



EMERGING TECH RESEARCH

Agtech Report

VC trends and emerging opportunities

Q2
2023





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We are adding PitchBook Exit Predictor probabilities to our Emerging Technology Research reports. PitchBook's proprietary [VC Exit Predictor](#) estimates the probability that a startup, or VC-backed company, will successfully IPO, be acquired, or merge. The tool is available exclusively to PitchBook subscribers.

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Published on August 15, 2023



For previous updates as well as our complete agtech research, please see the designated [analyst workspace](#) on the PitchBook Platform.



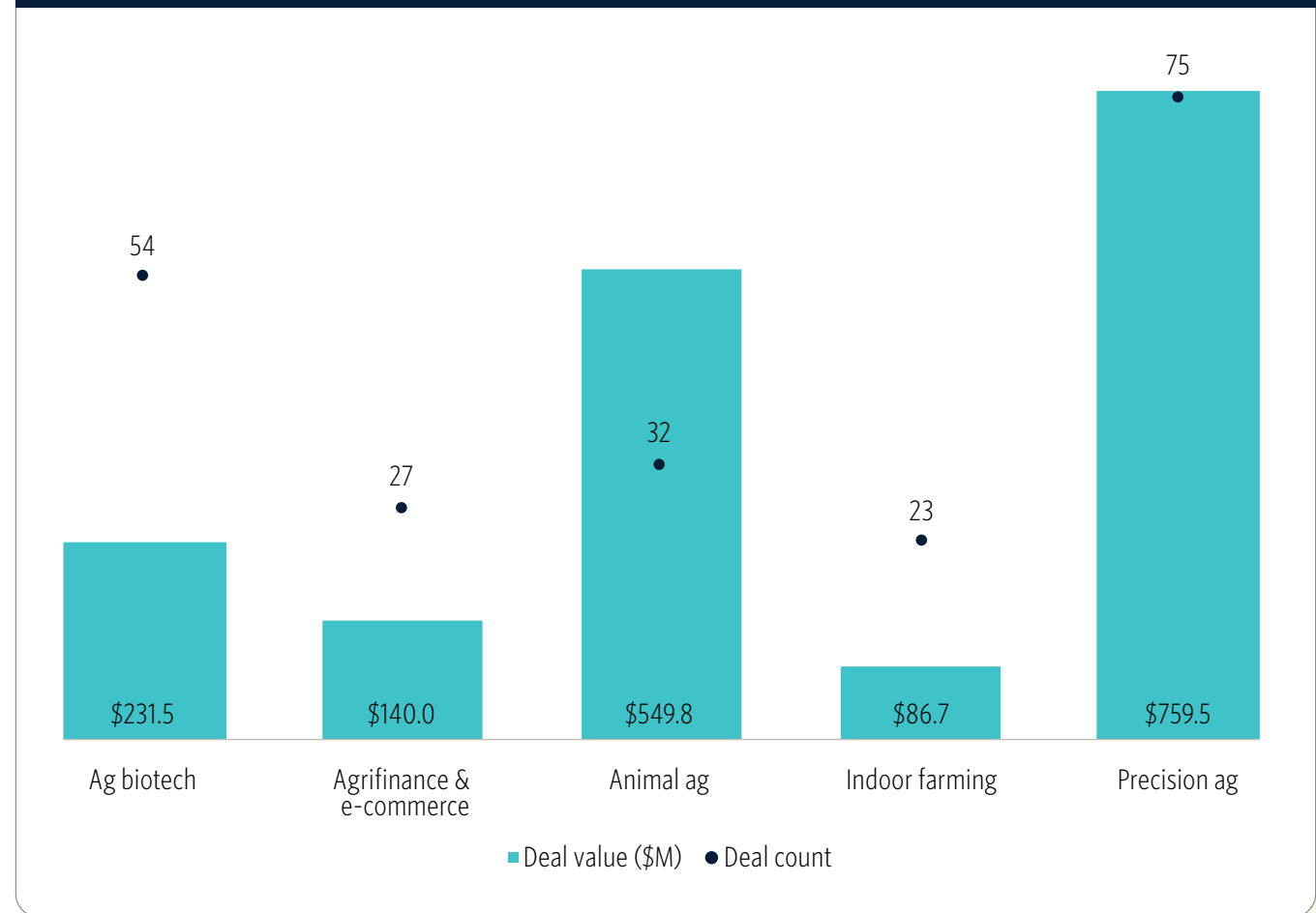
Vertical update

The steady decline in deal activity that began in Q2 2022 appears to be plateauing. Q2 2023 deal activity was on par with the quarter prior, which is far below the apex of late-2022 to early-2023. Likewise, exit activity in Q2 2023 was roughly equivalent to the quarter prior, signaling we may have reached the nadir.

A new report from the Intergovernmental Panel on Climate Change highlights that climate change is slowing growth in agricultural productivity, impacting crop production, animal health, fisheries, and water availability—particularly in the world’s most vulnerable regions.¹ The implications for agriculture technologies (agtech) are multifaceted. Primarily, there is a pressing need for technologies enabling climate resilience in agriculture, including those that facilitate soil and water conservation, agroforestry, and sustainable farming practices. Furthermore, advancements in data analysis and predictive modeling will be crucial to mitigate the risks from increased extreme weather events due to climate change. And given the significant impact on small-scale food producers, it is crucial to develop technologies that are accessible and affordable for them, thereby aiding them in adapting to climate change while maintaining productivity.

1: "AR6 Synthesis Report: Climate Change 2023," IPCC, Paulina Aldunce, et al., March 20, 2023.

Agtech VC deal activity by segment in Q2 2023*



Source: PitchBook • Geography: Global • *As of June 30, 2023

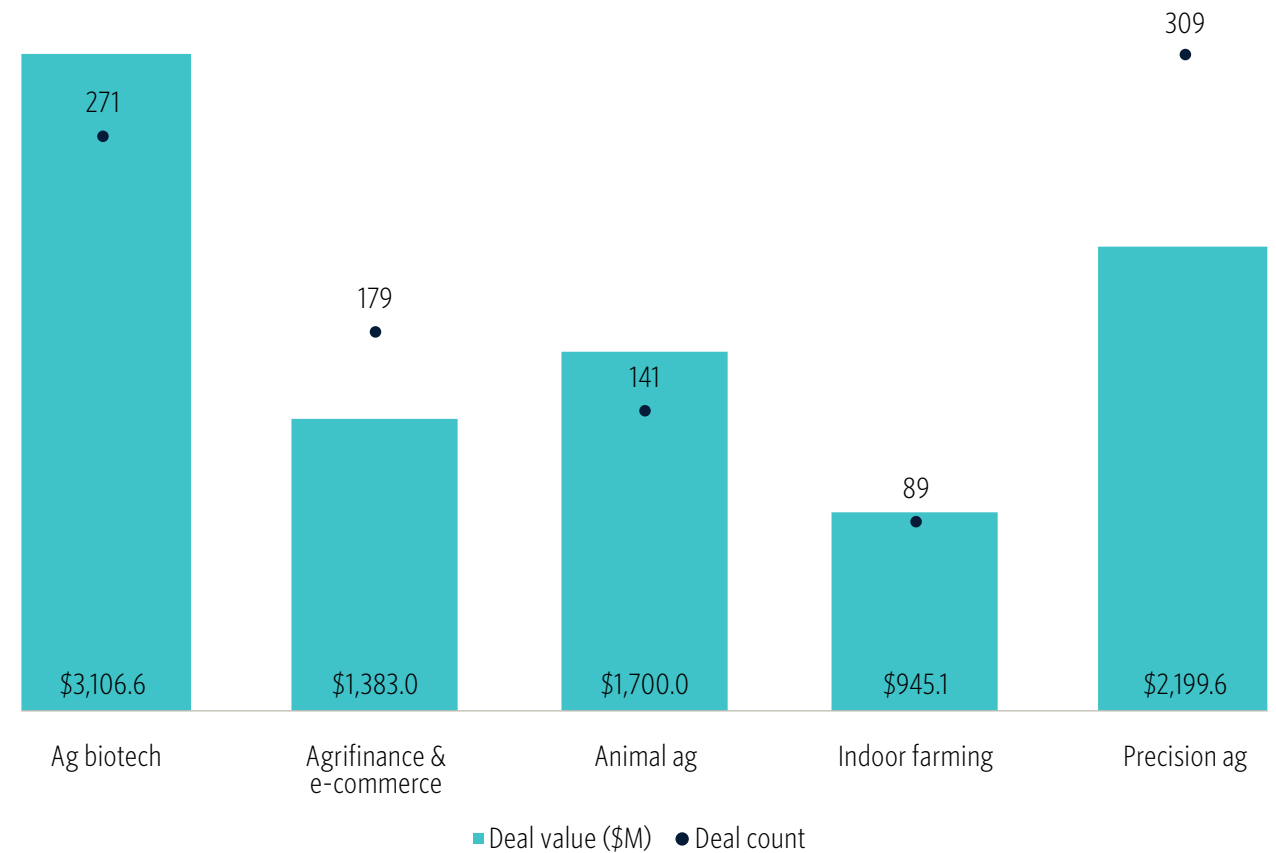


VERTICAL UPDATE

To strengthen the point, a recent survey of ag economists shows a shift in the agricultural economic outlook—both short and long term due to weather extremes and fluctuations in the commodity markets—with geopolitical risks involving China and the war in Ukraine being potential wildcard factors in the coming year.² Ag technologies, including weather prediction, precision farming, and plant biotechnologies, will play a critical role in adapting to shifting climates and improving productivity and yields.

To this end, the farm management software category logged its second-strongest quarter of deal values on record. Companies focused on farm optimization and analytics were top funding recipients. The aquaculture category also scored its second-strongest quarter of deal values on record. Sustainable fisheries and food security are key motivators for the uptick in investment.

