PitchBook

EMERGING TECH RESEARCH

Foodtech

3Q 2019

Contents

Contact

Alex Frederick
Senior Analyst, Emerging Technology
alex.frederick@pitchbook.com
206.480.1352

Research
analystresearch@pitchbook.com

This Emerging Technology Research report is updated on a quarterly basis to reflect changes in venture capital deal activity and other market related updates deemed valuable by the research analyst. The previous quarterly report can be accessed **here.**

Recent news and insights

Event	PitchBook view
October 11, 2019 **Uber reenters grocery**	Uber is making a second attempt at online grocery delivery with its recent majority stake investment in grocery delivery startup **Cornershop**. Uber attempted "everything" delivery with its UberRush service between 2015 and 2018. While this eventually led to the launch of **Uber Eats**, a viable grocery model was never identified, and the Rush service was closed in June 2018. Now, Uber's CEO Dara Khosrowshahi has declared renewed interest in positioning Uber to be "the operating system for your everyday life." Part of that goal includes grocery delivery. **Cornershop** provides grocery delivery services to cities in Chile, Peru, Mexico and most recently Canada, with ambitions to expand into the US. Since Uber shut down Rush, competitors have risen up, including **Instacart**, **Postmates**, Amazon and **Whole Foods**, as well as grocers such as Kroger and Walmart. With online grocery representing only 2% to 4% of the US grocery market, the opportunity remains large, and we expect Uber could become an important provider in the space.[1]
October 8, 2019 **Postmates delays IPO**	After announcing plans to go public, delivery company **Postmates** surprised our analysts by subsequently raising $225 million in PE growth capital and postponing its IPO indefinitely. This comes on the heels of a series of poorly performing tech IPOs culminating in **The We Company's** canceled IPO. As an online "anything" delivery platform, Postmates would have been the third food delivery company to go public after GrubHub and Uber (**Uber Eats**). The delay signals souring market conditions for tech companies, especially those without a clear path to profitability.

1: "Online Grocery Sales to Reach $100 Billion in 2025; Amazon is Current and Future Leader," Forbes, Pamela N. Danziger, January 18, 2018

Event

October 8, 2019

Aleph Farms grows meat cells in space

PitchBook view

Israeli cultured meat company **Aleph Farms** announced that it had successfully completed an experiment to grow "slaughter-free meat" on the International Space Station. The accomplishment marks a new milestone in the effort to grow meat from cells in order to reduce the environmental impact of industrial livestock production, address concerns related to the treatment of food-producing animals and meet the growing global demand for meat. The purpose of the experiment was to demonstrate that cultured meat could be generated anywhere and with minimal resource usage. Space-grown meat could be used to address food insecurity or even feed astronauts on long-term manned space missions. **Aleph Farms'** accomplishments raised public awareness of cultured meat technology and potential future use cases.

Executive summary

The foodtech ecosystem consists of companies that are changing the way food has traditionally been discovered, purchased, delivered, prepared and consumed. While tech-related investment into the food industry has traditionally flown under the radar, new technologies and mobile capabilities have sparked interest in the space in recent years, spurring $10.9 billion in VC investment across 289 deals through 3Q 2019. Additionally, recent high-profile investments into foodtech from technology companies, such as Amazon and Google, and IPOs from foodtech companies, including Beyond Meat and Uber, have underscored the growing importance of the sector.

We believe physical goods industries, such as the food business, are generally slower to implement new consumer-oriented technologies relative to other sectors, such as financial services. For this reason, we believe foodtech represents a large and growing market opportunity with the potential for significant disruption of legacy models. This edition provides an overview of the emerging foodtech ecosystem and key VC-backed foodtech companies that have received funding since 2015. We have limited our search to only those companies that have received over $15 million total invested capital and other companies that we felt were important to highlight.

Market segments were determined by similarities in use cases, then further categorized into more specific buckets. While we recognize that some startups could belong in multiple segments or even in different industries (i.e. restaurant tech, agtech, ecommerce, mobile commerce or robotics), we have placed them within the categories that best match our understanding of the primary consumer use case. Overall, we view the burgeoning foodtech ecosystem as vibrant, unique and poised for significant technology-driven growth.

Key takeaways

Cellular agriculture poised to address food-related issues: Cellular agriculture, also known as cultured meat, clean meat or lab-grown meat, is a term used to describe animal products (e.g. meat, dairy, leather) that are produced by replicating animal cells in a culture outside of the animal. The technique relies on a combination of biotechnology, tissue engineering, molecular biology and synthetic biology. At scale, cellular agriculture has the potential to allow for the production of high-quality (e.g. Kobe beef), safe (e.g. no hormones, antibiotics or diseases) meat and dairy products at a fraction of the cost of current meat production. Although commercialization is reportedly several years away, investment activity is already ramping up, with $248.4 million directed into the sector YTD. We expect continued escalation of funding events as commercialization draws near.

Consumer demand drives investment in plant-based meat and dairy: The plant-based food industry represents a small but growing opportunity with estimated annual growth rates in the 20% range and industry revenue of roughly $3.3 billion in the US. Startups have already raised significant VC and we expect that over time, plant-based meats will take share from an approximated $350 billion annual meat industry. Although high-profile funding activity has been aimed at plant-based burger patties, rising opportunities exist to replace other meat products such as fish and poultry.

Ghost kitchens materialize: Continued margin pressure on restaurant delivery services is giving rise to “ghost kitchens,” commercial kitchens that operate without a brick-and-mortar dining location. These companies primarily sell through meal delivery platforms and may be delivery-only brands or expansion kitchens extending the reach of existing restaurants. The reduced occupancy costs of ghost kitchens compared with operating a full-service restaurant allows both new and existing brands to grow with less capital. Many leading meal delivery companies have rolled out ghost kitchen operations, including **DoorDash**, **Deliveroo** and GrubHub.

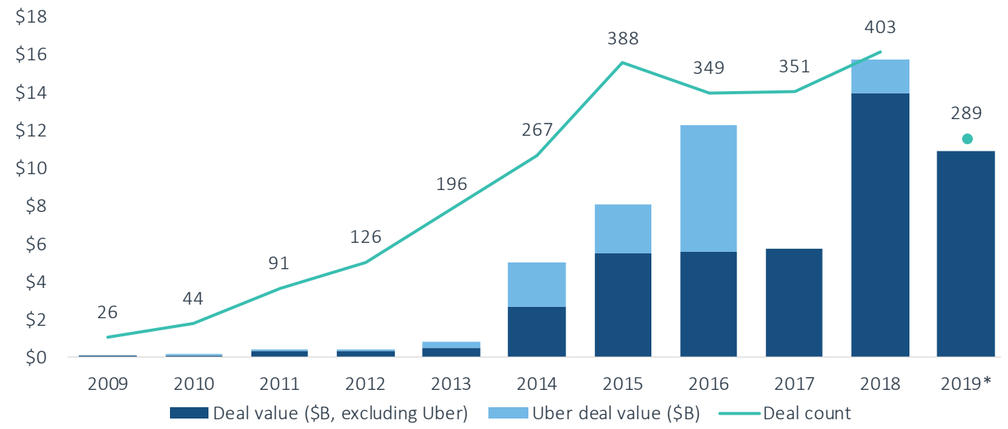
VC activity

Foodtech startups in 3Q 2019 saw strong VC investment activity, with $590 million invested. Consumer eating habits and preferences are shifting, and foodtech startups are launching to cater to the change. The meal ordering sector notched $177 million invested across eight VC deals in 3Q as global competition for market share continues pacing at elevated levels. The largest meal ordering deal of 3Q was a $125 million Series D investment in India-based **Rebel Foods**. The usual crew of investors known for mega-deals such as SoftBank, Tencent Holdings, Sequoia Capital and Temasek Holdings were all among the participants in the round as smart-phone adoption in India and an interest in food delivery heat up.

Identifying a viable path to profitability for food delivery is key in investors' minds, and this is one reason we have also observed sizable investments in autonomous delivery technologies. The largest autonomous delivery deal was a $100 million Series A round in Silicon Valley-based **AutoX Technologies**, which is developing autonomous driving technology with a focus on grocery and meal delivery. Startup **Starship** also raised $40 million in Series A funding to expand delivery robots on university campuses nationwide. These technologies offer the potential to reduce labor costs for food delivery companies, a significant expense and barrier to profitability.

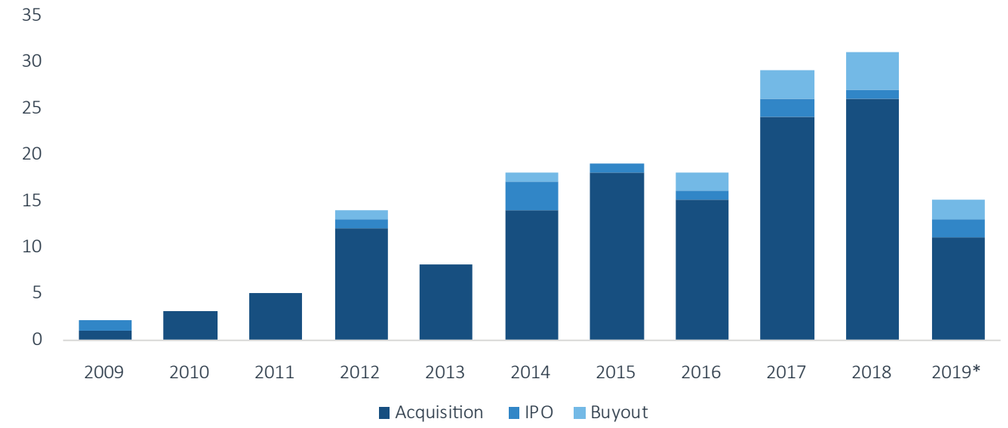
Lastly, plant-based food companies raised significant VC in 3Q, with 11 companies receiving financing. Beyond Meat's IPO signaled the mass appeal of plant-based foods, and investors have taken notice. The largest deal of the quarter was a $27.5 million investment in Boston-based **Motif FoodWorks**, which develops cultured meat and dairy products. We expect continued investment in the sector as startups strive to meet the growing demand for plant-based alternatives to meat and dairy products.

Figure 1. FOODTECH VC DEAL ACTIVITY



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 2. FOODTECH VC EXITS (#) BY TYPE



Source: PitchBook | Geography: Global | *As of September 30, 2019

Foodtech market map

Bio-engineered foods

Meal replacements
soylent, Huel, Feed.

Plant-based meat and dairy
IMPOSSIBLE, ripple, MycoTechnology, kite hill, Perfect Day, Clara Foods, NotCo, Good Catch, LAVA

Cellular agriculture
Perfect Day, Clara Foods, BlueNalu, Geltor, Memphis Meats, Wild Earth

Meal ordering

Meal ordering & delivery
Grab, DOORDASH, deliveroo, Rappi, SWIGGY, Postmates, 배달의민족 (Woowa Brothers), Faasos, Wolt, Freshly, RITUAL, olo, FRICHTI, lunchr, Daily Harvest, EatStreet, Slice, hungry root, goldbelly, MEALPAL, Cluster Truck, TERRITORY, Vita Mojo, caviar

Catering
ezcater, revolution foods, EAT CLUB, chewse, 美餐 Meican, Cooka, PLATTERZ, ohmygreen, ZeroCater, Smart Lunches

Curated snack boxes
Snack Nation, peeled snacks, Your Super Foods

Grocery ordering

Grocery ordering & delivery
instacart, Rappi, Miss Fresh, DaDa, bigbasket, 易果生鲜 (yiguo.com), GROFERS, Fresh Buddy, Kurly, good eggs, GrubMarket, PICNIC, Dmall, Kolonial.no, Dailuobo, L'Alveare che dice sì, Supermercado Now, happyfresh, Fengxiansheng, Farmdrop, FoodMaven, milkbasket

Specialty vendors
BOXED, Global Scanner, PinHaoHuo, STOCKWELL, vitafy, Mat Smart, iris nova

Meal kits
Sun Basket, Tovala, Farmer's Fridge, Gobble

Alcohol delivery
flaschenpost.de, HOPSY, SAUCEY

B2B food marketplace
ninjacart, Cheetah, scanntech

Industrial & consumer tech

Kitchentech & robotics
June, Vinçi, BRAVA, Tovala, Blendid, chowbotics

Delivery robots
nuro, Postmates, udelv, Flirtey, STARSHIP

Food waste & traceability
WISErg, FoodLogiQ, Too Good To Go, bluwrap, karma

Discovery & review

Chef experiences
heycater!, FEASTLY, Cozymeal

Food & beverage discovery
VIVINO, Winc, fave, CHEFSFEED

Recipes & cooking communities
Tastemade, 日日煮 DayDayCook, innit

Restaurant recommendations & review
The Infatuation, spotluck, zomato

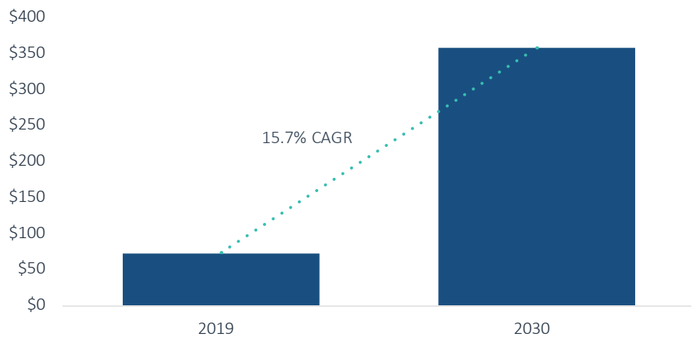
Companies included are VC-backed, segmented by primary use case and sorted by total capital raised.

SEGMENT DEEP DIVE

Meal ordering & delivery

MEAL ORDERING & DELIVERY

Figure 3. MARKET SIZE ($B)



Source: PitchBook, UBS and ResearchandMarkets | *As of July 18, 2019
Note: This chart represents estimates for global online food delivery revenue growth.

BUSINESS MODEL

Meal ordering & delivery platforms connect consumers with restaurants and delivery services that provide order and payment collection as well as dispatch services. Attractive characteristics of the space include large market size, growth supported by increased internet, smartphone adoption and sticky business models.

Companies in this space generally charge service fees. Key services include ecommerce, transaction services, restaurant-to-customer delivery and advertising services.

KPIS

- Ecommerce conversion rate
- Average order value (AOV)
- Customer lifetime value (LTV)
- Gross merchandise volume (GMV)
- Monthly active users (MAU)

KEY PROVIDERS

Uber Eats, DOORDASH, GRUBHUB, JUST EAT, Delivery Hero, Takeaway.com, Postmates, deliveroo, bite squad, delivery.com

KEY INVESTORS

Y Combinator, 500 startups, Lightspeed, BRANDPROJECT, DST, Index Ventures, BENCHMARK, CROSSLINK CAPITAL, NASPERS, INSIGHT PARTNERS

NOTABLE DEALS

Uber Eats (Uber)

May 2019
$67.6B IPO

DOORDASH

May 2019
$600M Series G

Led by:
Sands Capital Ventures and Darsana Capital Partners

INDUSTRY DRIVERS

- Consumer preference for mobile ordering
- Sophistication of ordering platforms to offer more options and personalization
- Relatively un-disrupted industry, with large potential market opportunity
- Demand among traditional food providers for digital distribution services

Overview

Meal ordering represents a large and growing market that has attracted significant VC funding, with $10.8 billion (including Uber) raised in 2018 and $7.5 billion raised through 3Q 2019. Delivery companies across the globe have received massive investments as they seek to grow market share in a low-margin business model that requires scale for profitability. The largest venture deal in 3Q 2019 was the announced $315 million investment in delivery company **Zomato**. Delivery companies such as Indonesia's **Go-Jek** and Singapore's **Grab Holdings** are growing their delivery services on the back of their established ridesharing operations, enabling them to quickly flex to meet delivery demand. Others including **Wolt** and Uber are also attempting to grow market share by pursuing new opportunities such as smaller cities and dine-in eating options.[2,3]

Meal ordering companies provide an app-based interface that connects consumers with food providers, including restaurants and other vendors. In addition to providing customers with a single destination to discover and order food, platforms also store payment and contact data as well as prior order information to make the ordering process as quick and effortless as possible. We believe these platforms provide significant value for customers seeking convenience, and this helps drive a large, stable customer base. Convenience also adds significant stickiness, decreasing the likelihood that customers will switch to another platform.

Meal ordering platforms can also provide many cross-functional features that we believe can significantly expand the opportunity for service providers. These platforms enable

2: Wolt raises $130 million series C to target whitespace of smaller markets with lower population density, an opportunity ignored by larger players. The company will utilize machine learning to optimize routes.

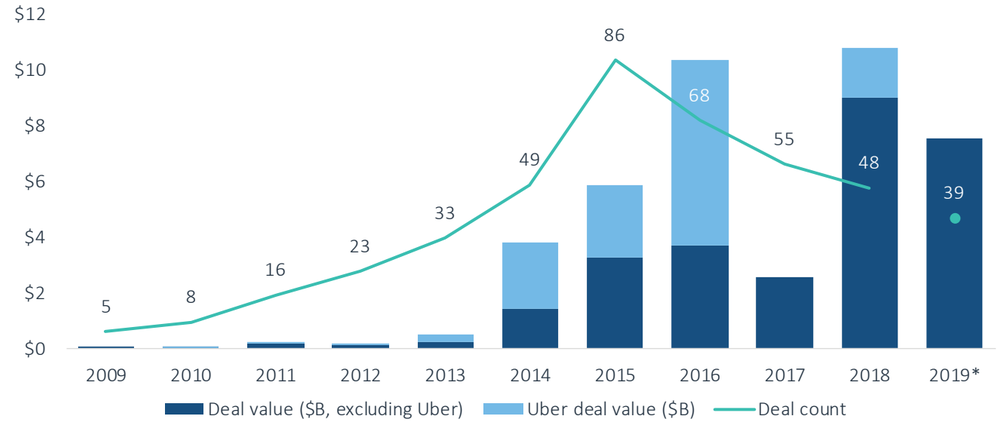
3: "Uber Eats Invades Restaurants With Dine-In Option," Tech Crunch, Josh Constine, July 2, 2019

MEAL ORDERING & DELIVERY

rich data collection that can be used to create new services and increase the potential for network effects as more restaurants and customers sign up. Innovative business models continue to emerge and gain traction for unique dining occasions. For example, **Ritual** aims to make food ordering a social experience by offering customers the option to combine orders with colleagues and by creating unique ways to tie into corporate wellness and social programs.

