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The rise of sustainable food and agriculture strategies in private equity

July 2023



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Sustainable investing at Campbell Lutyens

Overview



Our track record and team

Advising **\$24bn** of dedicated sustainable investing funds

>10 year track record in sustainable investing

Raised capital across **private equity, private credit** and **infrastructure**

Specialist global team across asset classes

Our goals

Committed to being the **leading advisor in sustainable investing in private markets**

Raise the bar on how our all of our clients approach sustainable investment and ESG

Increase the capital we raise for dedicated sustainable investing funds

Contribute to the development of private markets sustainable investing through thought leadership

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Our recent clients

\$24bn

Advised or currently being advised for sustainable investment strategies

CL's client-facing activities in sustainable investing span:

Primary fundraises, advisory mandates and secondary transactions

Private equity, infrastructure and private credit

Developed and emerging markets

A mix of social and environmental strategies

Primary fundraises & advisory mandates

Infrastructure		Private Equity		Private Credit
<p>European infrastructure manager</p> <p>€1.6bn target</p> <p>Renewable energy infrastructure</p> <p>In market</p>	<p>European infrastructure manager</p> <p>€650m target</p> <p>Energy efficiency and clean energy projects</p> <p>In market</p>	<p>AMBIENTA ENVIRONMENTAL INVESTMENTS</p> <p>€1.55bn</p> <p>Mid-market buyouts focused on resource efficiency and pollution control</p> <p>2022</p>	<p>lightrock</p> <p>€860m</p> <p>Late-stage VC / growth stage dedicated climate fund</p> <p>2022</p>	<p>European credit manager</p> <p>€500m target</p> <p>Impact-driven private credit</p> <p>In market</p>
<p>European infrastructure manager</p> <p>€750m target</p> <p>Emerging markets sustainable infrastructure</p> <p>In market</p>	<p>Stonepeak</p> <p>SPGR I</p> <p>\$2.75bn</p> <p>Global renewable energy</p> <p>2021</p>	<p>TRILL IMPACT</p> <p>€900m</p> <p>Advisory European impact buyouts</p> <p>2021</p>	<p>generation__</p> <p>€500m plus co-invest</p> <p>Global sustainability-driven growth / buyouts</p> <p>2020</p>	<p>European environmental sustainability manager</p> <p>€500m target</p> <p>Environmental sustainability focused private credit</p> <p>In market</p>
<p>European infrastructure manager</p> <p>\$500m target</p> <p>Global resilient cities</p> <p>In market</p>	<p>Meridiam for people and the planet</p> <p>Europe IV</p> <p>€2.3bn</p> <p>European sustainable infrastructure</p> <p>2021</p>	<p>LSP CONNECTING INNOVATION TO INVESTORS</p> <p>LSP VI</p> <p>€600m</p> <p>European life sciences VC</p> <p>2020</p>	<p>Global sustainability manager</p> <p>\$1bn target</p> <p>Sustainable private equity</p> <p>Preparing to launch</p>	<p>WHITE OAK</p> <p>\$300m</p> <p>ESG-focused private credit</p> <p>2020</p>

Secondary transactions

Secondary transactions		GP Capital Advisory		
<p>European energy manager</p> <p>Structured equity financing</p> <p>€260m</p> <p>Renewables platform</p> <p>In market</p>	<p>Global infrastructure manager</p> <p>Co-investment syndication</p> <p>£500m</p> <p>Hydrogen gas distribution asset</p> <p>2022</p>	<p>DENHAM CAPITAL</p> <p>Preferred equity financing</p> <p>\$200m</p> <p>Emerging market renewables</p> <p>2021</p>	<p>lightrock</p> <p>Advisory</p> <p>€900m</p> <p>VC / growth assets</p> <p>2020</p>	<p>Meridiam for people and the planet</p> <p>€1bn</p> <p>Global Sustainability infrastructure GP</p> <p>2023</p>

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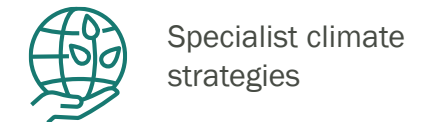
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Dedicated research spanning sustainable investing across private markets, including:





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Specialist and thematic funds representing \$60 billion mapped by Campbell Lutyens, including \$35 billion from private equity and venture strategies and \$25 billion from real assets strategies¹



Market underpinned by long term sustainability, macro and regulatory tailwinds, such as the need for more resilient supply chains and evolving consumer demands for green and healthy foods



Nascent but fast-moving private equity market with a high proliferation of first and second fund generations



High barriers to entry with idiosyncratic complexities such as commodity price exposure creating **potential for competitive advantage amongst managers with specialist sector knowledge**



Capital increasingly focused on upstream opportunities and their auxiliary technologies as downstream foodtech sectors have become crowded and proven prone to cyclicality in valuations



