, and healthcare that have created enormous value for service providers and investors; why not in ag?

CH4 Global:

'Cow burps are one of the largest sources of methane globally'

Words: Elaine Watson

Red seaweed (Asparagopsis) is widely recognized as one of the most effective tools for **reducing methane production in ruminant animals** (burping cows). The challenge is growing it at large scale.

CH4 Global, which has operations in the US and Australia, has developed a proprietary land-based production system that cofounder and CEO Dr. Steve Meller claims is significantly more efficient that competitive approaches to growing seaweed for feed supplements.

Disclosure: AgFunderNews' parent company AgFunder is an investor in CH4 Global.

"**We have shown that we can efficiently and effectively grow it at a much larger scale, frankly, than anybody else**. And we can do so in a way where we don't limit the propagation and the growth rates of the seaweed."

Speaking to AgFunderNews at the recent Asia-Pacific Agri-Foods Innovation Summit in Singapore, Dr. Meller explained: "We are building ponds at our new facility just north of Port Lincoln in South Australia that are 160,000 liters and designed to optimize the current and fluid flows so you can still get light penetration even as you double and continue to double and replicate. So there are no dead zones, no spots where current doesn't flow, no locations where light isn't penetrating at a certain intensity.

"Our profit margins will be in excess of 40% and our COGS (cost of goods) are four-to seven-and in some cases 10-fold lower than anybody else in this space."

The seaweed supplements generated at CH4 Global's new facility, which will be operational in the middle of 2024, have already been allocated to three buyers, he said. "100% of the output has been aligned with three commercial partners."

The next facility, phase 2, will be significantly larger, supplying enough feed supplements for up to four million cows.

On methane: "Cows burping is the single largest source of methane globally, larger than all of the methane emissions from the oil and gas sector. So it's a major problem. But it's also a major opportunity if you happen to have a platform that can reduce it in a cost effective and safe way. That's what we do."

On Asparagopsis: "The actives in Asparagopsis – and there are more than 100, don't let anyone tell you there's just one... they all interfere with that enzymatic assembly of methane [within the cow rumen] in a very well-known biochemical approach. So if you have the right amount of the material in the right concentration, because your processes defined it, you can now have a very effective solution... much more so than anything else on the planet today."

On methane reductions: "Published studies that have been done primarily in beef feedlots, less so in dairy, but there have certainly been some, they all support effectively 80 to 95% methane reduction with good quality [Asparagopsis] material. You'll see reports saying 38% or 30% or 40%. That's generally coming down to the fact that it's poor-quality material, the bioactives are either not stable or they're not at the right concentration."

Growing Asparagopsis at scale: "What is CH4 Global doing differently? It's really both in the growing and the processing. Both are significant drivers of cost."

The manufacturing set up: "The series B is ongoing. **We announced an early close of $29 million**; we've continued to raise more money and we're very close to our $45 million goal now at a time and environment where it's incredibly hard to raise money.

"What that's enabled CH4 Global to do is to build the world's first commercial scale facility, which we call an eco-park. Eco-park one, which is our first one, already has 100% of its output pre-assigned to three commercial partners, [enough to feed] about 10,000 cattle for each of the three partners.

"That facility, when it's fully up and running, should generate close to $20 million in revenue. But the really important goal is to validate the financial metrics."

The attraction to farmers: "What we know from the work CH4 Global has been doing on Australian beef as the first market we're going into, is that somewhere between a 2-3% premium is all that's required to cover 100% of the total costs of the product. More than that, farmers put money in their pocket, so they're incentivized.

"The second lever is feed efficiency [farmers can use less feed to achieve the same results]. It's in the low single digits as well, to 100% cover the cost.

"The third lever is the value of carbon, and the carbon reduced from a cow when you're at 90% [methane reduction] is somewhere in the range of $130-140 a ton.

"The fourth lever is the impact of taxes on greenhouse gas emissions, which are going to impact farmers."

Read the full story on AgFunderNews

What makes a great pitch? What raises alarm bells?

Agrifoodtech investors weigh in

Words: Elaine Watson

What makes a great pitch? At the most basic level, say investors quizzed by AgFunderNews in Singapore last month, entrepreneurs need to identify the problem they are addressing, spell out the market opportunity, and explain why they are best-placed to solve it.

A great pitch also requires energy and passion, a well-thought out go to market strategy, an innovative and differentiated product or business model, and some evidence of market interest, validation or traction.

As for red flags in pitches, not listening, over-inflated numbers, and the inability to clearly articulate what your business does were repeatedly cited by the investment team at AgFunder (AgFunderNews' parent company) and other investors we spoke to at the Asia-Pacific Agri-Food Innovation Summit and the GROW Impact Accelerator Demo Day.

What makes a great pitch?

"It's about the ability of the founders to tell a story. If they're not getting their message across clearly, if I can't understand what they're talking about... whether it's the business, the business opportunity, or the potential of the technology, I'm not going to be interested to pursue that founder and find out more."
Michael Dean, partner, AgFunder

"A great pitch tells you in the very beginning what they do, and they do it very clearly in a couple of sentences: 'We are a company that does this...' A great pitch is also one that will explain very quickly why they can make money and why they are different to the competition." **Manuel Gonzalez, partner, AgFunder**

"Founders should be honest and open about potential risks and challenges. Being defensive or evasive in your responses erodes trust in your pitch and undermines the credibility of your team."
Darren Leong, senior associate, Clay Capital

"If it's a founding team, we like the framework of a builder and a persuader. So sometimes it's the same person, sometimes two or even three different people. But a founding team needs to have this component of building... knowing the technology, being able to do R&D or science or scale up, but then also have the ability to pitch not only to investors and customers but also to employees in order to attract talent."
Michal Klar, partner, Better Bite Ventures

"A great pitch is a balancing act between understanding what you do and who you're pitching to. I think it's important to be masters of facts, but at the same time also register your relevant experience and address your audience's challenges. I would say avoid pitching as a single person in a team pitch. Often teams that have a senior person doing all the talking appear less trustworthy than one where there's chemistry between the team members that are pitching."
Darren Leong, senior associate, Clay Capital

"It's good to add a personal touch. For example, if you're pitching to an audience in a developed market, but your story is about the developing markets, about smallholder farmers, then it might be good to bring your audience -who might not be very familiar with the market -on a journey with you. Tell them a story that engages them, that brings out the emotional aspects of your pitch."
Angela Tay, investor, AgFunder

"I really like to be taken on a journey. So whoever's doing the pitch needs to be able to tell a story and build a narrative around their business that gets me excited and interested."
Michael Dean, partner, AgFunder

What kind of things in a pitch tend to raise alarm bells with investors?

