PitchBook

EMERGING TECH RESEARCH

Foodtech Report

VC trends and emerging opportunities

Q1
2022

Contents

Institutional Research Group

Analysis

Alex Frederick Senior Analyst, Emerging Technology
alex.frederick@pitchbook.com
pbinstitutionalresearch@pitchbook.com

Data

Matthew Nacionales Data Analyst
matthew.nacionales@pitchbook.com

Publishing

Report and cover designed by **Joey Schaffer**

Isometric landscape designed by **Megan Woodard**

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This report serves as a quarterly snapshot of the foodtech vertical in Q1 2022. For a comprehensive, detailed analysis of the foodtech industry by segment, please see our latest foodtech annual report.

Vertical overview

The foodtech sector includes technology-driven startups developing products and services that are changing how food has traditionally been discovered, purchased, delivered, prepared, and consumed. Examples of food technologies range from bioengineered foods such as Eat Just's cultivated chicken to emerging e-commerce solutions such as Gorillas' ultrafast grocery services.

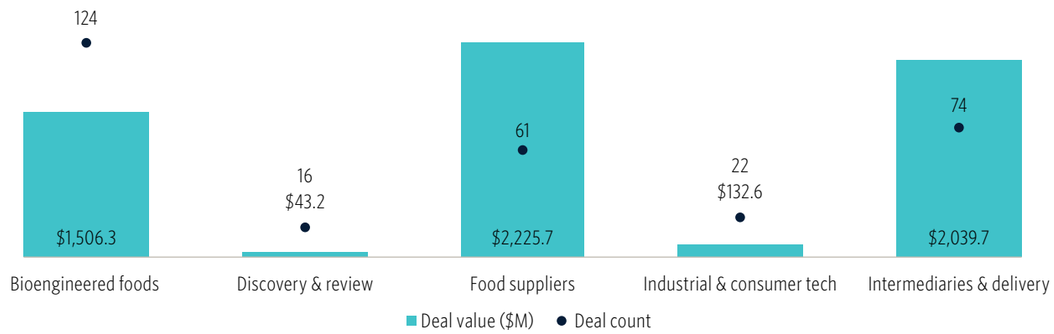
Food e-commerce and mobile commerce continue to be leading attractors of venture capital (VC) funding. Ultrafast delivery startups, which are predicated on delivery of convenience and grocery goods in under 15 minutes, continued to raise significant funding in Q1 despite shutdowns, consolidation, and questions around the model's long-term viability.

Although online grocers have primarily offered consumers convenience through pickup and delivery, we expect that inflation may drive a new value proposition: cost savings. The Bureau of Labor Statistics recently published a consumer price index summary indicating that the **cost of grocery goods increased 10% YoY** in March.[1] Inflation is eroding consumer spending power and shifting spending habits. Major grocery chains such as Kroger are teaming up with automated grocery fulfillment providers such as Ocado and Farmstead to build automated grocery fulfillment centers that enable significant cost savings at scale.

Meal kits may be experiencing a third wind. The category waned in popularity in the mid-2010s, only to regain popularity at the beginning of the pandemic as consumers looked for new and novel ways to prepare meals at home. Although supply chain complexities and inflation of grocery goods pose significant challenges to profitability, we logged several large investments in the space during Q1, indicating that VCs continue to be optimistic about the market opportunity.

1: "Consumer Price Index Summary – March 2022," US Bureau of Labor Statistics, April 12, 2022.

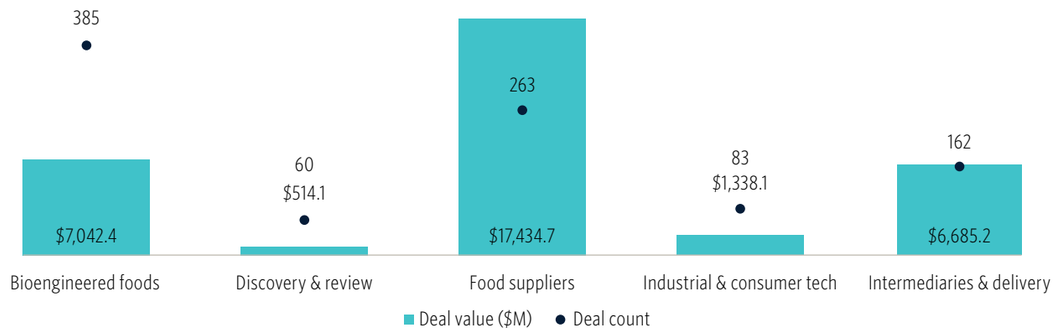
Figure 1. Foodtech VC deal activity by segment in Q1 2022*



Source: PitchBook | Geography: Global | *As of March 31, 2022

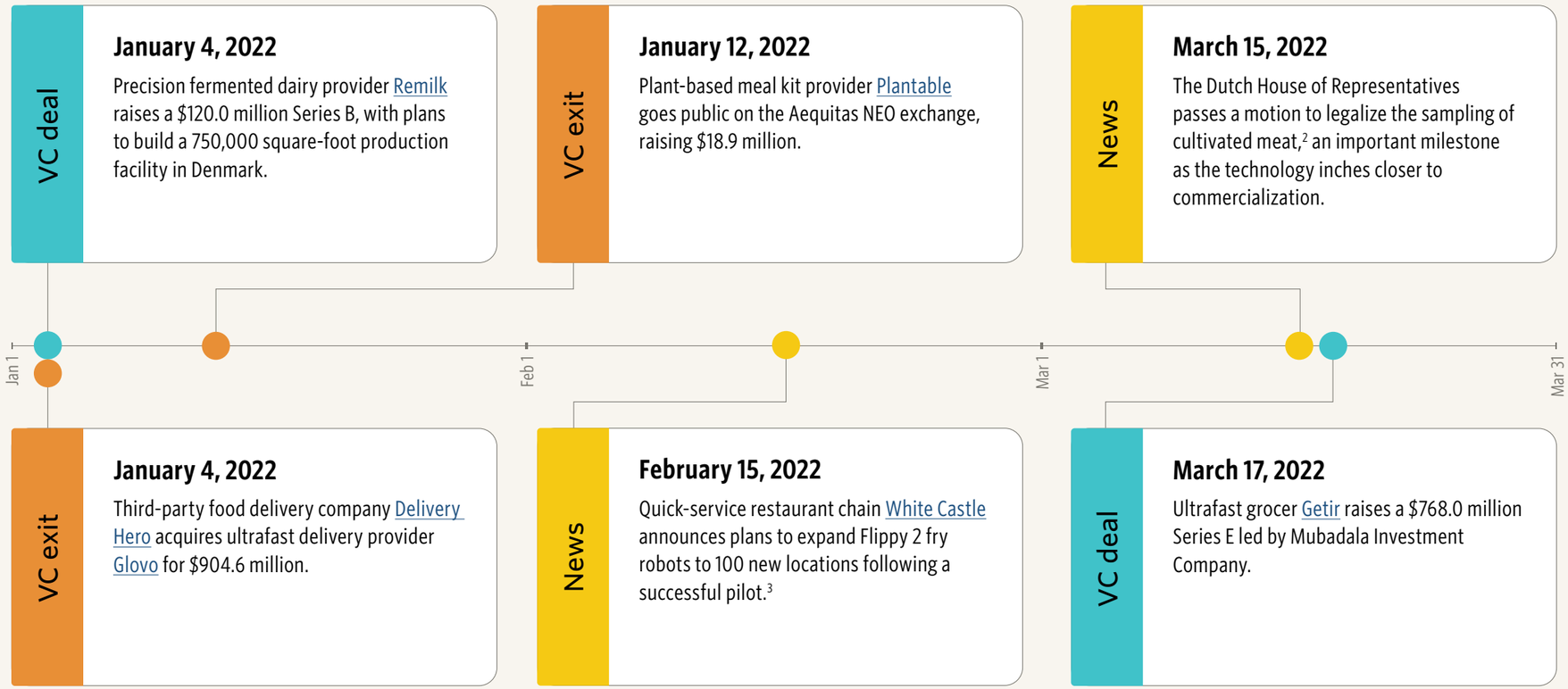
Note: We have excluded multi-vertical super apps from our analysis and all charts. These companies include Gojek, Rappi, Uber, Amazon, and Grab.