Trailing 12-month (TTM) agtech VC deal activity by segment*

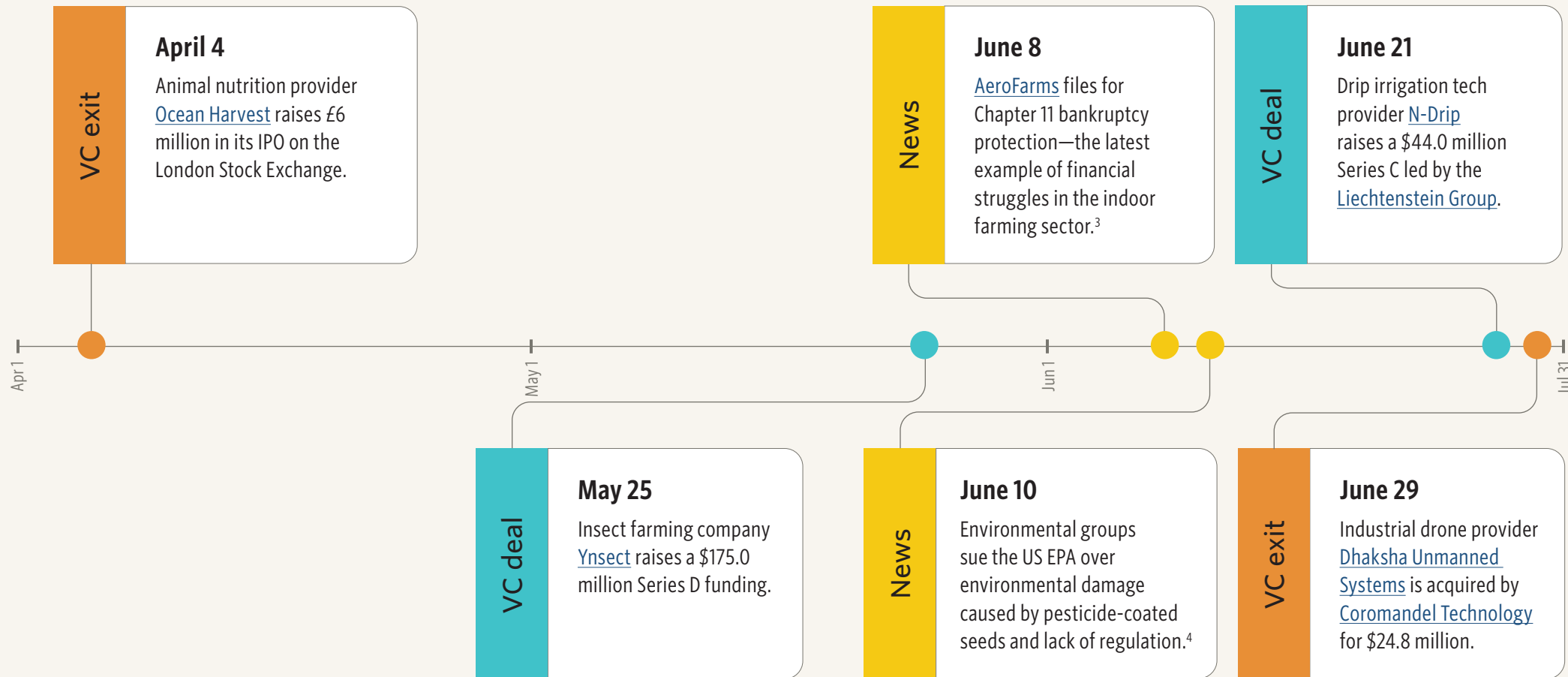


Source: PitchBook • Geography: Global • *As of June 30, 2023

²: "Ag Economists Turn More Positive Longer-Term On the Farm Economy," Ag Web, Tyne Morgan, July 20, 2023.



Q2 2023 timeline



3: "AeroFarms Announces Recapitalization Process to Concentrate Activities on its Danville Farm and its Highly Popular Microgreens Products," AeroFarms, June 8, 2023.

4: "EPA Sued Over Pesticide-Coated Seeds' 'Devastating Impacts' on US Wildlife," The Guardian, Tom Perkins, June 10, 2023.

Q2 VC activity

210
total deals

3.4%
QoQ growth

\$1.8B
total VC raised

-8.7%
QoQ growth

TTM summary

986
total deals

-23.9%
YoY growth

\$9.2B
total VC raised

-31.4%
YoY growth



Agtech landscape

- 1 Ag biotech
- 2 Agrifinance & e-commerce
- 3 Indoor farming
- 4 Animal ag
- 5 Precision ag





Agtech 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.

Ag biotech

- Animal biotech
 - Zhonaxin Breeding (中芯种业)
 - ASIMOV
 - CALYSTA (PROTEIN WITHOUT LIMITS)
 - 美山农牧
 - embark
 - Invetx
 - native
 - recombinetics
 - ScoutBio
- Plant biotech
 - PIVOT BIO
 - INARI
 - INSCRIPTA
 - DNAexus
 - SYNTHEGO
 - geno
 - genoflow
 - DNASCRIPT
 - AGBIOME
 - PROVIVI
- Biomaterials
 - Solugen
 - LYGOS
 - MANUSBIO
 - SEA6 ENERGY
 - AGRISOMA
 - bio-watt ENERGY HOLDINGS
 - Climate Robotics
 - GFS
 - inventure
 - AIREX ENERGY
- Plant data & analysis
 - NURITAS
 - strateos
 - TRACE GENOMICS
 - ORITAIN
 - scio (by Consumer Physics)
 - Arzeda
 - phylagen
 - Segra
 - BIOMEMAKER

Indoor farming

- Indoor farming components
 - greenlab
 - Plant Form
 - iunu
 - MOLEAER (ADVANCED HYDROPONIC TECHNOLOGY)
 - Terraformation
 - SOLLUM
 - EssenseGrow
 - ecoation
 - xiant TECHNOLOGIES
 - Opti-Harvest (Better Light Means Better Fruit)
- Indoor farming systems
 - qoo
 - IGS
 - AmplifiedAg
 - FREIGHT FARMS
 - vertical future
 - BACK TO ROOTS (Greenmark USA Organic Gardening Company)
 - RED SEA FARMS
 - GreenOnyx
 - N.THING
 - farmshelf
- Indoor growers
 - Plenty
 - TIAJQ-AG
 - BOWERY
 - soli organic
 - inform
 - Pure (TIAJQ-AG)
 - GOTHAM GREENS
 - little leaf (TIAJQ-AG)
 - REVOL (TIAJQ-AG)
 - Supernormal Greens

Agrifinance & e-commerce

- Agribusiness marketplaces
 - indigo
 - ninjacart
 - frubana
 - DeHaat (Seeds to Market)
 - Silo
 - 英货郎 (www.5199.com)
 - WA SO KO
 - 钱大妈 (QIANDAMA)
 - THIRD WAVE COFFEE
 - sayurbox
- Finance & insurance
 - FBN
 - PRODUCEPAY
 - one concern
 - Oxbury
 - Gro Intelligence
 - Samunnati
 - e clare
 - BUSHEL
 - Nxin
 - GROWERS EDGE



Agtech 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.

Animal ag

Aquaculture



Livestock & land animal tech



Pollination tech



Insect farming



Precision ag

Drones & imagery analytics



Farm management software



Robotics & smart field equipment



Field Internet of Things





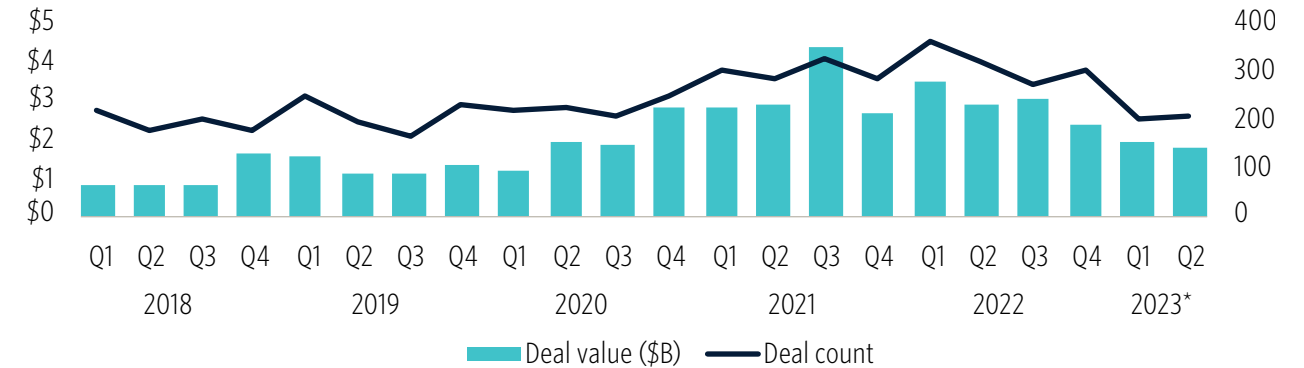
VC activity

In Q2 2023, we recorded 210 agtech deals with a total value of \$1.8 billion. While there was a slight increase in the count compared with the previous quarter, the deal values slightly decreased, indicating a potential plateau in deal activity. The funding environment for agtech continued to be challenging, exacerbated by elevated interest rates. Despite this, notable deals were closed, including insect grower [Ynsect](#)'s \$175.0 million Series D round and farm management platform [AIS](#)' \$117.0 million late-stage VC round.

2023 agtech's median pre-money valuation is \$17.0 million. This represents a significant rise of 33.1% YoY, which contrasts with our previous predictions of a decline due to market volatility. The trend can be attributed to a combination of factors, including a slowdown in deal activity and an emphasis on quality. GPs are now dedicating more time to due diligence and deal evaluation, resulting in longer closing times for deals. The ones that are being closed prioritize existing portfolio companies or those with lower risk and higher quality.

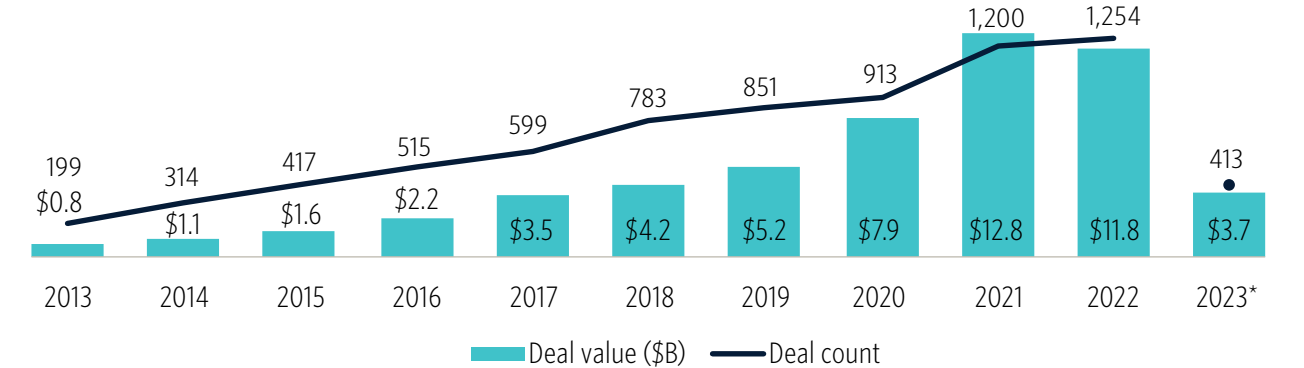
Exit activity has experienced a decline over the past year and this trend continued into Q2. Only 13 exits were recorded, with minimal deal value due to undisclosed M&A activity. The IPO market has been largely closed, however, we observed two companies navigate to the public markets in Q2. Animal nutrition provider [Ocean Harvest](#) registered an IPO, raising £6 million with its debut on the London Stock Exchange; and plant biotech company [Cibus](#) debuted on Nasdaq via a reverse merger with [Calyxt](#). M&A opportunities have been limited due to rising interest rates. Notable acquisitions in Q2 include drone provider [Dhaksha Unmanned Systems](#) by [Coromandel Technology](#) for \$24.8 million, and imagery analytics provider [Plantix](#) by [Helm](#) for an undisclosed amount. It is anticipated that exit activity will remain subdued until interest rates decrease and the IPO market reopens.