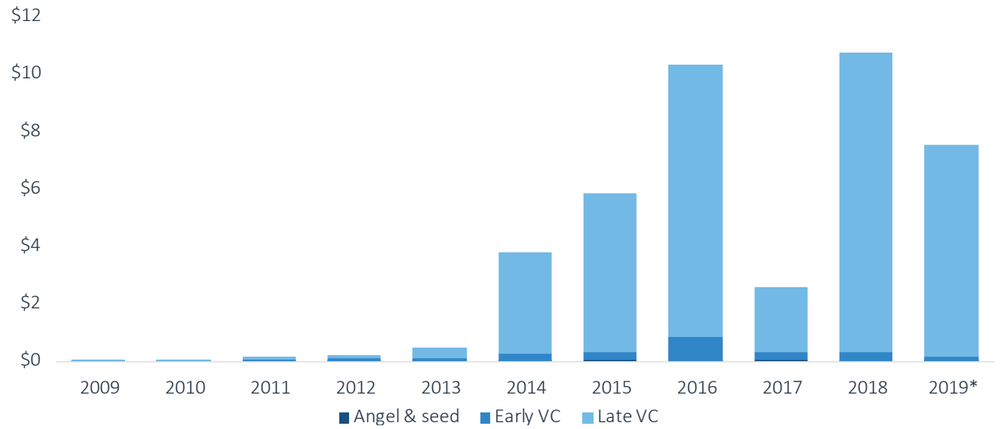
Operational issues such as logistics and delivery costs pose challenges and pressure margins of businesses in this category. Advanced technologies such as machine learning and predictive analytics are helping companies optimize operational efficiency. For example, **MealPal** suggests meals for its users while also requiring them to place orders hours before picking them up, helping restaurants plan for expected demand. In the longer term, we expect autonomous vehicles will play a significant role in reducing the cost of food delivery.

Figure 4. MEAL ORDERING & DELIVERY VC DEAL ACTIVITY



Source: PitchBook | Geography: Global | *As of September 30, 2019

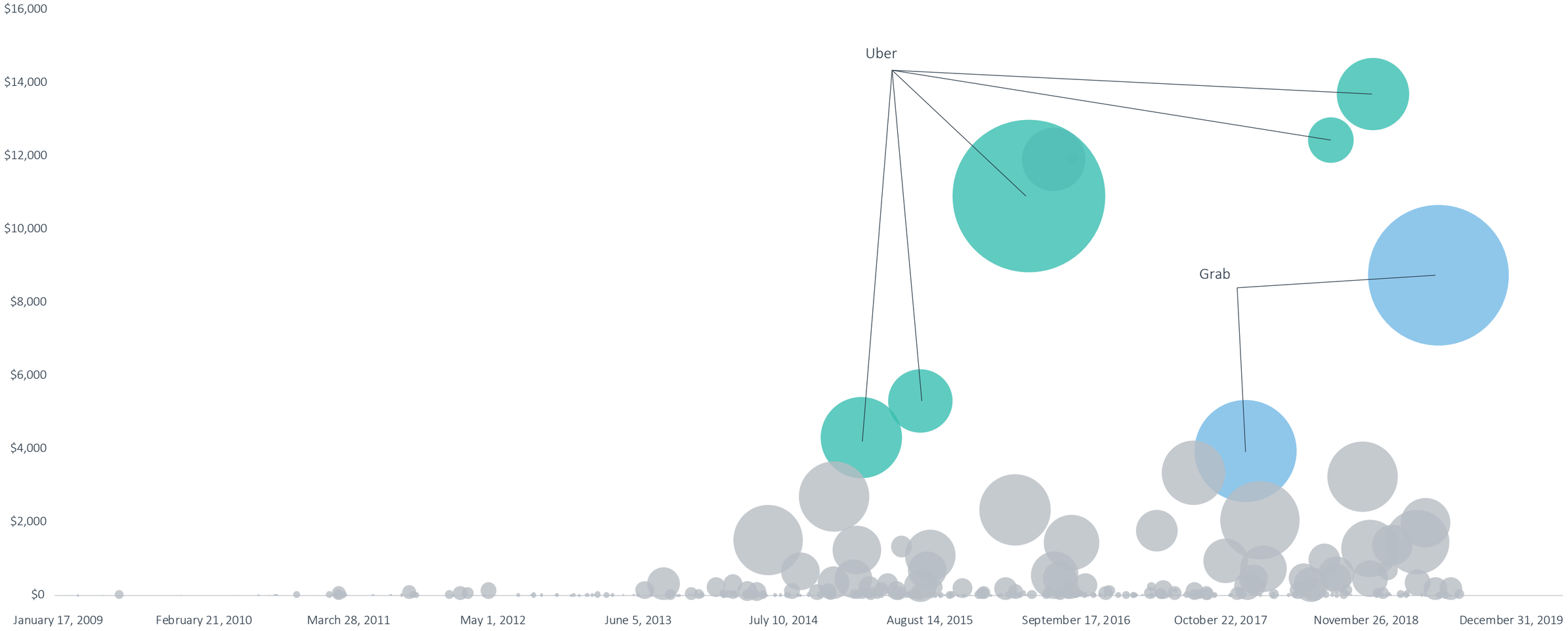
Figure 5. MEAL ORDERING & DELIVERY VC DEALS ($B) BY STAGE



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 6.

Top meal ordering & delivery VC deals ($M) by total capital raised



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 7.

Notable meal ordering & delivery VC deals

COMPANY	DEAL DATE	STAGE	DEAL SIZE ($M)	LEAD INVESTOR(S)
Grab	June 27, 2019	Series H	$4,800.0	Toyota Motor
Rappi	April 30, 2019	Late-stage VC	$1,000.0	CSC UpShot Ventures, Palm Drive Capital, SoftBank Group, SoftBank Investment Advisers
DOORDASH	May 23, 2019	Series G	$600.0	Darsana Capital Partners, Sands Capital Ventures
deliveroo	In progress	Series G	$575.0	Amazon.com
Glovo	April 30, 2019	Series D	$168.4	Lakestar

Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 8.

Notable meal ordering & delivery VC exits

COMPANY	DEAL DATE	DEAL SIZE ($M)	DEAL TYPE	ACQUIRER/INDEX	POST-MONEY VALUATION ($M)
ifood	November 13, 2018	$500.0	Buyout/LBO	Innova Capital, Just Eat Holding, Movile, Naspers Ventures	$500.0
Uber	May 10, 2019	$67,600.0	IPO	NYS: UBER	$75,713.5
bite squad	January 17, 2019	$321.3	M&A	Waitr(Christopher Meaux)	$321.3
ele.me	April 1, 2018	$9,500.0	M&A	Alibaba Group	$9,500.3
Scootsy	August 1, 2018	$8.0	M&A	Swiggy	$8.0

Source: PitchBook | Geography: Global | *As of September 30, 2019

Opportunities

The restaurant delivery market is maturing and only a small number of players dominate the largest markets. Companies such as **Deliveroo**, GrubHub and **Postmates** have accumulated a large enough market share to ward off new entrants. This has shifted early-stage investment opportunities away from pure delivery to emerging services higher up the value chain in terms of food production and delivery service aggregation.

Ghost kitchens: Ghost kitchens are commercial kitchens that operate without a brick-and-mortar dining experience for patrons. These companies primarily sell through meal delivery platforms and may be delivery-only brands, or expansion kitchens extending the reach of existing restaurants. One of the key benefits of ghost kitchens are the reduced occupancy costs compared with operating a full-service restaurant. This allows both new and existing brands to grow with less capital.

A valuable output of operating a meal ordering & delivery service is the massive dataset accumulated on consumer preferences and personal information. This data is providing delivery companies with highly specific consumer demand insights and identifying product gaps in the market. For example, **Uber Eats** could identify a neighborhood that is underserved by Mexican food vendors. Ghost kitchens can leverage this information to supply Mexican food products where that opportunity exists. Many top meal delivery companies have already rolled out their own ghost kitchen operations including **DoorDash, Deliveroo** and GrubHub.

Business models include commercial shared-kitchen facilities (think WeWork for food startups), consulting services such as marketing and delivery, as well as third party operations services such as those provided by **Brightloom**.

Existing players include **Fulton Kitchens**, **Kitchen United**, **CloudKitchens**, **Brightloom** and **DoorDash.**

Order aggregators: One of the largest headaches for restaurant operators when it comes to meal ordering & delivery is managing the various service providers in an easy and efficient way at the point of sale. Some restaurant employees utilize eight or more tablets, which can create chaos at the register and mix-ups at order pickup. This also requires significant training for employees while drawing attention away from customer service and restaurant management. Order aggregation startups such as **Chowly** and It's a checkmate are unifying the various meal delivery platforms onto a single screen or POS platform, optimizing the order and pickup process for operators.

Existing players include **Chowly**, **It'saCheckmate**, **Ordermark** and **Olo**.

Serving smaller cities and rural markets: The meal ordering & delivery market is highly competitive for several reasons, including limited price elasticity of consumers and the continued VC-subsidized pricing of larger competitors. This has driven most operators to compete in large markets where travel distances are generally shorter and where the concentration of drivers, restaurants and consumers is high. These conditions make it more feasible to turn a profit. Consequently, many smaller cities are underserved or have no operator presence at all. Some startup meal delivery platforms are using advanced technologies to target smaller markets with lower population density. **Wolt** claims that AI & ML will allow them to make the economics more attractive. In the long term, an emphasis on continued development of these technologies, as well as autonomous delivery, may allow meal ordering startups to achieve profitability and compete in larger markets against leading players.

Considerations

The market has matured: An overcrowded playing field has led to consolidation and aggressive competition. Although the US market is in growth stage, market leaders are solidifying their positions in many large metropolitan markets, with GrubHub and **Uber Eats** representing approximately 70% of the national food delivery market and rapidly growing in new and existing markets.[4] We believe this leaves little room for new entrants to get a significant foothold in the industry unless they are able to bring something new to the table.

Margins are slim: The economics of restaurant delivery can be challenging for providers. Between the price sensitivity of customers and low profit margins of the restaurant business, the ability to charge additional fees for service and delivery can be challenging. Labor availability and generally increasing wage pressure (often owing to minimum wage increases) add additional challenges. For example, **Deliveroo** posted a 0.85% gross margin in 2016. Over time, we believe scale, expanded platform monetization and autonomous driving technology may provide opportunities to improve margins.

Outlook

Consolidation to continue: As the meal ordering & delivery industry matures, we expect continued consolidation as companies seek to acquire market share or operational capabilities. As of July 25, 2018, GrubHub announced its acquisition of **LevelUp**, a customer loyalty and payments company. Lateral acquisitions such as this can provide several cross-functional benefits by allowing companies to better integrate with restaurants, providing better customer data and reducing transactional frictions.

Delivery to continue taking share from eating out: We expect restaurant delivery to continue to grow as consumers increasingly pursue the convenience and comfort of mobile ordering services. Delivery sales have increased 20% over the past five years and are projected to grow 12% annually over the next five years,[5] primarily as a result of digital ordering apps. While delivery has traditionally been focused on dinnertime, many consumers are beginning to order delivery for breakfast and lunch occasions as well, which we believe presents a significant opportunity to expand the market into areas that have historically been ignored.

4: "Foodservice Delivery in U.S. Posts Double-Digit Gains Over Last Five Years With Room to Grow," The NPD Group, April 3, 2018

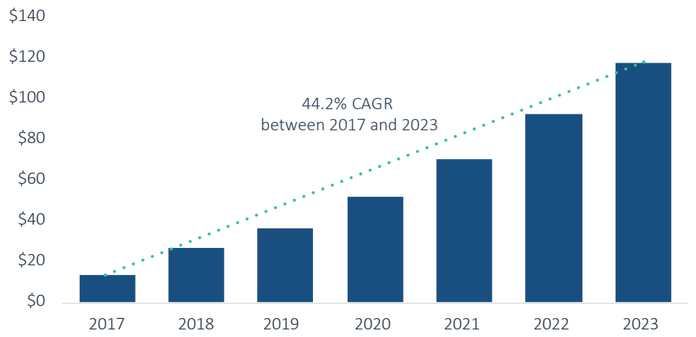
5: "The Stats Are in: Consumers Are Upping Restaurant Delivery," Restaurant Business Online, April 17, 2018

SEGMENT DEEP DIVE

Grocery ordering & delivery

GROCERY ORDERING & DELIVERY

Figure 9. MARKET SIZE ($B)



Source: Business Insider Intelligence | *As of February 2019
Note: This chart represents estimates for US online grocery market revenue growth.

BUSINESS MODEL

Grocery ordering & delivery companies sell groceries online and/or build platforms that facilitate the online purchase of groceries from grocers.

Businesses in this category monetize by charging service and/or delivery fees, selling memberships, or by marking up the price of groceries.

Attractive characteristics of the space include increased consumer spending on grocery goods (due to a strengthening economy), consumer preference for organic, natural and specialty goods; legacy businesses to disrupt and growing consumer acceptance of ecommerce.

KPIS

- Churn—revenue & client
- Gross merchandise volume (GMV)
- Payback period/sales efficiency
- Customer acquisition costs (CAC)
- Lifetime value (LTV) and CAC/LTV
- CAC recovery time (months to recover CAC)

KEY PROVIDERS

amazon, Walmart, Kroger, TARGET, ALDI, instacart, Rappi, missfresh, NewDada 新达达, bigbasket

KEY INVESTORS

Y Combinator, SEQUOIA, DST, TIGERGLOBAL, GGVCAPITAL, kima ventures, FJ LABS, BEENEXT, 联想创投集团 Lenovo Capital, GREYCROFT

NOTABLE DEALS

Rappi

April 2019
$1B late-stage VC

From:
SoftBank Group

GrubMarket

April 2019
$30M Series C1

Led by:
WI Harper Group and Digital Garage

INDUSTRY DRIVERS

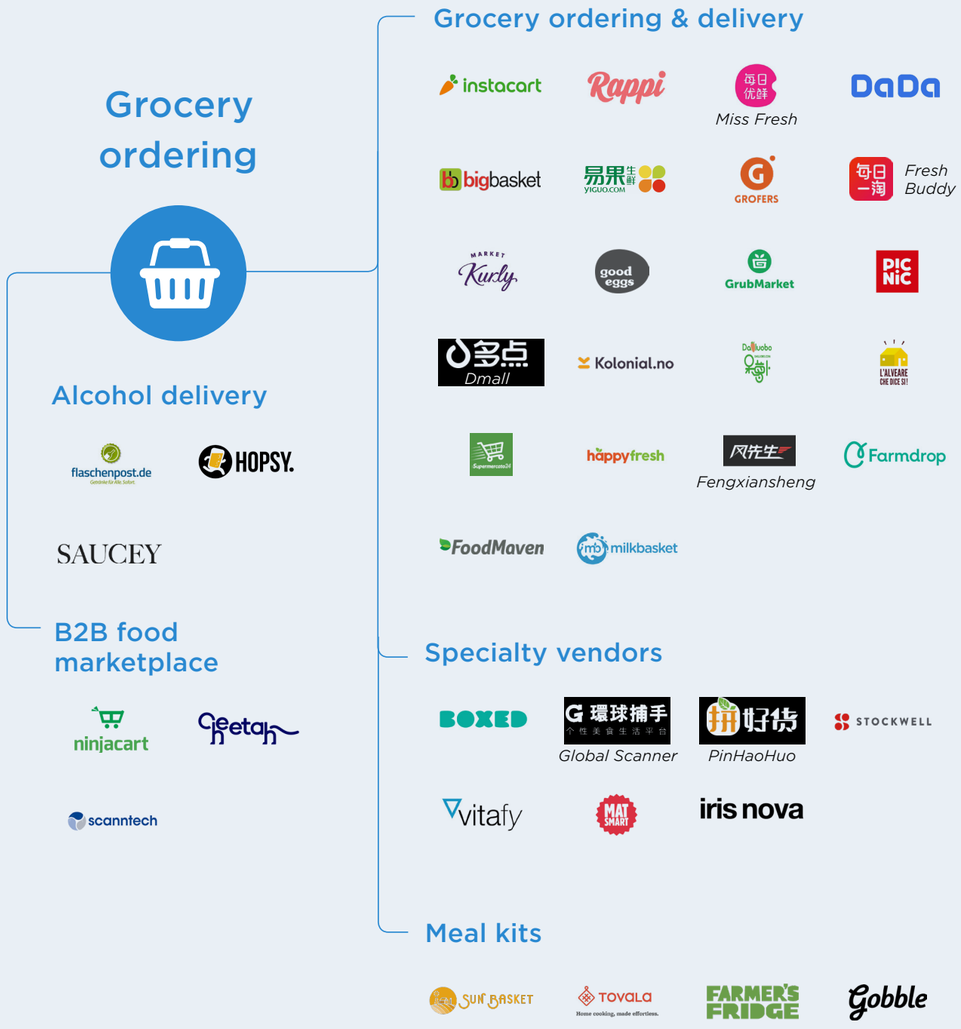
- Expanding online grocery spend reflecting changing consumer habits
- Sophistication of ordering platforms
- Rise of other food delivery services (i.e. meals), driving new grocery competition
- Growing demand for organic or premium foods not always available at local grocery stores
- Investment by Amazon and Walmart
- Grocer-willingness to experiment with hybrid models (e.g. in-store pickup) to better address changing customer preferences

Overview

While online grocery sales remain a very small share of the total market—currently representing only 2% to 4%—the industry is expected to grow to 20% of total grocery retail by 2025, representing a significant growth opportunity in an otherwise low-growth industry.[6] IBIS places the US grocery market at $655 billion with a 0.9% CAGR,[7] implying that online grocery may grow to roughly $132 billion in sales by 2025.

The opportunity to reach consumers at home through grocery delivery and other solutions is not lost on investors, and startups as well as large businesses such as Amazon and Kroger are busy homing in on profitable business models. We believe the leading startups in the space include **Boxed** and **Good Eggs. Boxed** differentiates by selling branded and private-label groceries in bulk online, similar to the Costco model, but without the membership fees and the large retail warehouses. **Good Eggs** markets itself as a digital version of a farmers' market, in some cases delivering goods from the farm to the customer's doorstep in a single day. Compared with 2Q, VC activity in the sector was quiet this quarter, the largest deal being a $4.5 million early-stage investment in Colorado Springs-based **FoodMaven**.