Figure 2. Foodtech TTM VC deal activity by segment*



Source: PitchBook | Geography: Global | *As of March 31, 2022

Q1 2022 timeline



Q1 VC activity

359
total VC deals
(down 13.3% QoQ)

$6.9B
total VC raised
(down 40.8% QoQ)

TTM summary

1,548
total VC deals
(up 24.7% YoY)

$36.2B
total VC raised
(up 38.2% YoY)

2: "Permission for Cultured Meat Sampling Next Step Towards Sustainable Meat," Innovation Origins, Aafke Eppinga, March 15, 2022.
3: "White Castle Expands Partnership with Miso Robotics to Install Flippy 2 in 100 New Locations," *PR Newswire*, February 15, 2022.

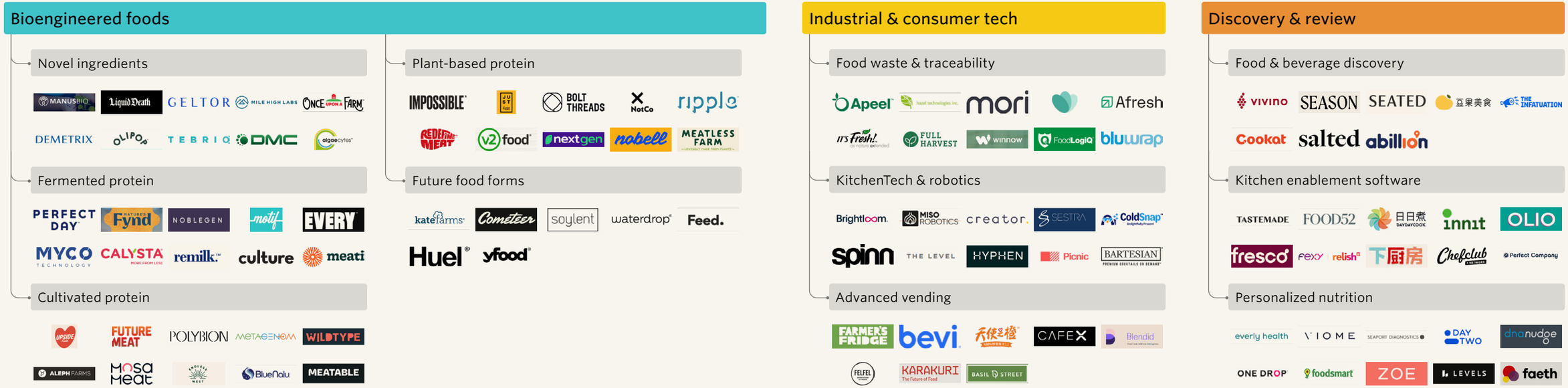
Foodtech landscape

1. Bioengineered foods
2. Industrial & consumer tech
3. Discovery & review
4. Intermediaries & delivery
5. Food suppliers

Foodtech VC ecosystem market map

Click to view the interactive market map on the PitchBook Platform.

Market map is a representative overview of venture-backed or growth-stage providers in each segment. Companies listed have received venture capital or other notable private investments.



Foodtech VC ecosystem market map

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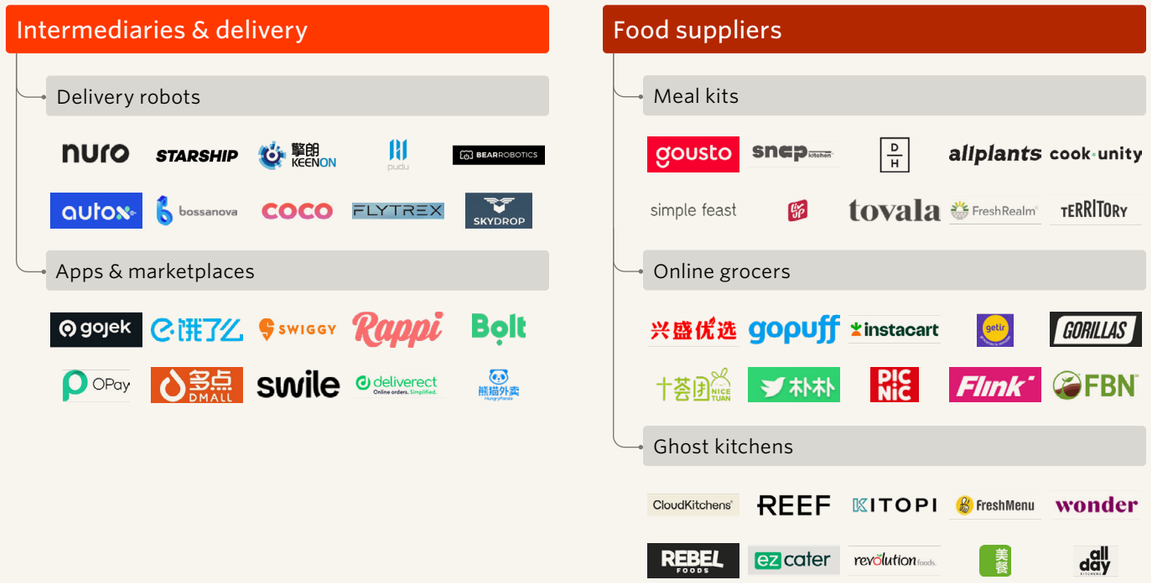
Market map is a representative overview of venture-backed or growth-stage providers in each segment. Companies listed have received venture capital or other notable private investments.



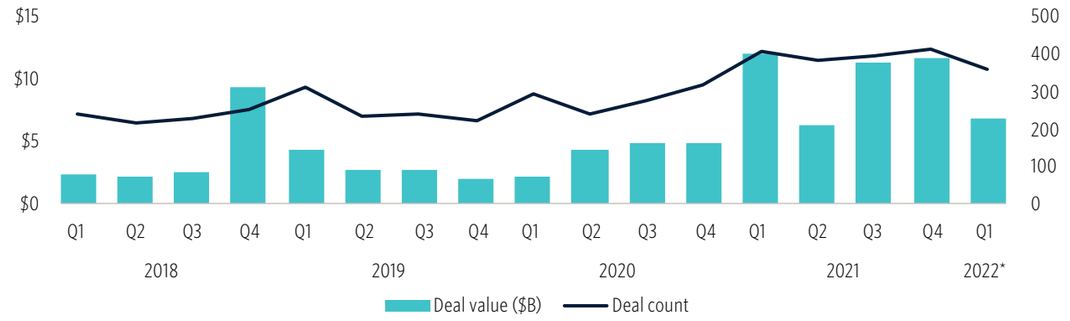
VC activity

Compared with Q4 2021, foodtech venture funding pulled back in Q1 2022, with $6.9 billion invested across 359 deals. Deal values declined 40.8% QoQ, while deal count declined 13.3%. This reversal may be the first step in a larger market recalibration, which many expected given the unsustainable surge in VC funding in 2021 and public market volatility in Q1 2022. The true impacts of the macroeconomic climate are likely not yet visible in Q1 data, as most deals were finalized before market volatility became apparent. We expect that the effects of the macroeconomic climate will become more clear in H2 2022 as investor sentiment takes hold.

Valuations continue to experience upward pressure despite the funding dip, reaching record highs across all VC stages. The greatest growth in valuations was at the early stage, which rose 92.7% between 2021 annually and Q1 2022 to reach $44.0 million. Median valuations reached $160.0 million at the late stage, up 60.0%. Overall deal size growth has slowed to low single digits and has declined at early and late stages. Median early-stage deal size totaled $4.0 million in Q1, down 14.5%, while late-stage deal sizes fell to $12.0 million, down 20.3%. The bifurcation in valuations and deal sizes implies continued fierce competition among VCs, which is increasingly tempered by cautious investment sizes.