Agtech VC deal activity by quarter



Source: PitchBook • Geography: Global • *As of June 30, 2023

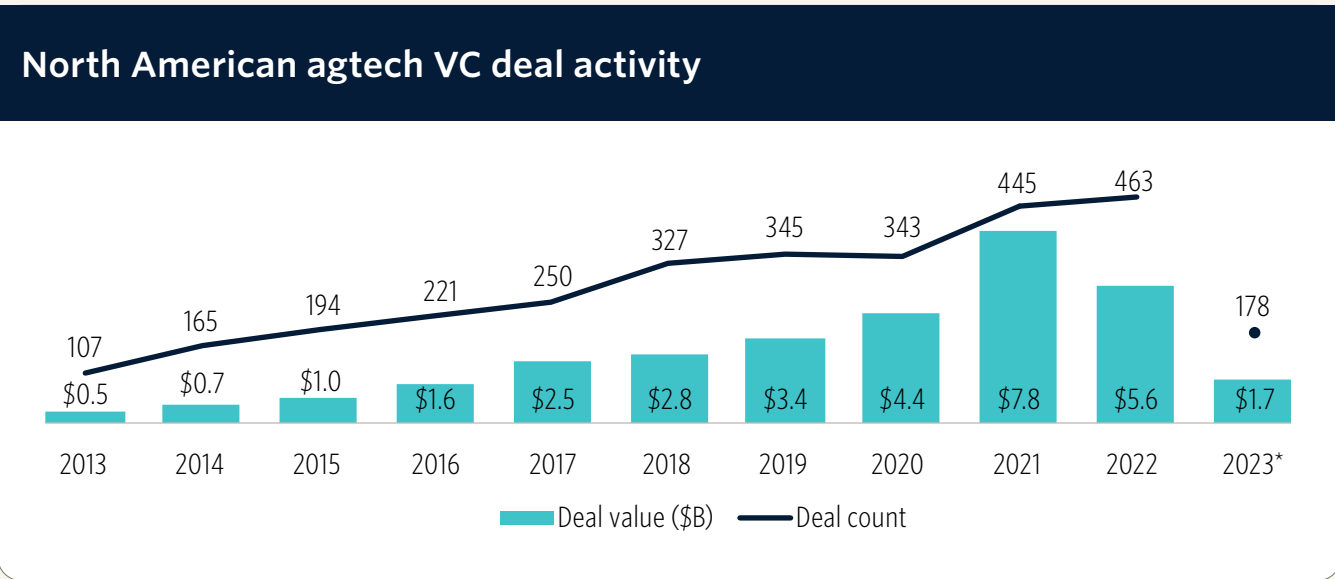
Agtech VC deal activity



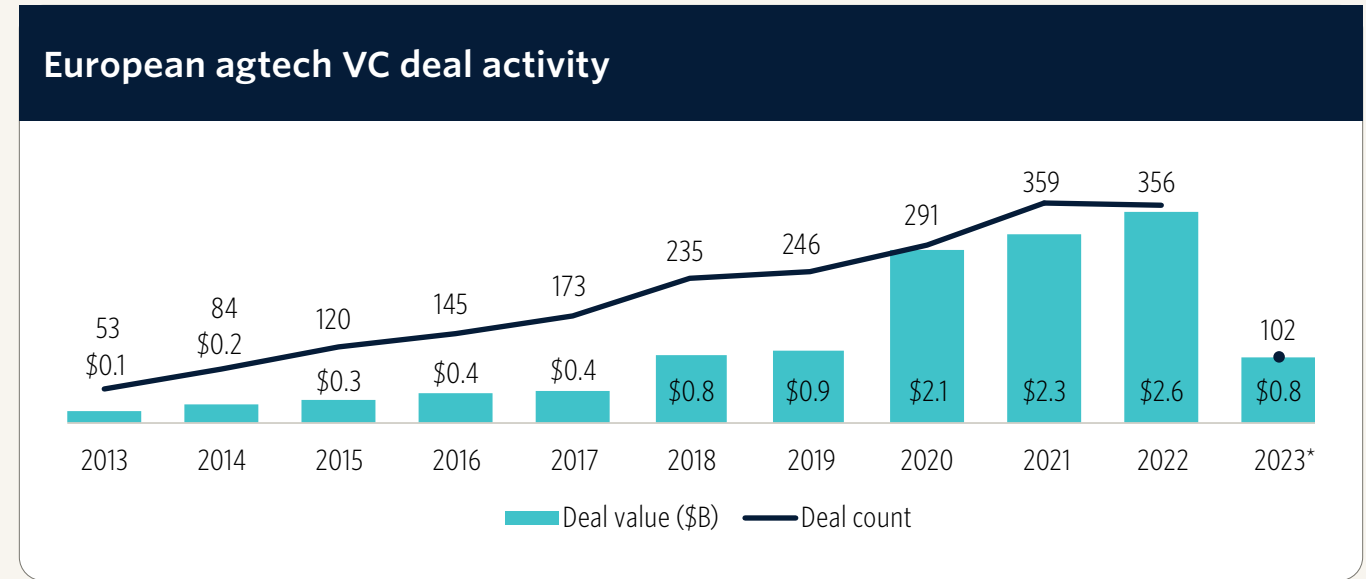
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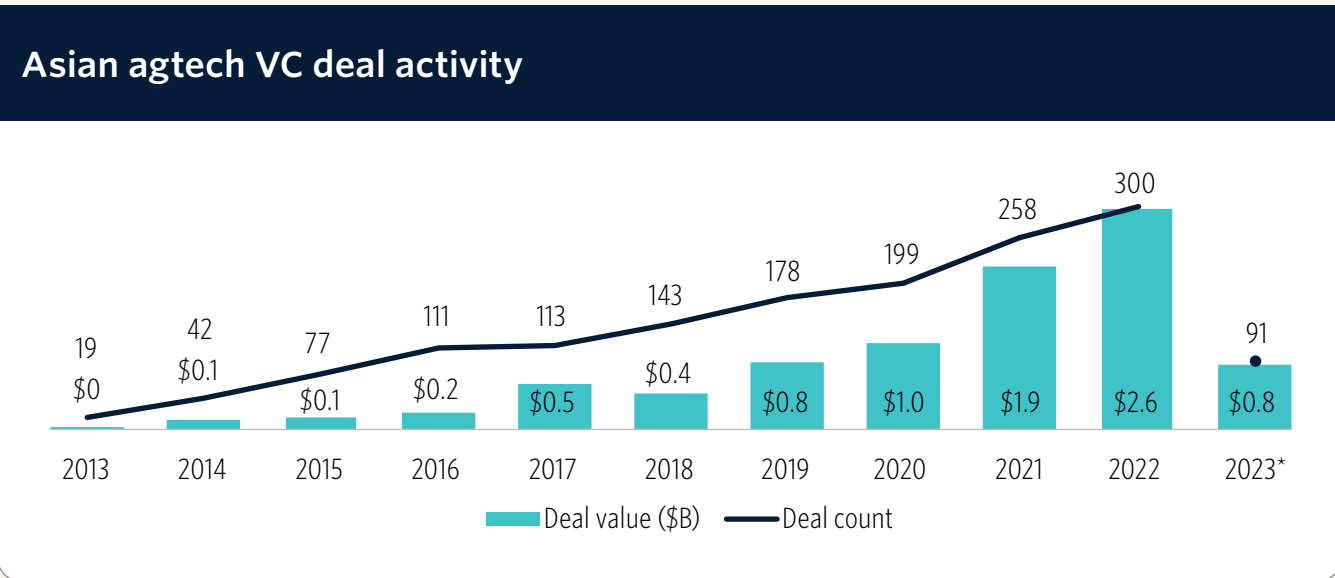
VC ACTIVITY



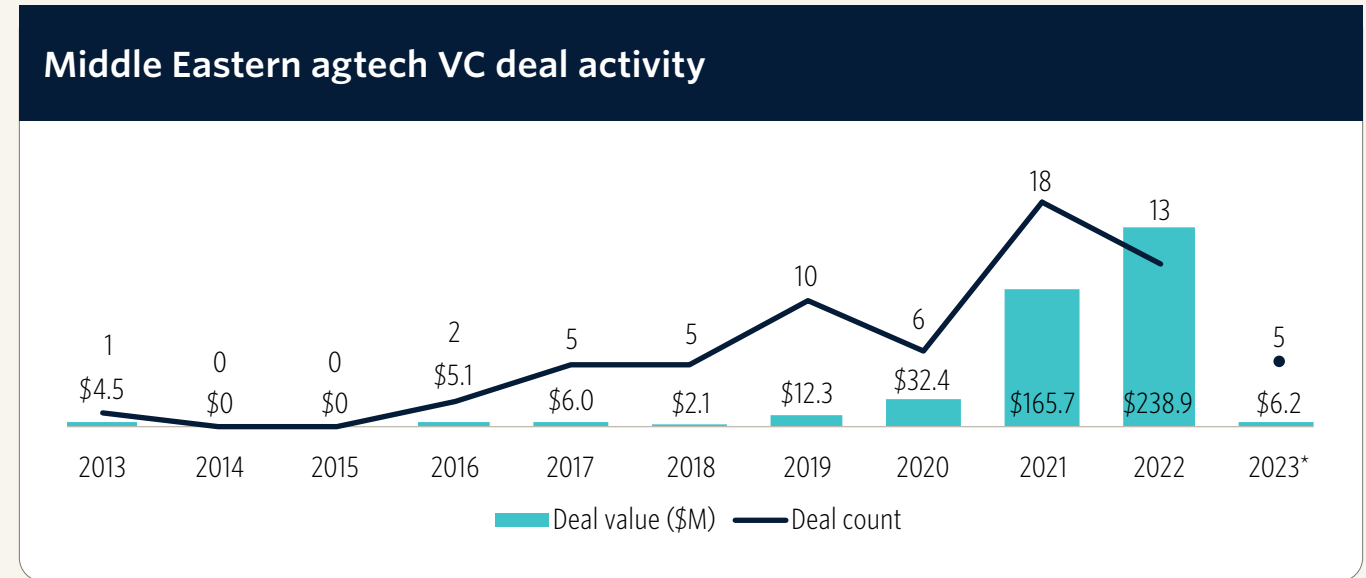
Source: PitchBook • Geography: North America • *As of June 30, 2023



Source: PitchBook • Geography: Europe • *As of June 30, 2023



Source: PitchBook • Geography: Asia • *As of June 30, 2023



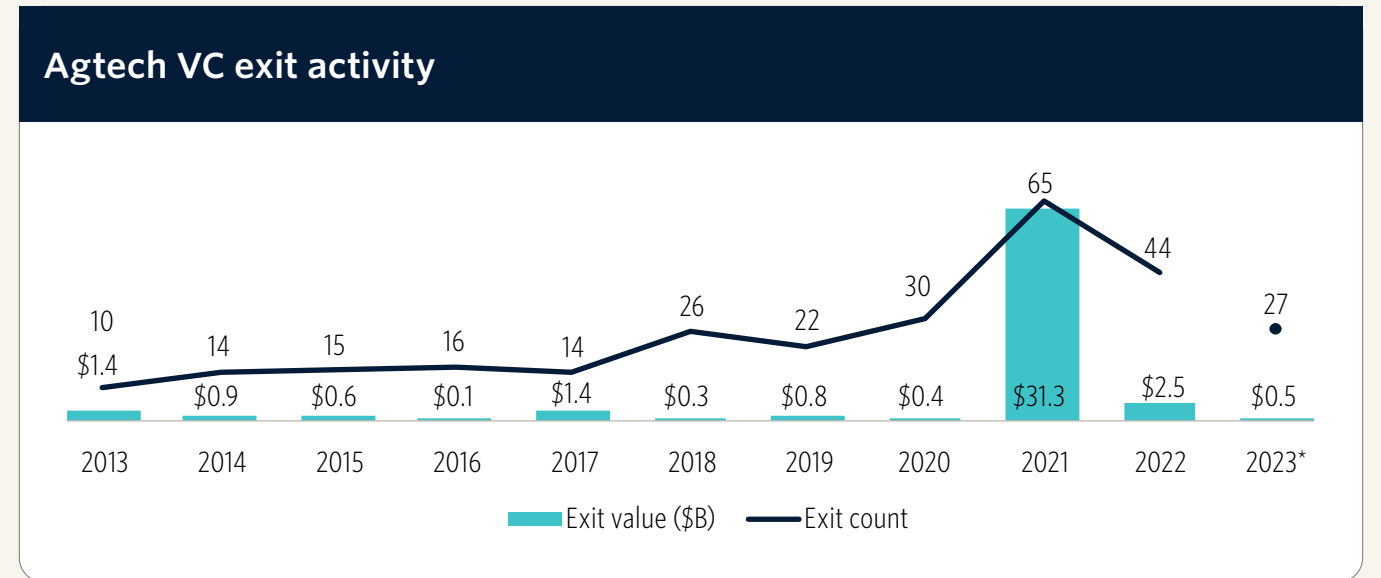
Source: PitchBook • Geography: Middle East • *As of June 30, 2023