1. Detailed mapping available upon request from sustainableinvesting@campbell-lutyens.com

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The macro backdrop



Supply shocks and inflation

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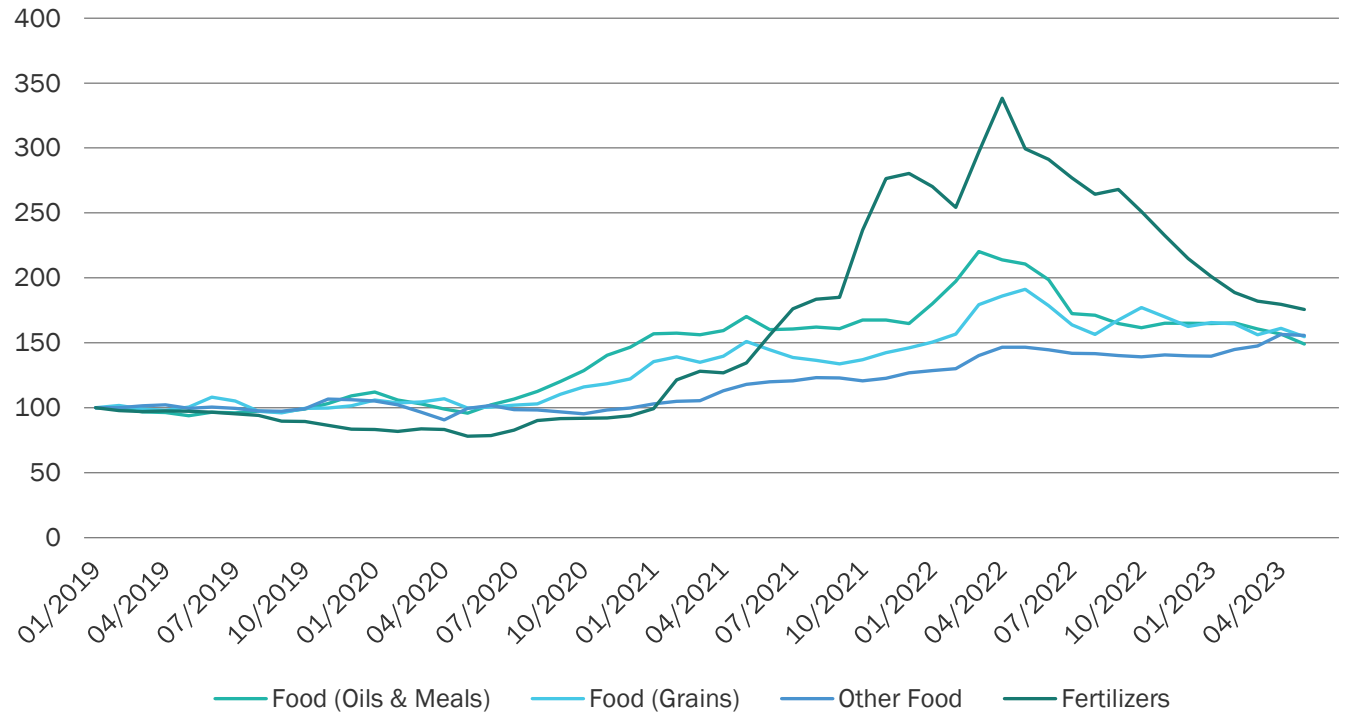
The European Commission Food Security Portal reported that by the end of 2022 **cotton prices** had been in **high volatility** for **over 440 days**¹.



The 2021-2022 market for food inputs was marked by spiking prices and shortages due to geopolitical shocks (namely Russia's invasion of Ukraine), lasting supply shocks in the wake of the COVID-19 pandemic, and extreme weather events related to climate change:

- While prices of foods and fertilizers have decreased since peaks in the first half of 2022, they are still 40-80% above 2019 levels.
- Combined with the rising cost of energy inputs, increased agricultural prices are making their way through the value chain affecting midstream and downstream businesses and consumers

Fertilizer and food commodity prices (rebased, January 2019 = 100)



Sources: World Bank Commodity Price Data (The Pink Sheet), May 2023, Visual Capitalist.
1. As of 29 December 2022

Supply shocks and inflation

Ukraine and the wake of COVID-19

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Supply chain disruptions and COVID-19

Since the pandemic, there has been a closure of trade channels, labor shortages, raw material delays and virus outbreaks at food processing plants.

Notably **27 countries** around the world have set up **food-related trade barriers** since the onset of COVID-19.



- While lockdowns have eased, supply side disruption has persisted given a rise in protectionism and disrupted travel systems

Geopolitical factors

The Russia-Ukrainian war has had a material impact on global food trade, aggravating a global food crisis.

The war is expected to have lasting effects on the region's food production: **in 2022, Ukrainian farmers sowed 22% less hectares of spring crops.**



- Before the Russian invasion, Ukraine was the top sunflower seed oil exporter (50% global export share) as well as a top five global exporter in wheat, barley, and maize
- Typically, Ukraine's food exports could provide enough calories to feed 400 million people, influencing the global market and food prices
- Before the war, 90% of Ukraine's agricultural exports were seaborne. Despite solidarity lanes and Russia stopping their naval blockade, exports remain challenged

Supply shocks and inflation

Extreme weather events and climate change

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Impacts of climate change are being felt by the food production system

Traditional agricultural methods are highly exposed to the increased frequency of extreme weather and rising temperatures associated with climate change.

40% of the variation in crop yields in recent decades was caused by extremes in precipitation and temperature, affecting production of Asian corn and rice, European wheat, and North American corn, wheat, and soy.



Citrus growers in Florida reported that **50-90% of their fruit had been torn off trees by high winds and rain** after Hurricane Ian.



The Collier FAIRR Climate Risk Tool estimated that a **2°C scenario would be associated with a decrease of 7-10% of rangeland livestock** due to increased costs of water, feed, and infrastructure damage caused by extreme weather events, as well as lower animal productivity.



- Wheat crops in France were scorched last year by drought and a dry spring period with rainfall near the lowest levels on record in January to May 2022
- In September 2021 flooding hit major agricultural provinces in China with some regions experiencing more than a sixfold increase in rainfall compared with the prior 20 years. Millions of acres of cropland were flooded leading to billions of dollars of food losses and price increases for consumers

Sustainability and demographics (1/2)

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Sustainable farming practices

Intensive agriculture practices have led to severe soil degradation and erosion, for example through tilling or disruption by farm vehicles.