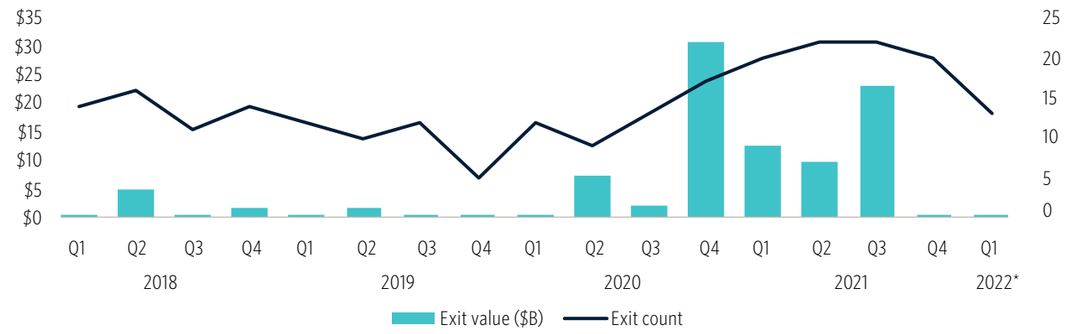
Exits also demonstrate the ways public market volatility affects the private markets. Exit activity in Q1 slowed to a trickle, with a notable dearth of public listings and buyouts. We logged 10 acquisitions, only two public listings, and one buyout, demonstrating a markedly curtailed liquidity compared with 2021. Poor public market performance, especially regarding tech companies, reduced exit opportunities for foodtech startups in the near term. Investors and startups alike are likely waiting until conditions improve.

Figure 3. Foodtech VC deal activity by quarter



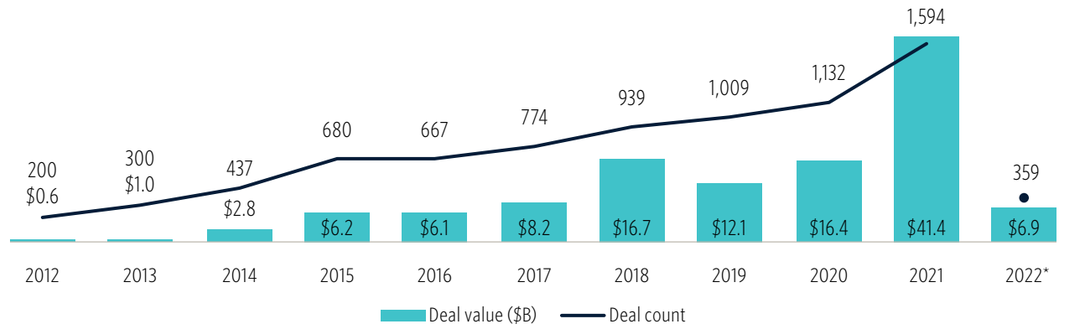
Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 4. Foodtech VC exit activity by quarter



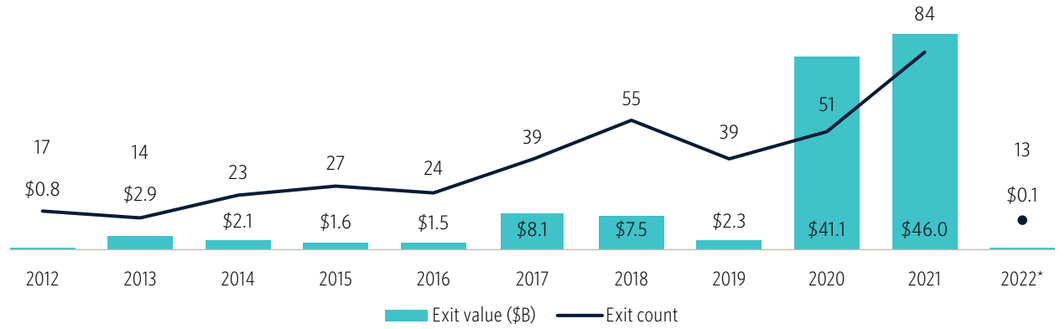
Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 5. Foodtech VC deal activity



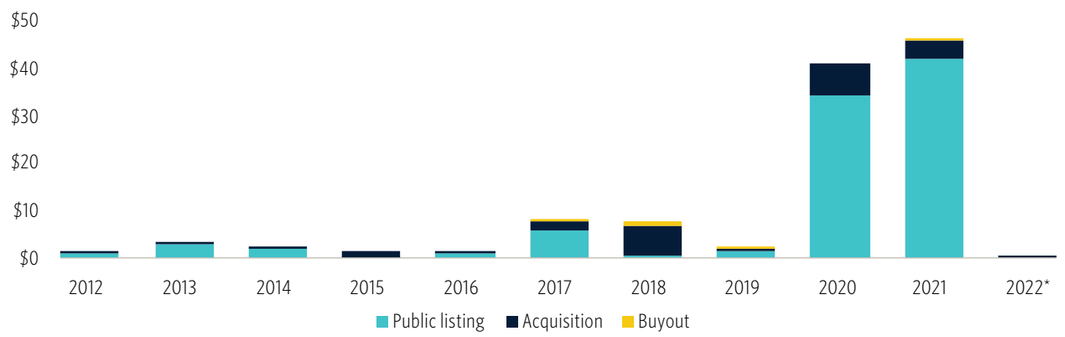
Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 6. Foodtech VC exit activity



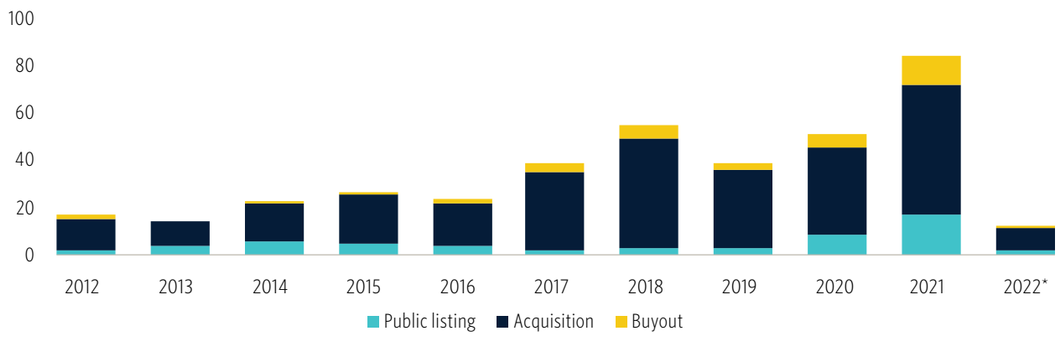
Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 7. Foodtech VC exit value ($B) by type



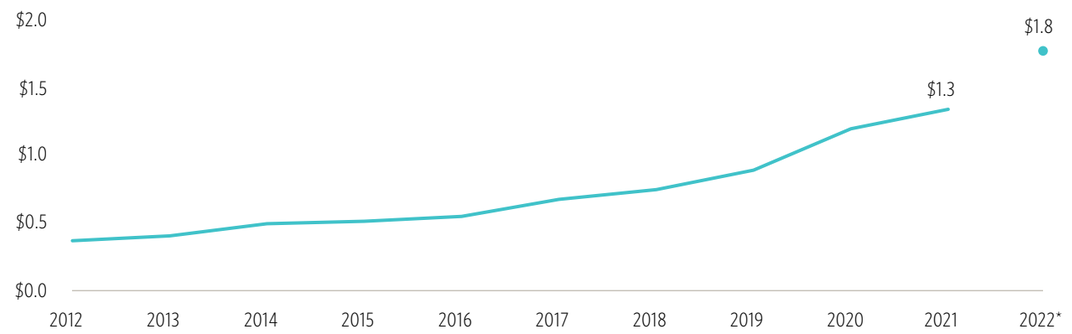
Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 8. Foodtech VC exit count by type



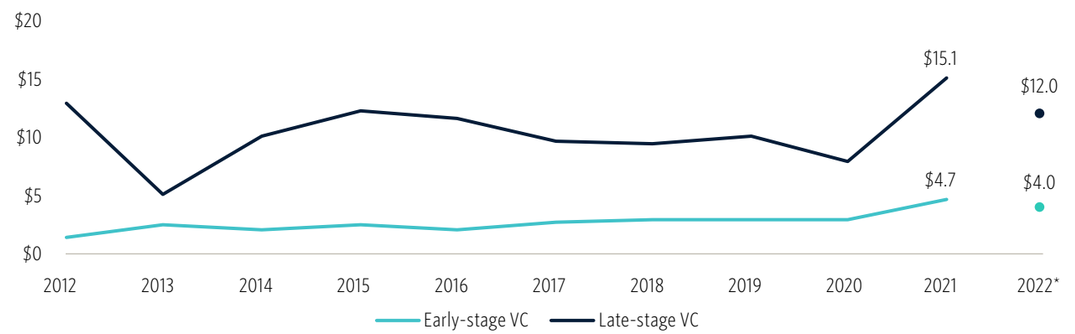
Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 9. Median foodtech angel & seed deal value ($M)