"The first one [red flag] is if they don't explain immediately what they're doing and you have to figure it out in the middle of the pitch."
Manuel Gonzalez, partner, AgFunder

"It worries me if a founding team doesn't take very well to advice. As a venture fund, we pride ourselves on building and fostering a harmonious and collaborative spirit with the founders we are investing in... there should be some sort of willingness and openness to take inputs that are relevant and helpful for the business. So we would flag companies that are not very open to listening to advice; lack of coachability is an issue."
Darren Leong, senior associate, Clay Capital

"In the first few conversations, if you start to have a sense that the founder has very fixed ideas of how to do things, and you get the sense that he or she may not be very receptive to me, I think that is a red flag. You're going to be on an emotional journey with this founder for the next few years. You've got to like each other, you've got to like working with each other. And if it's someone who's not very receptive at the outset, very likely, that person is not going to be receptive to ideas down the road."
Angela Tay, investor, AgFunder

Read the full story on AgFunderNews

Image credit: Eat Just, Josh Tetrick founder and CEO Eat Just

10 years in foodtech

with 'remarkable' and 'polarizing' alt protein pioneer Josh Tetrick

Words: Elaine Watson
Image credit: Eat Just

Eat Just — like **Beyond Meat** — is often seen as a proxy for the broader alt protein space, regarded by some as a visionary foodtech pioneer attempting to disrupt two vast addressable markets (meat, eggs) and by other less charitable observers as a "house of cards built on one individual's ability to separate people from their money."

Regardless of where you sit on this spectrum, says one foodtech investor, it would be "pretty catastrophic" for the category if either of these loss-making firms were to crash and burn, so a lot is riding on their performance in the coming months.

So how should we view Eat Just, and can Tetrick — "**one of the best capital-raisers in the business**" — raise the funds to take cultivated meat from a loss-making novelty to a commercially viable alternative to animal agriculture?

'He's always had magical abilities to raise capital'

Armed with capital from **some of Silicon Valley's biggest spenders**, California-based Eat Just (formerly Hampton Creek) first positioned itself as a **b2b plant-based egg supplier**, before losing patience with the lead times of large CPG companies and introducing its own consumer brands (Just Mayo, Just Cookie Dough) based on yellow pea protein in 2013.

By 2019, however, cofounder Josh Tetrick was betting the house on **JUST Egg**, a scrambled egg alternative made from mung beans. He'd also staked a claim in the nascent **cultivated meat industry** via a new division called **GOOD Meat**, a move seen by some commentators as a costly distraction from the core business, although Tetrick persuaded investors it was a logical adjacency.

Tetrick — **who parted company with his entire board in 2017** — has emerged from all this as a polarizing figure, with some praising his strategic thinking and adaptability and others arguing that he has burned through vast amounts of cash (a jaw-dropping **$850 million+ to date**) for little reward, saved only by his **"phenomenal"** pitching skills.

One industry source told AgFunderNews: "His relationship with his board, the fund raising, executives leaving the company... brought many questions.

"However, he is one of the pioneers in building the alternative protein industry and I wish Eat Just great success. Josh's persistence is remarkable."

A second source told us: "He's always had magical abilities to raise capital and the egg product at least is fantastic. A lot of people want to see him fail, but a lot of people also want to see him succeed. I'm in the latter camp."

'I don't understand how he is still in business'

Other sources we spoke to were less charitable. "I don't understand how he is still in business," one alt protein investor told us. "He's raised a ton of capital from people I would generally consider to be well disciplined, thorough investors, and has shown very little progress other than headlines."

Ultimately, he said, "People shouldn't be giving him hundreds of millions of dollars [to fund a commercial-scale cultivated meat factory] if Eat Just is what I think it is, which is just a house of cards built on one individual's ability to separate people from their money."

The evolving media narrative

As for the media narrative surrounding the company, the headlines were consistently positive in the early days, with Tetrick **emerging victorious from spats with Unilever** and **the FDA** over product labeling, **raising bucketloads of cash**, and building a CPG brand that initially appeared to be giving multinational food brands a run for their money.

In 2015-2017, however, press coverage soured, as anonymous sources briefed **Business Insider** about a 'cult of delusion' at a food company masquerading as a tech company, and Bloomberg published articles alleging fraudulent product buyback schemes for Just Mayo, **boardroom squabbling, food safety issues and financial problems.**

Tetrick rode the storm, however, telling **FoodNavigator-USA** in 2017 that, "If you look at any company, Apple, Nike, Tesla, they hired lots of people when they were growing fast, and those people left."

And while Tetrick acknowledged that some independent contractors

had been tasked with buying Just Mayo to "stimulate sales momentum," the amount spent on buybacks was less than 0.5% of sales between 2013 and 2015, he claimed. The SEC and DOJ came to the same conclusion, he noted: "There was no 'there' there."

In 2018, the media narrative changed again, this time for the better with the launch of JUST Egg, which looked like it could transform the company's fortunes. This was followed by glowing press coverage about Eat Just's GOOD Meat division, the **first player** to launch cultivated meat in the world (in Singapore in 2020) **and the first to enter the US market — along with UPSIDE Foods — this summer.**

More recently however, Tetrick has been fielding challenging questions about his cash reserves, after **bioreactor provider ABEC** and **engineering firm CRB** sued GOOD Meat for breach of contract over allegedly failing to pay its bills.

Tetrick, who has **recently raised an undisclosed sum** from the **Ahimsa Foundation**, tells AgFunderNews he'd do some things differently if he had his time over again, but points out that Eat Just is disrupting vast established, heavily-subsidized, industries with products that have never been produced at scale.

"There's not a template for how you make egg from a plant or meat from a cell."

JUST Egg 'closer to operational profitability'

The plant-based egg side of the business is "closer to operational profitability" but "still has a lot of work to do" says Tetrick, who **laid off 18% of the staff at Just Egg earlier this year** and recently instituted a second round of layoffs.