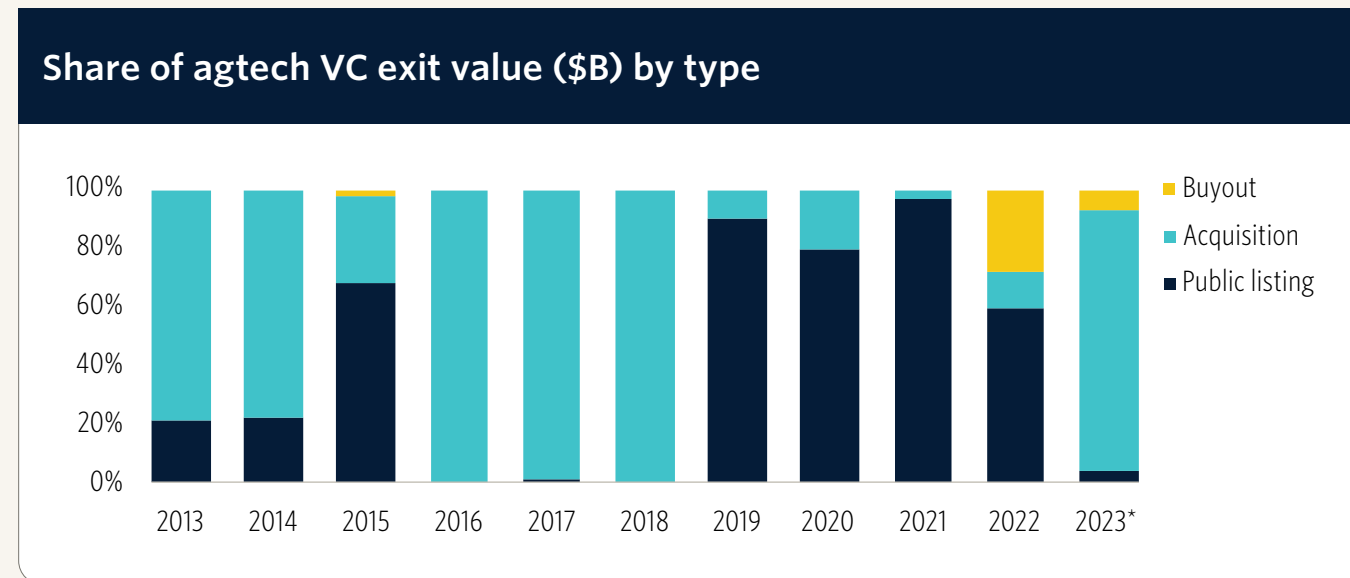
VC ACTIVITY



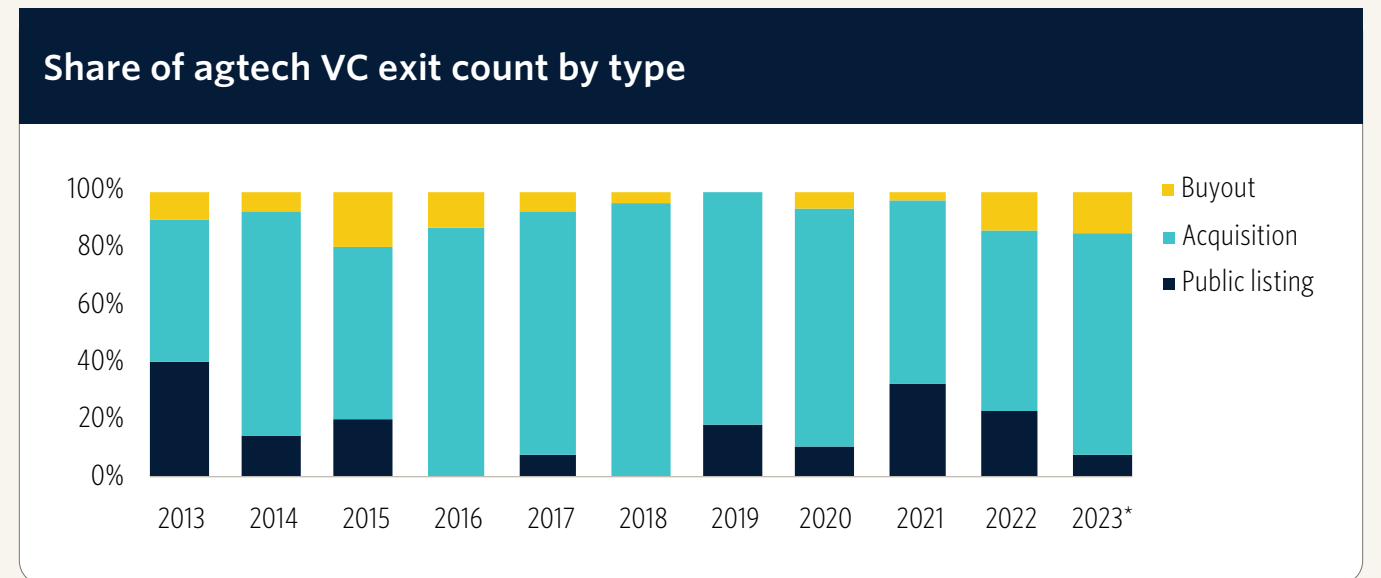
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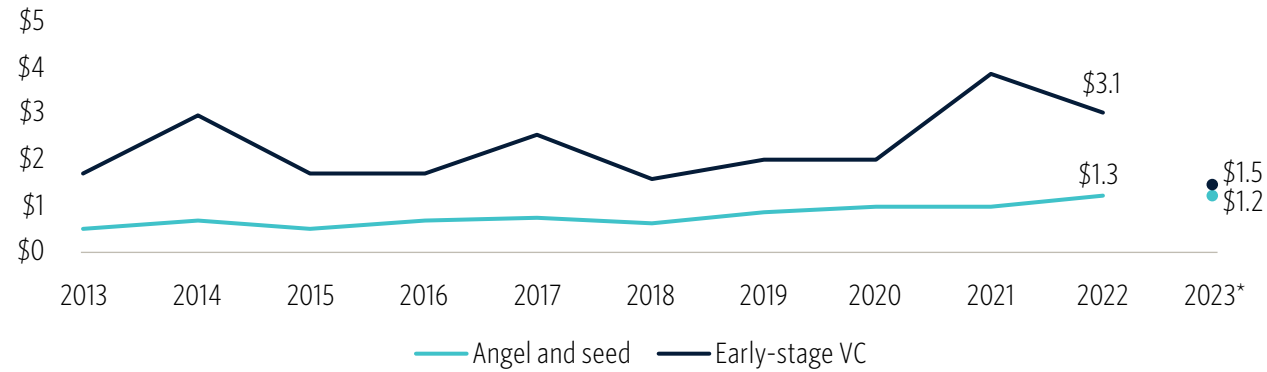


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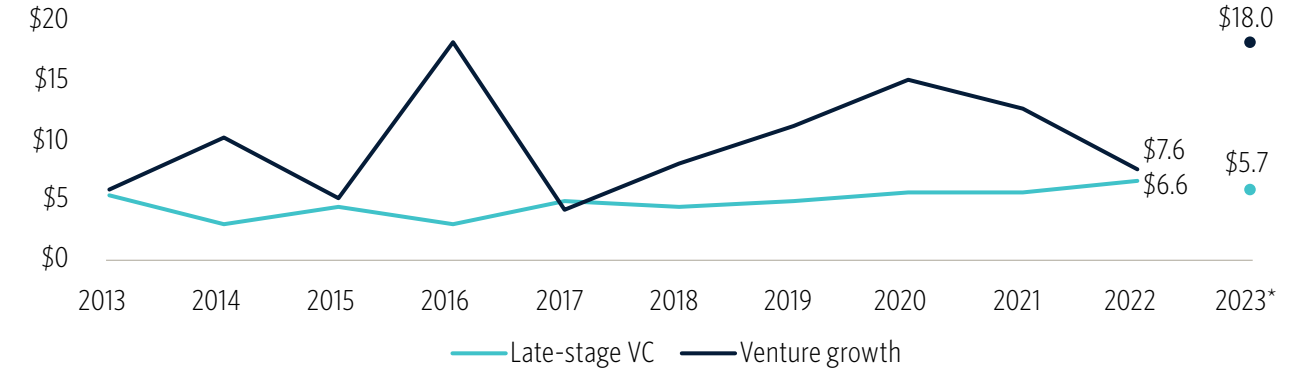
VC ACTIVITY

Median agtech angel and seed and early-stage VC deal values (\$M)



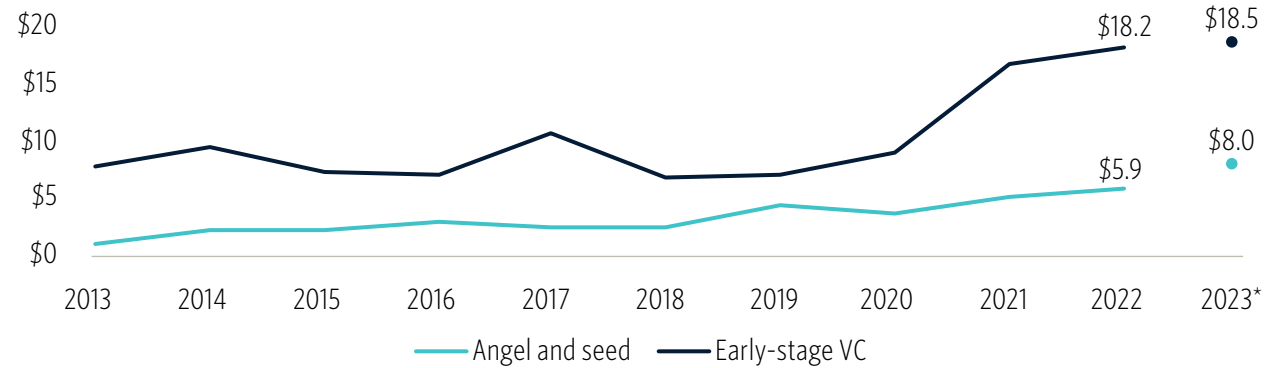
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Median agtech late-stage VC and venture growth deal values (\$M)