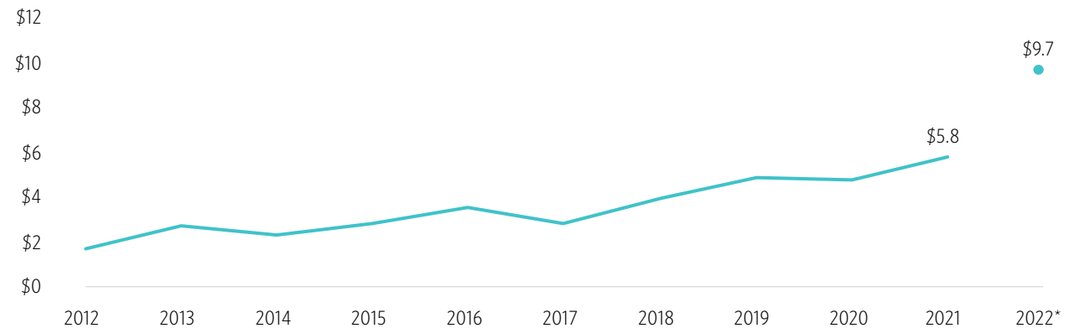
Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 10. Median foodtech early-stage and late-stage VC deal value ($M)



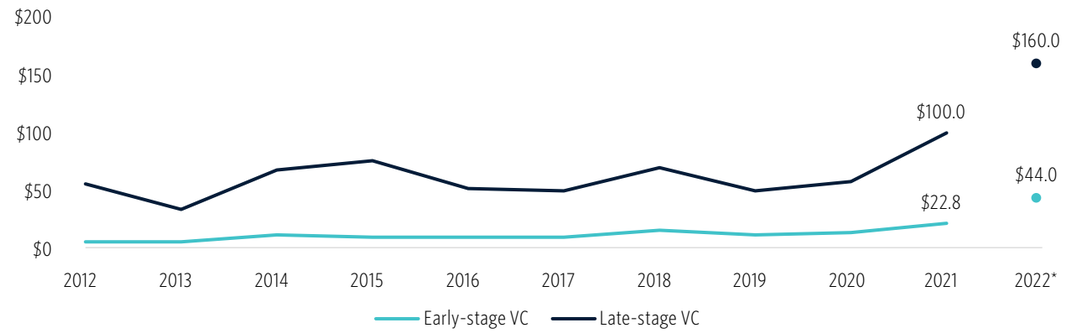
Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 11. Median foodtech angel & seed pre-money valuation ($M)



Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 12. Median foodtech early-stage and late-stage VC pre-money valuation ($M)



Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 11. Median foodtech angel & seed pre-money valuation step-up

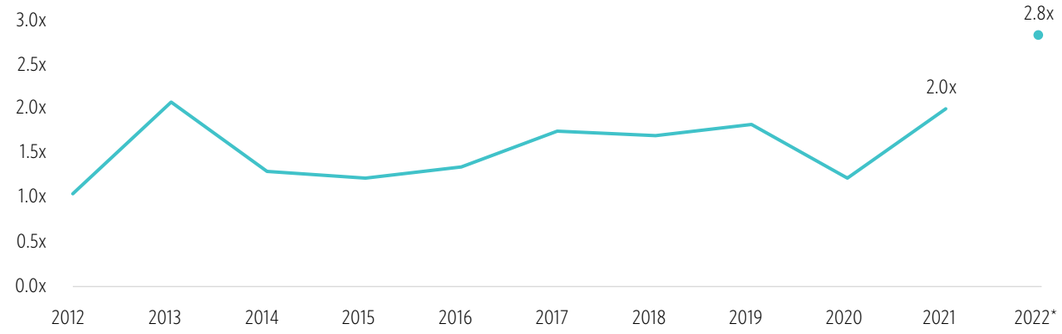


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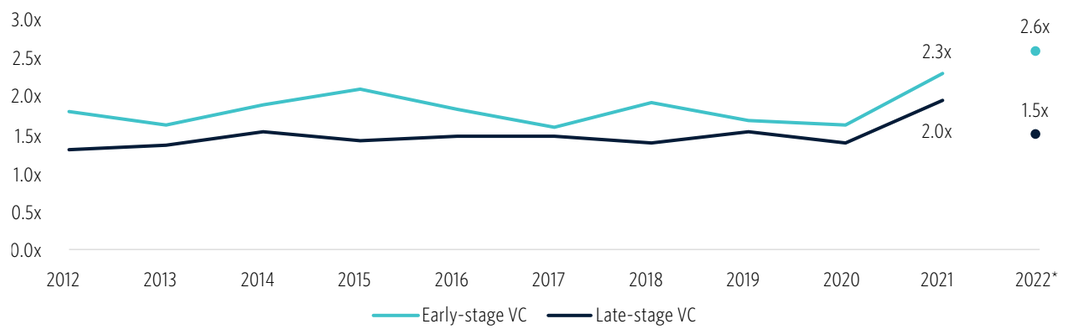
Figure 12. Median foodtech early-stage and late-stage VC pre-money valuation step-up



Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 13. **Key foodtech angel & seed deals***

Company	Close date (2022)	Category	Stage	Deal size ($M)	Lead investor(s)
Faeth Therapeutics	January 19	Personalized nutrition	Seed	$20.0	Future Ventures, Khosla Ventures
Change Foods	February 7	Fermented protein	Seed	$14.0	Route 66 Ventures
Lula	February 3	Apps & marketplaces	Seed	$13.0	Outlander Labs, Ripple Ventures, UP.Partners
Plantish	March 1	Plant-based protein	Seed	$12.5	State Of Mind Ventures
Tender Food	February 15	Cultivated protein	Seed	$12.0	Undisclosed
Zero	February 3	Online grocers	Seed	$11.8	Sway Ventures
Onego Bio	February 22	Cultivated protein	Seed	$11.3	Agronomics, Maki.vc
VFC Foods	January 18	Plant-based protein	Seed	$10.1	Veg Capital
NovoNutrients	February 15	Fermented protein	Series 1 Seed	$9.3	Happiness Capital, E2JDJ, SOSV
Arkeon	March 4	Fermented protein	Seed	$7.0	Synthesis Capital, ReGen Ventures

Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 14. **Key foodtech early-stage VC deals***

Company	Close date (2022)	Category	Stage	Deal size ($M)	Post-money valuation ($M)	Lead investor(s)
Zapp	January 27	Online grocers	Series B	$200.0	N/A	468 Capital, BroadLight Capital, Lightspeed Venture Partners
Remilk	January 4	Fermented protein	Series B	$120.0	$325.0	Dancap Family Investment Office
Starfield Food Science Technology	January 10	Plant-based protein	Series B	$100.0	N/A	Primavera Capital Group
Next Gen Foods	February 15	Plant-based protein	Series A	$100.0	N/A	K3 Ventures, GGV Capital, Bits x Bites
Bazaar	March 15	Apps & marketplaces	Series B	$70.0	N/A	Dragoneer Investment Group, Tiger Global Management
Curefoods	January 12	Ghost kitchens	Series B	$62.0	$325.0	Iron Pillar, Accel, Chiratae Ventures India Advisors, Binny Bansal, Sixteenth Street Capital, Alteria Capital, BlackSoil Group, Trifecta Capital Partners
Coco	February 8	Delivery robots	Series A	$56.0	N/A	Founders Fund, Sam Altman, Silicon Valley Bank
MILKRUN	January 20	Online grocers	Series A	$54.1	N/A	Tiger Global Management
Lunchbox	February 1	Apps & marketplaces	Series B	$50.0	$330.0	Coatue Management
MarketForce	February 22	Online grocers	Series A	$40.0	N/A	V8 Capital Partners

Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 15. **Key foodtech late-stage VC deals***