The **average topsoil depth in Iowa decreased by as much as two thirds**, from around 14-18 inches (35-45cm) at the start of the 20th Century to 6-8 inches (15-20cm) by its end



- 95% of the world's food is grown in topsoil and excessive degradation is threatening crop yields given topsoil's role in filtering water and absorbing carbon
- Excessive use of synthetic fertilizers and pesticides have stripped farmland of nutrients, minerals and microbes as well as disrupting important soil structures

Reducing emissions

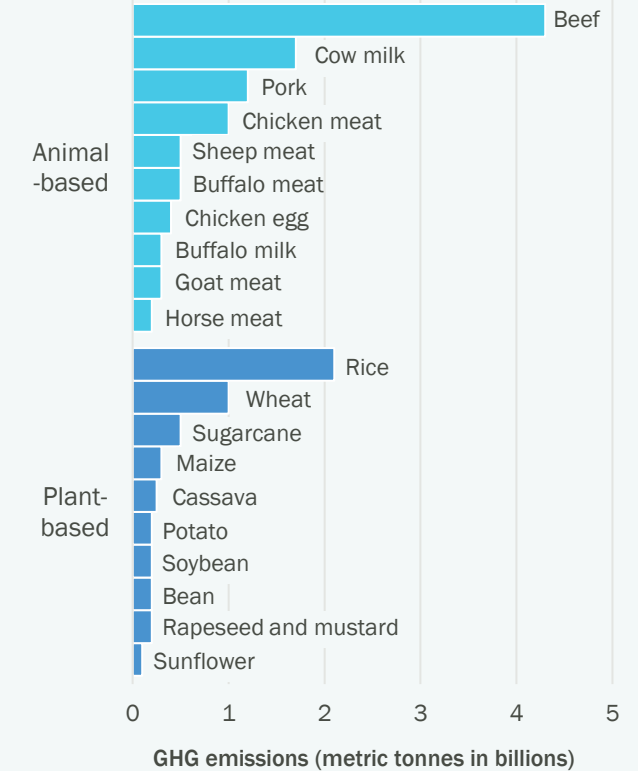
The global food system accounts for 30% of the world's greenhouse gas emissions (15.8 gigatonnes of CO2 equivalents).

Agricultural methods are particularly important, as **the land and farming stages of the supply chain account for 80% of the footprint**



- Solutions to unsustainable food and agriculture practices are gaining attention, with COP27 including the first ever day dedicated to food and climate (see page 17)

Animal-based food production contributes to the most emissions



Sources: BBC (Why soil is disappearing from farms), The Guardian (The world needs topsoil to grow 95% of its food – but it's rapidly disappearing), BBC (A revolution in Food and Farming), The Guardian (Meat accounts for nearly 60% of all greenhouse gases from food production, study finds)

Sustainability and demographics (2/2)

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Population growth

The global population reached 8 billion in 2022 and is expected to hit 9.7 billion in 2050.

46% of habitable land is used for agricultural purposes
82% of global calorie supply coming from plant-based food,
77% of agricultural land is used for livestock (meat and dairy)



- Expected to be a boom in the global middle and consumer class
- From 2020-2030 the global middle class is expected to grow by 1.3 billion people (+37%) and consumer spending by the global middle class is expected to grow by \$18 trillion (+41%)
- Growth of the middle class is associated with changing diets to consuming more meat and dairy, i.e. more resource-intensive foods

Reducing land use

Nearly all habitat loss is driven by the expansion of agriculture through deforestation and conversion of wild grasslands into farm and cropland.

140% of the world's total habitable land would be required to feed the population if everyone adopted the **average US diet**



- Different foods and farming practices have distinct associated land intensities

Food safety, traceability, and waste

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Food safety and food traceability

Households place increasing importance on the consumption of fresh and healthy, and traceable products. Additionally, following the outbreak of high-profile diseases being transmitted from animals to humans, greater focus is being given to animal health.

The World Health Organization estimates that **food contamination causes one in 10 people worldwide to fall ill each year**, resulting in **420,000 deaths**



The Grocery Manufacturers Association estimated that **food fraud may affect approximately 10% of all commercially sold food products**, costing the global food industry **\$10-15 billion per year**



- Food traceability seen as a solution to food fraud and food safety concerns
- Particularly following costly large-scale food recalls such as Ferrero's 2022 recall of Kinder products after concerns of Salmonella contamination.

Waste management

Around **14%** of food is lost from post-harvest to wholesale, and **17%** in retail and consumption, together representing **8-10%** of global greenhouse gases.

The value of **food produce** each year that is **wasted exceeds \$1 trillion.**



Technological revolution

Genetic, biotechnology and data science

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Genetics and biotechnology

Genetics and biotechnology may be applied to address health, sustainability and food security concerns associated with the production system – one example of this is CRISPR-Cas9.

Research is underway using **CRISPR-based gene editing to improve drought tolerance in wheat, cassava, papaya, sugarcane and cotton**



- The CRISPR-Cas9 (CRISPR) technology was thrust into the spotlight in 2012
- CRISPR enables scientists to find and edit specific DNA sequences; CRISPR made the process of editing plant and animal genomes relatively cheap and easy, whereas before editing genomes took years and cost hundreds of thousands of dollars
- Further advancements include tissue engineering and 3D printing

Leveraging data and automation in the ag sector

Agriculture has been slow to adopt key technological advancements such as data science, robotics and automation, AI, and digitization

Sanjeev Krishnan, founder and managing director of S2G Ventures, states that while 'Agtech 1.0' concentrated on genetics, pesticides and fertilization, **'Agtech 2.0' focuses much more on digitization, data science and alternative farming**



- These technologies enable businesses to aggregate and interpret data, and make decisions in real time with applications including forecasting yield, supply chain optimization, and farm management
- The data revolution in the food and agriculture sectors is being driven by trends including labor shortages, increasing food demand, and expanding digital infrastructure and improving connectivity

Consumer behaviors continue to change

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Developing consumer behaviors

There has been an ongoing trend of consumers having higher interest in sustainable, organic and/or healthy food products.