He won't share revenues but says JUST Egg is the dominant player in the plant-based egg space with a repeat purchase rate of 51%, distribution in 48,000+ retail points of distribution in North America, and branded partnerships with several CPG companies.

Meanwhile, foodservice sales for JUST Egg grew 15% and 39% in Q1 and Q2 of this year respectively.

However, more work still needs to be done on improving margins via more efficient sourcing of mung beans, increased scale, monetizing co-products (mung bean starch), and improving the protein extraction process, says Tetrick.

If he could go back, he says, "I'd have hired more process engineers in the beginning to connect lab to large-scale commercialization, because there is a radical difference between what you can do in the lab and what you can commercialize with reasonable costs and a large scale. I would also have purchased our own protein separation facility and owned that much faster. By doing those two things, JUST Egg probably would have been out three or four years earlier."

Click here to read our full interview with Tetrick at AgFunderNews, which also explores his move into cultivated meat.

Eat Just timeline

2011 Josh Tetrick and Josh Balk form Hampton Creek with a mission to displace industrialized egg production.

2012 Tetrick hires former Unilever Food Solutions R&D director Johan Boot, engages in the "systematic analysis of hundreds of varieties of plants to identify those that can replicate the function of egg in any given application."

2013 Just Mayo launches in US retail, made from canola oil, modified starches, and yellow pea protein.

2014 Hampton Creek completes $23m Series B led by Horizons Ventures followed by a $90m series C led by Horizons Ventures and Khosla Ventures. Unilever, which **sued Hampton Creek for false advertising** in November, **dropped the lawsuit in December** amid a torrent of bad publicity.

2015 Weeks after telling Hampton Creek it was playing fast and loose with food labeling regs by branding its egg-free spread 'Just Mayo', the FDA told Tetrick **he could keep the 'Just Mayo' brand name** – as long as he made minor tweaks to the label.

2016 Hampton Creek sued for allegedly misclassifying employees as independent contractors.

2017 Hampton Creek becomes Eat Just and **unveils plans to enter the cultivated meat market**, but is dogged by reports of boardroom power struggles, a product withdrawal at Target and a trademark dispute. The DOJ and the SEC find no evidence of wrongdoing in the wake of allegations that the company had orchestrated an internal buyback scheme designed to artificially inflate sales figures.

2018 Launch of JUST Egg made with mung bean protein isolate and canola oil, and designed to look, cook, and taste, just like scrambled egg.

2019 JUST Egg gains traction: "There are few examples of a plant-based product outselling an animal-based product in national distribution — this is one of them."

2020 GOOD Meat — the world's first cultivated meat brand — launches in Singapore.

2020 Eat Just's mung bean protein receives novel foods approval in the EU.

2022 GOOD Meat signs 7-year deal with ABEC to design, manufacture, install and commission the "largest known bioreactors for avian and mammalian cell culture" in a facility in the US.

2023 GOOD Meat launches in the US. ABEC and CRB sue Eat Just and GOOD Meat for **breach of contract over alleged non-payment of bills.**

Carbon offsetting:

the good, the bad and the ugly

Words: Louisa Burwood-Taylor

For a while now, people have questioned the value of carbon credits generated by the forestry and agriculture sectors.

Many commentators including myself have likened **carbon farming** initiatives to the Wild West of the agriculture sector as the science behind the measurement of soil carbon at any scale is still fairly basic and unreliable. Lagging regulation is another potential risk for innovators in the space as are the varying standards used by the few high-profile certifiers responsible for issuing the majority of carbon credits to corporations trying to meet their net-zero targets. This didn't stop agrifoodtech investors from putting carbon-related startups at the top of their investment wishlist for 2023, **as featured in the AgFunder global agrifoodtech investment report.**

But the cracks are now starting to show and earlier this year an **investigation by The Guardian** revealed that **over $1 billion of carbon credits certified by leading platform Verra** could be worthless. Verra approves three-quarters of all voluntary carbon offsets but according to the investigation, 94% of Verra-certified carbon credits had no benefit to the climate with little evidence of deforestation reduction. Furthermore, The Guardian argues that the threats to the forests were overstated. While the **Integrity Council for the Voluntary Carbon Market**, an independent governance body, has since **released** a new set of rules aimed at boosting the "integrity" of the global carbon market, commentators are arguing that 2023 is a "make or break year" for carbon markets.

The situation escalated this week **as the CEO of Verra** announced he is stepping down.

Recently, at the **Hack Summit** in Lausanne, Switzerland, organized by our friends at **Hack Capital**, I moderated a panel of three entrepreneurs working on carbon-related initiatives in the food and agriculture issue to dig into the state of carbon offsetting today: the good, the bad and the ugly, and what the future might hold. While linked to the Verra situation, it's important to note that the conversation was mostly based on agriculture-related carbon offsetting compared to Verra's focus on forestry.

Antony Yousefian, VP of Climate & Circularity at **Wiliot**, an ambient sensing and IoT company that's started tracking the carbon footprint of food through the supply chain, argued that certifications need to be done by consensus involving multiple entities and people to avoid poor quality credits; currently certifying bodies are almost incentivized to issue credits. He highlighted the **Open Forest Protocol** as an example of a consensus-based model.

Jerome Cochet, cofounder of **GoodCarbon**, a marketplace matchmaking buyers and sellers of carbon credits focused mostly in forestry but also in agriculture, said that while he had certainly noticed a reduction in demand for carbon credits in the wake of the Verra scandal, he was still glad The Guardian had surfaced the investigation as it meant companies were now focusing on the quality of their carbon credits, which is only a good thing. "So they want to invest into projects which last a long time and which really have a true impact. And I guess that was the right push to bring into the market, but it also put a couple of [carbon credit purchasing] decisions on hold," said Cochet.

Also on the panel was **Robert Gerlach**, founder of **Klim**, a German startup helping farmers transition to regenerative agriculture, a system of farming that can help them to store carbon in their soils and thereby potentially sell offsets. [Disclosure: AgFunder, AFN's parent company, is an investor in Klim.]

In the context of generating soil carbon through farming, Gerlach's main argument was that while the measurement part is certainly imperfect, albeit improving all the time, the industry needed to start somewhere, urgently. "If we do not get the agriculture sector to change dramatically very quickly, then we won't achieve our climate targets. And so we need to accept a certain level of pragmatism. That means we should be aware of the measurement errors we incur, calculated in, and then move forward with that knowledge ahead," said Gerlach.