Company	Close date (2022)	Category	Stage	Deal size ($M)	Post-money valuation ($M)	Lead investor(s)
Getir	March 17	Online grocers	Series E	$768.0	$11,800.0	Mubadala Investment Company
Bolt	January 11	Apps & marketplaces	Series F	$710.5	$8,371.8	Fidelity Management & Research, Sequoia Capital
Swiggy	January 24	Apps & marketplaces	Series K	$700.0	$10,700.0	Invesco
Weee!	February 28	Online grocers	Series E	$425.0	$4,100.0	SoftBank Investment Advisers
Metagenomi	January 21	Cultivated protein	Series B	$175.0	N/A	Farallon Capital Management, PFM Health Sciences
Gousto	January 6	Meal kits	Late-stage VC	$148.2	$1,682.3	SoftBank Group
Starship	February 4	Delivery robots	Series B	$130.0	$530.0	NordicNinja VC, Taavet+Sten
Foxtrot	January 11	Online grocers	Series C	$100.0	$475.0	D1 Capital Partners
Wildtype	January 28	Cultivated protein	Series B1	$100.0	$449.7	L Catterton
MycoTechnology	March 30	Fermented protein	Series E	$85.0	$545.0	Oman Investment Authority

Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 16. **Key foodtech VC exits***

Company	Close date (2022)	Category	Exit size ($M)	Exit type	Acquirer(s)/index
Tasty9	January 26	Meal kits	$83.8	M&A	Fresheasy
Plantable	January 12	Meal kits	$18.9	Public listing	Aequitas NEO Exchange
Ucook	February 24	Online grocers	$12.2	M&A	Silvertreebrands
Vegano	February 15	Meal kits	$6.2	Public listing	Canadian National Stock Exchange
Heo Dak	January 5	Online grocers	N/A	M&A	Fresheasy
Cultured Decadence	January 25	Cultivated protein	N/A	M&A	UPSIDE Foods
Maverix	January 27	Meal kits	N/A	M&A	Curefoods
Frichti	March 10	Apps & marketplaces, meal kits, online grocers	N/A	M&A	Gorillas
Kitch	January 31	Ghost kitchens	N/A	M&A	Glovo
First Delivery	January 28	Apps & marketplaces	N/A	M&A	Bring Me That

Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 17. **Key foodtech incumbents**

Company	Category	Key products	EV/NTM revenue*	EV/NTM EBITDA*
DoorDash	Apps & marketplaces	Restaurant delivery	4.2	93.1
De'Longhi Group	Kitchentech & robotics	Smart appliances	1.0	6.8
Beyond Meat	Plant-based protein	Plant-based meat	4.9	N/A
Blue Apron	Meal kits	Meal kits	0.2	N/A
Just Eat Takeaway.com	Apps & marketplaces	Restaurant delivery	1.2	N/A

Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 18. **Key foodtech VC-backed companies***

Company	Category	VC ($M) raised to date	Post-money valuation ($M)	Most recent VC deal type
Ele.me	Apps & marketplaces	$7,335.5	$30,000.0	Late-stage VC
Xingsheng Selected	Online grocers	$5,440.0	$12,000.0	Late-stage VC
Gopuff	Online grocers	$3,434.7	$15,000.0	Series H
Swiggy	Apps & marketplaces	$3,550.8	$10,700.0	Series K
Instacart	Apps & marketplaces	$2,734.8	$39,000.0	Series I
Nuro	Delivery robots	$2,132.0	$8,600.0	Series D
Bolt	Apps & marketplaces	$1,902.3	$8,371.8	Series F
Impossible Foods	Plant-based protein	$1,862.5	$7,000.0	Series H
Getir	Online grocers	$1,794.0	$11,800.0	Series E
CloudKitchens	Ghost kitchens	$1,550.0	$15,000.0	Late-stage VC

Source: PitchBook | Geography: Global | *As of March 31, 2022

League tables

Figure 19. **Most active foodtech accelerators by deal count since 2021***

Company	Deal count
Y Combinator	26
Techstars	18
Astralabs	10
IndieBio	6
Startup Wise Guys	5
Brinc	4
Google for Startups Accelerator	4
SKU	3
Plug and Play Tech Center	3
Alchemist Accelerator	3

Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 20. **Most active VC investors in foodtech in 2022***

Investor	Deal count	Investor type
SOSV	12	VC
S2G Ventures	9	VC
AgFunder	7	VC
Better Bite Ventures	6	VC
Siddhi Capital	6	VC
Lever VC	5	VC
Global Founders Capital	5	VC
Blue Horizon Corporation	5	VC
CULT Food Science	5	VC

Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 21. **Most active PE investors in foodtech since 2019***

Investor	Deal count	Investor type
General Atlantic	4	Growth/expansion
Warburg Pincus	4	PE/buyout
Verdane	3	PE/buyout
InvestEco Capital	3	Growth/expansion
The CapStreet Group	3	PE/buyout

Source: PitchBook | Geography: Global | *As of March 31, 2022

Figure 22. **Most active foodtech strategic acquirers since 2019***

Investor	Deal count	Investor type
Delivery Hero	6	Corporation
LIVEKINDLY	5	VC-backed company
Glovo	4	VC-backed company
GrubMarket	4	VC-backed company
HungerRush	3	PE-backed company
Carrefour	3	Corporation
Fresheasy	3	VC-backed company

Source: PitchBook | Geography: Global | *As of March 31, 2022

Emerging opportunities

Continuous glucose monitors

Biomedical tools provide valuable insight into personalized nutrition.

3D food printers

3D printers may be printing your next steak.

Continuous glucose monitors for personalized nutrition

Overview

Continuous glucose monitors (CGM) are tools that continuously track blood glucose. This technology has been in the market since 1999,[4] and it initially came in the form of implantable sensors. As the technology has evolved, it has become less expensive and less intrusive, improving the quality of life for patients and allowing for a variety of new consumer use cases. Devices including Abbott's FreeStyle Libre are among a new category of CGMs called "flash glucose monitoring systems," which can be applied like an adhesive bandage and provide continuous readings for up to 14 days. The devices store eight hours of data and can be transmitted wirelessly. Because of this innovation, blood sugar is increasingly being used as a data source to help interpret metabolic health and guide personalized nutrition. Companies providing personalized nutrition services using CGM and providers of CGM technology together attracted $118.6 million in VC funding in 2021, up 52.7% from the 2020 annual total.

Metabolic health

Metabolic health reflects the body's ability to maintain ideal blood sugar levels, triglycerides, high-density lipoprotein (HDL) cholesterol, blood pressure, and other bioindicators. Nutrition and diet play a significant role in metabolic health, but a variety of behavioral and environmental factors can affect it as well, including:

- Sleep
- Stress response
- Exercise
- Environmental toxins
- Genetics
- Gut microbiome

Poor metabolic health can negatively affect:

- Brain function
- Energy
- Memory
- Mood
- Skin health
- Fertility

It can also increase the risk of developing chronic diseases such as Type 2 diabetes, heart disease, kidney disease, and other medical conditions. According to a recent study, only 12% of adults living in the US are metabolically "healthy."[5]

4: "Continuous Glucose Monitoring Devices: Past, Present, and Future Focus on the History and Evolution of Technological Innovation," National Library of Medicine, Journal of Diabetes Science and Technology, Olesya Didyuk, et al, January 13, 2020.

5: "Prevalence of Optimal Metabolic Health in American Adults: National Health and Nutrition Examination Survey 2009–2016," Metabolic Syndrome and Related Disorders, Joana Araújo, Jianwen Cai, and June Stevens, February 8, 2019.

Business model

CGM personal nutrition providers tend to sell via subscription or hybrid models and may offer bonus services a la carte. Levels charges $199 for an annual subscription that includes access to the app and community programming. Members are expected to pay an additional $199 per month for CGMs and can pay $179 for metabolic blood testing. Partnered nutritionists offer nutrition coaching for an additional fee. In total, a subscriber is likely to spend at least $2,945 annually.

Competitor ZOE offers a similar hybrid software-as-a-service (SaaS) and hardware-as-a-service (HaaS) model charging $59 per month for app access, a personalized nutrition program, and unlimited coaching. Subscribers start with a one-time, two-week testing regime costing $294, leading to an annual total cost of $1,002 when paid monthly, or $642 if paid annually. ZOE's program is less expensive because subscribers wear the CGM for two weeks instead of continually.