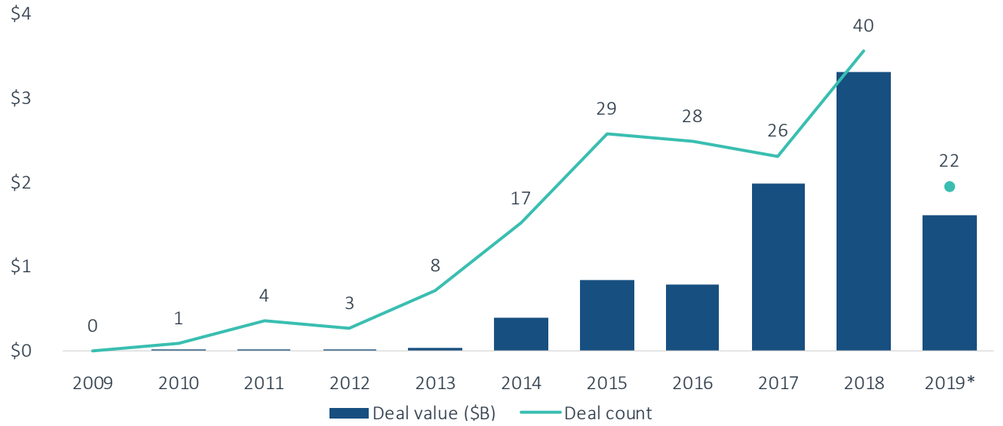
We believe personalization of the customer shopping experience will be a key factor in how grocery delivery companies differentiate. Customer demand for convenience, cost-savings and selection when they shop as well as the ability to select the exact brand, ripeness of fruit, etc. is a key aspect of the brick-and-mortar grocery shopping experience. Online grocery shopping that can best bridge the gap between these expectations will



6: "Online Grocery Shopping Is Misunderstood," Explorer Research, Anne Stephenson, November 7, 2018
7: "Supermarkets & Grocery Stores Industry in the US Market Research Report," IBIS World, April 2019

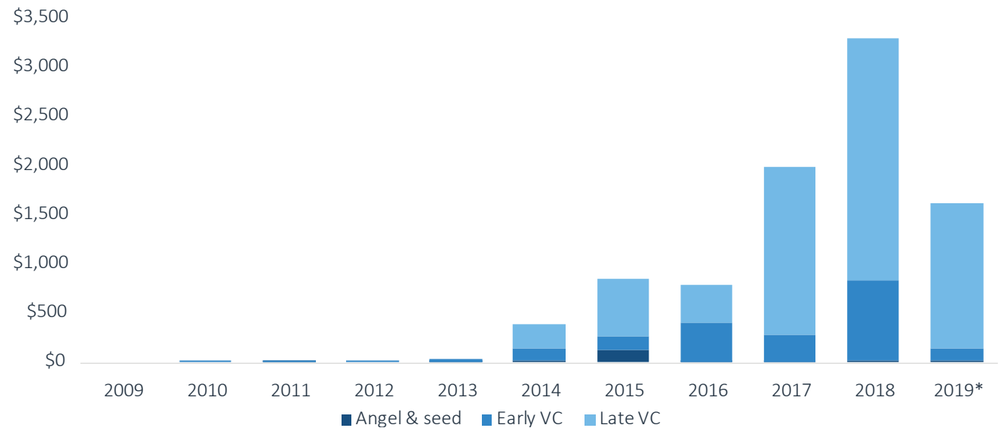
likely have the most success. For example, Instacart has implemented a chat system that shoppers can use to interface directly with customers during the shopping process. This ability to cater to consumer tastes while maintaining a profit will be key to winning in the online grocery business.

Figure 10. GROCERY ORDERING & DELIVERY VC DEAL ACTIVITY



Source: PitchBook | Geography: Global | *As of September 30, 2019

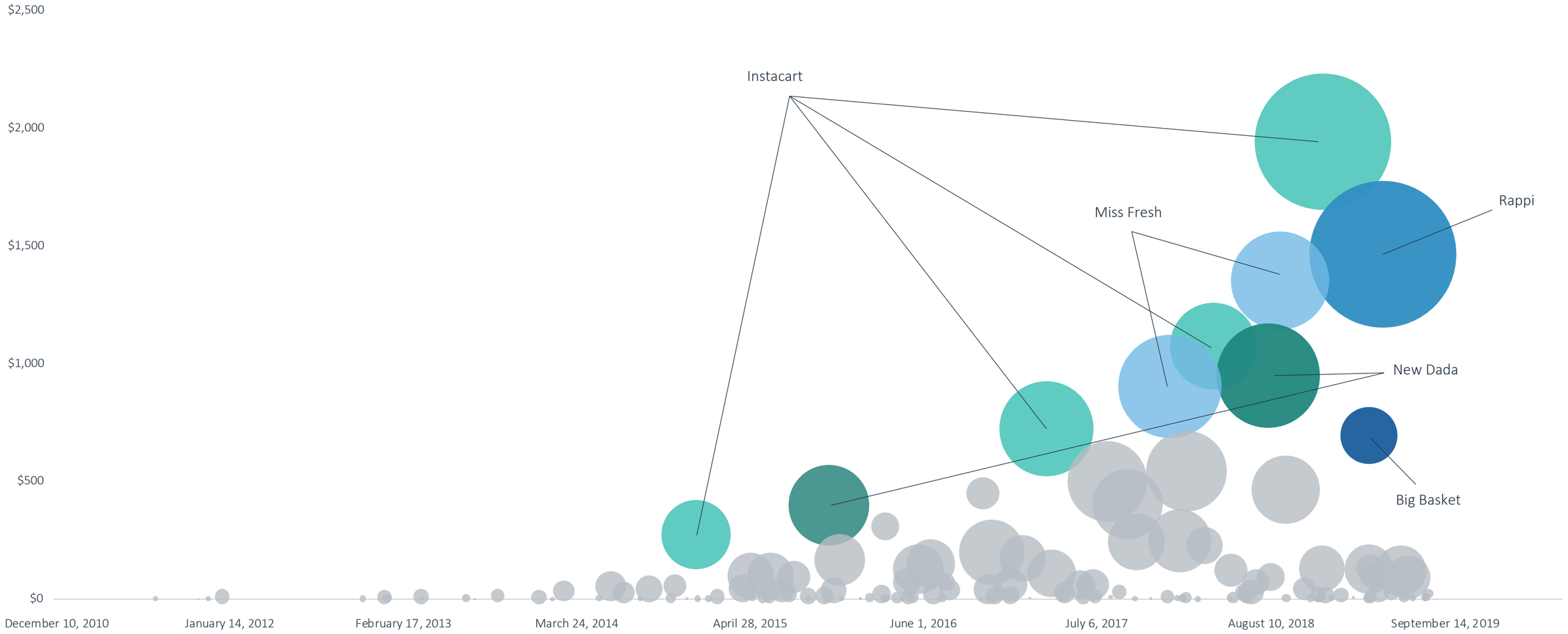
Figure 11. GROCERY ORDERING & DELIVERY VC DEALS ($M) BY STAGE



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 12.

Top grocery ordering & delivery VC deals ($M) by total capital raised



Source: PitchBook | Geography: Global | *As of September 30, 2019

GROCERY ORDERING & DELIVERY

Figure 13.

Notable grocery ordering & delivery VC deals

COMPANY	DEAL DATE	STAGE	DEAL SIZE ($M)	LEAD INVESTOR(S)
叮咚买菜 (Dingdongmaicai)	June 12, 2019	Series B3	$120.0	Starquest Capital China
呆萝卜 (Dailuobo)	June 28, 2019	Series A	$91.9	Hillhouse Capital Group and Morningside Venture Capital
milkbasket	In progress	Series C	$50.0	Undisclosed
Kolonial.no	April 1, 2019	Late-stage VC	$34.8	Kinnevik
GrubMarket	April 5, 2019	Series C1	$30.0	WI Harper Group and DG Incubation

Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 14.

Notable grocery ordering & delivery VC exits

COMPANY	DEAL DATE	DEAL SIZE ($M)	DEAL TYPE	ACQUIRER/INDEX	POST-MONEY VALUATION ($M)
Cornershop	In progress	Undisclosed	M&A	Uber	Undisclosed
SZOPI.PL	October 22, 2019	Undisclosed	M&A	Supermercato24	Undisclosed
redmart	November 2, 2016	$40.0	M&A	Lazada South East Asia	$40.0
SHIPT	December 14, 2017	$550.0	M&A	Target	$550.0

Source: PitchBook | Geography: Global | *As of September 30, 2019

Opportunities

AI & ML and predictive analytics software: Grocery goods are an especially difficult product to sell for several reasons. Nearly all goods have a degree of perishability, and some can be heavy (e.g. cases of beverages, pet food, charcoal) or fragile (e.g. chips or tomatoes). Consumers also have specific preferences about the size and condition of certain items, especially produce. With average grocery stores stocking 30,000-50,000 unique items, fulfilling various orders can be challenging. Fortunately, grocery shopping habits tend to be repeatable, which lends themselves to AI & ML technologies that can help automate and anticipate many orders. Companies involved in grocery ordering analytics include retail data analytics company **Kuona Analytics** and ecommerce management platform **Skubana.**

Warehousing and fulfilment robotics: The process of picking and bagging grocery items is labor-intensive and time-consuming. Innovations to warehousing—in terms of the technologies used inside the warehouses as well as the warehouses themselves—are being developed to optimize operations and reduce costs.

Existing players include **TakeOff**, **Flexe**, **Stord, Clearpath Robotics** and **GreyOrange**.

Autonomous delivery: Autonomous delivery could help propel the next phase of growth for the grocery delivery industry. Delivery robots and other driverless methods promise to reduce operational costs and offer a potential path to profitability.

Existing players include **Nuro**, **Starship**, **Kiwibot** and **Robomart**.

Focusing on the high end: While traditional grocery spending largely tracks GDP growth, we believe luxury, organic and natural food products are experiencing higher growth rates (mid to upper single digits) and often have higher price points as well. We believe providers catering to this segment of the food market may experience higher growth and margin opportunities.

Considerations

Amazon looms: Amazon began testing grocery delivery in 2007. The seriousness of the company's threat became real when it acquired **Whole Foods Market** in 2017. Amazon's reputation for market dominance, as well as its scale and price competitiveness, present significant challenges for rivals. The acquisition of **Whole Foods Market** provided Amazon with an established food sourcing network that could be bolted on to its sophisticated delivery infrastructure capabilities to optimize costs. Prime membership and multiple delivery models (delivery, Prime Now delivery, pick-up) give the company a significant head start in the industry.

Low-margins challenge profitability: Despite a trend toward higher-margin goods, grocery is traditionally a low-margin business. High perishability of fresh goods as well as the complex and expensive infrastructure required to facilitate storage, packing and delivery of grocery goods creates significant capex requirements and ongoing costs, a staggering barrier to entry for business models that warehouse grocery goods.

Discount grocers undercut online grocers' low-cost advantage: Retailers are challenged by consumer desire for both low-cost and premium products and the subsequent rise of discount grocery operators present an additional challenge for grocery ordering companies. Discount grocers such as Germany-based companies **Aldi** and **Lidl** have driven down the price of groceries by as much as half while subsequently finding ways to

offer premium and organic products. Likewise, warehouse clubs and big-box stores such as Costco and Walmart offer fresh groceries at discount prices.

The challenge of balancing customer options with speed: An ongoing challenge in online shopping is how to balance individual consumer food preferences with a consistent consumer experience. For example, consumers can have idiosyncratic produce habits, choosing goods based on size, quality, ripeness, etc. Offering such options in an online setting is logistically complex and could have a negative impact on the customer experience. Balancing personalization and consumer preference with operational cost and logistical requirements represents a significant pain point for this industry.

Outlook

Investment in grocery to grow: We expect investment in the space to pick up over the near to midterm, driven in part by the added visibility from prominent players such as Amazon and Instacart. Nearly $3.5 billion was invested in grocery ordering companies in 2018, up from $2.0 billion in 2017. As of 3Q, 2019 is on pace to exceed 2017 deal value but fall slightly short of 2018, which included hefty deals closed for **Instacart** and **New Dada**. Most of the investment activity thus far has been at the early venture stages. However, we have seen investment shift to the late stage in the first three quarters of 2019, although there have only been 22 total deals closed YTD. While we expect early-stage investment to continue, we expect a continued shift toward the late stage as the industry matures.

Grocer enablement: We believe brick-and-mortar grocers (e.g. Kroger), meal delivery companies (e.g. **DoorDash**), or companies with established infrastructure (e.g. Uber) are relatively well-positioned to succeed in grocery delivery as they leverage existing assets. Although delivery is not core to the standard grocery business model, many grocers already offer some level of home delivery, and we expect they will likely be more aggressive in the space as delivery becomes more mainstream. Due to the costs and challenges of last-mile delivery service, an increasing number of grocery stores are partnering with third-party companies to outsource delivery operations. This has been key to **Instacart's** growth as several major grocery chains (Safeway, Kroger and Fred Meyer) have partnered with the company.

Instacart dominates third-party delivery: We believe leading providers in third-party delivery include **Instacart** and **Postmates**, while leading online grocery providers include Peapod and **Good Eggs**. **Instacart** is able to reduce costs by aggregating and optimizing the picking and delivery of orders. No internet grocery providers dominate the market.

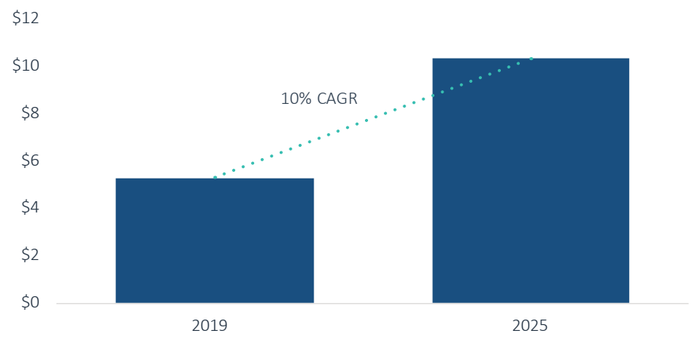
Delivery services consolidation: Consolidation is highly likely going forward as larger players look to gain competencies, scale and expand their customer base. Examples include recent acquisitions such as **Shipt** (by Target) and Unata (by **Instacart**). Possible acquisition targets include **BigBasket**, which has raised over $700 million, as well as **Boxed**, which has raised $243 million and has courted offers from Kroger.

SEGMENT DEEP DIVE

Meal kits

MEAL KITS

Figure 15. MARKET SIZE ($B)



*Source: PitchBook, Hexa Research and Market Study Report | *as of July 2019*
Note: This chart represents estimates for global meal kit delivery revenue growth.

BUSINESS MODEL

Meal kit businesses sell easy-to-follow recipes and pre-portioned ingredients to consumer for home preparation. While the service began as an online-only subscription, kits can now be purchased in grocery and other retail stores. Value propositions of meal kit services include convenience, time saving and a unique culinary experience.

Attractive characteristics of businesses in this space include stable subscription revenue, cost savings from ordering ingredients at scale and a large TAM.

KPIS

- Customer acquisition costs (CAC) & CAC/ lifetime value
- Churn—revenue & client
- Upsell potential (ARPU)
- Food cost percentage
- Channel sales revenue mix

KEY PROVIDERS

Blue Apron, HelloFRESH, Sun Basket, Plated, Home Chef, gousto, Marley Spoon, Gobble, chefs plate, Purple Carrot

KEY INVESTORS

Correlation Ventures, Y Combinator, Unilever Ventures, relevance capital, AngelCoFund, Founders Circle Capital, MMC Ventures, Bessemer Venture Partners, First Round, Vulcan Capital

NOTABLE DEALS

Sun Basket

May 2019
$30M Series E

Led by:
PivotNorth Capital

gousto

January 2019
$22.8M late-stage VC

From:
Unilever Ventures, BGF Ventures, and MMC Ventures

INDUSTRY DRIVERS

- Growth of the subscription economy
- Consumer demand for experience products (i.e. unique cooking recipes curated by chefs)
- Consumer demand for time-saving and single-use products
- Improvement in logistics/shipping infrastructure enabling delivery of fresh food boxes
- Diversification of how people consume food (meal kit, food delivery, online grocery spend)
- Incumbent competition (i.e. Costco, Walmart)

Overview

Meal kits are packages containing recipes and the fresh ingredients necessary to prepare them. The business model launched in Sweden in the mid-2000s and has grown tremendously, with many startups in the space and two public companies: Blue Apron and HelloFresh. Convenience and variety are two of the core value-propositions to this business. Meal kit companies have also begun expanding from online-only to physical sales channels, partnering with big-box stores, grocery stores and other retailers to get their goods in front of customers.

We believe the meal kit industry primarily takes share from the grocery store and restaurant industries, which implies a relatively large addressable market opportunity. In 2017, the US grocery market generated $608 billion in revenue,[8] and single-location, full-service restaurants (including single-location or family-operated sit-down restaurants) generated $312 billion.[9] This compares to current total meal kit revenues of roughly $5 billion. We believe that meal kits will remain a relatively small niche category compared with grocery unless new business models or consumer trends unlock additional consumer value. In recent years, consumer packaged goods (CPG) brands have seen a steady uptick in interest from tech-focused VC and angel investors, with firms such as Andreessen Horowitz, Khosla Venture and Sapphire Ventures all investing in meal kit companies within the past two years.

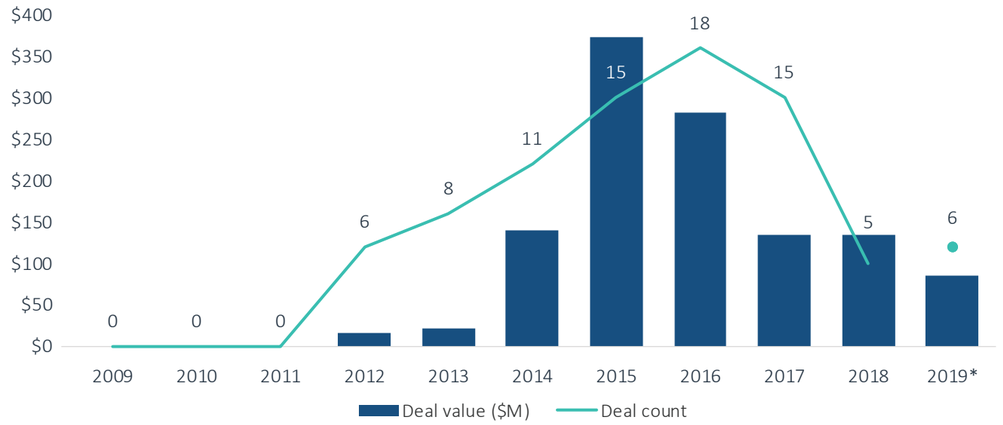
Despite the strong initial growth in the meal kit industry, we believe the model may have an uncertain future, which stems in part from the relatively low barriers to entry

8: "Supermarkets & Grocery Stores in the US," IBIS World, July 2018
9: "Single Location Full-Service Restaurants in the US," IBIS World, June 2018

MEAL KITS

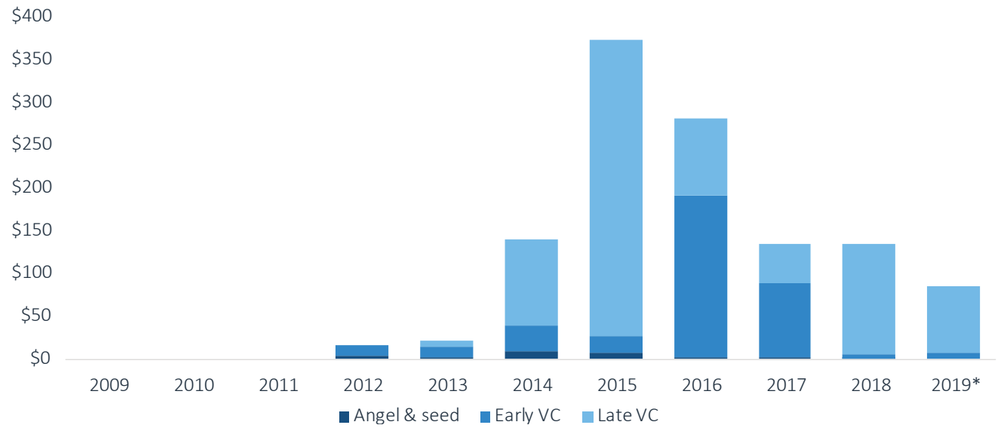
and challenging unit economics. Notwithstanding **Sun Basket** raising $30 million in 2Q 2019, we believe this industry continues to struggle. In May 2019, Japanese grocer Oisix announced a $30 billion acquisition of **Purple Carrot** at a valuation $4 million below the prior venture round. Additionally, the public debuts of former VC-backed market leaders Blue Apron and HelloFresh have struggled to meet investor expectations.