Other takeaways from the quick 30-minute session about carbon offsetting included the worry that carbon tunnel vision was relegating other important environmental factors like biodiversity and was especially "short-sighted" when related to the benefits of regenerative agriculture. The impact on farmer livelihoods also came up, but perhaps not in as much detail as I'd have hoped as I expressed my concerns that this was yet another way farmers could get the raw end of the deal. Related but not in response to that, Yousefian had a mic drop moment when asked by an audience member about the differing quality of carbon credits, arguing that carbon credits should not even be a commodity and instead, we should be paying farmers an asset management fee to look after their stored carbon.

We also talked about carbon offsetting regulation and what form and shape that was coming in in Europe and the US and how that will impact operations across the supply chain. And lastly, the panelists all shared what's at the top of their wishlist for the future of carbon markets.

Diving into Tepbac:

why AgFunder invested

Words: Angela Tay

Angela Tay, senior investment associate at AgFunder Asia, explains why AgFunder chose to invest in aquaculture startup Tepbac's $2.25 million pre-Series A round

How did I end up sitting on a bridge like a literal lame duck, in the middle of a shrimp pond, not daring to move forwards or backwards because either me, my phone or both of us could drop into the water at any moment?

Such was the start of my trip to get an in-person understanding of shrimp farming in Vietnam by visiting Tepbac, AgFunder's first Vietnam aquaculture investment out of both the AgFunder Grow Impact Fund and AgFunder SIJ Impact Fund.

Bridge over troubled shrimping water

Tepbac co-founders Lam Nguyen and Trần Duy Phong took me to visit some southern Vietnam shrimp farms, some of which are Tepbac customers. Vietnam is one of the top five producers of shrimp in the world, accounting for more than $4 billion out of the $32 billion global shrimp market. Tepbac says the country plans to triple production in the future.

At first, I walked out confidently along one of the bridges that are a common sight at most shrimp ponds, only to feel it sway a few seconds later as I realized it wasn't as structurally sound as I'd assumed.

This image is almost a metaphor for shrimp farmers everywhere as they attempt to balance and manage the uncertainties of what is inherently a very risky business.

When done right, shrimp farming can be very lucrative. But shrimp farming in Vietnam faces several challenges, including inefficient farming practices leading to reduced productivity and lower yield, higher costs, disease outbreaks, and negative environmental impact. A disease outbreak can wipe out the livelihood and wealth of shrimp farmers, and it could take decades before they are able to recover, reducing many of them to poverty.

Bringing farmers an additional 30% of value per harvesting season

To address these challenges and help farmers improve efficiencies, productivity, reduce their risks and farm shrimp sustainably, Phong, together with his classmate Lam Nguyen, co-founded Tepbac in 2012.

Initially, they started a media company Tepbac.com, to plug the market gap in information sources about aquaculture. Tepbac.com has since scaled to become one of the most popular aquaculture resources in the world. As the cornerstone of the ecosystem, they went on to develop Farmext, a comprehensive suite of farm management SaaS solutions and hardware devices which help with automation, remote controls and environmental monitoring for shrimp farmers.

Both Phong and Lam come from shrimp farming backgrounds. Phong grew up helping on his father's shrimp farm and went on to major in aquaculture before learning to code and build machines himself. Lam's family also farmed shrimp for decades. It is not a stretch to say that thanks to their backgrounds, they are personally connected to most of the stakeholders in the industry, from the universities to feed companies and seafood processors and exporters.

There are many aquaculture hardware companies out there; most fail to make a splash in the market because they provide inaccurate information or their machines break easily due to being submerged in dirty water.

What sets Tepbac's Farmext apart from the rest of the pack is the "Envisor," the IoT device that Phong and his team spent more than four years developing and testing in the field to ensure efficacy. Envisor is the world's first patented environmental measuring device, and its self-cleaning capability means that it delivers accurate data, thus enabling the entire automation process to run smoothly. Envisor can be deployed on one of those bridges that are a common sight at most shrimp ponds, enabling farmers to feed their shrimp and check on their health. You can also see auto feeder machines and feed trays positioned on the bridges.

Tepbac estimates that the cost of implementing Farmext could bring farmers up to an additional 30% of value per harvesting season. Phong also has ambitions to digitize the entire production supply, starting with an e-commerce platform to help shrimp farmers connect with input material suppliers and help them save 20% to 30% on input materials, and build out a full financing and exchange platform in the near to medium term.

An 'unwavering' commitment to farmers

Tepbac has to date served about 1,500 farms. The company's clientele ranges from small- and large-scale farmers to shrimp processing plants to the government.

On my trip, it was clear to see why their businesses have been and will keep growing. The shrimping industry in Vietnam remains largely un-digitized. Tepbac offers an easy-to-use solution that addresses farmers' needs, improve crops and, most importantly, is affordable for farmers and owners (who are often one and the same).