Key providers

Since the Abbott FreeStyle Libre flash glucose monitor became available in 2017, several personalized nutrition providers have entered the market to use CGM technology to help customers improve metabolic health and achieve health and fitness goals. Although there are alternatives, most personalized nutrition providers use the Abbott FreeStyle Libre to gather glucose readings.

Levels — Levels is a personal nutrition provider incorporating CGM, metabolic blood testing, food logging, and fitness activity to derive actionable metabolic insights. Live nutritionist support is available via the mobile app to interpret results. Compared with other solutions, Levels is more focused on optimizing for fitness performance. Levels was founded in 2019 and has raised $55.8 million in VC funding.

Veri — Veri tracks glucose levels, sleep, and nutrition using a mobile app and a CGM to achieve health goals, including losing weight, reducing stress, and improving sleep. The platform guides users on what and when to eat in order to achieve these specific goals. Veri was founded in 2019 and has raised $4.0 million in VC funding.

NutriSense — NutriSense tracks a multitude of factors affecting metabolic health, including glucose levels, meal composition, fasting, meal timing, exercise, stress, and sleep. Compared with other providers, NutriSense is among the most robust in terms of analytical tools, although its metrics may be less actionable. The cost includes personalized dietitian support, which may help users interpret results. NutriSense was founded in 2019 and has raised $20,000 in seed funding.

ZOE — ZOE is one of the most comprehensive providers, using novel biometric tests to understand factors affecting metabolic health and to provide users with personalized health guidance. The ZOE program incorporates biometric tests, including blood fat levels and microbiome analysis, in addition to blood sugar monitoring with a CGM. Users are sent a kit that includes a CGM, as well as stool and blood tests. The biometric analysis, combined with food tracking, provides a comprehensive view of metabolic health factors. After an individual uses the CGM for 14 days, ZOE has enough data to predict how different foods will affect their blood sugar and fat levels. Then, users stop wearing the CGMs and rely on the app for insights. ZOE was founded in 2017 and has raised $65.6 million in VC funding.

Other personalized nutrition and CGM providers include Supersapiens, January AI, and Signos.

Glucose monitoring provides nearly immediate biofeedback on how diet and other factors influence metabolic health. Other personalized nutrition platforms offer genetic and gut microbiome testing services to provide valuable personalized insights. The main drawback is the two- to 10-week lag between when the sample is taken and when results are available. Key providers offering personalized nutrition services using other technologies include:

Genopalate — Uses DNA analysis to derive insights, including:

- DNA-based behaviors, such as emotional eating and late-night snacking
- Cravings for fat, carbohydrates, and sweets, among other things
- Unique taste preferences
- Personalized nutrition, such as best time to eat; food sensitivities such as gluten and lactose intolerance; and nutrition analysis for optimal diet

DNAfit — Uses DNA testing to create a dietary profile that includes optimal diet type, food sensitivity, and vitamin levels. Product offerings include dietician coaching and meal planning.

Lumen — Sells an electronic device that measures CO_2 concentration in breath to determine if the body is burning fat or carbohydrates for energy. After taking a reading, the Lumen app provides food recommendations to optimize for metabolic health, weight loss, and fitness goals.

Day Two — Similar to ZOE, Day Two sends users a kit that includes stool and blood test kits to assess gut microbiome health and average blood sugar levels. Based on the gut microbiome profile, biometrics, and health and lifestyle data obtained through questionnaires, the platform

Figure 23. Top VC-backed providers of CGM devices and services

Company	Most recent deal date*	VC ($M) raised to date*	Deal type
One Drop	August 24, 2020	$107.2	Late-stage VC
ZOE	May 4, 2021	$65.6	Early-stage VC
Laxmi Therapeutic Devices	April 12, 2021	$29.2	Seed
Ultrahuman	August 4, 2021	$25.5	Early-stage VC
GraphWear	October 4, 2021	$24.7	Late-stage VC
January AI	January 11, 2021	$19.5	Seed
Signos	November 10, 2021	$17.0	Early-stage VC
Supersapiens	April 27, 2021	$13.5	Early-stage VC
Levels	March 21, 2022	$12.0	Late-stage VC
Glucovation	April 10, 2017	$6.2	Early-stage VC

Source: PitchBook | Geography: Global | *As of March 31, 2022

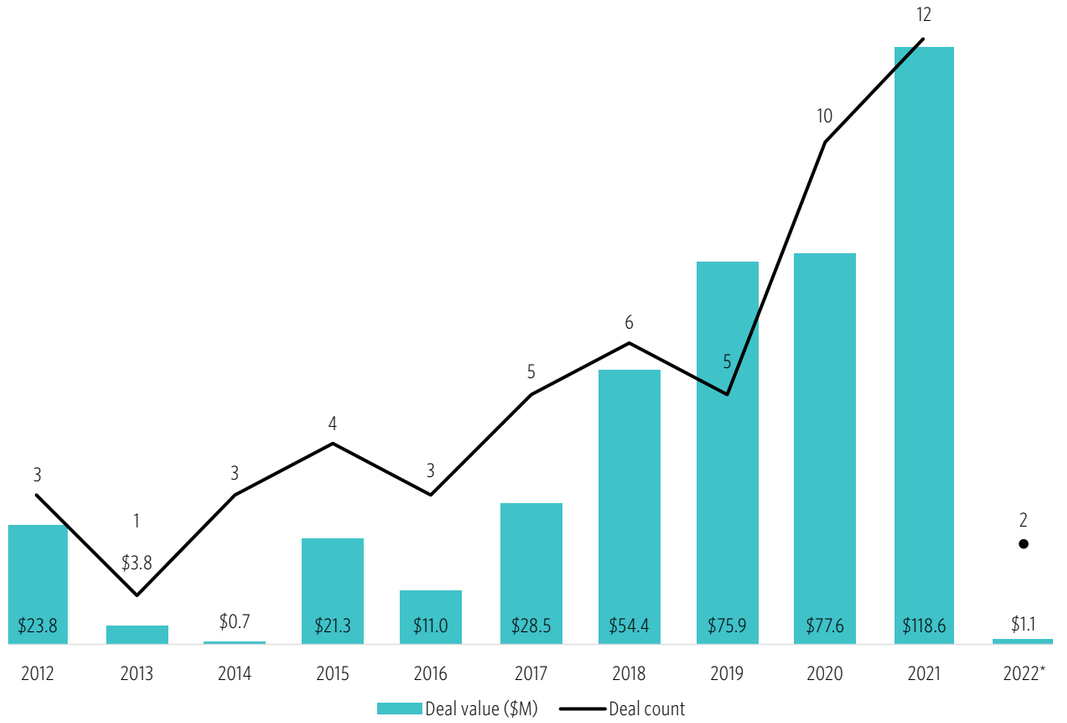
makes personalized nutrition recommendations to normalize blood sugar levels. Instead of having users wear CGMs, Day Two taps into a dataset of a historical clinical study that measured how different foods and eating habits affect blood sugar levels, and rather than having users track glucose levels in real-time, it uses artificial intelligence (AI) to predict how users will respond to foods and other factors. Unlike other providers, Day Two is available only to employers or through health plans.

Outlook

While nascent, personalized nutrition is quickly evolving. The tools to measure factors affecting metabolic health are becoming less intrusive and less expensive, and continued research and evolving AI tools are helping companies provide ever more powerful and actionable insights. In instances of extreme data volume, wherein a human data analyst might become overwhelmed, AI can help identify patterns. In the case of human health, many factors are at play. We expect personalized nutrition tools leveraging biometric data to become increasingly insightful as models continue to train. Eventually, algorithms may become robust enough that most providers end up doing away with CGM—similar to Day Two's approach.

When considering downsides to CGM, thus far, there have been relatively few scientifically rigorous trials linking biometric-based, AI-driven recommendations to optimal outcomes. We are also concerned with the potential for questionable behavior in the industry. Some companies are using biometric insights to sell supplements and vitamins. One provider, uBiome, was even charged with fraud.