Figure 16. MEAL KITS VC DEAL ACTIVITY



Source: PitchBook | Geography: Global | *As of September 30, 2019

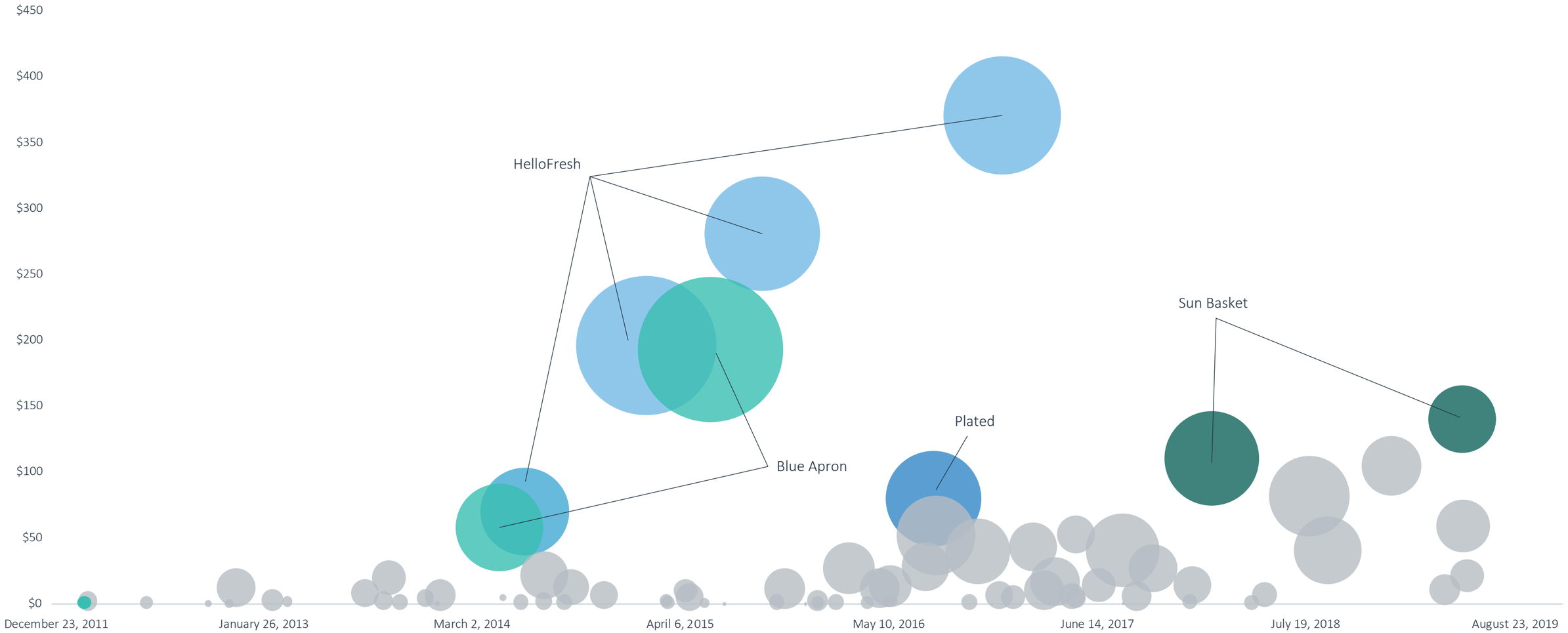
Figure 17. MEAL KITS VC DEALS ($M) BY STAGE



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 18.

Top meal kits VC deals ($M) by total capital raised



Source: PitchBook | Geography: Global | *As of September 30, 2019

MEAL KITS

Figure 19.

Notable meal kits VC deals

COMPANY	DEAL DATE	STAGE	DEAL SIZE ($M)	LEAD INVESTOR(S)
比宝 (Bibofood)	May 23, 2019	Late-stage VC	--	Blue Elephant Capital & EdBeta Fund
Simply Cook	April 18, 2019	Series A	$6.1	Octopus Renewables
TOVALA	May 31, 2019	Series A2	$7.1	New Stack Ventures and Vernon & Park Capital
SUN BASKET	May 21, 2019	Series E	$30.0	PivotNorth Capital

Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 20.

Notable meal kits VC exits

COMPANY	DEAL DATE	DEAL SIZE ($M)	DEAL TYPE	ACQUIRER/INDEX	POST-MONEY VALUATION ($M)
PURPLE CARROT	In progress	$30.0	M&A	Oisix ra Daichi	$30.0
chefs plate	October 17. 2018	Undisclosed	M&A	HelloFresh	Undisclosed
MARLEY SPOON	July 2, 1018	$96.7	IPO	ASX: MMM	$4,149.0
HOME CHEF	June 22, 2018	$700.0	M&A	Kroger	$700.0
QUITOQUE	March 15, 2018	Undisclosed	M&A	Carrefour	Undisclosed

Source: PitchBook | Geography: Global | *As of September 30, 2019

Opportunities

Differentiated meal kit models: The popularity of meal kits can be attributed in part to the potential to save time shopping for and preparing meals. Although the meal kit model works for some, time and effort to cook the meals remains a key complaint for many customers. Some startups are finding new ways to address this problem. For example, **Tovala** launched a meal kit product alongside a custom-designed smart oven. The raw meal kit ingredients arrive in ready-to-bake aluminum containers that are placed in the oven, providing a fresh cooked meal with minimal work.

Advertising, branding and product partnerships: Partnering with trending brands helps meal kit companies and consumers stay current with the latest cooking techniques, flavors and technologies. Blue Apron recently partnered with plant-based meat company Beyond Meat to capitalize on consumer interest in plant-based meat burgers. Blue Apron also partnered with consumer-packaged goods startup **Rumi Spice** to incorporate the brand's product into recipes. Partnerships can help meal kit companies retain customers and improving LTV, while also helping partner companies reach broader audiences. Providing advertising or samples within kits also allows consumers to learn about new products or try before buying at grocery stores or restaurants.

Warehouse & assembly automation: Similar to grocery ordering, meal kit companies struggle with high operational costs related to sourcing ingredients and assembling orders. Warehouse automation software and hardware can streamline the process, optimizing operations and reducing costs. For example, Blue Apron cites the implementation and expansion of automation in production and fulfillment as essential to meeting target business, financial and operating results.

Considerations

An overcrowded market with narrow competitive moat: Arguably the biggest challenge to meal kit companies is the proliferation of competitors in the market and relatively low barriers to entry. With over 150 companies (21 of which are VC-backed) battling for a share of the $5 billion market, it's exceedingly difficult to stand out and earn a profit.[10] New competition from grocers, big-box stores and convenience chains makes this an even greater challenge. As previously mentioned, food retailers have begun to compete with the standard meal kit delivery business model by selling kits in brick-and-mortar stores. These stores have either teamed up (through partnership or acquisition) with existing market players or created their own kits. Costco has partnered with Blue Apron to sell kits in their warehouse stores. Walmart has taken an alternate approach by creating their own meal kits to sell in-store. While the expansion to in-store sales may prove to be a successful channel to reach customers, it also suggests the market for online meal ordering may be smaller than current perception implies.

Disappointing performance: Blue Apron, the largest and most well-known of the meal kit companies, went public on June 29, 2017. The stock debuted at $10 per share and has been on a slow decline ever since, dropping as low as $6.10 per share over the past year. This performance signals investor concern over the viability of the meal kit model, which we believe faces several challenges, including competition and the complexities of managing the food supply chain to quickly source, package and deliver ingredients. We expect customer service costs are also relatively high given unique delivery needs and the many questions and problems that could arise with providing what are essentially cooking courses.

10: "Packaged Facts"

The Amazon effect: Amazon has a reputation for expanding into and dominating new markets. The company has already begun testing meal kits in Seattle, and national expansion is imminent. Customers can order meal kits for delivery or purchase at Amazon Go convenience stores. Utilizing the power of Prime memberships and its ownership of **Whole Foods**, Amazon will likely be an imposing player in the market, capturing significant market share from smaller providers.

Outlook

Rising share of meal kits sold in brick-and-mortar outlets: We expect investment to grow over the near to midterm as meal kits continue to gain visibility. Although brick-and-mortar retailers will bring unwelcome competition, the added visibility will increase the size of the market. Continued differentiation (e.g. kits tailored to specific diets and a range of price points) and consumer responsiveness will also contribute to growth of the market.

Upstream consolidation: We expect consolidation could be driven by larger incumbents seeking to protect their market position and ensure they have a seat at the table in this growing industry. Additionally, recent acquisitions (e.g. **Plated**, by Albertsons), hint at the capital intensity of the meal kit model, suggesting pure-play companies may not be viable over the long term. Food retailers that partner with or acquire meal kit companies can leverage existing infrastructure to reduce operational costs and improve margins.

Platforming and cross-selling: We expect meal kit companies will continue to innovate with new products and services as they attract new customers and work toward more profitable business models. For example, HelloFresh has already started expanding into ready-made foods by selling salads, sandwiches and snacks through office vending machines.[11] Additionally, Walmart, **FreshDirect** and several other competitors offer "heat and serve" prepared foods that further tap into customers' desire for convenience.

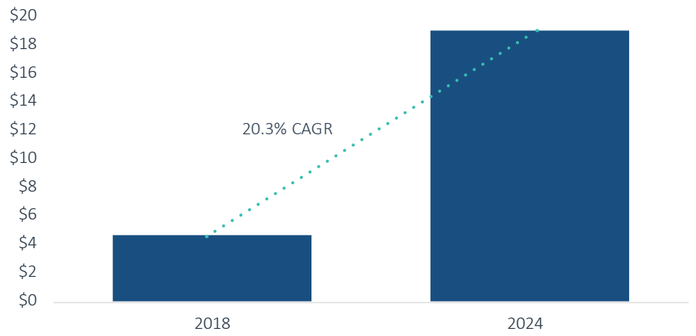
11: "Hello Fresh Go," Hello Fresh, 2018

SEGMENT DEEP DIVE

Plant-based meat and dairy

PLANT-BASED MEAT AND DAIRY

Figure 21. MARKET SIZE ($B)



Source: UBS, Allied Market Research, Mordor Intelligence, Markets and Markets and PitchBook | *As of July 2019
Note: This chart represents estimates for global meat alternatives revenue growth.

BUSINESS MODEL

Companies in this category produce vegetarian food products that simulate meat and dairy products. Attractive growth drivers for this space include the large market for vegetarians and omnivores, growing interest in plant-based foods and growing social awareness of the benefits of vegetarian eating.

Plant-based meat and dairy providers primarily sell products to restaurants and grocery stores. These companies tend to have lab-based high R&D expenses.

KPIS

- MRR & growth
- Churn—revenue & client
- Customer acquisition costs (CAC) & CAC/Lifetime value
- Return on research capital (RORC)

KEY PROVIDERS

IMPOSSIBLE, BEYOND MEAT, ripple, kitehill, NotCo, Perfect Day, Good Catch, willowcup, The Vegetarian Butcher, The Better Meat Co.

KEY INVESTORS

khosla ventures, blue horizon, Horizons Ventures 維港投資, Collaborative Fund, SOSV, New Crop Capital, powerplant ventures, VegInvest, GV

NOTABLE DEALS

IMPOSSIBLE

May 2019
$300M Series E1

Led by:
Horizons Ventures and Temasek Holdings

BEYOND MEAT

May 2019
$1.2B IPO

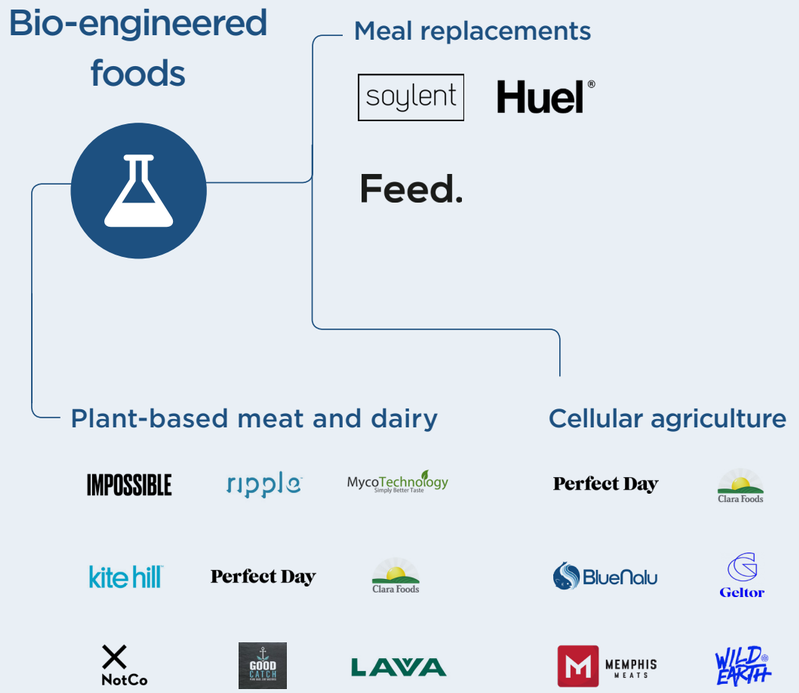
INDUSTRY DRIVERS

- Strong flow of investment dollars driving alternative food product development
- Sizable vegetarian market and growing interest in alternative diets
- Growing environmental awareness raising concerns about traditional food production
- Advances in bio-food sciences enabling more efficient production of bio-engineered foods

Overview

Plant-based meat and dairy is comprised of vegetarian food products that attempt to simulate meat and dairy products in both taste and texture. The plant-based food industry represents a small but growing opportunity with estimated annual growth rates in the 20% range and industry revenue of roughly $3.3 billion in the US.[12] We believe growth in the sector is driven primarily by an increasing view that plant-based food products have several benefits compared to the traditional meat industry. According to a 2018 Mintel study, 46% of Americans believe plant-based proteins are healthier than animal-based proteins.[13] We expect that over time, plant-based meats will take share from the approximately $350 billion annual meat industry.

Investment in plant-based meat and dairy presents both a financial, social and environmental impact opportunity. Impact investors view plant-based meats as helping to raise awareness of animal welfare, environmental issues and human health. It helps that these products are emerging at a time when industrial meat production has been linked to increased greenhouse gas emissions, water pollution, overconsumption and deforestation, among other issues.[14] For example, it is estimated that global adoption of vegetarian diets could reduce greenhouse gasses by 63%. Additionally, overconsumption of certain types of meat has been linked to several health issues, including cardiovascular disease and colorectal cancer.[15] According to an Oxford study, reducing meat consumption to established global dietary guidelines could help curtail the cost of public



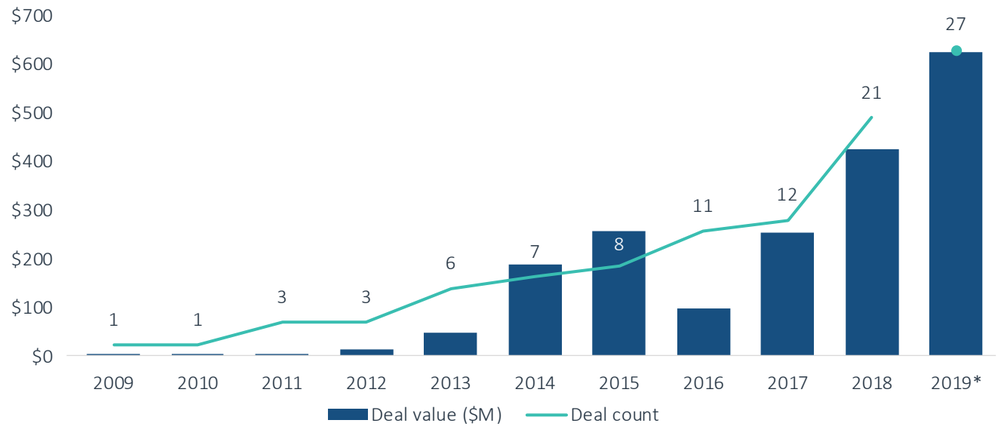
12: “2018 Retail Sales Data for Plant-Based Foods,” Plant-Based Foods Association & Nielson, 2018
13: “Taste Is the Top Reason Us Consumers Eat Plant-Based Proteins,” Mintel, February 15, 2018
14: “What Is the True Cost of Eating Meat?” The Guardian, May 7, 2018
15: “Mean Consumption, Health, and the Environment,” Science Magazine, July 20, 2018

PLANT-BASED MEAT AND DAIRY

and environmental health issues by $1.5 trillion globally by 2050.[16] While many of these products sell at a premium today, we expect that gradual scaling of the industry could result in more affordable and authentic meat substitutes.

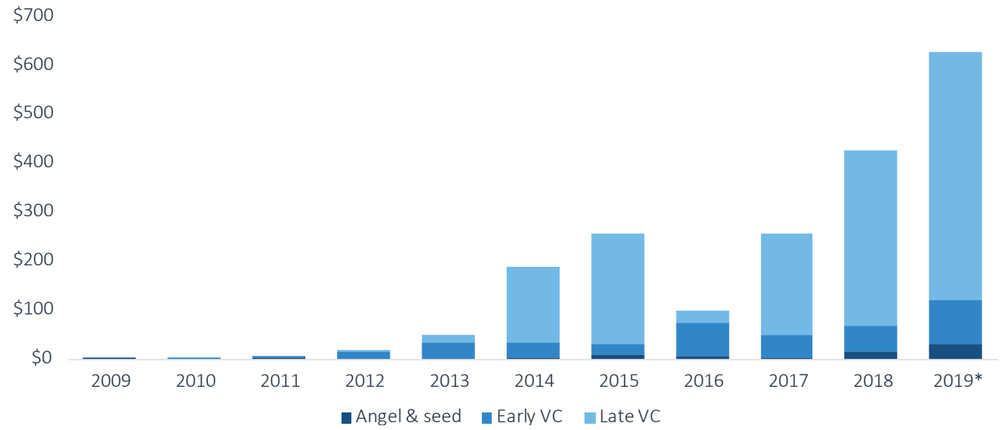
16: "Plant-Based Diets Could Save Millions of Lives and Dramatically Cut Greenhouse Gas Emissions," University of Oxford, March 21, 2016

Figure 22. PLANT-BASED MEAT AND DAIRY VC DEAL ACTIVITY



Source: PitchBook | Geography: Global | *As of September 30, 2019

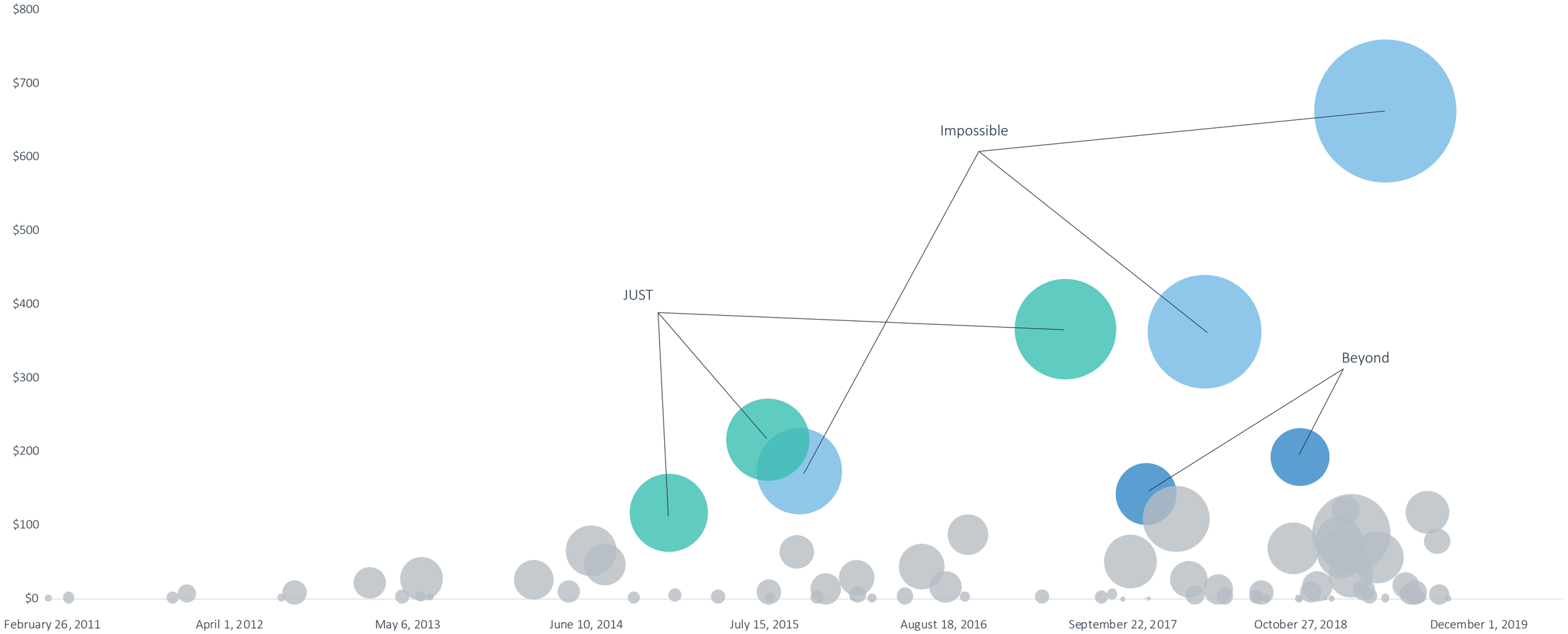
Figure 23. PLANT-BASED MEAT AND DAIRY VC DEALS ($M) BY STAGE



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 24.