A 2020 IBM consumer report found **nearly six in 10 consumers surveyed are willing to change their shopping habits to reduce environmental impact**



For those who say it is very/extremely important, **over 70% would pay a premium of 35%, on average, for brands that are sustainable and environmentally responsible**



Increasing health consciousness and “food as medicine”

- A 2022 McKinsey survey found 70% of consumer respondents want to be healthier, and healthy eating is a top priority for c. 50%
- Most survey respondents prioritize healthy eating over one’s personal climate impact

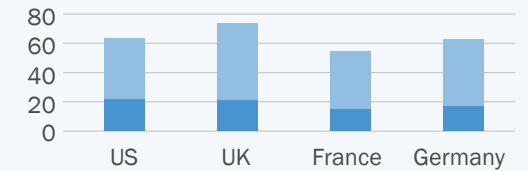
Macro events may create new challenges to changing consumer preferences given supply-side shocks

- Given plant-based and alt-foods often sell at a premium, their demand may be a casualty in the new macro environment, particularly as they are not seen to have reached a taste parity
- However, organic foods have been relatively resilient with organic dairy, meat, fish and poultry facing lower sales declines than non-organic counterparts (October 2021 to July 2022)

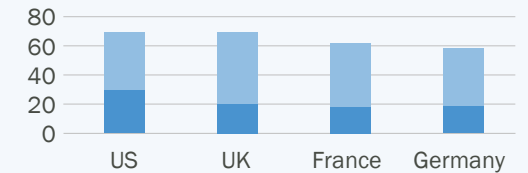
Changes in eating habits are seen across all generations – especially among younger consumers¹

Change in eating habits since COVID-19 began, by nation, by generation
% of respondents agreeing (n=8,192)

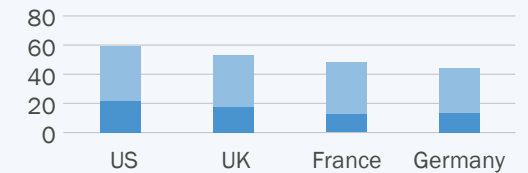
Generation Z



Millennials



Generation X



Some change Major change

Sources: IBM (Meet the 2020 consumers driving change, Report), Pitchbook, McKinsey (Hungry and confused: The winding road to conscious eating), Agriculture and Horticulture Development Board (AHDB)
1. McKinsey

Evolving regulatory framework

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Illustrative regulatory developments affecting the agriculture and food industry include:



The new European Common Agricultural Policy

On 2 December 2021, the agreement on reform of the common agricultural policy (CAP) was formally adopted with three of the 10 key objectives being dedicated to climate



European Green Deal including the Farm to Fork strategy

Aiming to accelerate the transition to sustainable food systems



Inflation Reduction Act (IRA)

Nearly \$40 billion in funding earmarked for provisions to support climate smart agriculture initiatives such as conservation and carbon sequestration programs
\$300 million for the US Department of Agriculture to assess the climate benefits of healthy soil



COP27's Food4Climate pavilion

COP27 Good4Climate pavilion: The first-ever pavilion dedicated to the climate impact of food at an international climate conference
COP26 deforestation pledge: to halt and reverse forest loss and land degradation by 2030



Alternative proteins

Increasing regulatory attention given to the alt-protein market including US Department of Agriculture's final approval for Good Meat and UPSIDE Foods to sell lab-grown meat in the US



US National Biotechnology and Biomanufacturing Initiative (NBBI)

President Biden signed executive order to launch the NBBI in mid-September 2022. Aiming to strengthen US supply chains, advancing bioproducts, biotechnology development and biomanufacturing, \$2 billion of funding has been earmarked



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Illustrative food value chain