Figure 24. CGM VC deal activity



Source: PitchBook | Geography: Global | *As of March 31, 2022

CONTINUOUS GLUCOSE MONITORS FOR PERSONALIZED NUTRITION

Each of the personalized nutrition tools assessed requires meal tracking, which presents a challenge for user adherence—especially when there is no immediate biofeedback. Personalized nutrition tools such as Levels that incorporate CGMs may reduce this hurdle by informing users how their diet affects health in real time.

Lastly, we believe there are numerous data security concerns inherent in consumer biometric platforms. Consumer DNA providers such as MyHeritage have experienced data hacks, and there is no reason to think it could not happen again. Some of these providers work with employers and health insurers, which could potentially lead to discriminatory insurance or even employment decisions. Finally, biometric data could be valuable for targeted advertising. Weak consumer protection laws may allow personalized nutrition platforms to monetize this private information.

3D food printers

Overview

3D printing is the process of constructing a three-dimensional object from a digital model. 3D printers typically operate by printing thin layers of material in succession. The process gained mainstream attention in the 2010s as declining equipment costs made consumer models affordable and new use cases, such as home construction, emerged. Although plastics are the most commonly used material in 3D printing, edible ingredients can be used to 3D print food products. The next wave of this technology is 3D bioprinting, which involves printing living cells, growth factors, and other biomaterials to produce whole cut cultivated meat. 3D-food-printer companies logged $185.7 million in VC funding in 2021, up 15.7x from 2020's annual total.

Use cases

3D-printed food evokes futurist visions of meal preparation, wherein consumers instantly generate a meal at the push of a button. At present, technological developments are shifting this vision from a Jetsons-esque fantasy to an inevitable reality. However, near-term applications are a far cry from this so-called fantasy.

Use cases can be separated into two categories: personalization and commercial manufacturing tools.

Much of initial 3D food printing has come in the form of consumer food personalization applications, which tend to be superficial decorations applied to prepared foods instead of entirely 3D-printed foods. However, a small number of alt-protein companies are developing 3D-printed meat solutions such as whole cut steak and fish.

Examples of emerging use cases include:

Food creations — Startup Natural Machines makes a 3D food printer designed for restaurants, food companies, and food enthusiasts. The company provides a variety of ideas for foods to print; they mostly take the form of accents that add flair to dishes, such as a 3D-printed chocolate cup.

Drink decorations — The hospitality industry is continually looking for the next big way to attract and retain customers. PRINT A DRINK has developed the first 3D printer for drinks. It doesn't "print" an entire drink; instead, it prints 3D designs suspended in the drink to decorate it. The printer injects the drink with an oil-based liquid using a glass needle.

Printed, personalized vitamins — Existing multivitamin options are one-size-fits-most and cannot account for consumers' unique needs and health goals. If consumers want more out of vitamins, they need to take multiple pills—which can be inconvenient and costly. Startup Nourished sells personalized vitamins, which the company tailors to the needs of each client. New customers take a health and demographic survey, and Nourished produces 3D-printed, custom vitamins.

Creating 3D-printing software for the food industry — Typical all-purpose 3D-printing software fails to account for the unique characteristics that make the food paste used in 3D printing more challenging to work with than plastic filament. La Pâtisserie Numérique is developing 3D-printing software designed to improve the performance of food paste and edible inputs for the food industry. Restaurant chefs and other food vendors looking to create 3D-printed food products are likely target customers.

3D-printed meat

One of the challenges of cultivated meat is the form the cells take when the cultivation process is complete. Far from steak, cultivated meat cells form a meat slurry that needs to be combined with fat and other flavors, processing necessary to provide a form and taste familiar to consumers. Aside from the physical shape and form, whole cuts of meat contain a combination of muscle tissue, fat, and blood vessel fibers that, when combined, give steak its familiar flavor, as well as a unique marbling effect.

3D bioprinting is a derivation of 3D printing that prints using a liquid mixture of animal cells and other biomaterials onto a scaffold to create a three-dimensional structure. 3D-printed meat companies are developing techniques to "print" whole cuts of meat into attractive shapes. They include multiple cell fibers (muscle, fat, and connective tissue) to provide a realistic product. Two cultivated meat companies, MeaTech and SavorEat, are working on 3D-bioprinted whole cuts of meat, while NovaMeat is developing a 3D-printed hybrid meat product containing both cultivated and plant-based ingredients.

Plant-based steak can be produced using 3D printers as well, and the process is less complex than animal-based steak because no cultivated animal cells are used. In 2018, Redefine Meat developed its 3D-printed plant-based whole cuts of meat and first introduced its products to restaurant patrons. Since then, the company has expanded rapidly. Its plant-based steaks are now available at over 200 restaurants. Revo Foods is developing plant-based fish filets using 3D printing to layer orange muscle tissue and white connective tissue realistically.

Figure 25. **Top VC-backed providers of 3D food printers**

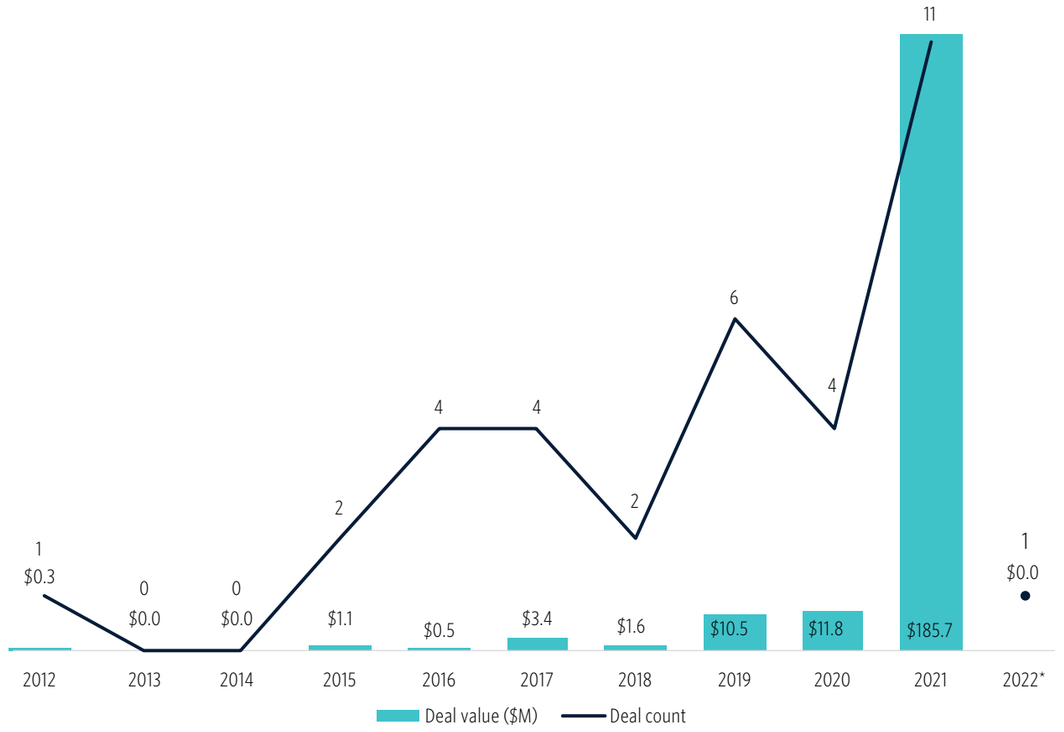
Company	Most recent deal date*	VC ($M) raised to date*	Deal type
Redefine Meat	August 23, 2021	$171.1	Early-stage VC
Nourished	September 7, 2021	$15.2	Early-stage VC
Novameat	December 15, 2021	$8.7	Early-stage VC
CellX	August 20, 2021	$4.3	Early-stage VC
Revo Foods	August 19, 2021	$2.7	Early-stage VC
Natural Machines	June 30, 2017	$2.3	Late-stage VC
Procusini	March 28, 2019	$1.8	Early-stage VC
Shinnove	May 1, 2018	$1.6	Early-stage VC
BeeHex	April 1, 2019	$1.4	Early-stage VC
Kosmode Health	September 1, 2021	$0.5	Seed

Source: PitchBook | Geography: Global | *As of March 31, 2022

Outlook

3D food printing raised record VC funding in 2021, logging $185.7 million in VC funding across 11 deals. The rise in funding can be attributed primarily to growing enthusiasm for alt-proteins and a desire to create alt-meats that better mimic animal meats in form and flavor. We believe that other, nonmeat use cases will remain relatively underdeveloped in the medium term. Printing is relatively slow, and food paste can be challenging to manipulate. Printing an entire meal at the push of a button is not possible with existing technology, and it is unclear whether there is enough innovation in the space to reach that future state anytime soon. We expect most capital to continue to be deployed for commercial food production applications, especially those relating to alt-proteins.