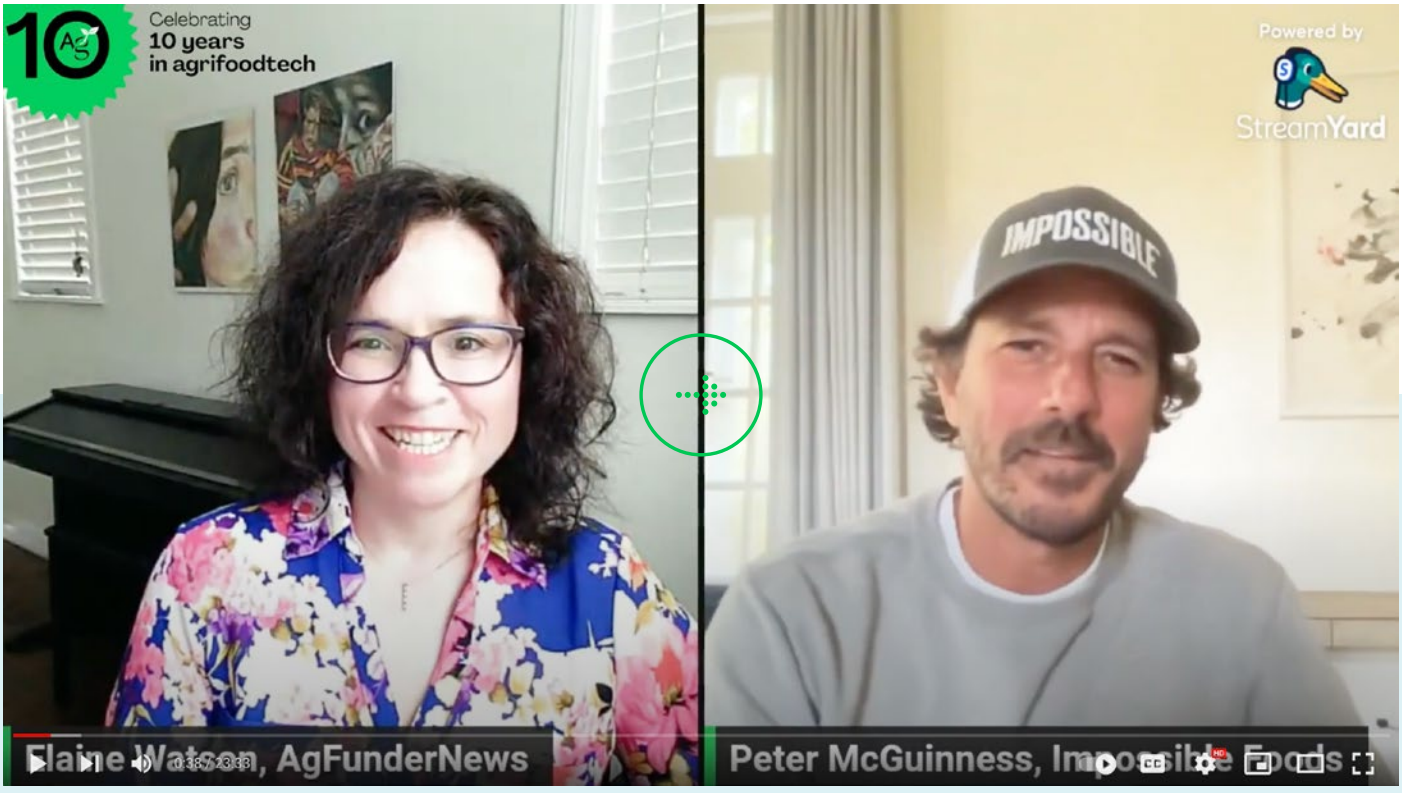
As a venture capitalist, I have had the opportunity to work with some truly incredible startup founders, but few have impressed me as much as Phong and Lam. While their family's backgrounds in shrimp farming have given them unique perspectives on the industry and a deep understanding of the challenges that farmers face, the Tepbac team especially stands out for its unwavering commitment to bettering the lives of farmers, improving the aquaculture industry of Vietnam and laser-sharp focus of driving Tepbac forward from one milestone to the next.

We have no doubt that Tepbac will continue to be a driving force in the industry for years to come.

Impossible Foods CEO on alt meat:

‘We kind of insulted the very people we wanted to try our product: meat eaters’

Words: Elaine Watson



As a private company, San Francisco-based **Impossible Foods** has not faced the same level of public scrutiny as **beleaguered rival Beyond Meat.** But given the jaw-dropping sums (**almost $2 billion**) pumped into the startup over the past 12 years, the pressure to deliver is intense.

Image credit: Impossible Foods

So how is it performing?

"Pretty darn well," against the backdrop of **weakening retail category sales**, negative media sentiment and inflationary pressures, claims CEO Peter McGuinness, who won't share any hard numbers, but says Impossible is gaining share in a declining market.

It's also safe to assume the brand is doing something right in the foodservice arena given that it has retained its spots on the menu at Starbucks, Burger King and White Castle, points out McGuinness, a former ad executive who took the helm at Impossible in April 2022 after several years with Greek yogurt giant Chobani.

But with some commentators questioning whether we have already reached peak 'alt meat,' what do Impossible and other key players in alt meat need to do to reach a broader audience?

We covered:

- Impossible Foods' performance.
- Is an IPO on the cards?
- Merchandising plant-based meat.
- Do we need a 'Got Milk' campaign for meat alternatives?
- What messaging around plant-based meat resonates with a broader audience?
- How is Impossible Foods transitioning from a tech company to a 'tech-enabled food company?'
- What happened to Impossible milk?
- Does Impossible's flagship 'heme' ingredient (the focus of a legal battle with Motif FoodWorks) give it a meaningful edge over the competition?
- Have we already reached 'peak' alt meat?

Building demand, driving awareness:

"We have 15% household awareness, so 85% of the country hasn't heard of us, and you can't buy what you haven't heard of. We did our first ever marketing campaign in June and July, in 11 years. It takes time to build a brand, but awareness leads to trial; trial leads to repeat.

"We need to create demand. The whole notion of 'build it and they will come,' put it on the shelf and it'll sell itself, was a false premise."

What is your priority as CEO?

"We will innovate like a tech company, but we're going to operate like a food company. And that battle is won or lost at the store, on the shelf. It's about building out a retail execution team. It's about getting more display, getting more merchandising, really going at point of sale material in a big big way. At the same time, we're going to do marketing campaigns to build awareness."

Impossible Milk, eggs, cheese:

"We're not focused on them and we don't have plans to pursue them in the future. We're focused on chicken, beef, and pork with 40 SKUs and all day-parts covered. We don't need any more SKUs. Let's just execute on [what we already have]."

Marketing meat alternatives:

"I think the category was not launched in the best possible way. It was launched against the cattle industry. And, you know, no one wants a civil war in America. It was against things, not for things. We kind of insulted the very people we wanted to have

try our product... You don't vilify people, you don't judge people; you invite people to try your products. And so this became political a little bit if I'm being honest. It became bicoastal, elitist and academic.

"It's like 'Don't mess with my frickin' burger... I had a rough week, the kids are crazy, my boss is mean, and I'm just trying to have a burger and a beer and you're trying to get all political on me,' right? Let's just be a great burger that people will enjoy. And if you want to put [dairy] cheese on it, put cheese on it. You have it your way... whatever it's going to take to encourage people to eat more.

"We need to tone down that rhetoric. This is business. We're making good food and we want to make it available to everyone.

Pricing:

"People got it wrong when I first started, everyone was like price, price, price. We took price, Beyond Meat took price [and] didn't see [an increase in] volume. It's about value, it's about the value proposition, which has to start with delicious food, no compromise."

IPO?