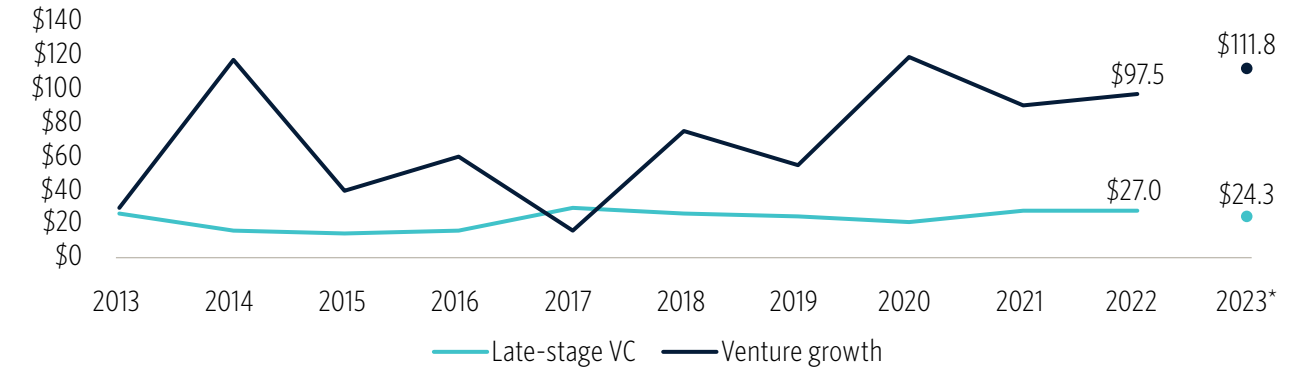
Source: PitchBook • Geography: Global • *As of June 30, 2023

Median agtech angel and seed and early-stage VC pre-money valuations (\$M)



Source: PitchBook • Geography: Global • *As of June 30, 2023

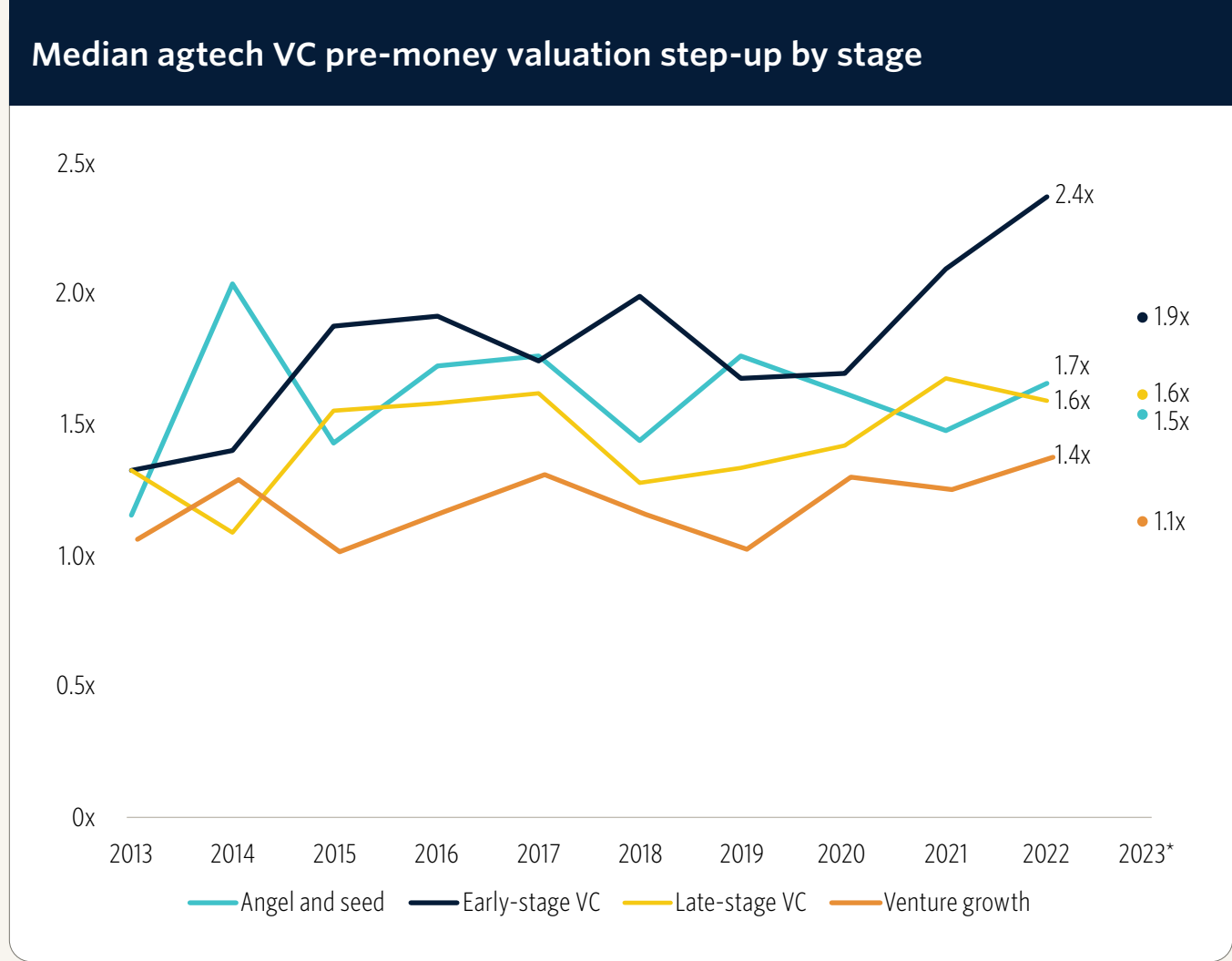
Median agtech late-stage VC and venture growth pre-money valuations (\$M)



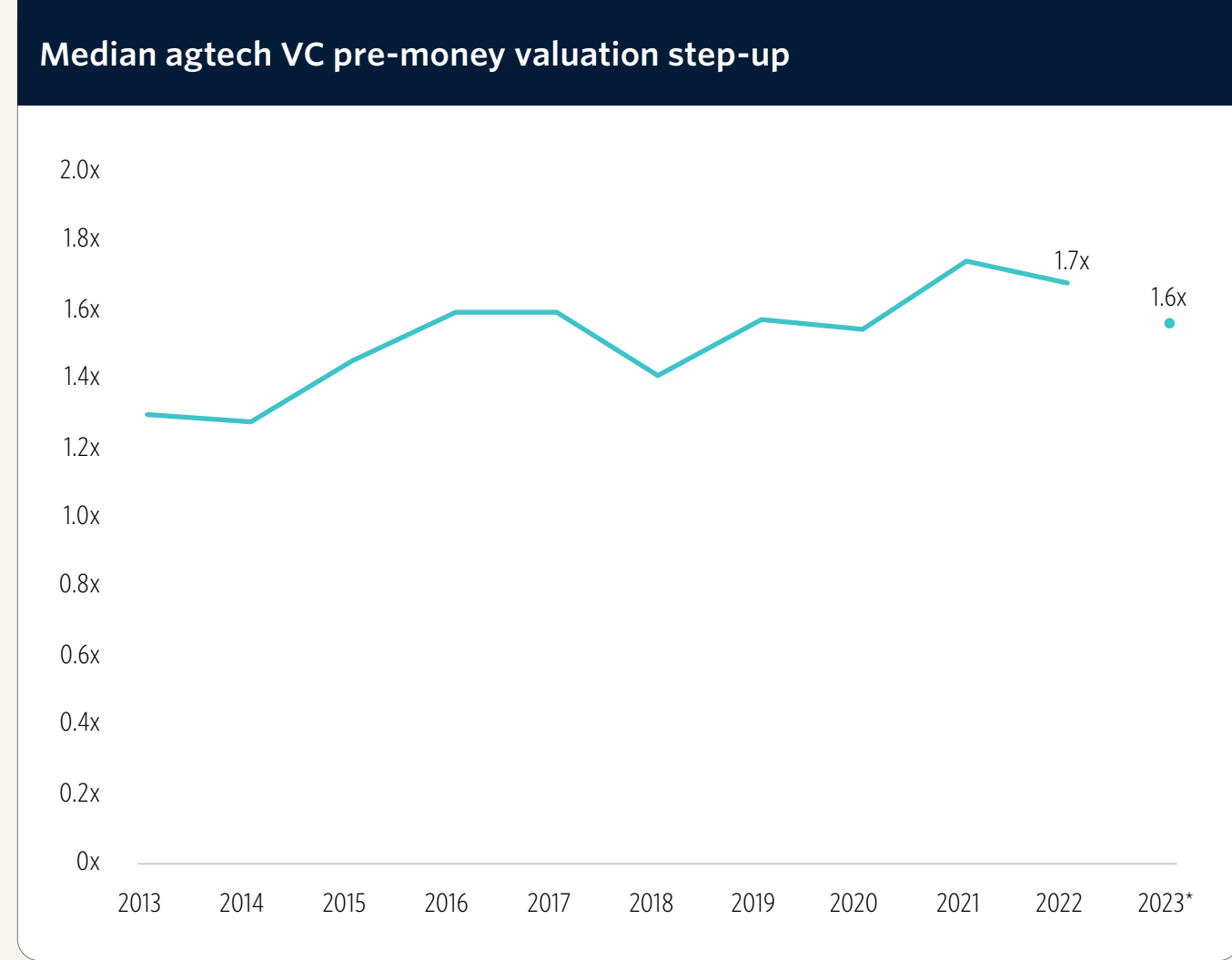
Source: PitchBook • Geography: Global • *As of June 30, 2023



VC ACTIVITY



Source: PitchBook • Geography: Global • *As of June 30, 2023



Source: PitchBook • Geography: Global • *As of June 30, 2023



VC ACTIVITY

Key agtech angel and seed VC deals*

Company	Close date (2023)	Subsegment	Stage	Deal value (\$M)	Lead investor(s)	Valuation step-up
Robigo	April 28	Plant biotech	Seed	\$10.0	Congruent Ventures	N/A
Macro Oceans	April 4	Plant biotech	Seed	\$5.0	N/A	N/A
Myno	May 31	Biomaterials	Seed	\$4.9	N/A	N/A
OCELL	May 11	Drones & imagery analytics	Seed	\$4.9	N/A	N/A
Dalan Animal Health	June 27	Animal biotech, pollination tech	Seed	\$4.5	At One Ventures, Prime Movers Lab, Veterinary Angel Network for Entrepreneurs	1.5x
Finres	June 26	Finance & insurance	Seed	\$4.4	Illuminate Financial Management, Speedinvest	N/A
Vivid Machines	April 20	Robotics & smart field equipment	Seed	\$4.3	Business Development Bank of Canada	N/A
Demex	June 26	Farm management software	Seed	\$4.1	N/A	N/A
Alga Biosciences	April 6	Animal biotech	Seed	\$4.0	Collaborative Fund	N/A
Improvin'	May 9	Farm management software	Seed	\$3.9	Dynamo Ventures, Pale blue dot	N/A