Top plant-based meat and dairy VC deals ($M) by total capital raised



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 25.

Notable plant-based meat and dairy VC deals

COMPANY	DEAL DATE	STAGE	DEAL SIZE ($M)	LEAD INVESTOR(S)
MycoTechnology	January 30, 2019	Series C	$30.5	S2G Ventures, Middleland Capital and ADM Capital
NotCo	February 25, 2019	Series B	$30.0	The Craftory
ripple	February 14, 2019	Late-stage VC	$11.9	Evolution VC Partners
kitehill	September 6, 2019	Series C1	$10.0	Undisclosed
GOOD CATCH	June 27, 2019	Early-stage VC	$10.0	New Crop Capital and Stray Dog Capital

Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 26.

Notable plant-based meat and dairy VC exits

COMPANY	DEAL DATE	DEAL SIZE ($M)	DEAL TYPE	ACQUIRER/INDEX	POST-MONEY VALUATION ($M)
Beeter.nl	February 15, 2017	Undisclosed	Buyout/LBO	Korys Investments	Undisclosed
BEYOND MEAT	May 2, 2019	$1,200.0	IPO	NAS: BYND	$1,457.7

Source: PitchBook | Geography: Global | *As of September 30, 2019

Opportunities

Meat and fish alternatives: The popularity of Beyond Meat and Impossible has demonstrated that consumers have the palate for plant-based meat and dairy. The fake meat hamburger was the first product to gain widespread adoption and was one of the few products sold in grocery stores. However, there are many other meat and dairy products yet to gain broad appeal that convincingly simulate the real thing. Swiss startup **Planted** recently launched a plant-based chicken, and Primal Roots is tackling a variety of mushroom-based meat simulations including bacon, shrimp and lobster. Although a slew of incumbent CPG companies (e.g. **Boca**, **MorningStar Farms**) have been selling fake chicken products for years, we believe today's providers are tapping into a different consumer base that is more focused on the environmental and ecological impacts of the traditional meat industry.

Dairy alternatives: Milk and yogurt sections in the grocery store have seen some surprising new brands in recent years. New dairy-free brands are squeezing out valuable shelf-space, and popular dairy brands are developing their own plant-based products to compete. Dairy alternatives are a large and flourishing market forecasted to reach $23.4 billion globally by 2024 at a 9.9% CAGR.[17] Despite a slew of well-known brands, upstarts such as **Lavva**, **Kite Hill** and **Forager Project** are disrupting the yogurt aisle. In the milk section, peas, oats and even bananas are providing consumers with several dairy-free alternatives. VC-backed brands such as **Mooala**, **Oatly** and **Ripple Foods** are just a few of the many companies seizing on popular sentiment toward plant-based products.

Considerations

Political and social backlash and regulatory advocacy: We expect continued controversy as incumbent meat producers find ways to directly and indirectly compete with the alternative meat industry. For example, Missouri prohibited the use of the word "meat" to define food products "not derived from harvested production livestock or poultry." This would make it illegal to label plant-based meat alternatives as "meat" for marketing or packing purposes without qualifiers that explain the product is plant-based. Additionally, animal meat advocacy groups such as the Missouri Cattlemen's Association are employing lobbying efforts to create regulatory roadblocks to fight growing competition from plant-based meat producers.

Sales channel risk: Choosing the correct sales channels and marketing strategies is critical in a competitive and overcrowded market. The two largest plant-based meat companies, Beyond Meat and Impossible, are taking two different strategies. Beyond Meat is prioritizing selling in grocery stores, focusing its efforts on product placement in the meat section alongside animal meat products. Alternately, Impossible is focused solely on restaurants, partnering with celebrity chefs to showcase its product. Targeting restaurants allows companies to achieve greater margins as well as maintain control of the brand and product image, while grocery sales allow access to a larger pool of potential customers (although at higher expense, which may be implausible for early-stage businesses).

Alternative meat development requires significant R&D: We expect initial R&D requirements will be a considerable barrier to entry for startups, given the high degree

17: "Daily Alternative Products Market: Growth, Trends, and Forecast (2019-2024), Mordor Intelligence

of technology required to develop, produce and refine plant-based meat. This will keep pressure on margins at least in the short term. While scaling the product will likely be the most effective way to increase margins, the industry also faces commoditization risk as consumer adoption expands.

Outlook

Gradual adoption as industry slowly grows: Due to lack of visibility and awareness, we expect that in the near to midterm, the alternative meat and dairy sector will expand at a conservative pace, with growth estimates in the mid-single digits range over the next several years. While expanded product variety, from plant-based "chicken" fingers to faux-tuna filets, are providing consumers with more options and new reasons to try alternative meats, we expect adoption to be gradual.

Competition and commoditization likely to shape industry growth: As demand increases, we expect a flood of new entrants chasing an expanding market opportunity. While high up-front R&D costs may dissuade competitors initially, successful products could quickly become commoditized as competitors learn to reverse engineer manufactured foods. This, combined with limited shelf space, could lead to a relatively low-margin industry over time.[18]

Favorable legislation/incentives: While it is still early days, we believe that over the long term, as the benefits of consuming plant-based meat and dairy become more widely known and calculable, regulation could likely encourage growth in the industry. Initial policies would likely be at the state level and could be in the form of tax incentives or other rebates aimed at driving production and consumption of meat and dairy alternatives. Such measures could be considered on par with the early days of solar power installation incentives and will likely be controversial.

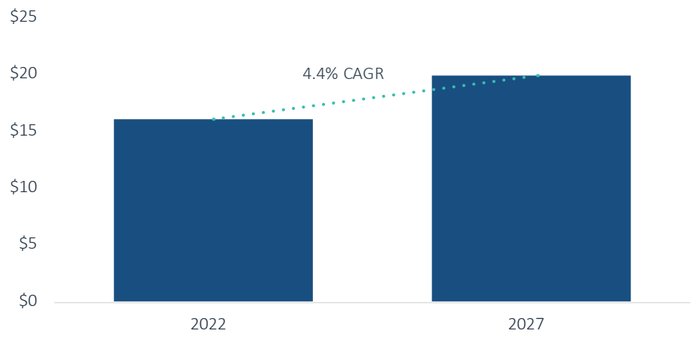
18: "Culture Wars: Yogurt Biz Fights Competition Inside and Out," AdAge, June 26, 2018

SEGMENT DEEP DIVE

Cellular agriculture

CELLULAR AGRICULTURE

Figure 27. MARKET SIZE ($B)



Source: Markets and Markets, Data Bridge Market Research, BCC Research, PitchBook
Note: This chart represents expected global revenues ($B) for cultured meat.

BUSINESS MODEL

Providers in the cellular agriculture space include biotech firms working to synthesize animal muscle and fats for human consumption. While all known companies are in the design phase, some have produced samples for consumption.

KPIS

- MRR & growth
- Churn—revenue & client
- Customer acquisition costs (CAC) & CAC/ lifetime value
- Return on research capital (RORC)

KEY PROVIDERS

AquaBounty Technologies, Memphis Meats, Aleph Farms, mosa meat, BlueNalu, Fork&Goode, Meatable, Wild Type, Finless Foods, JUST

KEY INVESTORS

New Crop Capital, StrayDog Capital, blue horizon, VegInvest, Indie Bio, Starlight Ventures, qb3 ucb·ucsc·ucsf, Cargill, Gates Ventures, KBW ventures

NOTABLE DEALS

Aleph Farms Meat Growers

May 2019
$12M Series A
Led by:
New Protein Capital

Fork&Goode

January 2019
$3.5M seed
Led by:
Starlight Ventures

INDUSTRY DRIVERS

- Environmental/social costs: An Oxford University and University of Amsterdam study estimated that cultured meats could be produced with up to 96% less greenhouse gas, 82%-96% less water and 99% less land use than conventional meat.[19]
- Demand for meat expected to double by 2050 as the earth's population climbs and as developing countries gain more wealth.
- Concern for health issues as a result of GMO feed, hormones, diseases and other issues can be controlled for through lab production.

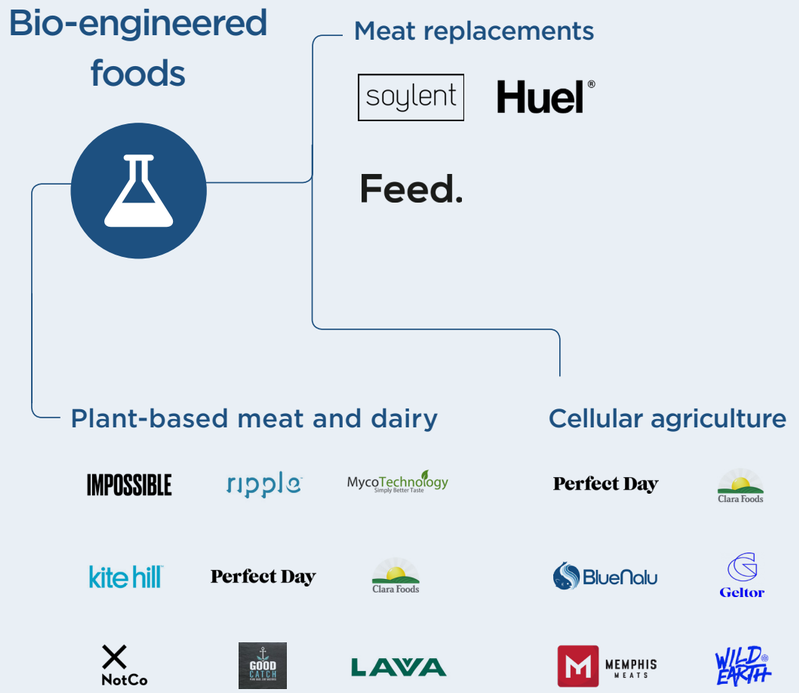
19: "Environmental Impacts of Cultured Meat Production," Environmental Science & Technology, Hanna L. Tuomisto & M. Joost Teixeira de Mattos, June 17, 2011

Overview

Cellular agriculture, also known as cultured meat, clean meat or lab-grown meat, is a term used to describe animal products (e.g. meat, dairy, leather) that are produced by replicating animal cells in a culture outside of the animal using a combination of biotechnology, tissue engineering, molecular biology and synthetic biology. At scale, cellular agriculture has the potential to allow for the production of high-quality (e.g. Kobe beef), safe (e.g. no hormones, antibiotics, or diseases) meat and dairy products at a fraction of the costs of current meat production.

Traditional meat production, even at scale, is incredibly inefficient and requires an enormous quantity of land, water, fertilizer, feed, oil and other resources. Although the price to consumers may be low ($3 to $4 per pound), this is partially offset by subsidies, while the full environmental and ecological impacts are likely much greater. Lab-grown meat has been an area of focus for several years; in 2013, the first cultured meat cost an estimated $1.2 million per pound to produce. While today's cultured meat has reportedly come as low as $37 per pound, this is still well out of reach for most consumers. Regulation poses additional challenges, with the FDA expecting to finalize inspection and labeling rules sometime in 2019.

Global demand for meat is extensive and growing, driven by an increasing global population (expected to be 10 billion by 2050) and increasing wealth in emerging countries. For example, Chinese meat consumption has increased fivefold over the past 30 years in tandem with China's developing economy. Rising demand is testing the limits of industrial agriculture. Although plant-based meat and dairy offer an enticing alternative,



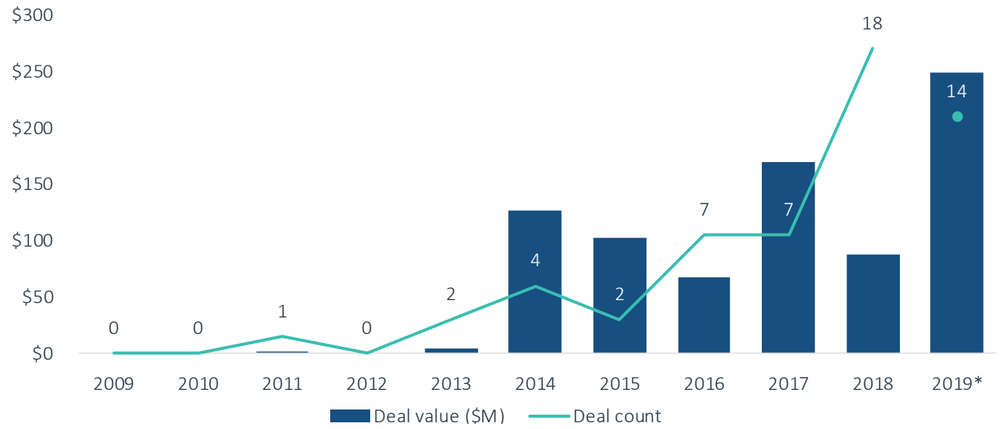
CELLULAR AGRICULTURE

a significant population of meat-eaters will likely never forgo real meat as long as they can afford it. Cellular agriculture, at scale, has the potential to provide a near limitless supply of real animal protein at a fraction of the cost.[20]

Cellular agriculture companies compete not only with the traditional meat industry, but with emerging plant-based meat companies (i.e. Beyond Meat) as well. Leaders in the space include Israeli cellular agriculture startup **Aleph Farms,** which raised a $12.0 million Series A in May 2019. Interestingly, the round included an investment from agriculture behemoth **Cargill**, suggesting that incumbents are viewing lab-based meats as a viable strategy. Another provider in the industry, **Mosa Meat**, raised a $9 million Series A in 2018, and offers a helpful overview of the science on its website.[21]

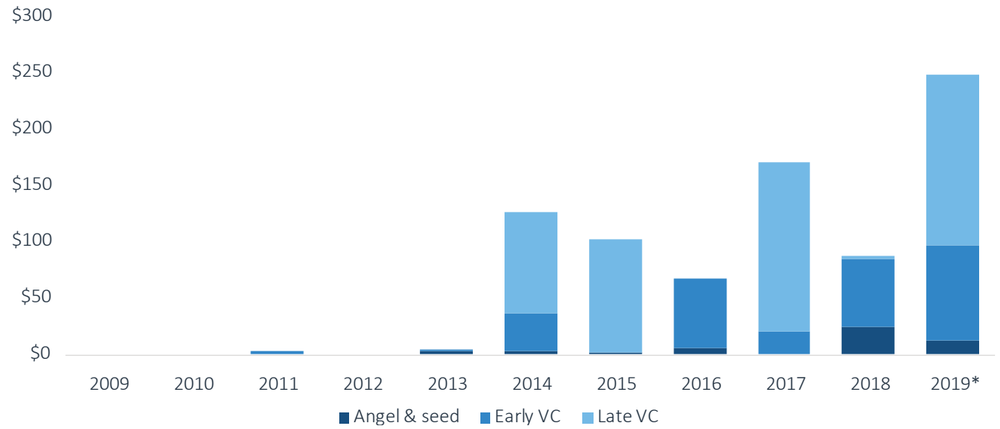
20: "Lab-Grown Meat Is Getting Cheap Enough for Anyone to Buy," Fast Company, Adele Peters, March 2, 2018
21: "How It'd Made," Mosa Meat

Figure 28. CELLULAR AGRICULTURE VC DEAL ACTIVITY



Source: PitchBook | Geography: Global | *As of September 30, 2019

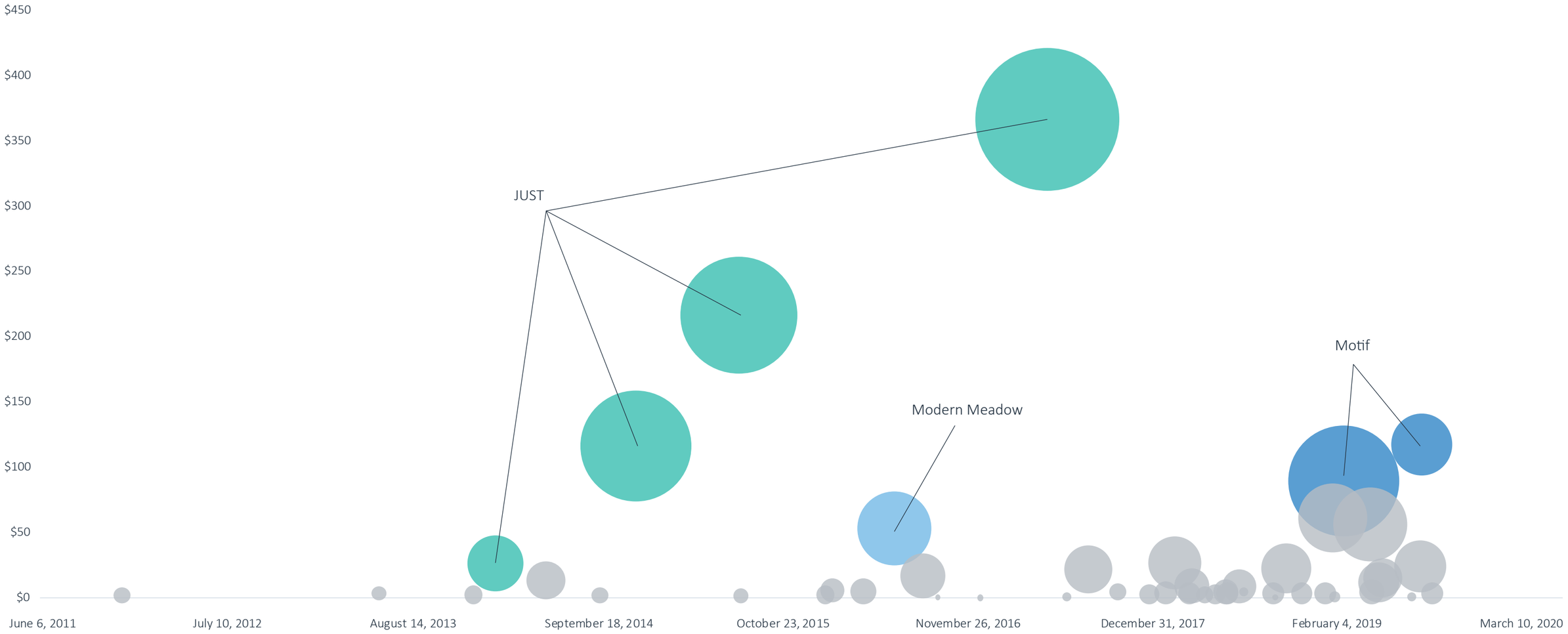
Figure 29. CELLULAR AGRICULTURE VC DEALS ($M) BY STAGE



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 30.