"We've raised a lot of money... and we're well capitalized, so we don't need to go public right now. And thankfully so, because the markets aren't the best. A lot of companies are not in our position where we don't have to fundraise right now and we don't have to have any [liquidity] event right now."

Read the full story on AgFunderNews

‘We could use $100bn per year.’

Astanor’s Eric Archambeau on how agrifoodtech will mature after its dot com-style crash

Words: Louisa Burwood-Taylor

After kicking off his career during the heady days of the dot com boom — and subsequent bust — Eric Archambeau cofounded **Astanor Ventures** with George Coelho in 2017 as an impact venture capital fund for food and agriculture.

Fast forward to today and the European firm has made around 40 investments **across the supply chain** and recently announced the closing of its **second fund on €360 million.**

We caught up with Archambeau on the **Future Food** podcast as part of a series of interviews and features for the 10-year anniversary of Monsanto’s Climate Corp acquisition and AgFunder’s creation. Read some highlights below and listen to the full interview on the podcast below, **here**, or wherever you get your podcasts.

Future Food (FF): Did you see the Monsanto acquisition of Climate Corp as something that was pivotal for the agtech industry? Did it live up to its valuation and the impact that it had?

Eric Archambeau (EA): Climate Corporation was pivotal in that investors could peg their expectation to the fact that there were deals in the sector. But it has remained an outlier in many ways.

If you look at many other sectors that developed over the years, it takes a while to get maturity in both the offer and the demand; the demand from acquirers and the offer from companies that need to be maturing. I think we’re getting there and despite the gloom right now, companies have never been so developed and relevant for what the larger companies are looking for, whether they are companies that are offsetting big companies that are in the fertilizer business, or companies that are in the tractors business, or people who are in food businesses.

My prediction is that we're entering a phase where in the next two to three years, we'll see, finally after 10 years, we'll see the beginning of that M&A.

I think the past 10 years were the equivalent of the late 1990s for the internet. The current time is the equivalent of the dot com crash, and then the next three, four years, starting probably next year, is going to be the beginning of a much more mature era for agrifoodtech.

AFN: Why have there been so few sizeable exits in agrifoodtech? Is there a problem or is it timing?

EA: It is both the problem and the timing.

So from a problem point of view, corporates have rationale, up to a point, in the corporate strategy or corporate development strategy. They will need to understand what is the end demand from the customers. And they need to understand what they are lacking in their own R&D groups, product development groups, and that they really need to acquire that from the outside. That takes some cycles: for the demand to be clear enough and the numbers to be clear enough takes a few years to develop.

I think we're getting very close to that. In our portfolio, we can see, for example, some of the companies, which have had some time for, for example, several seasons to demonstrate that the crops benefit from their products, or that some of the bioengineering has been now validated from a regulatory point of view. It's not an anti-virus software where you can push a button and then you have 1,000 customers. Initially, it takes time: you need to build, you need to grow, you need to harvest, you need to measure and that took a few years for that to mature.

AFN: Which categories have been the most successful?

EA: Probably the most successful category has been around precision farming so far. We see a number of our investments there are really happening and it's also about timing; we've made a few investments in vertical farming that were small investments really early on, and then there was a wave of interest into that but we were probably too early to really come back. But the precision farming category I think is really happening. And we, from a timing point of view, I think, well, they are the right time.

About $30 billion was invested in agrifood tech last year after about $50 billion the year before. Is it enough?

It's enough if you put that money to play investing in companies that are really going to make the system change, in our case, in the most impactful way but I think we're far away from having saturated the market. There are so many new and really inspiring founders that are coming up with new ideas, access to technology that is really needed to make things move. I think we could probably use $100 billion a year overall across the supply chain, because what is really missing is not the early-stage tickets in seed, Series A and Series B where we have quite a few players, but really for the bigger tickets, the $50 million to $200 million or more; there's not enough money to be put there. And so the big roles that will help those companies reach escape velocity and have the opportunity to have a sustainable path that are not necessarily going to be acquired but could develop into a bigger company. We don't have enough for that, so, yes, we need more.

Read the full story on AgFunderNews

Why plant nutrition is the driver of soil regeneration

Words: John Kempf

Editor's Note: John Kempf is founder and chief vision officer of Advancing Eco Agriculture (AEA), and one of the leading thinkers in regenerative agriculture. AEA recently announced the expansion of its crop nutrition manufacturing capabilities in Aurora, Colorado to supply an extra 20 million acres of farmland. Here Kempf writes in-depth about why crop nutrition is so important in regenerative agriculture but is often left out of the conversation.

Regenerative agriculture is commonly defined as a regeneration of soil health. A set of soil management practices that includes non-disturbance (no-till), keeping soil covered, incorporating livestock, utilizing cover crops, increasing species diversity, and maintaining continuous living roots in the soil are generally agreed upon as the drivers of a regenerative farm management system.

However, these management practices all miss a fundamental driver of soil health, which can supersede the impact of all the practices above: plant nutritional integrity.

The nutritional integrity of a crop determines its capacity for photosynthesis and carbon sequestration. Photosynthetic activity can vary as much as 3-4x based on a plant's nutritional status. Manganese, magnesium, phosphorus, nitrogen, iron, and other minerals are directly involved in the photosynthesis process. Inadequate levels of any of these nutrients will directly bottleneck photosynthesis and limit the quantity of carbon that is fixed and converted into sugars over each 24-hour photoperiod cycle.

The foundational requirements of photosynthesis are adequate water, carbon dioxide, sunlight, a green leaf containing chlorophyll and balanced mineral nutrition. Farmers intimately understand the critical requirement for water. Sunlight is considered a given. Carbon dioxide supply and mineral nutrition are commonly misunderstood or ignored entirely in outdoor production agriculture. Because of this misunderstanding, most crops being grown in an outdoor agricultural setting are photosynthesizing at only a fraction of their inherent genetic potential.

In our consulting work at Advancing Eco Agriculture, we understand that plant nutrition and microbiome management are the foundational drivers of plant immunity and crop yields, which are brought together in the Plant Health Pyramid. We

collect plant sap analysis data through the entire crop life cycle to manage nutritional integrity and increase disease and insect resistance. Our team has collected tens of thousands of samples over the last fifteen years on dozens of crop species. Almost universally, crops experience significant nutritional imbalances that limit their capacity for photosynthesis. Once we correct these nutritional imbalances, yields and pest resistance increase immediately as a result of the increased photosynthetic activity.