Source: PitchBook • Geography: Global • *As of June 30, 2023



VC ACTIVITY

Key agtech early-stage VC deals*

Company	Close date (2023)	Subsegment	Stage	Deal value (\$M)	Lead investor(s)	Valuation step-up
Pixxel	May 11	Drones & imagery analytics	Series B	\$29.5	Alphabet	1.6x
Source.ag	June 7	Indoor growers	Series A	\$27.0	Acre Venture Partners, Astanor Ventures	N/A
Waterplan	May 23	Drones & imagery analytics	Series A	\$18.4	Base10 Partners, Giant Ventures, Transition Global	N/A
Inevitable	May 15	Farm management software	Series A	\$14.7	N/A	N/A
EniferBio	April 19	Animal biotech	Series A	\$12.0	Aqua-Spark	N/A
Harpe Bio Herbicide	April 18	Plant biotech	Early-stage VC	\$10.5	Archer Daniels Midland	N/A
Carbonwave	April 6	Plant biotech	Series A1	\$7.0	Mirova	1.0x
TOWING	May 17	Indoor farming components	Series A	\$6.2	N/A	4.4x
Agriodor	May 2	Plant biotech	Early-stage VC	\$5.5	BNP Paribas Développement, CapHorn Invest, Capagro, SWEN Capital Partners, UI Investissement	45.1x
Haber Technologies	April 4	Robotics & smart field equipment	Series A	\$5.4	N/A	N/A

Source: PitchBook • Geography: Global • *As of June 30, 2023



VC ACTIVITY

Key agtech late-stage VC deals*

Company	Close date (2023)	Subsegment	Stage	Deal value (\$M)	Lead investor(s)	Valuation step-up
AIS	June 30	Farm management software	Late-stage VC	\$117.0	N/A	N/A
The Green Coffee Company	June 8	Agribusiness marketplaces	Series C	\$100.0	Legacy Group Investments	N/A
Lemnate AquaFarms	May 4	Aquaculture	Late-stage VC	\$58.5	N/A	N/A
EcoRobotix	May 9	Robotics & smart field equipment	Late-stage VC	\$52.0	Aqton, Cibus Fund	N/A
FarmWise	May 11	Robotics & smart field equipment	Series B	\$51.4	Fall Line Capital, Middleland Capital	N/A
Mast Reforestation	May 16	Drones & imagery analytics	Series B	\$30.0	Carbon Streaming	1.7x
ClimateAI	April 13	Farm management software	Series B	\$22.0	Four Rivers Group	2.2x
Nutrition Technologies	June 26	Insect farming	Late-stage VC	\$21.7	N/A	N/A
Stacked Farm	June 27	Indoor growers	Late-stage VC	\$21.4	Tayside Investments Australia	N/A
Guardian Agriculture	June 20	Drones & imagery analytics	Series A	\$20.0	Fall Line Capital	2.0x

Source: PitchBook • Geography: Global • *As of June 30, 2023



VC ACTIVITY

Key agtech venture growth deals*

Company	Close date (2023)	Subsegment	Stage	Deal value (\$M)	Lead investor(s)
eFishery	May 25	Aquaculture	Series D	\$195.7	G42 Global Expansion Fund
Ynsect	April 16	Insect farming	Series D	\$175.0	N/A
Tomorrow.io	June 14	Farm management software	Series E	\$87.0	Activate Capital Partners
Percepto	June 12	Drones & imagery analytics	Series C	\$67.0	Koch Disruptive Technologies, Zimmer Partners
N-Drip	June 21	Field IoT	Series C	\$44.0	Liechtenstein Group
VictoryFarms	April 6	Aquaculture	Series B	\$35.0	Creadev
Vive Crop Protection	June 8	Plant biotech	Series C	\$34.4	Conexus Venture Capital Fund
CropX	April 19	Farm management software	Series C	\$30.0	Aliaxis
Manus Bio	May 31	Biomaterials	Late-stage VC	\$21.2	N/A
Sichuan Qiang Mountain Agriculture and Animal Husbandry Science and Technology	April 1	Animal biotech	Late-stage VC	\$18.1	Red Dot Capital Partners

Source: PitchBook • Geography: Global • *As of June 30, 2023



VC ACTIVITY

Key agtech VC exits*

Company	Close date (2023)	Subsegment	Exit value (\$M)	Exit type	Acquirer(s)/index	Valuation step-up
Dhaksha Unmanned Systems	June 29	Drones & imagery analytics	\$24.8	Acquisition	Coromandel Technology	1.8x
Ocean Harvest Technology	April 4	Animal biotech	\$17.2	Public listing	London Stock Exchange	N/A
SlantRange	May 24	Drones & imagery analytics	N/A	Acquisition	Hiphen	N/A
Plantix	April 27	Drones & imagery analytics	N/A	Acquisition	Helm (Hamburg)	N/A
S4Go	June 3	Finance & insurance, farm management software	N/A	Acquisition	AgroTools	N/A
Sunbloom Proteins	April 20	Plant biotech	N/A	Acquisition	Avril (France)	N/A
Cibus	June 1	Plant biotech	N/A	Public listing	Calyxt	N/A
Flexineb	May 11	Livestock & land animal technology	N/A	Acquisition	PARI	N/A
Mercaris	June 27	Agribusiness marketplaces	N/A	Acquisition	Argus Media	N/A
Igrain	June 30	Agribusiness marketplaces	N/A	Acquisition	Clear Grain Exchange	N/A

Source: PitchBook ▪ Geography: Global ▪ *As of June 30, 2023



VC ACTIVITY

Key agtech incumbents*

Company name	Category	Key products	EV/NTM revenue	EV/NTM EBITDA
CNH Industrial	Robotics & smart field equipment	Tractors	1.7x	12.2x
John Deere	Robotics & smart field equipment	Tractors, sprayers, planters	3.1x	12.8x
Archer Daniels Midland	Livestock & land animal tech	Feed, feed additives, premix, macroingredients	0.5x	8.6x
Zoetis	Animal biotech	Vaccines, parasite control products, antibiotics	9.8x	22.6x
AppHarvest	Indoor growers	Tomatoes, strawberries, salad greens	6.5x	N/A
Hydrofarm	Indoor farming components	Nutrients, grow media, containers, lighting, atmospheric control	0.7x	104.4x
Benson Hill	Plant biotech	Phenotyping, predictive breeding, environmental modeling	0.8x	N/A
GreenLight Biosciences	Plant biotech	dsRNA biopesticides	12.7x	N/A
Corteva Agriscience	Plant biotech	Seeds & traits, crop protection, biologicals, digital tools	2.4x	12.1x
Nutrien	Plant biotech	Fertilizer, feed	1.4x	6.0x

Source: PitchBook • Geography: Global • *As of June 30, 2023



VC ACTIVITY

Top angel and seed VC-backed agtech companies by total VC raised to date*

Company name	Category	VC (\$M) raised to date	Post-money valuation (\$M)	IPO probability (%)	M&A probability (%)	No exit probability (%)
QualySense	Robotics & smart field equipment	\$42.7	\$23.3	14%	73%	13%
The trū Shrimp Companies	Aquaculture	\$33.3	N/A	1%	29%	70%
SemiosBio Technologies	Field IoT	\$180.5	\$789.6	12%	83%	5%
Pursell	Plant biotech	\$25.2	N/A	2%	75%	23%
Planet Farms	Indoor farming components	\$78.6	\$529.7	9%	61%	30%
Greeneye Technology	Robotics & smart field equipment	\$44.6	N/A	2%	90%	8%
Agtonomy	Robotics & smart field equipment	\$22.5	N/A	4%	50%	46%
Kula Bio	Plant biotech	\$71.2	\$210.0	1%	88%	11%
IrriGreen	Robotics & smart field equipment	\$20.8	N/A	1%	70%	29%
Constructive Bio	Plant biotech	\$20.0	N/A	4%	60%	36%

Source: PitchBook ▪ Geography: Global ▪ *As of June 30, 2023
 Note: Probability data based on [PitchBook VC Exit Predictor methodology](#).



VC ACTIVITY

Top early-stage VC-backed agtech companies by total VC raised to date*

Company name	Category	VC (\$M) raised to date	Post-money valuation (\$M)	IPO probability (%)	M&A probability (%)	No exit probability (%)
Plant-Ag	Indoor growers	\$900.0	N/A	N/A	N/A	N/A
Zhongxin Breeding	Animal biotech	\$338.7	\$1,230.8	N/A	N/A	N/A
Colossal Laboratories & Biosciences	Animal biotech	\$230.0	\$1,450.0	35%	41%	24%
Re:Ocean	Aquaculture	\$222.3	N/A	11%	62%	27%
Maihuolang Information Technology	Agribusiness marketplaces	\$150.0	N/A	N/A	N/A	N/A
Supernormal Greens	Indoor growers	\$149.7	\$109.9	7%	53%	40%
FJ Dynamics	Robotics & smart field equipment	\$130.9	N/A	N/A	N/A	N/A
Synspective	Drones & imagery analytics	\$118.5	\$284.6	12%	79%	9%
Pairwise	Plant biotech	\$115.0	N/A	17%	50%	33%
E-ctare	Finance & insurance	\$114.6	N/A	4%	60%	36%

Source: PitchBook ▪ Geography: Global ▪ *As of June 30, 2023
Note: Probability data based on [PitchBook VC Exit Predictor methodology](#).



VC ACTIVITY

Top late-stage VC-backed agtech companies by total VC raised to date*

Company name	Category	VC (\$M) raised to date	Post-money valuation (\$M)	IPO probability (%)	M&A probability (%)	No exit probability (%)
Solugen	Biomaterials	\$637.8	\$2,175.0	92%	6%	2%
Pivot Bio	Plant biotech	\$621.3	\$1,700.0	70%	28%	2%
InnovaFeed	Insect farming	\$479.3	N/A	55%	43%	2%
Little Leaf Farms	Indoor growers	\$410.0	N/A	53%	45%	2%
Frubana	Agribusiness marketplaces	\$354.3	N/A	30%	61%	9%
Pure Harvest Smart Farms	Indoor growers	\$334.3	N/A	67%	28%	5%
DNA Script	Plant biotech	\$294.0	\$659.7	86%	12%	2%
Capella Space	Drones & imagery analytics	\$254.0	\$320.0	28%	70%	2%
AgBiome	Plant biotech	\$236.2	N/A	82%	16%	2%
Gremon Systems	Farm management software	\$237.3	N/A	7%	54%	39%

Source: PitchBook ▪ Geography: Global ▪ *As of June 30, 2023
 Note: Probability data based on [PitchBook VC Exit Predictor methodology](#).



VC ACTIVITY

Top venture growth VC-backed agtech companies by total VC raised to date*

Company name	Category	VC (\$M) raised to date	Post-money valuation (\$M)	IPO probability (%)	M&A probability (%)	No exit probability (%)
Indigo	Agribusiness marketplaces, plant biotech	\$1,701.6	\$3,950.0	94%	4%	2%
Plenty	Indoor growers	\$941.0	\$1,425.0	94%	4%	2%
Farmers Business Network	Agribusiness marketplaces, farm management software, finance & insurance	\$919.3	\$3,800.0	94%	4%	2%
Infarm	Indoor growers	\$632.4	\$1,200.1	61%	28%	11%
Ynsect	Insect farming	\$583.4	N/A	60%	27%	13%
Bowery	Indoor growers	\$516.6	N/A	12%	86%	2%
Inscripta	Plant biotech	\$489.2	N/A	96%	2%	2%
Soli Organic	Indoor growers	\$477.6	N/A	75%	19%	6%
Inari	Plant biotech	\$476.0	\$1,500.0	80%	17%	3%
Synthego	Plant biotech	\$459.5	\$1,200.0	92%	2%	6%

Source: PitchBook ▪ Geography: Global ▪ *As of June 30, 2023
 Note: Probability data based on [PitchBook VC Exit Predictor methodology](#).