Top cellular agriculture VC deals ($M) by total capital raised



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 31.

Notable cellular agriculture VC deals

COMPANY	DEAL DATE	STAGE	DEAL SIZE ($M)	LEAD INVESTOR(S)
Clara Foods	April 25, 2019	Series B	$40.0	Ingredion
motif FOODWORKS	August 15, 2019	Early-stage VC	$27.5	General Atlantic
BlueNalu	August 12, 2019	Series A	$20.0	Agronomics, New Crop Capital and Stray Dog Capital
FUTURE MEAT	October 10, 2019	Series A	$14.0	S2G Ventures and Emerald Technology Ventures
WILD TYPE	October 8, 2019	Series A	$12.4	CRV

Source: PitchBook | Geography: Global | *As of September 30, 2019

Opportunities

Tissue engineering suppliers: Existing tools and approaches to produce cellular agriculture are based largely on existing medical technologies and rely on traditional suppliers of laboratory equipment and technology. We believe several of these suppliers are significantly exposed to the cellular agriculture opportunity, including:

Ospin GMBH: Develops modular molecular bioreactors to propagate animal cells

Culture Biosciences: Third-party "biomanufacturing-as-a-service" including lab testing facilities and a digital biomanufacturing platform

Robur Health: Genome-level metabolic modeling

Cellink: Bioprinting technologies

3D Cultures: Economical tools for biofabrication and tissue engineering

Dairy and other cellular agriculture: The leading cellular agriculture startups are primarily focused on beef, pork, poultry and seafood, and many other meat and dairy products have yet to receive the cellular agriculture treatment. VC-backed **Perfect Day** recently launched the first cellular agriculture-produced ice cream. The process allowed the final product to be lactose free. Approximately 65% of the global population is estimated to be lactose intolerant in adulthood. Developing authentic dairy products without lactose could massively expand the current market for dairy goods, not to mention the potential cost savings involved in at-scale production. Milks, cheeses and other meat and dairy products will all likely be future targets for cellular agriculture.

Existing players include **C16 Biosciences**, **Wild Earth** and **Perfect Day**.

Considerations

Pushback from traditional meat producers: The National Cattlemen's Beef Association and other trade groups have strengthened lobbying efforts to add regulatory hurdles, particularly around labeling, for cellular agriculture as the technology has gained traction.[22] Successful lobbying efforts on behalf of parties opposed to cellular agriculture development may create significant roadblocks in the path to innovation and commercialization.

Expensive production process: Cellular agriculture technology is based on tools and techniques originally developed for medical and biotech purposes in a lab. As such, the production process is currently performed in very small batches at great expense. As the technology and production process has matured, costs have plummeted.[23] Several startups are convinced that the cost will continue to decline to less than $5 per pound within the next two years, compared to $3 to $4 for regular beef.[24] Despite advancements, scaling for mass production is more complex than iterative innovations and will likely require the advent of entirely new technologies. A $5 burger may be possible in the next few years, but it will not likely be widely available in the near future.

Consumer perception: A recent survey of consumer perceptions of cellular agriculture indicates that despite consumer interest in reducing health risks, environmental harm and animal welfare issues, concerns for product taste, price, safety and naturalness may

22: "The Fight Over Cultured Meat Is Heating Up, and Big Meat Is Demanding That Trump Intervene," Business Insider, Erin Brodwin, July 26, 2018
23: "The $325,000 Lab-Grown Hamburger Now Costs Less Than $12," Fast Company, Ariel Schwartz, April 1, 2015
24: "$5 Lab-Grown Burger Could Be Ready by 2012," Genetic Literacy Project, Daniel Nelson, September 28, 2018

pose significant barriers to acceptance.[25] Cellular agriculture advocates must be careful to manage public perception of cultured meat and work to educate consumers on the benefits and considerations of cellular agriculture versus industrial agriculture.

Outlook

Initial products will be a far cry from steak: Several startups have claimed that a cellular agriculture product will be in consumer hands (or mouths) in the next two years. Due to technological limitations, these products will likely look different from consumer expectations. Although animal muscle can be manufactured, the end result is inferior to natural meat in terms of appearance, taste, smell and texture, having the consistency of a dense cake and missing flavor-adding fats. Consumers can expect to see processed products such as tuna mixes or hamburgers reach market first. New techniques will need to be invented before cultured steak or sashimi will see commercialization.

Seed and early-stage investment to continue: As of 3Q 2019, nearly $250 million has been invested in cellular agriculture startups, and over $800 million cumulative has been invested in the past decade. Because consumer production has not yet been achieved and many risks remain, we expect investors to continue to seed capital to the early innovators as they work through the early development cycle.

25: "A Survey of Consumer Perceptions of Plant-Based and Clean Meat in the USA, India, and China," Frontiers, Christopher Bryant, Keri Szejda, Nishant Parekh, Varun Desphande & Brian Tse, February 21, 2019

Supplemental materials

Select company analysis

DOORDASH

Business overview

DoorDash is a restaurant delivery company that provides restaurant discovery and delivery functionality to customers and provides outsourced delivery services to restaurants. The company utilizes a B2C model and charges consumers a delivery fee.

1,000+ employees

Leadership

Co-founder & CEO: Tony Xu

Co-founder & CTO: Andy Fang

CFO: Prabir Adarkar

COO: Christopher Payne

Competitors

Uber (Uber Eats), Postmates, GrubHub, Deliveroo

Financing history

Raised-to-date: $2.0 billion over nine deals

Most recent round: $600 million of Series G venture funding in a deal led by Sands Capital Ventures and Darsana Capital Partners

$12.6 billion post-money valuation

First institutional round: $2.4 million (September 2013)

Ownership

Sands Capital Ventures, Darsana Capital Partners, SoftBank Group, Hercules Capital, Dragoneer Investment Group, Sequoia Capital, DST Global, NFX, Temasek Holdings, Coatue Management and more.

IMPOSSIBLE

Business overview

Impossible Foods is a plant-based meat startup producing plant-based burgers. The firm utilizes a B2B2C model to sell burgers to consumers through restaurants.

350+ employees

Leadership

Founder & CEO: Patrick Brown MD

Chief Strategy Officer: Nick Halla

CFO & COO: David Lee

Chief Science Officer: David Lipman MD

Chief Supply Chain Officer: Chris Gregg

Competitors

Beyond Meat, Just, Seattle Food Tech, The Meatless Farm Co., The Vegetarian Butcher

Financing history

Raised-to-date: $777 Million over 11 deals

Most recent round: $300.0 million from Horizons Ventures, Temasek Holdings among others

$2.0 billion post-money valuation

First institutional round: $6.4 million (undisclosed date)

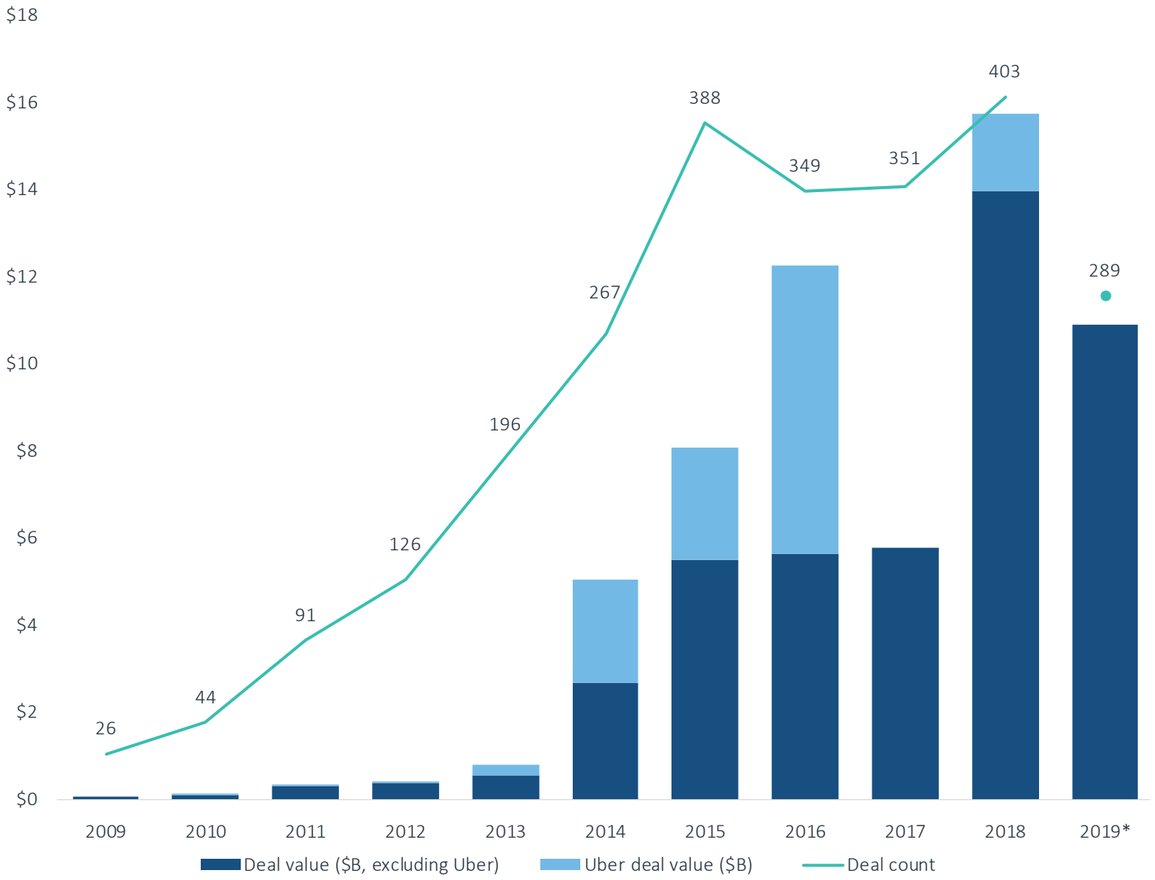
Ownership

Horizons Ventures, Temasek Holdings, Open Philanthropy Project, GV, G Squared, Sailing Capital, Xandex ventures, Khosla Ventures, Serena Williams, Jay Brown, Shawn Carter (Jay-Z), Alexis Ohanian, Katy Perry, Jaden Smith, Bracket Capital, UBS and Viking Global Investors among others

Additional VC data

Figure 32.

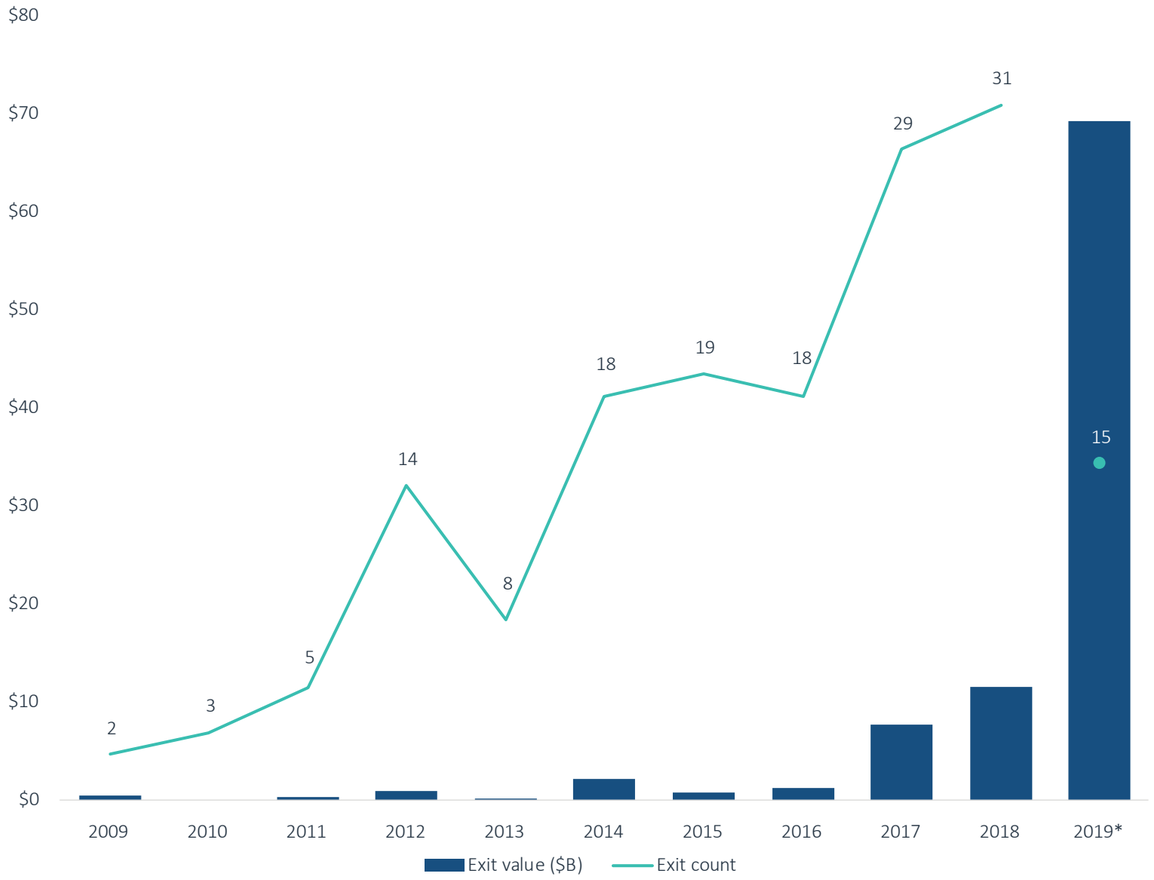
Foodtech VC deal activity



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 33.

Foodtech VC exit activity



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 34.

Notable foodtech VC deals

COMPANY	SEGMENT	DEAL DATE	STAGE	DEAL SIZE ($M)	LEAD INVESTOR(S)
Zomato	Meal ordering & delivery	In progress	Series I	$315.0	Ant Financial
Rebel Foods	Meal ordering & delivery	August 1, 2019	Series D	$125.0	Sistema Asia Capital and Evolvence Capital
AutoX Technologies	Delivery robots	September 17, 2019	Series A	$100.0	Dongfeng Motor
Milkbasket	Grocery ordering & delivery	In progress	Series C	$50.0	Undisclosed
Starship (Electronics)	Delivery robots	August 20, 2019	Series A	$40.0	Morpheus Ventures
Simple Feast	Recipes & cooking communities	September 18, 2019	Series B	$33.0	14W
Motif FoodWorks	Cellular agriculture	August 15, 2019	Early-stage VC	$27.5	General Atlantic
Snackpass	Meal ordering & delivery	August 23, 2019	Series A	$23.5	Rough Draft Ventures, Pioneer Fund and First Round Capital
BlueNalu	Cellular agriculture	August 12, 2019	Series A	$20.0	Agronomics, New Crop Capital and Stray Dog Capital
Huang Xiao Di	Meal ordering & delivery	July 15, 2019	Series A	$14.5	Ares Management

Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 35.

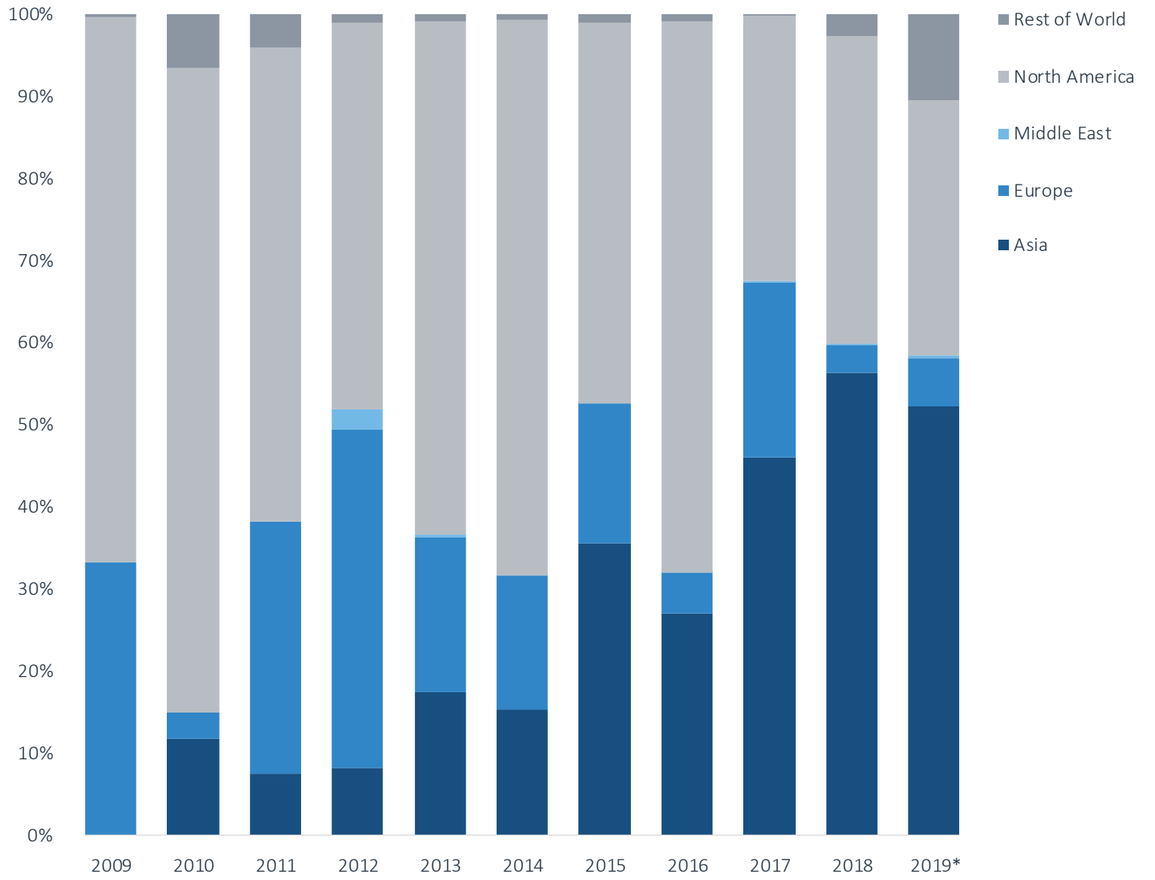
Notable foodtech VC exits

COMPANY	DEAL DATE	DEAL SIZE ($M)	DEAL TYPE	ACQUIRER/INDEX	POST-MONEY VALUATION ($M)
Uber	May 10, 2019	$67,613.0	IPO	NYS: UBER	$75,713.5
Beyond Meat	May 2, 2019	$$1,217.1	IPO	NAS: BYND	$1,457.7
Cornershop	October 11, 2019	Undisclosed	M&A	Uber	Undisclosed
Reds True Barbecue	June 27, 2019	Undisclosed	M&A	Tokyo Industries	Undisclosed
Food52	September 29, 2019	$83.0	Buyout/LBO	The Chernin Group	$100.0
Purple Carrot	In progress	$30.0	M&A	Oisix ra Daichi	$30.0
Good Uncle	August 6, 2019	Undisclosed	M&A	Aramark	Undisclosed
Panna	September 25, 2019	Undisclosed	M&A	Discovery	Undisclosed
LemonCat	August 13, 2019	Undisclosed	M&A	CaterWings	Undisclosed
City Pantry	July 12, 2019	$20.2	M&A	Just Eat Holding	$20.2

Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 36.