This misunderstanding of the primal importance of photosynthetic efficiency underscores the misconception around the slogan "healthy soils create healthy plants". While it is true that healthy soils produce healthy plants, the question is: "What creates healthy soils?" At the most fundamental level, what creates healthy soils is plants photosynthesizing, sequestering carbon, and transferring that carbon through root exudates into the soil profile to feed the symbiotic microbial community in the rhizosphere.

Without photosynthesis and carbon induction, there is no soil. Soil without the contribution of plants is nothing more than decomposed rock particles. The generally accepted 'regenerative management practices' all point to the necessity of maintaining living plants constantly photosynthesizing but miss addressing the fundamentals of photosynthetic effectiveness. Thus, it is healthy plants that create healthy soil. Plant photosynthesis is the engine that drives the generation (and regeneration) of soil health, not the other way around.

It is commonly assumed that growing crops is somehow inherently extractive, that we deplete soil carbon when growing a crop, and to regenerate, we need to grow 'cover' crops to place carbon back into the soil. In the agronomic literature, it was historically understood that the fastest way to build soil carbon was to grow corn. Today, growing corn is considered one of the fastest ways to deplete soil carbon. This is a result of the nutritional mismanagement of contemporary agronomy, focusing exclusively on a few nutrients (and applying them in excess), while not maintaining nutritional balance to manage photosynthesis. We can build soil carbon levels while we are growing a crop. Any crop. It only requires managing plant nutrition differently and optimizing for photosynthesis and immune function.

Not considering photosynthetic variability is a foundational oversight in almost all of the carbon sequestration literature. It is not accurate to assume that the rate of photosynthesis is a constant and remains consistent across different research settings. For example, researchers report wildly varying percentages of plant photosynthates being transferred to the soil as root exudates, some as low as 5%, and some as high as 95%. This extremely high variability depends on many factors, including plant species, stage of growth, microbiome, and soil environment. But the biggest driver of variability remains the rate of photosynthetic efficiency. Imagine how our agriculture might look different if every crop transferred 95% of its total carbon to the soil, as compared to 5%? Our contemporary agronomy management practices ensure that most crops remain on the bottom end of the spectrum.

The best news is, when you increase photosynthesis, you cannot prevent yields from increasing. Healthy plants with abundant energy levels will produce more fruit, seeds, and vegetative biomass. A model of regenerative agriculture based on sound nutrition management has the capacity to increase the yields of many crops significantly, while simultaneously reducing the need for fertilizers and pesticides.

Managing plant nutritional integrity is a fundamental driver of regenerating soils, and the one driver with an immediate economic impact for farmers. Because of the rapid economic response, the demand for nutritional products designed to fit a regenerative management system is growing quickly.

Our agrifoodtech investment reports

Words: Nathalie Gibson

I joined the AgFunder team in September 2022 after partnering with the firm for many years in my previous role with Foodbytes (Rabobank).

With a news site active since 2013 and over **35 agrifoodtech investment reports** published since 2015, there was a wealth of information and intelligence to build on. Shortly after joining, we refreshed the design of the reports to make them even more digestible for our readers.

$100bn
in agrifoodtech funding detailed and reported

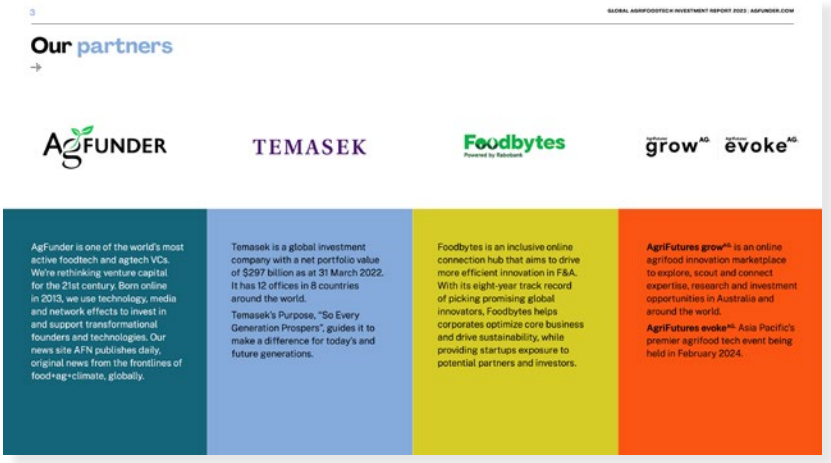
35+
reports published since 2015

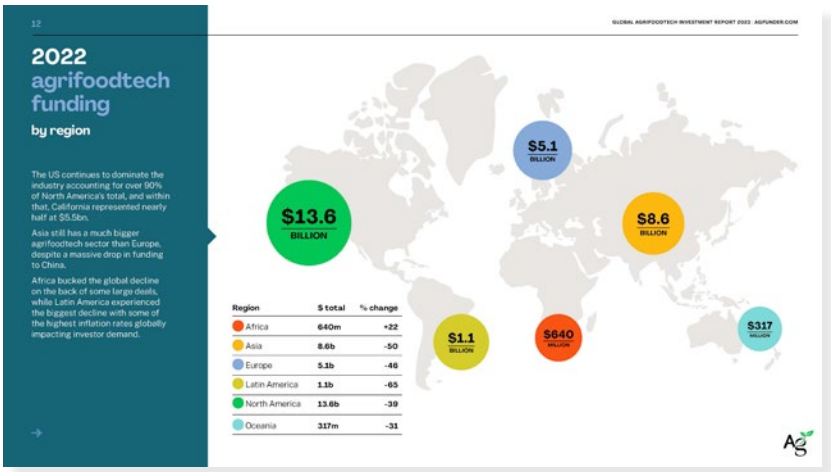
6
agrifoodtech investment reports annually