VC ACTIVITY

Most active investors in agtech accelerator deals since 2022*

Investor name	Deal count
SVG Ventures-THRIVE	35
EIT Food	33
Cultivator	22
Techstars	20
i.d.e.a. Fund	14
Google for Startups Accelerator	10
Tech Incubator Program for Startups	8
RootCamp - A SpinLab Incubator	8
GROW Accelerator	7
Katapult Group	6
European Innovation Council	6

Source: PitchBook • Geography: Global • *As of June 30, 2023

Top VC investors in agtech companies in 2023*

Investor name	Deal count
SOSV	8
Conexus Venture Capital Fund	7
At One Ventures	5
iSelect Fund	5
Lowercarbon Capital	4
SVG Ventures-THRIVE	4
Invest Nebraska	4
Cavallo Ventures	4
Serra Ventures	4
Main Sequence Ventures	4

Source: PitchBook • Geography: Global • *As of June 30, 2023



VC ACTIVITY

Top PE investors in agtech companies since 2020*

Investor name	Deal count	Primary investor type
HarbourVest Partners	7	PE/buyout
Altas Partners	5	PE/buyout
AlpInvest Partners	5	PE/buyout
Hellman & Friedman	5	PE/buyout
The Carlyle Group	4	PE/buyout
Columna Capital	3	PE/buyout
APES Partners	3	PE/buyout
Banneker Partners	3	PE/buyout
L Capital	3	PE/buyout

Source: PitchBook • Geography: Global • *As of June 30, 2023

Top strategic acquirers of agtech companies since 2020*

Investor name	Deal count	Investor type
Hub International	4	PE-backed company
GrubMarket	4	VC-backed company
GrowGeneration	3	Corporation
Syngenta	2	Corporation
Agromarket	2	Corporation
High Street Insurance Partners	2	PE-backed company
John Deere	2	Corporation
Papé Machinery Agriculture & Turf	2	Corporation
Kubota	2	Corporation
xFarm Technologies	2	Corporation

Source: PitchBook • Geography: Global • *As of June 30, 2023



Emerging opportunities

Ag workforce management

Startups are leveraging technology and data to address workforce challenges.

Farm machinery retrofit

Startups are developing tools to retrofit farm machinery with autonomous driving capabilities.

Biofertilizers

Biotech firms are designing biological fertilizers that improve plant and soil health to supplement or replace traditional synthetic fertilizers.



Ag workforce management

Overview

Agriculture workforce management software represents a niche but rapidly growing segment of the agtech industry. These tools allow for the efficient organization and coordination of labor, equipping the agricultural sector with the means to navigate challenges related to labor shortages, training, compliance, and productivity. With the growing emphasis on digital transformation, these software solutions are becoming increasingly crucial to the successful operation of modern farms.

Workforce management in the agricultural sector has been a persistent issue, with hurdles such as labor shortages, inadequate training, and an ageing workforce. Nevertheless, startups are emerging as significant players in transforming these challenges by implementing innovative, technology-driven solutions.

Trends and innovations

Agriculture workforce management software is seeing significant technological advancements, driven largely by the adoption of AI, Internet of Things (IoT), machine learning, and mobile technology. Startups are leveraging these technologies to offer real-time labor tracking, predictive analytics, task allocation, and payroll management.

Another trend is the emphasis on user-friendly interfaces and mobile compatibility, recognizing the importance of ease-of-use and accessibility in the adoption of new technologies. Startups like [Ganaz](#) and [PickTrace](#) offer mobile apps that allow farm managers to monitor and manage their workforce on the go.

Inclusion and diversity in the workforce are becoming a central focus for many companies. Platforms such as [Deputy](#) and [Seso](#) are designed with flexible work conditions in mind, catering to a diverse range of workers and encouraging wider participation in agricultural work.

Challenges and opportunities

The agriculture sector faces several challenges that can impact the effectiveness and acceptance of workforce management software. These challenges, while significant, also represent areas of opportunity for innovative startups and established companies alike.

Labor shortages: The agricultural sector struggles with labor shortages. This presents an opportunity for software providers to incorporate automation in their platforms, minimizing human labor dependency.

Inadequate training: The lack of adequately trained labor in using advanced technology is a hurdle. This creates an opportunity for companies to integrate user-friendly interfaces and training modules in their software, facilitating technology adoption.

Ageing workforce: The ageing agricultural workforce can be resistant to new technologies. Software solutions must focus on simplicity and ease-of-use, while simultaneously, efforts must be made to attract a younger, tech-savvy generation to the sector through innovative tech and flexible work conditions.



AG WORKFORCE MANAGEMENT

Trending startups

Startups like [PhyFarm](#), [Kisanwala](#), and [Seso](#) are disrupting ag workforce management by integrating advanced technologies into their solutions. [PhyFarm](#) uses AI-driven predictive analytics to optimize labor allocation and boost productivity. [Kisanwala](#), an Indian startup, leverages AI and data analytics to provide farmers with insights for data-driven decision-making regarding their labor force. [Seso](#) has introduced a unique solution that focuses on creating a fair and efficient agricultural labor market. It is not just providing a workforce management platform but also striving to improve labor conditions and standards, thereby contributing to a more inclusive agricultural industry.

On the other hand, [PickTrace](#), [Ganaz](#), [Aghelp](#), [Deputy](#), [Hayload](#), and [L1NDA](#) offer comprehensive workforce management solutions with different specializations. [PickTrace](#) delivers a platform focused on labor tracking and harvest management, while [Ganaz](#) facilitates direct communication between farmers and workers, aiding recruitment and transparency. [Aghelp](#) is making strides with a solution that assists farmers in finding and managing labor efficiently. [Deputy](#) stands out for its focus on ease-of-use and flexibility, targeting a diverse range of individuals to engage in agricultural work. [Hayload](#) simplifies farm management by offering a set of tools for managing labor, equipment, and resources. [L1NDA](#), while not agriculture-specific, has found success with a flexible workforce management system adaptable to various industries, including agriculture. The disruptive approaches of these startups are not just optimizing labor management but also fostering an inclusive and sustainable future for the ag industry.



AG WORKFORCE MANAGEMENT

Key ag workforce management VC-backed companies*

Company name	VC (\$M) raised to date	Last financing valuation (\$M)	Most recent VC deal type
Deputy	\$106.0	N/A	Late-stage VC
PickTrace	\$48.8	\$61.2	Series B
Seso	\$31.5	\$125.0	Series A
Ganaz	\$11.6	\$26.0	Series A2
L1NDA	\$1.1	N/A	Series A
Kisanwala	\$1.0	N/A	Angel
PhyFarm	\$0.3	\$2.1	Seed
Aghelp	\$0.1	\$0.3	Accelerator/incubator
Hayload	N/A	N/A	Seed

Source: PitchBook • Geography: Global • *As of June 30, 2023



Farm machinery retrofit

Overview

Autonomous farm machinery is a rapidly evolving segment within the agriculture industry. This sector leverages advancements in AI, IoT, robotics, and machine learning to deliver automated solutions for a range of farming operations. As the drive toward precision agriculture accelerates, so does the demand for autonomous farm machinery. However, fully autonomous farm equipment is not yet widely available, and what is available can be cost-prohibitive for many farmers, creating a significant market opportunity for companies providing navigation and autosteer retrofitting solutions.

Retrofitting: Bridging the gap

Retrofitting existing machinery with autosteer and autonomous navigation systems offers a practical solution to the high cost of fully autonomous equipment. These systems allow farmers to enjoy the benefits of automation—such as improved efficiency, reduced input costs, and increased precision—without the need for significant capital investment.

Moreover, retrofitting offers flexibility, as systems can be transferred between different pieces of equipment, and it allows farmers to continue using machinery they are already familiar with, reducing the learning curve typically associated with new equipment.

Market dynamics and growth

The market for autonomous farm machinery is expected to grow exponentially, driven by increasing food demand, scarcity of labor, and the push for sustainable farming practices. However, the high cost of fully autonomous machinery poses a significant barrier to entry for many farmers. As a result, there is increasing interest in retrofitting existing farm machinery with autonomous capabilities, making it a more affordable and accessible option.

Key players

In the field of autonomous farm machinery, traditional agriculture equipment manufacturers like [John Deere](#) and [CNH Industrial](#) are making strides with fully autonomous or semi-autonomous machinery. Simultaneously, companies like [FieldBee](#), [Sabanto](#), and [Polymath Robotics](#) have carved a niche in offering autosteer and navigation retrofitting solutions, allowing existing machinery to be upgraded with autonomous features.

Challenges and opportunities

Retrofitting autosteer and navigation systems is not without challenges. There can be a significant learning curve for farmers who are not tech-savvy. Additionally, while retrofitting is cheaper than buying new autonomous machinery, the upfront costs can still be prohibitive for some farmers. The cost to retrofit a tractor with autonomous capabilities could cost between \$43,000 and \$74,000, while buying an autonomous tractor can range from \$50,000 to \$163,000.⁵

⁵: ["An Overview of Autonomous Tractors and Retrofit Kits For Sale in 2022," Future Farming, René Koerhuis, January 3, 2022.](#)



FARM MACHINERY RETROFIT

However, these challenges present opportunities for companies in this sector. Companies that provide comprehensive training and support services, along with affordable and easy-to-install solutions, are likely to gain a competitive edge. Additionally, there is potential for companies to partner with financial institutions to provide financing options to make retrofitting more accessible to farmers.

Outlook

As the agriculture industry moves toward more precision and sustainability, the demand for autonomous farm machinery is expected to grow. Retrofitting companies are uniquely positioned to bridge the gap, providing an affordable and practical way for farmers to adopt autonomous technology. As they continue to innovate and overcome challenges, the market potential for these companies is significant.



FARM MACHINERY RETROFIT

Key farm machinery retrofit VC-backed companies*

Company name	VC (\$M) raised to date	Last financing valuation (\$M)	Most recent VC deal type
FJ Dynamics	\$130.9	N/A	Series B
Blue White Robotics	\$48.0	\$111.8	Series B
FieldIn	\$47.1	N/A	Series B
Agtonomy	\$22.5	N/A	Early-stage VC
Sabanto	\$22.0	\$46.5	Series A
Beagle	\$1.8	N/A	Early-stage VC
FieldBee	\$1.6	N/A	Late-stage VC
Polymath Robotics	\$0.5	N/A	Early-stage VC
AgriRobot	N/A	\$40.5	Accelerator/incubator

Source: PitchBook • Geography: Global • *As of June 30, 2023



Biofertilizers

Overview

Biofertilizers are biological products that use living microorganisms to improve the nutrient profile of soil. Beneficial microorganisms such as Rhizobium bacteria, Mycorrhizal fungi, and Phosphate-solubilizing bacteria contribute to enhanced plant growth and fertility by fixing nitrogen, solubilizing phosphorus, and synthesizing growth-promoting substances. As a sustainable alternative to traditional chemical fertilizers, biofertilizers are gaining traction in the agtech landscape, with numerous VC-backed startups leading the disruption.