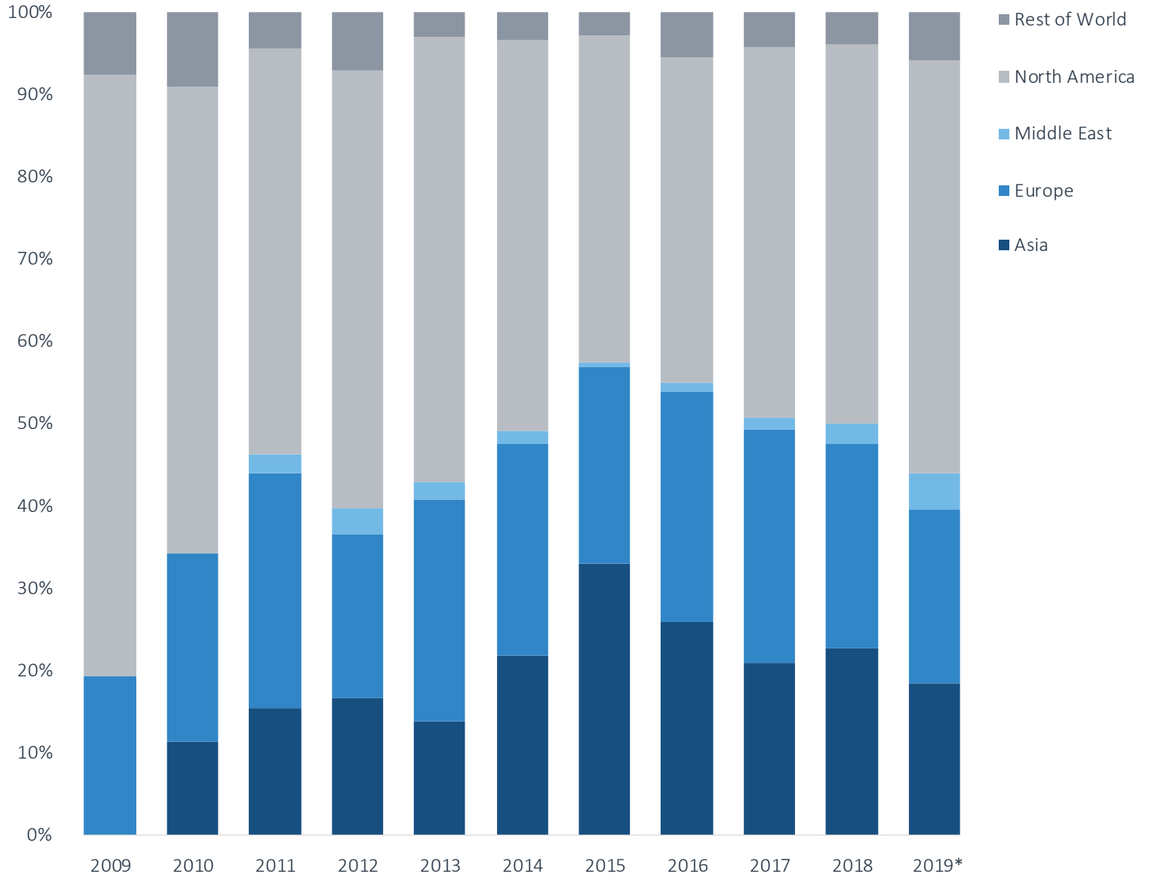
Foodtech VC deals ($) by region



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 37.

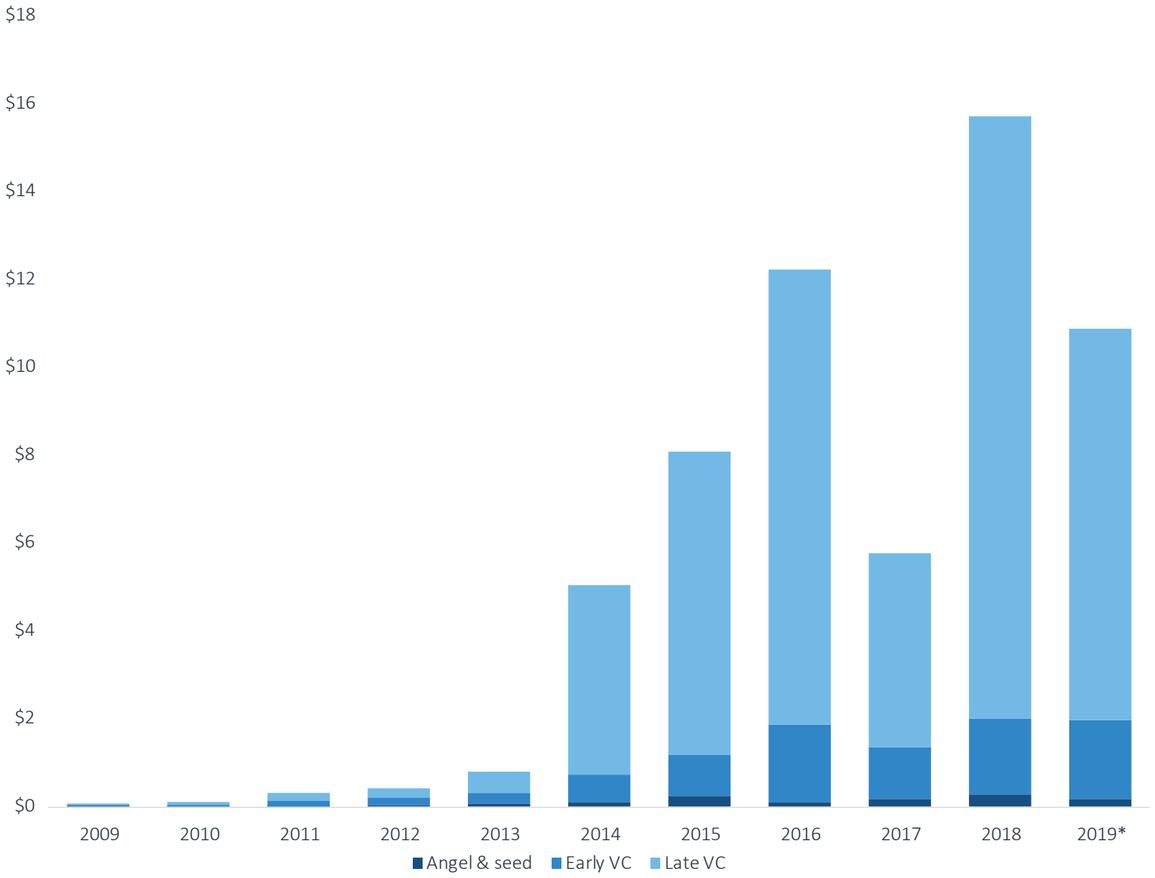
Foodtech VC deals (#) by region



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 38.

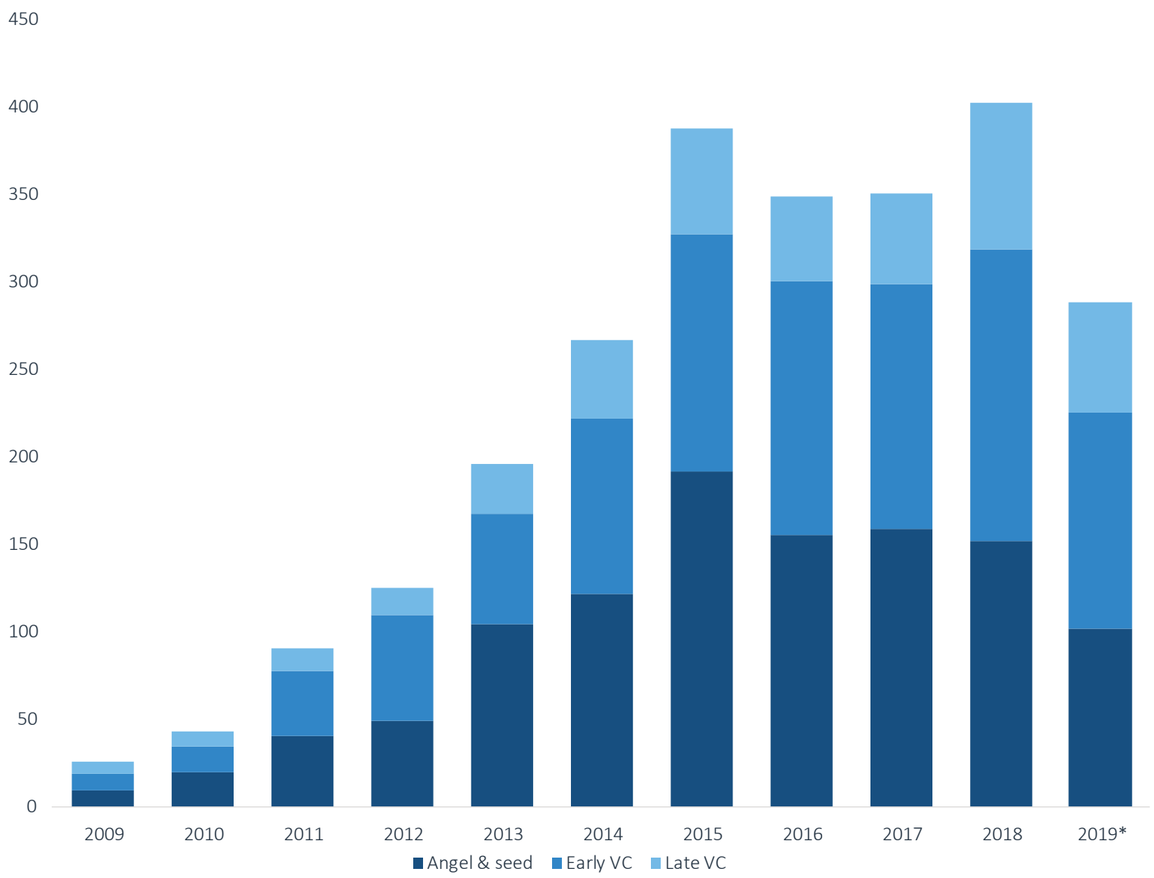
Foodtech VC deals ($B) by stage



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 39.

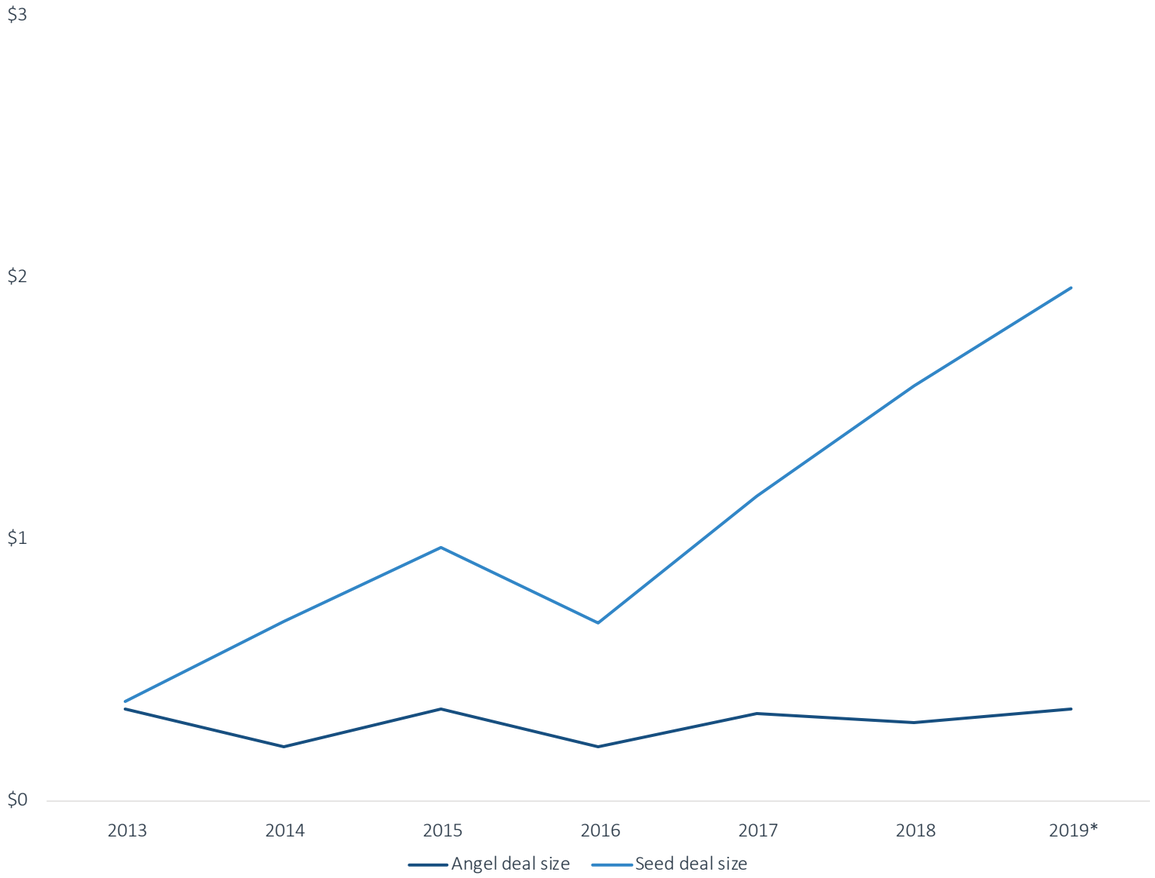
Foodtech VC deals (#) by stage



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 40.

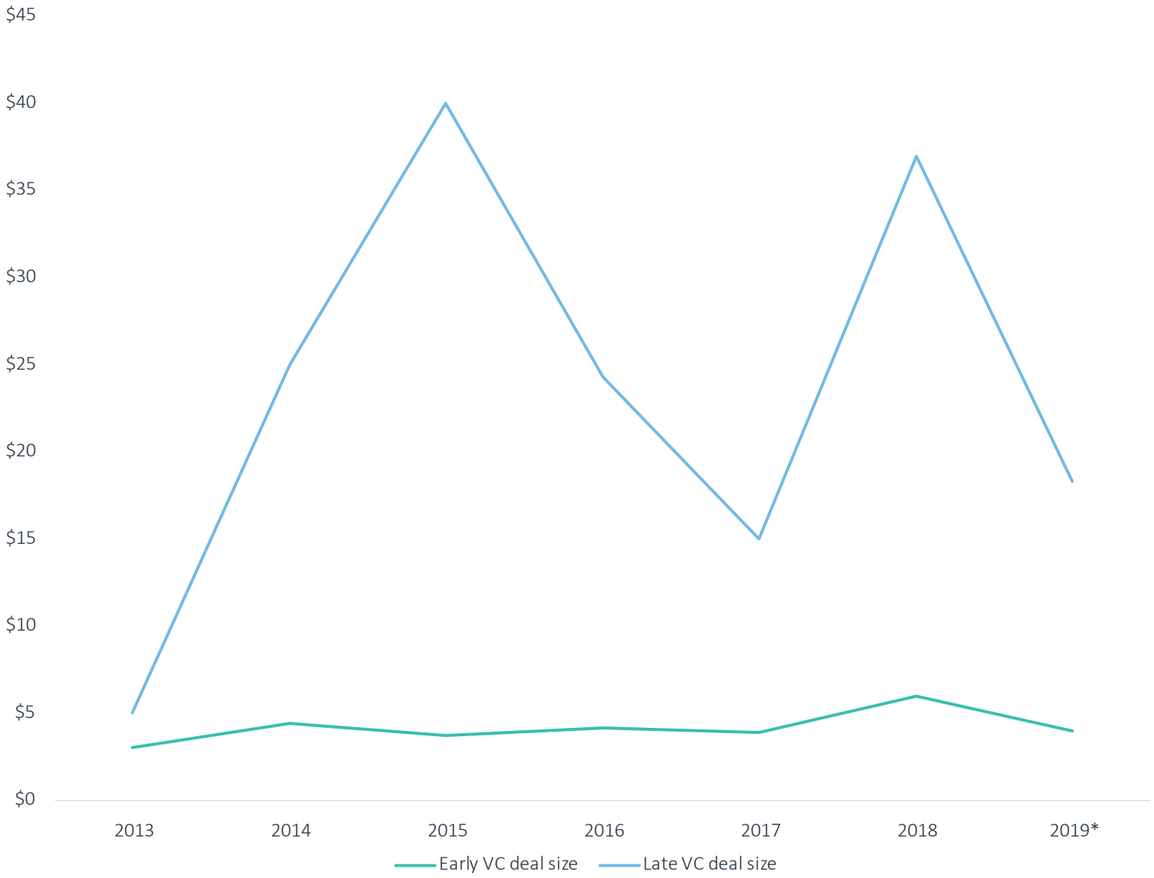
Median angel & seed foodtech VC deal size ($M)



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 41.