Simplifying the increasing complexity in food systems

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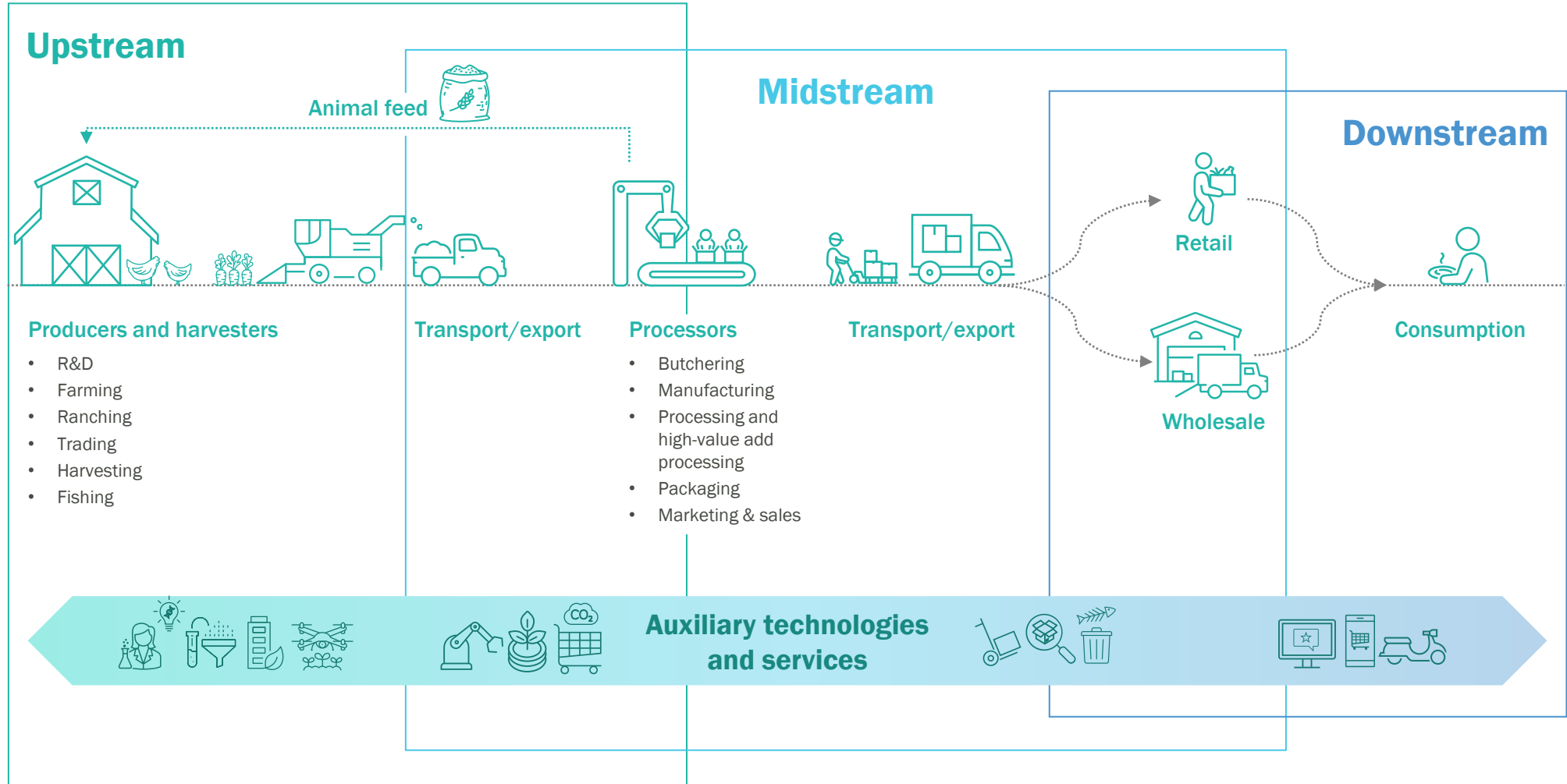
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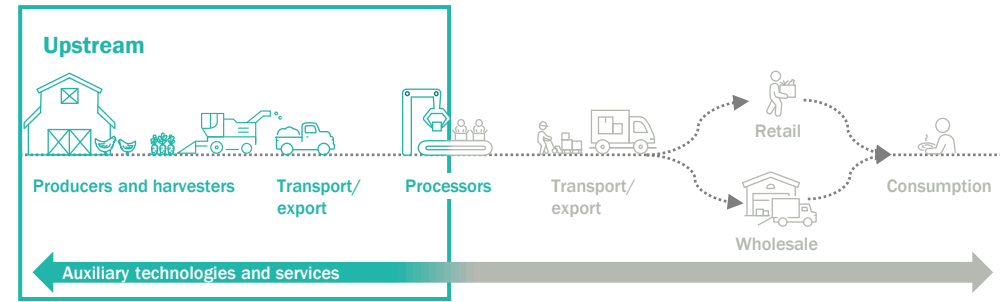
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Sources: Deloitte, FAO

Strictly private and confidential

Upstream investment opportunities (1/2)



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Traditional farming

(farmland, cropland, timberland, aquaculture)

- Traditional investments into food and agricultural producing assets including farmland (for example buy-and-leaseback, own-and-operate, or value add vertical integration strategies), and buyouts of upstream agribusiness or farm operating companies
- Variable target returns dependent on whether investment is driven by a real assets-based or PE-style strategy, as well as the underlying product
- Products span higher value permanent crops such as almonds which attract higher yields per hectare to lower value annual row crops such as wheat
- Value additions may include upgrading low-value land to higher yielding crops or introducing productivity gains through new technologies and farming techniques
- Other value creation tools may come from the traditional PE playbook such as upgrading management teams, geographical/export market expansion, and vertical integration

Example investment

Cibus' 2019 investment into international primary producer of berries, The Summer Berry Company



Agricultural biotechnology and chemistry

- Solutions which harness biological or chemical processes to improve yields, by leveraging the rapid innovation in synthetic biology and gene editing
- Includes on-farm inputs for crop and animal ag such as genetics, microbiome, breeding, new fertilizer and pesticide technologies, GMOs, and feed additives

Example investment

AgBiome, a developer of naturally-derived crop protection products, held a \$117m Series D in 2021 led by Novalis LifeSciences and Blue Horizon



Bioenergy and biomaterials

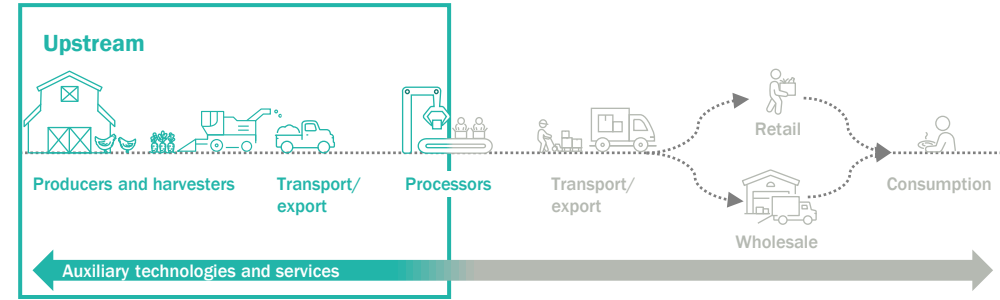
- Biologically derived energy, materials, fabrics, ingredients and nutrients
- Examples may include non-food extraction, feedstock and fertilizer technologies, sustainable plant-based textiles and leathers

Example investment

Pivot Bio's \$430 million Series D in 2021 led by DCVC. Pivot Bio develops microbial nitrogen fertilizers for cereal crops



Upstream investment opportunities (2/2)