Biofertilizers are rising in popularity due to their role in promoting sustainability, improving soil health, and long-term cost-effectiveness. In particular, the importance of the last point has grown since the Russia-Ukraine conflict disrupted the synthetic fertilizer market. The low environmental impact of biofertilizers aligns with global efforts toward green solutions and tighter regulations on chemical fertilizers. Consumer trends favoring organic and sustainably-produced foods are also driving demand. Additionally, biofertilizers enhance climate change resilience by improving plant disease resistance and stress tolerance and contribute to food security by enhancing soil health and crop productivity. Taken together, these multifaceted benefits are making biofertilizers an increasingly popular choice in modern agriculture.

Market dynamics and VC investment trends

The global biofertilizer market is expected to witness substantial growth, fueled by the increasing demand for organic produce, rising environmental consciousness, and tightening regulations on chemical inputs. VC firms have recognized this potential, and significant investments are being funneled into startups creating innovative biofertilizer solutions.

Startups leading the disruption

VC is actively supporting several innovative startups in the biofertilizer domain. [Pivot Bio](#), backed by prominent investors such as [Breakthrough Energy Ventures](#) and [Temasek Holdings](#), is developing biofertilizer with nitrogen-fixing microbes—offering a more sustainable and reliable source of nitrogen for crops and reducing reliance on synthetic nitrogen fertilizers. Another key player, [Kula Bio](#), with financial backing from [Collaborative Fund](#) and [The Engine](#), has developed a bacteria-based biofertilizer that can be applied to fields using traditional practices and is cost competitive with synthetic fertilizer.

In the same space, [Lucent Biosciences](#), funded by [Prime Impact Fund](#), is addressing soil degradation and nutrient runoff with its carbon-neutral, bioavailable micronutrient fertilizers. On the other hand, [Bionema](#), a leading biological technology developer, is working on a broad portfolio of chemical-free crop protection solutions including biofertilizers, biopesticides, and biostimulants. Together, these VC-backed startups are reshaping the landscape of ag inputs, leading the shift toward a more sustainable future in agriculture.

Disruption of traditional chemical ag inputs

Biofertilizers are reshaping the traditional ag input market by:

- **Enhancing soil health:** Unlike chemical fertilizers that can harm the soil's biological activity over time, biofertilizers improve the soil's fertility and biodiversity.



BIOFERTILIZERS

- **Increasing nutrient uptake:** Biofertilizers improve nutrient solubility and availability, boosting plant nutrient uptake.
- **Reducing environmental impact:** Biofertilizers are eco-friendly, reducing the pollution associated with chemical fertilizers.

Challenges and opportunities

While the biofertilizer industry holds promise, it faces challenges that limit its full potential. Biofertilizers do not fully replace chemical fertilizers and their effectiveness may vary with soil conditions and crop types. The limited shelf life, odor, and quality control issues further complicate their use. Additionally, farmers' lack of access to quality biofertilizers and training on their use, along with regulatory, infrastructure, and supply chain hurdles, pose significant barriers. Overcoming these challenges is crucial for the industry to disrupt traditional agricultural practices.

Outlook

With the drive for sustainable agricultural practices, the demand for biofertilizers is poised to surge. VC-backed startups, with their innovative approaches, are disrupting traditional chemical ag inputs, paving the way for a more sustainable future. The biofertilizer market offers an optimistic outlook, promising significant growth and impact on global agricultural practices.



BIOFERTILIZERS

Key biofertilizer VC-backed companies*

Company name	Total raised (\$M)	Last financing valuation (\$M)	Last financing deal type	IPO probability (%)	M&A probability (%)	No exit probability (%)
Pivot Bio	\$696.3	\$1,700.0	Series D	70.0%	28.0%	2.0%
Loam	\$109.7	N/A	Series B	45.0%	51.0%	4.0%
Kula Bio	\$71.2	\$210.0	Series A	1.0%	88.0%	11.0%
Andes	\$51.1	N/A	Series A	2.0%	93.0%	5.0%
Chonex	\$49.0	N/A	Late-stage VC	1.0%	51.0%	48.0%
Lucent Biosciences	\$14.6	\$35.6	Series 2	4.0%	85.0%	11.0%
Azotic Technologies	\$8.6	N/A	Late-stage VC	4.0%	53.0%	43.0%
Solasta Bio	\$6.8	N/A	Early-stage VC	8.0%	76.0%	16.0%
Reazent	\$4.1	N/A	Seed	1.0%	33.0%	66.0%
Bionema	\$3.6	N/A	Series B	1.0%	71.0%	28.0%

Source: PitchBook ▪ Geography: Global ▪ *As of June 30, 2023
 Note: Probability data based on [PitchBook VC Exit Predictor methodology](#).



Select company highlights



SELECT COMPANY HIGHLIGHTS: EFISHERY

eFishery

Founded
2013

HQ location
Bandung, Indonesia

First disclosed institutional round
\$4.0M in a Series A round (November 2018)

Employees
2,000+

Total raised
\$493.5M over six deals

Last disclosed financing
Raised \$195.7M of Series D funding

Overview

[eFishery](#) is a technology company that provides integrated feeding solutions for fish and shrimp farming. The company was founded with the aim to revolutionize the aquaculture industry by providing smart, data-driven, automated feeding solutions. Their flagship product is a smart automatic feeder that can feed fish and shrimp automatically, adapt the feeding schedule based on the animal's appetite, and connect farmers to the cloud through the IoT technology. This helps farmers monitor and schedule feeding times, which can increase productivity, reduce waste, and improve profitability.

Leadership

[eFishery](#)'s leadership team is comprised of key individuals who have made significant contributions to the company's success. The CEO and co-founder, Gibran Huzaifah, is an entrepreneur with a rich background in the aquaculture industry. His innovative vision and deep understanding of the sector have played a pivotal role in guiding the company's strategic direction and growth. Chrisna Aditya, Chief Internal Operations Officer and co-founder, brings valuable expertise in technology and systems design. His skills have been instrumental in crafting [eFishery](#)'s unique smart feeding technology, positioning the company as a key player in the fusion of technology and aquaculture.



SELECT COMPANY HIGHLIGHTS: EFISHERY

Competitors

[eFishery](#) operates in a niche yet competitive field that blends aquaculture and technology. One significant competitor is [Aquabyte](#), a company that applies machine learning to optimize fish feeding in aquaculture, mirroring [eFishery](#)'s dedication to using advanced tech in this sector. Another competitor is [XpertSea](#), a technology firm leveraging AI and data analytics to bring

transformative solutions to aquaculture, underscoring the sector's increasing reliance on data-driven decision-making. [Umitron](#), which provides technology solutions such as IoT and AI for aquaculture, is also a formidable player in the market. The dynamic nature of the industry implies that the competitive landscape may continue to evolve, with new entrants possibly disrupting the market with innovative solutions.

Financing history

Seed	Series A	Series B	Series C	Late-stage VC	Series D
September 8, 2015	November 13, 2018	September 3, 2020	January 10, 2022	March 6, 2023	May 25, 2023
Total raised: N/A	Total raised: \$4.0M	Total raised: \$19.8M	Total raised: \$90.1M	Total raised: \$150.0M	Total raised: \$195.7M
Pre-money valuation: N/A	Pre-money valuation: \$8.3M	Pre-money valuation: \$69.5M	Pre-money valuation: \$317.2M	Pre-money valuation: N/A	Pre-money valuation: \$1,222.7M
Investors: N/A	Investors: N/A	Investors: Argor Capital, Northstar	Investors: Peak XV Partners, SoftBank Investment Advisers, Temasek Holdings	Investors: N/A	Investors: G42 Global Expansion Fund



SELECT COMPANY HIGHLIGHTS: INVETX



Founded
2018

HQ location
Boston, Massachusetts

First institutional round
\$25.5M in a Series A funding at a \$19.0M pre-valuation (September 2022)

Employees
11+

Total raised
\$86.0M over two deals

Last financing
Raised \$60.5M in Series B funding at a \$74.0M pre-valuation (March 2022)

Lead investors
Eight Roads, GV, Novo Holdings, F-Prime Capital

Overview

[Invetx](#) is a pioneering animal health biopharmaceutical company that leverages insights and technological advances from human biotechnology to veterinary medicine. It is committed to creating a comprehensive platform for protein therapeutic discovery and development, focusing mainly on monoclonal antibodies, recombinant proteins, and gene therapy.

The firm was founded with the vision to transform the way therapeutics are developed and commercialized for animals, aiming to bring the latest breakthroughs in human biotechnology to the veterinary field. They are specifically targeting unmet medical needs in animal health, with the goal of delivering novel, high-impact therapeutics to veterinarians and pet owners.

Leadership

The leadership team at [Invetx](#) consists of accomplished individuals from diverse fields. Dr. Juergen Horn, the CEO and co-founder, brings valuable scientific knowledge from his extensive experience in biotechnology and pharmaceuticals. Jeff Troderman, the CFO and Inside Counsel, has over 15 years of experience in financial leadership and helps guide life science and technology companies toward profitability. William Brondyk Ph.D., the Chief Scientific Officer, has over 20 years of experience in developing protein therapeutics and leads the research strategy for the animal health market. Lastly, Colin Giles Ph.D., the Chief Development Officer, utilizes his background in the animal health industry to navigate clinical and regulatory affairs. Together, they drive [Invetx's](#) mission to advance veterinary medicine through biotechnology.



SELECT COMPANY HIGHLIGHTS: INVETX

Competitors

[Invetx](#) is in a competitive arena within the innovative animal health solutions sector. Among the established heavyweights are [Zoetis](#) and [Elanco Animal Health](#), two global companies that have an extensive portfolio of veterinary vaccines and medicines. Their large-scale operations and wide reach give them a formidable presence in the market.

However, [Invetx](#) also competes with emerging, VC-backed startups like [PetMedix](#) and [Animab](#). [PetMedix](#) is focused on developing antibody-based therapeutics for pets, mirroring [Invetx](#)'s focus on human biotechnology adapted for veterinary medicine. [Animab](#), on the other hand, concentrates on developing orally administered products that help establish a healthy gut microbiome in animals, representing another novel approach in the sector.

These newer competitors, backed by VC funding, bring innovation and agility to the sector, and their potential breakthroughs could significantly disrupt the animal health market. This diverse competition highlights the dynamic and fast-paced nature of the animal health therapeutics field.

Financing history

Series A	Series B
September 30, 2020	March 28, 2022
Total raised: \$25.5M	Total raised: \$60.5M
Pre-money valuation: \$19.0M	Pre-money valuation: \$74.0M
Investors: Anterra Capital, AbCellera, Tekla Capital Management	Investors: Completed, Anterra Capital (Maarten Goossens), Casdin Capital, Eight Roads, F-Prime Capital (Jessica Alston), GV, Novo Holdings (Kartik Dharmadhikari), Tekla Capital Management (Jason Akus)

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As the private markets continue to grow in complexity and competition, it's essential for investors to understand the industries, sectors and companies driving the asset class.

Our Industry and Technology Research provides detailed analysis of nascent tech sectors so you can better navigate the changing markets you operate in—and pursue new opportunities with confidence.

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