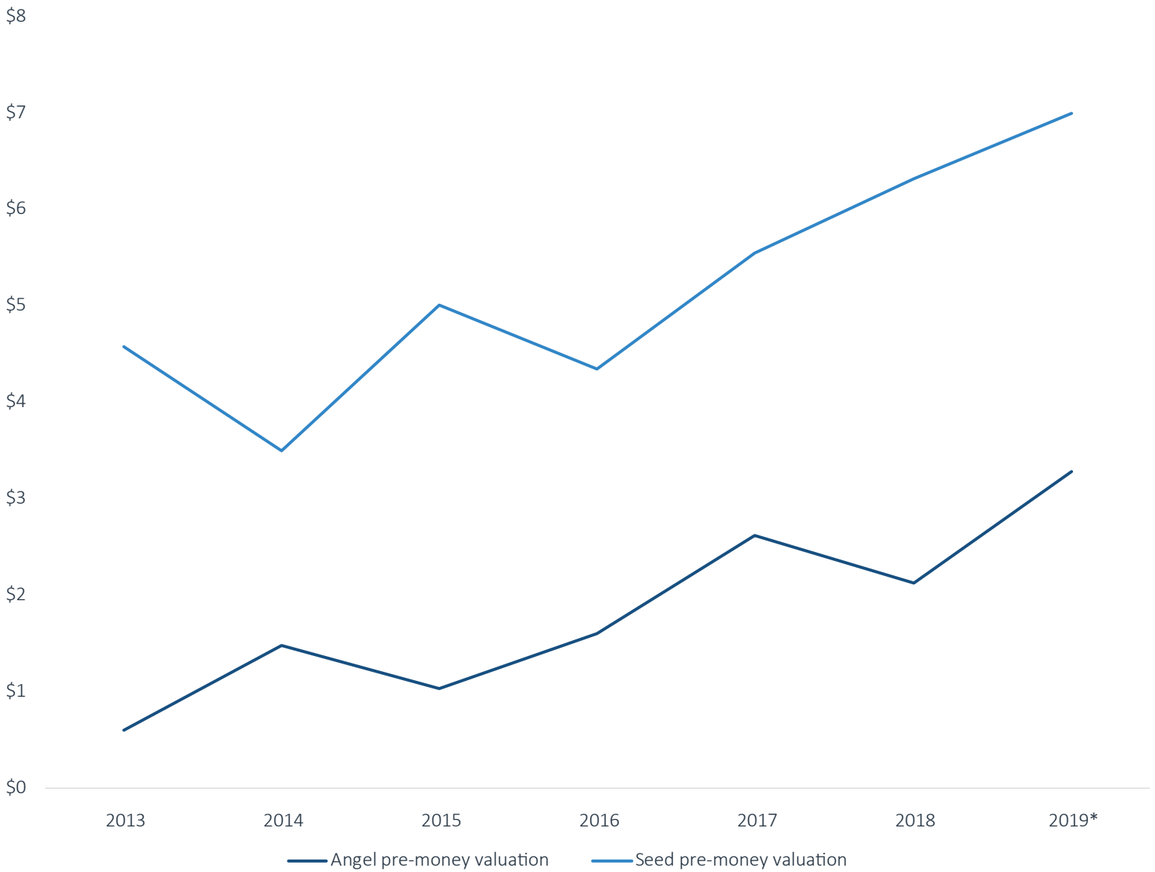
Median early stage & late stage foodtech VC deal size ($M)



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 42.

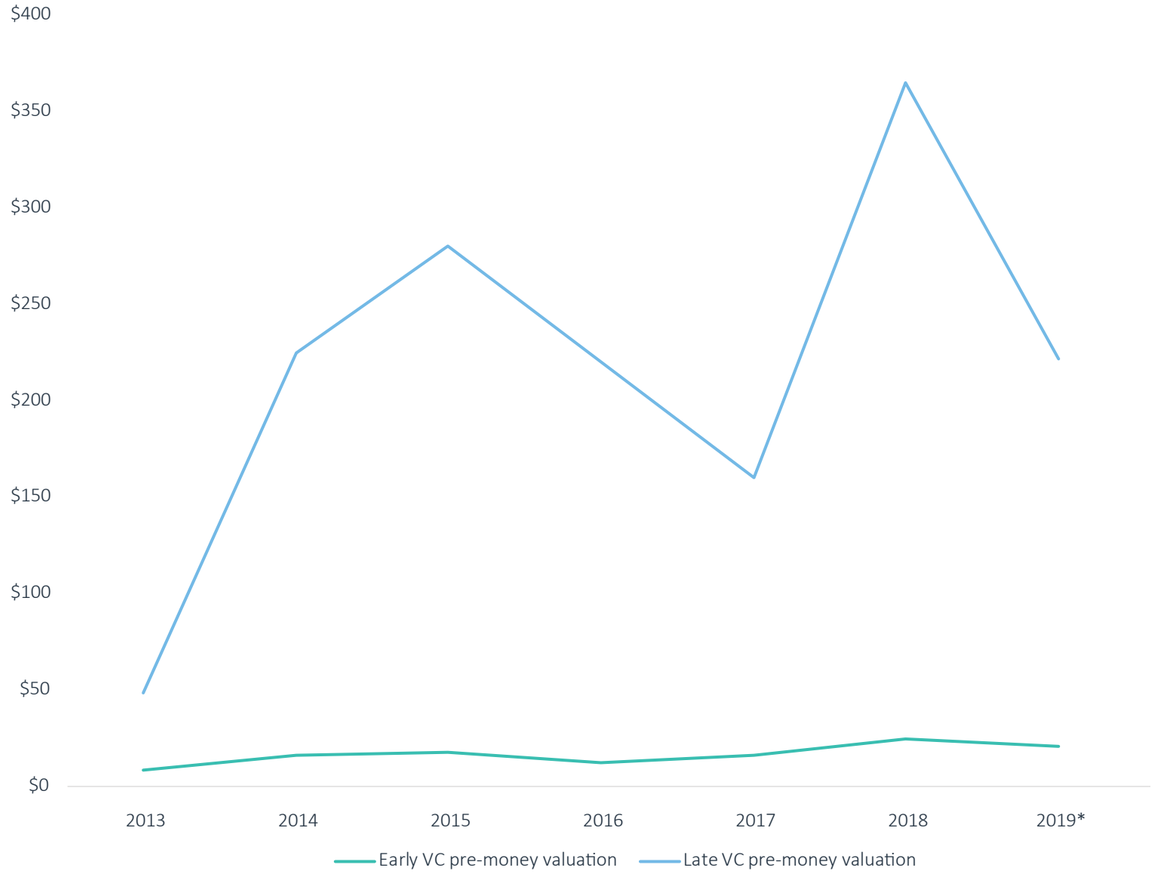
Median angel & seed foodtech VC pre-money valuation ($M)



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 43.

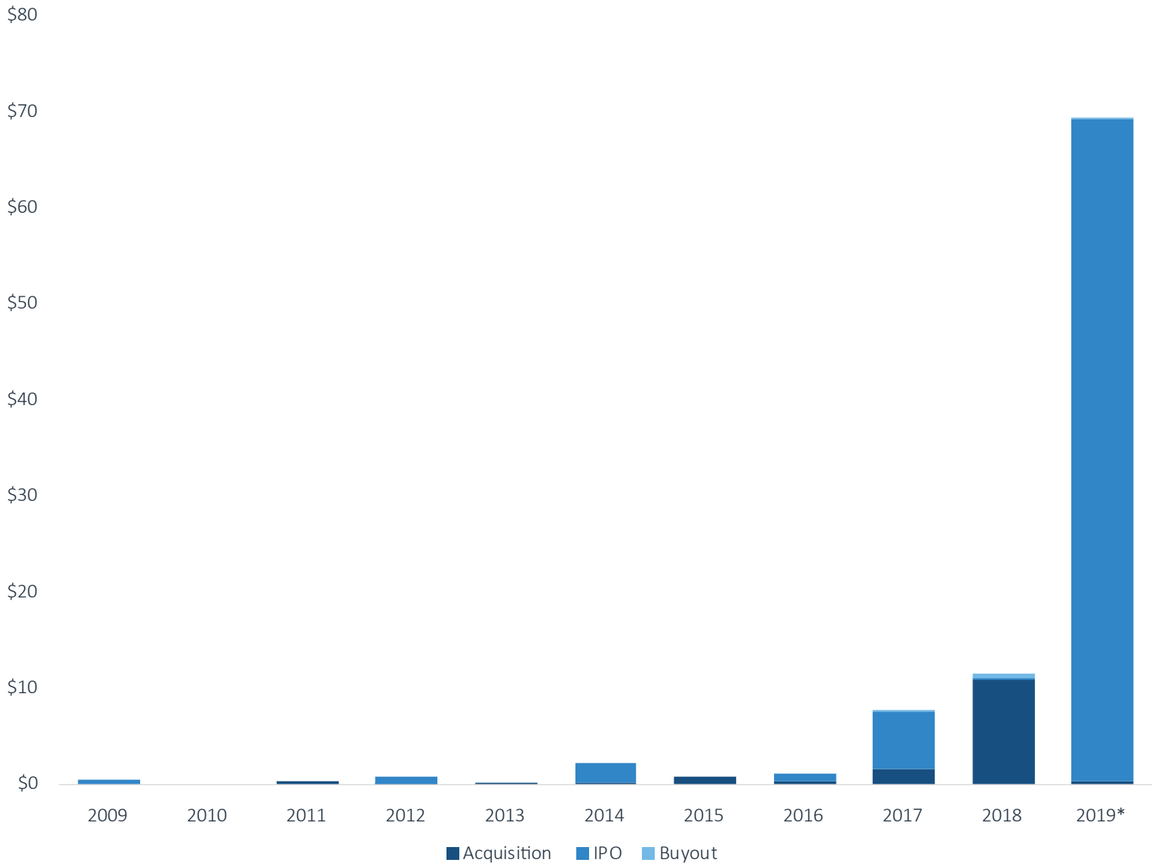
Median early stage & late stage foodtech VC pre-money valuation ($M)



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 44.

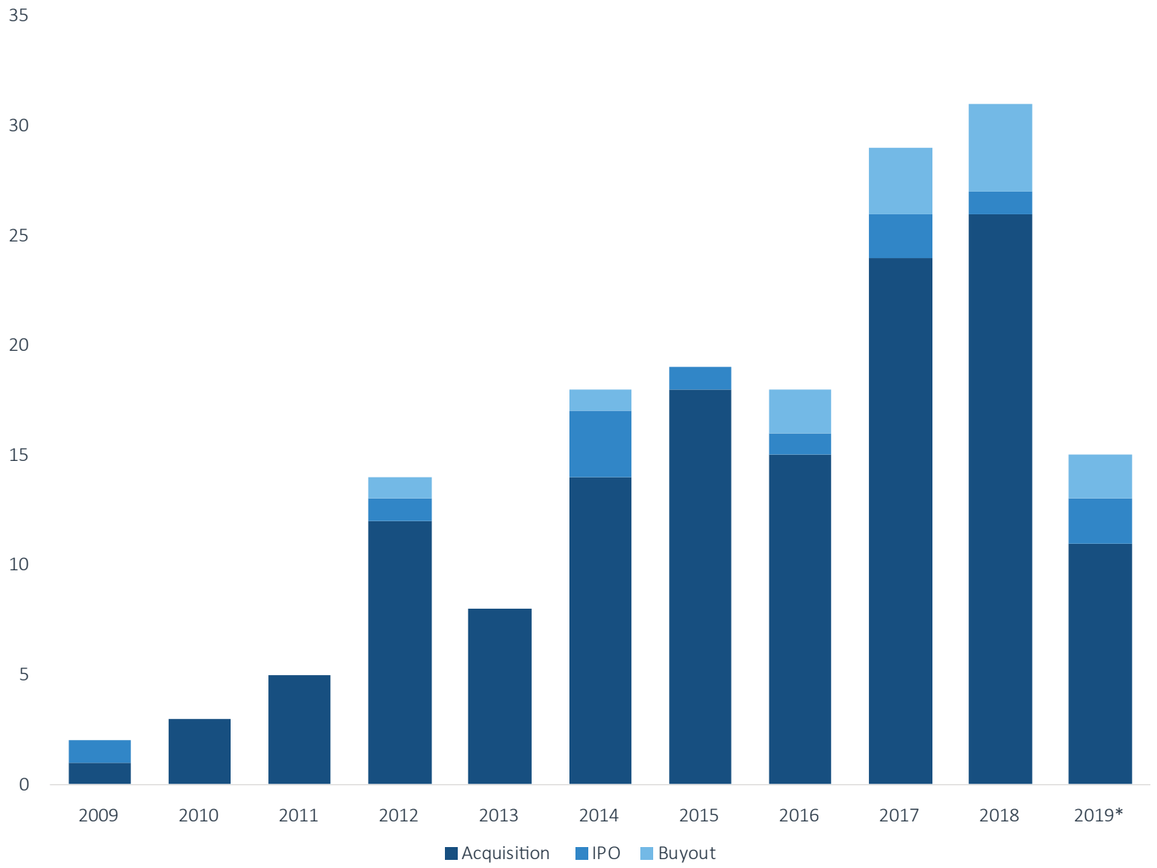
Foodtech VC exits ($B) by type



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 45.

Foodtech VC exits (#) by type



Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 46.

Top VC investors in foodtech by capital invested

INVESTOR NAME	CAPITAL INVESTED ($M)
Sequoia Capital India	$5,809.6
USAA Corporate Development	$5,600.0
Caspian Venture Capital	$5,600.0
Fort Ross Ventures	$5,600.0
Sway Ventures	$5,600.0
SoftBank Capital	$5,300.0
Lightspeed Venture Partners	$5,061.9
Struck Capital	$4,895.9
Ping An Ventures	$4,816.0
Malaysia Venture Capital Management	$4,812.3

Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 47.

Top PE investors in foodtech by capital invested

INVESTOR NAME	CAPITAL INVESTED ($M)
Innova Capital	$500.0
SoftBank Investment Advisers	$375.0
Intermediate Capital Group	$331.3
Exponent Private Equity	$331.3
GPI Capital	$225.0
Tamburi Investment Partners	$165.0
Spectrum Equity	$130.8

Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 48.

Top VC investors in foodtech by deal count

INVESTOR NAME	DEAL COUNT
New Crop Capital	31
Accel	24
Kima Ventures	24
SOSV	22
CPT Capital	21
Blue Horizon (Zurich)	19
Stray Dog Capital	19
Collaborative Fund	17
DST Global	17
Sequoia Capital	17

Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 49.

Top PE investors in foodtech by deal count

INVESTOR NAME	DEAL COUNT
Miton CZ	3
Spectrum Equity	3
Stripes	2
Walter Capital Partners	2
Verdane Capital	2

Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 50.

Top VC-backed foodtech companies by VC raised

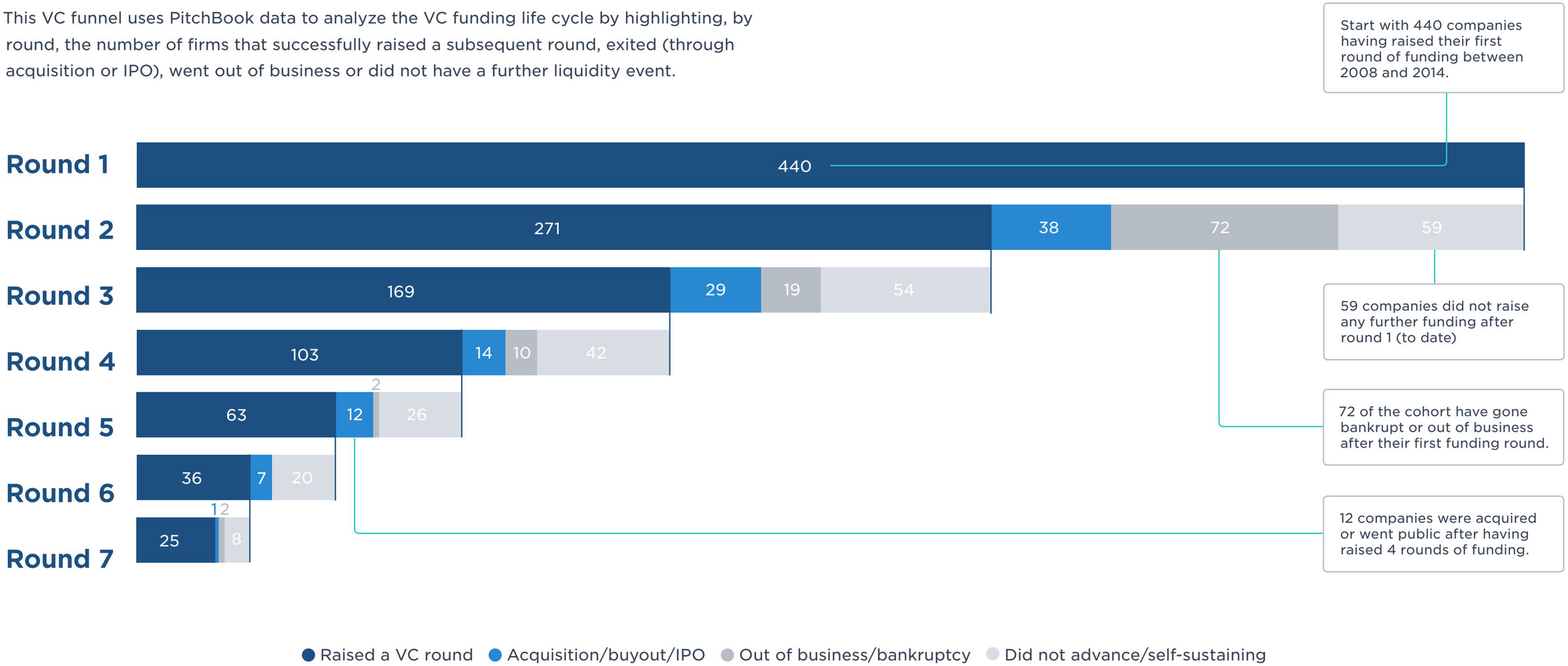
COMPANY	VC RAISED ($M)	POST-MONEY VALUATION ($M)	LAST FINANCING DATE
Grab Holdings	$8,740.1	$14,934.7	June 27, 2019
Alibaba Local Services	$4,000.0	$30,000.0	November 7, 2018
GO-JEK	$3,250.0	N/A	December 1, 2018
DoorDash	$1,971.7	$12,600.0	May 23, 2019
Instacart	$1,944.8	$7,871.0	December 13, 2018
Rappi	$1,464.3	$3,500.0	April 30, 2019
Miss Fresh	$1,352.0	N/A	September 6, 2018
Swiggy	$1,265.5	$3,300.0	December 20, 2018
Nuro	$1,032.0	$2,700.0	February 11, 2019
New Dada	$950.0	N/A	August 9, 2018

Source: PitchBook | Geography: Global | *As of September 30, 2019

SUPPLEMENTAL MATERIALS

Foodtech VC funnel

This VC funnel uses PitchBook data to analyze the VC funding life cycle by highlighting, by round, the number of firms that successfully raised a subsequent round, exited (through acquisition or IPO), went out of business or did not have a further liquidity event.



Buyers list

Figure 51.

Strategic buyers (corporations, holding companies & private companies)

INVESTOR NAME	DEAL COUNT
Delivery Hero	13
Foodpanda	8
Just Eat Holding	7
GrubHub	4
Takeaway.com	3
TripAdvisor	3

Source: PitchBook | Geography: Global | *As of September 30, 2019

Figure 52.

Financial buyers (PE groups)

INVESTOR NAME	DEAL COUNT
Harwood Private Equity	1
Innova Capital	1
Montage Capital	1
STG Partners	1
The Chernin Group	1
Wheelhouse Partners	1

Source: PitchBook | Geography: Global | *As of September 30, 2019

About PitchBook Emerging Tech Research

Independent, objective and timely market intel

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 Emerging Tech 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.

Additional research

Artificial Intelligence & Machine Learning
Cameron Stanfill
cameron.stanfill@pitchbook.com

Cloudtech
Paul Condra
paul.condra@pitchbook.com

Fintech
Robert Le
robert.le@pitchbook.com

Foodtech
Alex Frederick
alex.frederick@pitchbook.com

Healthtech
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
Asad Hussain
asad.hussain@pitchbook.com

Supply Chain Tech
Asad Hussain
asad.hussain@pitchbook.com