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Farm mechanization and software

Machinery and technology solutions (both hardware and software) aimed at enhancing yield and/or resource efficiency

Hardware

- Innovation of machinery applied throughout the farming process
- Decarbonization opportunity to shift traditional fossil-fuel equipment (tractors, harvesters etc.) to zero-emission counterparts
- McKinsey estimates this transition would realize cost savings of \$229 per ton of CO₂ equivalent

Software

- Leveraging advancements in data science and software solutions which may be used to monitor, analyze, forecast and optimize farm management

Combining hardware and software technologies enables farmers to engage in precision agriculture techniques

Example investment

Paine Schwartz's growth equity investment of Advanced Agrilytics, which helps growers to interpret agronomic data to boost yields through optimized management of inputs and farming practices



Novel farming systems

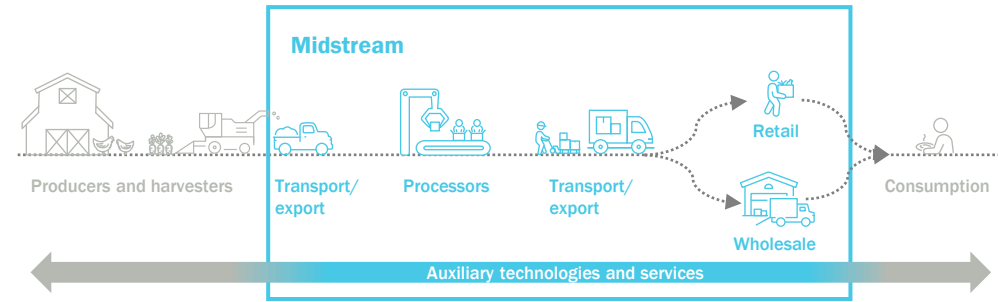
- Non-traditional farming systems including urban agriculture, automated vertical farming, and aquaponics
- Urban agriculture is mostly small scale but yields are being improved by technological innovation
- Vertical farms are indoor farming spaces which precisely automate agricultural inputs across temperature, lighting, irrigation and fertiligation
- Benefits of urban and vertical farms include: reducing transport requirement, improving food freshness, increased land efficiency, reduced reliance on weather variation, as well as a limited risk of disease and drought
- Indoor, closed and controlled farming systems have also been applied to foods and feedstock such as insects
- Aquaponics involves the integration of fish farming (aquaculture) and hydroponics (soil-free agriculture) in a symbiotic system that is more water and resource efficient

Example investment

Ynsect's \$372m Series C in 2020 led by Astanor. Ynsect is a vertical farmer of insects for food, animal feed and fertilizers



Midstream investment opportunities (1/3)



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Agrifinance and agribusiness marketplaces

- High market volatility caused by externalities (supply shock, weather, pandemics) combined with a long cash cycle creates a financing gap for farmers to invest into new capital
- This is further stressed by appreciation of land values as institutional investors acquire more farmland as a “safe haven” asset
- Grain producers may have working capital tied up in their crops for up to 18 months before realization, and they have to consider price, exchange rate, and interest rate movements before planting
- Opportunity to provide growers with access to agrifinancial services, risk assessment tools, and marketplaces connecting industry stakeholders such as input vendors, distributors, agronomists, and financing providers
- Financial services may include long-term contracts to hedge price movements and spreading of crops

Example investment

ProducePay’s \$18.5m Series B round in 2018 led by Anterra. ProducePay is an agriculture fintech providing financing, analytics, and marketplace tools for the fresh produce market



Traditional food processing and manufacturing

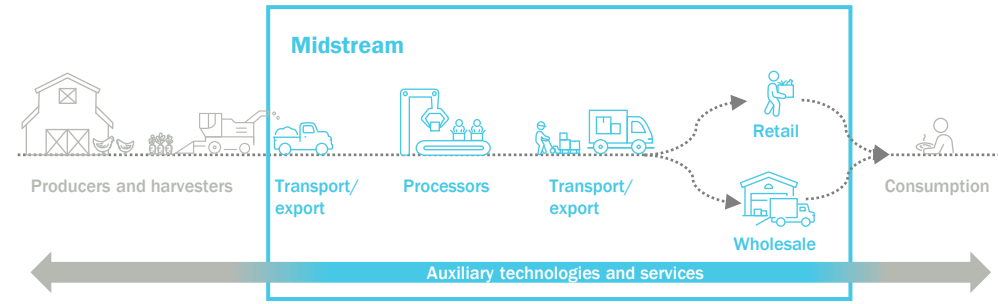
- Converting agricultural outputs and ingredients into ready-to-consume products
- Traditional food processing and manufacturing may encompass anything from meat slaughtering to food product manufacturing
- Within food product manufacturing this may include (among others) producing baked goods and confectionaries, beverages, frozen foods, or preserved fruit and vegetables
- Companies in this segment may be vertically integrated to include downstream consumer brands of the finished goods they produce

Example investment

PAI Partners’ 2019 buyout of Ecotone, a producer of organic, vegetarian, and natural foods (brands include Whole Earth peanut butter)



Midstream investment opportunities (2/3)



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Processing tech and packaging

- Technologies enabling food processing as well as packaging for finished food products
- Packaging solutions may have a high sustainability alignment, for example by focusing on:
 - Materials which are less carbon-intensive at the point of production; or
 - Circular economy products which are compostable or recyclable at the point of disposal to reduce the amount of packaging which ends up as polluting litter, in landfill, or being incinerated

Example investment

2021 growth capital investment by Circularity Capital, Sodical Instituto Financiero de Castilla y León and AXA into PackBenefit. PackBenefit produces sustainable packaging solutions for the food service industry including compostable cellulose trays



Food waste and safety

- Solutions to improve food safety and freshness as well as reduce waste
- Methane emitted from rotting food waste in landfills is over 80 times more potent in driving temperatures than CO₂ over a 20-year period
- Food waste costs the hospitality industry over \$100bn annually; kitchens can waste up to 20% of food purchased, often equivalent to their total net profits.