Figure 26. 3D food printers VC deal activity



Source: PitchBook | Geography: Global | *As of March 31, 2022

Select company highlights

SELECT COMPANY HIGHLIGHTS

Founded
2019

44+
employees

Total raised:
$131.3M

Last financing:
Raised $120.0M in a Series B

Last financing valuation:
$325.0M

Lead investors:
Dancap Family Investment Office

Overview

Rehovot, Israel-based Remilk is an alt-protein provider of dairy proteins made through precision fermentation technology. Self-described as the "world's cleanest milk," cow milk made from Remilk's alt-dairy proteins is lactose, cholesterol, and animal-free. Dairy proteins manufactured include both casein and whey made using a yeast-based fermentation process.

Although the market is saturated with plant-based dairy products, precision fermentation is a more nascent and complex technology capable of producing more-convincing dairy products. Consumers have expressed an expectation for high-quality taste and performance,[6] and it is unclear if early entrants have met that high bar.

Remilk is pursuing a business products & services model by selling its proteins to food companies to produce dairy products such as yogurt and cheese. The company has commenced high-volume production in multiple facilities globally and recently announced plans to build a 750,000 square-foot production facility in Kalundborg, Denmark.

Leadership

Remilk was co-founded by Aviv Wolff, a serial entrepreneur, and Ori Cohavi, who has a biochemistry Ph.D. and experience working in biotech.

Competitors

Remilk competes against dairy and alt-dairy companies. Compared with plant-based milk and animal milk, precision fermented dairy proteins have the potential to perform identically to animal proteins while offering animal-free health and ethical benefits. There are roughly 20 other precision fermented dairy providers globally. The largest is Perfect Day, which has raised $711.5 million at a $1.6 billion post-money valuation and supplies dairy proteins for food products, including ice cream and cream cheese spread and sports protein powder. Other VC-backed precision fermented daily providers include Motif FoodWorks, Formo, and New Culture.

6: "Precision Fermentation: Is the World Read for Animal-Free Dairy?" Food Navigator, Flora Southey, February 14, 2022.

Outlook

Remilk has focused its efforts on scaling production and distribution by manufacturing its dairy proteins in facilities globally. The most recent funding round of $120.0 million will enable it to build a production facility in Europe that it purports will be the world's largest. Its business products & services focus will enable Remilk to optimize production and availability, leaving the challenges of product development, marketing, and sales of consumer goods to food companies.

Figure 27. **Remilk financing history**

Accelerator/incubator	Accelerator/incubator	Seed	Series A	Series B
March 1, 2020	**April 27, 2022**	**N/A**	**December 9, 2020**	**January 4, 2022**
Total raised: N/A	**Total raised:** $0.02M	**Total raised:** N/A	**Total raised:** $11.3M	**Total raised:** $120.0M
Pre-money valuation: N/A	**Pre-money valuation:** N/A	**Pre-money valuation:** N/A	**Pre-money valuation:** $18.7M	**Pre-money valuation:** $205.0M
Lead investors: jumpTAU	**Lead investors:** ProVeg Incubator (Albrecht Wolfmeyer)	**Lead investors:** Fresh.Fund	**Lead investors:** Fresh.Fund	**Lead investors:** Dancap Family Investment Office

Founded
2015

1,500+
employees

Total raised:
$823.5M

Last financing:
Raised $425.0M in a Series E

Last financing valuation:
$4.1B

Lead investors:
Softbank Investment Advisors

Overview

Weee! is an online grocery provider specializing in Asian and Hispanic foods. The company was initially launched to improve access to quality Asian groceries and has since expanded to serve Hispanic and Latino populations. Weee! is digital-only and has no brick-and-mortar grocery stores. Grocery orders are fulfilled out of local fulfillment centers instead of shipped, thereby enabling the grocer to provide fresh meat and produce.

Although the company was growing rapidly before 2020, the pandemic proved to be a great accelerator. In 2020, Weee! had already achieved profitability and was available in eight markets across five US states. Today, Weee! serves 40 states and over 100 markets.

Leadership

Weee! was founded in 2015 by Larry Liu, a Chinese immigrant to the US who was frustrated with his experience with Chinese grocery stores in the US, citing long travel times, crowded stores, old produce, and poor product selection.[7] His executive team includes Chief Finance and Strategy Officer Ankur Shah, who has a background in VC investing at Acumen Fund and business consulting at McKinsey & Co. John Chu, the director of the film "Crazy Rich Asians," was brought on as Chief Creative Officer in early 2022.

Competitors

Weee! competes with brick-and-mortar Asian and Hispanic grocery stores, including H Mart, 99 Ranch Market, and Northgate Market. It differentiates by offering a wider selection of goods as well as the convenience of shopping from home. As an online grocer, Weee! also competes against other online providers including Instacart and Hungryroot, as well as larger brick-and-mortar chains that have been expanding rapidly into e-commerce, such as Kroger, Amazon, and Albertsons. Weee! differentiates from online grocers with its focus on Asian and Hispanic markets. When compared with the digital operations of Kroger and Albertsons, Weee! likely holds an operational advantage that may equate to cost savings because it operates without the added challenge of brick-and-mortar stores.

7: "Online Grocery Weee's Larry Liu on Delivering In A Pandemic," *The Seattle Times*, Tali Arbel, April 11, 2021.

Outlook

Weee! has been expanding rapidly to reach new markets across the US. The next major step will be implementing robotics and automation technology in fulfillment centers to improve order capacity and efficiency. Cost savings may be an important point of differentiation as consumers see grocery spending power eviscerated by inflation.

Fulfillment optimization will also help improve delivery speed. Currently, delivery is scheduled two+ days out, while many competitors offer delivery options in two hours or less. New upstarts offering convenience and grocery delivery in 15 minutes or less will likely place increased pressure on Weee! to improve delivery capabilities.

Figure 28. **Weee! financing history**

Series A	Series B	Series B1	Series C	Series D	Series E
December 2, 2018	**December 18, 2019**	**March 17, 2020**	**August 17, 2020**	**March 16, 2021**	**February 18, 2022**
Total raised: $11.8M	**Total raised:** $18.0M	**Total raised:** $10.0M	**Total raised:** $35.0M	**Total raised:** $315.0M	**Total raised:** $425.0M
Pre-money valuation: $29.0M	**Pre-money valuation:** $100.0M	**Pre-money valuation:** $170.0M	**Pre-money valuation:** $600.0M	**Pre-money valuation:** $2,500.0M	**Pre-money valuation:** $3,675.0M
Lead investors: Goodwater Capital and iFly.vc	**Lead investors:** XVC and VMG Partners	**Lead investors:** XVC (Boyu Hu)	**Lead investors:** DST Global	**Lead investors:** DST Global	**Lead investors:** SoftBank Investment Advisers

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PitchBook Data, Inc.

John Gabbert Founder, CEO

Nizar Tarhuni Senior Director, Institutional Research & Editorial

Paul Condra Head of Emerging Technology Research

Additional research

Agtech
Alex Frederick
alex.frederick@pitchbook.com

Artificial Intelligence & Machine Learning
Brendan Burke
brendan.burke@pitchbook.com

Fintech
Robert Le
robert.le@pitchbook.com

Foodtech
Alex Frederick
alex.frederick@pitchbook.com

Information Security
Brendan Burke
brendan.burke@pitchbook.com

Insurtech
Robert Le
robert.le@pitchbook.com

Internet of Things (IoT)
Brendan Burke
brendan.burke@pitchbook.com

Mobility Tech
Jonathan Geurkink
jonathan.geurkink@pitchbook.com

Supply Chain
Jonathan Geurkink
jonathan.geurkink@pitchbook.com

Emerging Spaces and Vertical Snapshots
Ryan Vaswani
ryan.vaswani@pitchbook.com