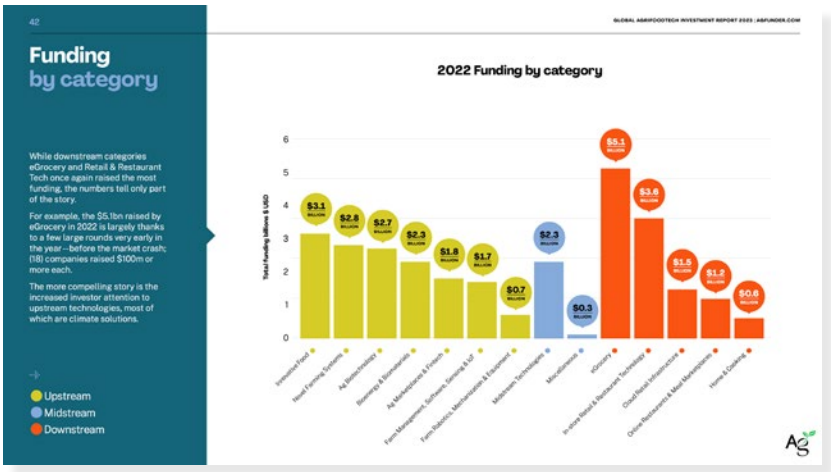
3
report special briefings in Singapore and San Francisco

With the new design, we were able to collaborate with more partners. Not only did they enable us to have an even more robust dataset but they brought new insights to our reporting which allowed us to broaden the scope to include new sections such as startup spotlights, infographics, and country deep-dives.

It's been exciting to test and learn how we can take our research to the next level, and we've had great feedback from our expanded emerging markets focus with our **first Africa investment report** published in September 2022, **Asia-Pacific in October 2022** and **Latin America following in June 2023**. Not only are we building our readership from these regions but we increasingly hear how valuable it is to showcase these emerging market trends to our developed market audience.







Agrifoodtech Investment Report calendar 2024

Global	February
India	April
Latin America	June
Africa	September
Europe	October
Asia-Pacific	November

Did you know?

AgFunder works with a number of partners around the world on customized reports spanning specific sectors and topics.

We collaborate with partners on data and insights to produce industry reports, some which are private and others that are published publicly.

A re-emerging post-pandemic world saw us launch invite-only Report Briefing events for our network of portfolio companies, LPs and partners. The first took place in Singapore showcasing our first Asia-Pacific report 2022, followed by our **Global report briefing in March 2023** in San Francisco. It was great to get the chance to dive into the reports' insights and hear directly from the ecosystem (in person!) their feedback and predictions for the coming year.

Without the support of our partners, our reports would not be possible to produce. It has been rewarding collaborating with partners to help achieve awareness about their businesses, products, and innovation programs alongside our investment data, research and insights.

If you would like to find out more about becoming a report partner, please reach out to me via email.

Nathalie Gibson, Head of Partnerships: **nathalie@agfunder.com**

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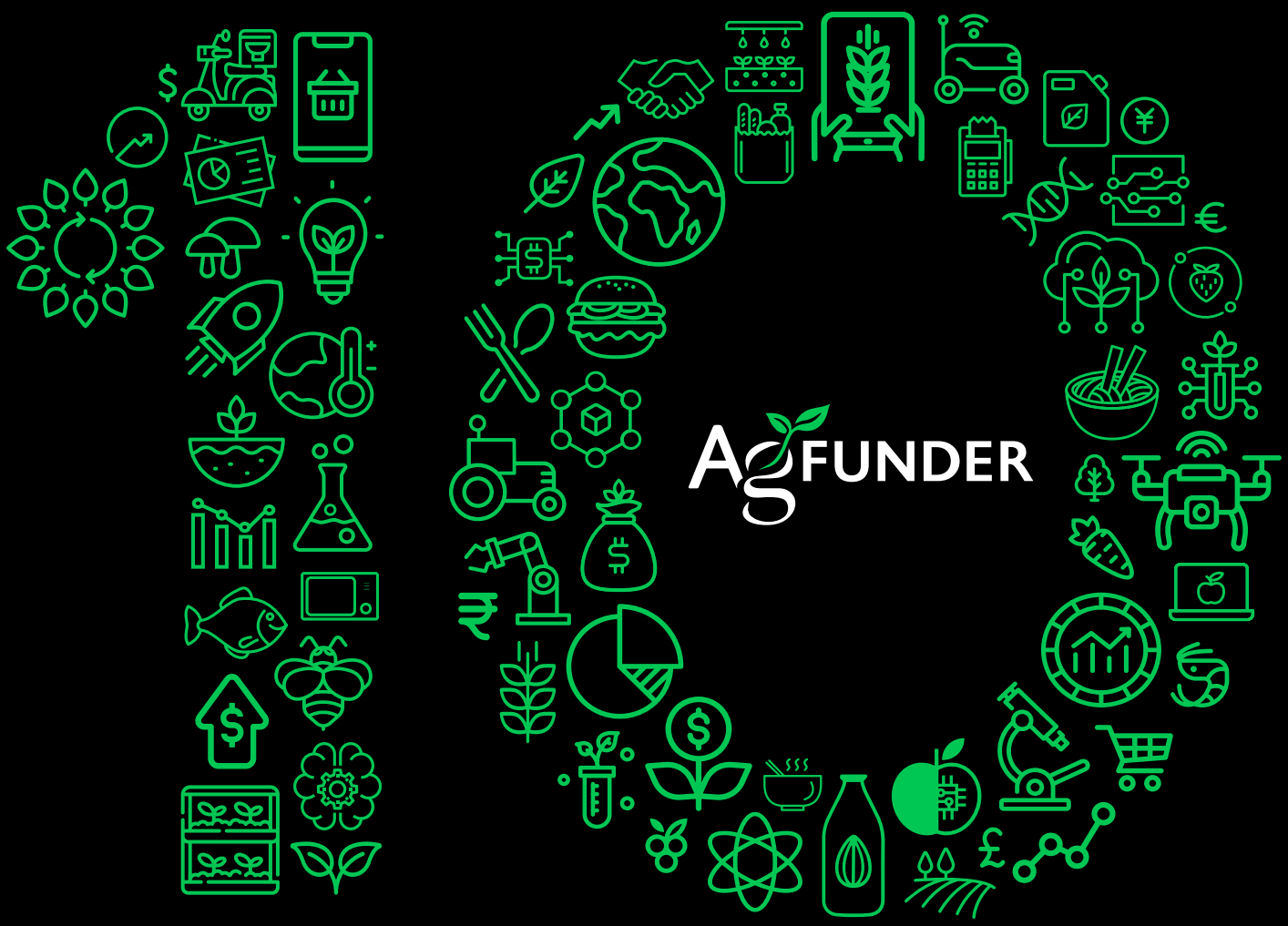

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