Example investment 1

Apeel Sciences, a producer of plant-based fruit coatings to extend shelf life which closed a \$280m series E round in 2021 led by Temasek

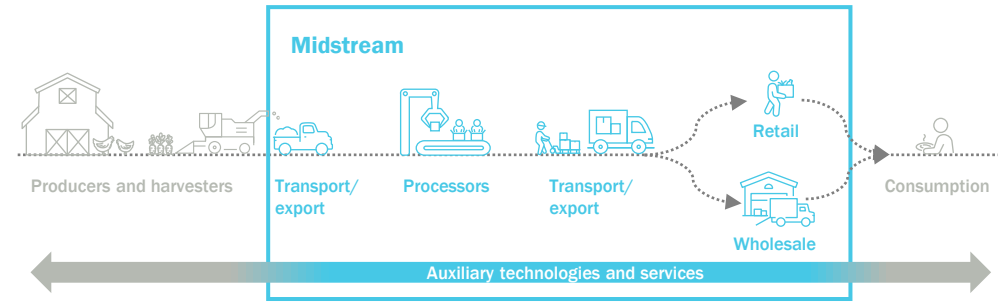


Example investment 2

Winnow's £10m series B in 2019 led by The Ingenious Group. Winnow is a producer of technology and sensors to monitor the waste in kitchen bins



Midstream investment opportunities (3/3)



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Supply chain optimization, logistics and fulfilment, food traceability

- Supply chain optimization and regulatory compliance is particularly important in the food sector as a staple good which is necessary for consumers' wellbeing and associated with health benefits and risks
- Businesses in this position of the value chain may be tackling a number of different requirements such as:
 - Mitigating against supply chain disruptions
 - Tracking and tracing to protect against food fraud, contamination and defects in the supply chain
 - Ensuring the efficient fulfilment of food orders

Food traceability

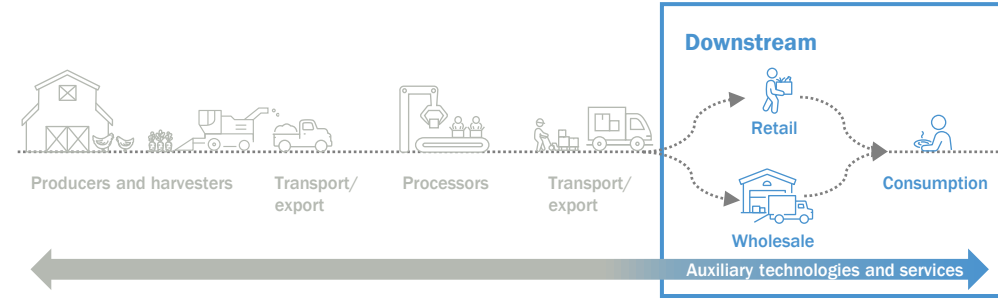
- Food traceability solutions bring clear benefits for both retailers and consumers such as a reduced risk of costly recalls of unsafe products
- Tracking food throughout the supply chain may leverage tools such as blockchain to instantly trace products through each point of contact from farm to consumer
- In 2017, Walmart announced a blockchain partnership with IBM and other food supply chain players to increase food traceability. Walmart's trials using blockchain technologies reduced the time it took to track a package of sliced mangoes from one week to just two seconds

Example investment within the food traceability space

The Riverside Company's 2022 takeover of FoodLogiQ as an add-on to its ESHA Research platform. FoodLogiQ provides a SaaS-based supply chain transparency software to streamline supply chain management processes, ensure supplier compliance with food safety standards and optimize product traceability



Downstream investment opportunities (1/3)



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Intermediaries and delivery restaurant marketplaces

- Intermediaries and marketplaces designed to offer consumers streamlined access to a range of food options
- These include restaurant marketplaces, on-demand grocery marketplaces, and online delivery platforms
- Delivery and marketplace apps have proliferated and matured since the pandemic-induced lockdowns in 2020, which increased consumer uptake for on-demand food delivery

Example investment

2023 \$300m late stage VC financing into ultrafast grocery specialist Getir, which was led by Mubadala



Innovative food

- Novel substitutions for traditional foods (often farmed meat-based foods) such as plant-based, fermentation based, and animal cell-cultured foods
- Innovative foods also include substitutes to other foods produced from animal by-products or by animals, including dairy goods or honey
- Note that there is opportunity to invest in innovative foods downstream (branded products), or further upstream e.g. into the enabling technologies necessary to increase bioreactor capacity, a key limiting factor to achieving scale in the cultured food segment

Example investment 1

UPSIDE Foods' \$400m series C round in 2022 led by Abu Dhabi Growth and Temasek. UPSIDE Foods is a sustainable cultured meats producer

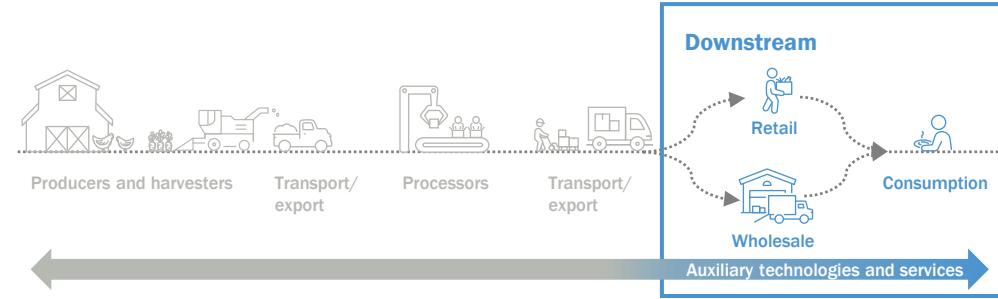


Example investment 2

Astanor's 2022 seed funding into MeliBio, a producer of vegan nectar goods



Downstream investment opportunities (2/3)



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Retail and grocery

- Businesses selling food and beverage products directly to consumers either through bricks-and-mortar or online channels

Example investment

Inverleith's 2018 buyout of Planet Organic, the UK's first fully certified organic supermarket



Hospitality

- Traditional hospitality businesses focused on catering and/or the consumption of food and beverages (e.g. restaurants and cafés)

Example investment

Encore Capital's 2019 buyout of Mildred's, a vegetarian and vegan restaurant chain based in London



Traditional consumer brands

- Ready-to-consume or ready-to-prepare goods for consumers

Example investment

The 2021 acquisition of Health-Ade, a producer of kombucha beverages with gut-health benefits, by First Beverage Group and Manna Tree Partners



Online food suppliers

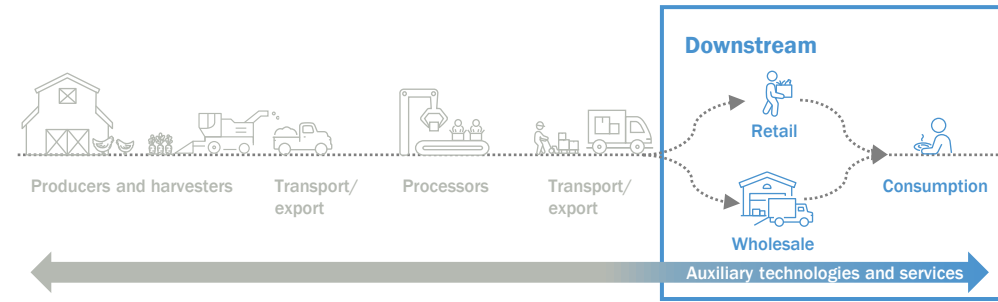
- The online food suppliers sectors can include anything from online restaurants, meal-kit subscriptions, or dark kitchens (highly efficient kitchen spaces without a storefront that produce food for delivery only)

Example investment

CloudKitchens' 2021 late stage VC financing in 2021, which included Microsoft as a supporter



Downstream investment opportunities (3/3)



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In-store, retail, and cooking tech

- Smart machinery and technologies for kitchens and in-store
- These may include (among others) point-of-sale systems, shelf-stacking robots, specialised 3D food printers, smart kitchen appliances

Example investment

LDV Partners' 2022 venture investment into Creator, a developer of automated robots producing customizable burgers



Discovery and review

- Apps and services enabling consumers to discover and share information on new foods, restaurants, and other products or experiences

Example investment

Vivino's \$155m series D round led by Kinnevik in 2021. Vivino is a wine discovery application utilizing community data





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What are GPs and LPs doing?



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Overview of the GP market

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Campbell Lutyens has **mapped over \$60 billion** in specialist and thematic funds with a focus on the food and agriculture value chain across the risk-return spectrum of real assets, buyout and venture strategies

Detailed mapping available on request from sustainableinvesting@campbell-lutyens.com



An emerging sector

Relative to the proliferation of energy transition funds, the market for specialist food and agriculture private equity funds is still relatively nascent.

This is evidenced by the high number of first- and second-generation funds, particularly at a smaller scale within the VC segment.

As an emerging space, key questions and for LPs beginning to allocate to the space include:

- does the manager have an established track record?
- is the managers' expertise transferable to the fund strategy?
- is the strategy investable and scalable?

The sector features high barriers to entry with specific risks (commodity price risks, climate risks, dietary fads), enabling the emergence of specialists with differentiated competitive advantages.



North America leads the charge

LP feedback (as supported by our mapping) has emphasized that North America is the furthest ahead in its development, especially for cultivating scaled specialists.

North America is followed by Europe, which is 'catching up' in terms of investor focus and market activity.

Israel was a first mover in the foodtech market, home to early cultivated meat players such as Aleph Farms and supported by their 2015 novel food regulatory framework.

Asia is a deep market with a growing middle class and incomes. However, foreign investors have found it difficult to navigate the investment regulatory regimes and currency complexities. This said, in some markets (for example in Singapore), business regulations have stimulated significant innovation within food and agtech.

Relative attractiveness of permanent vs annual cropland

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Permanent vs annual cropland



You might get **£400 (about \$425) to £600 off your corn crop... while you're receiving £60,000 if you're growing kiwi fruits¹**



Rob Appleby, Cibus Fund

- Substituting farms or agricultural facilities upstream to focus on permanent crops with higher revenue per hectare
- Compensating for the higher expected return is also higher associated risk
- For example, it takes years for vines to become productive, in which time consumer dietary preferences may change.



Recent returns

- The National Council of Real Estate Investment Fiduciaries' ("NCREIF") Farmland Index reports rolling four-quarter total return for US cropland
- 12-month trailing returns in Q1 2023 were near 20-year lows for permanent cropland
- In comparison, annual cropland returns remained very high in the four quarters to Q1 2023
- The higher recent return in annual crop farms will have been partly driven by the elevated price of corn and soybean futures (due to the ongoing Ukraine conflict and wider inflationary pressures). These high prices directly increase the revenue generated and values for farms using corn and soybean in their rotation
- Over the past 22 years, four-quarter total returns have generally been higher for permanent cropland, albeit more volatile

Annual cropland

13.27% 12-month trailing return at Q1-23 (3.72% from income and 9.30% from appreciation)



Permanent cropland

2.30% 12-month trailing return at Q1-23 (2.80% from income and -0.49% from appreciation)



Source: The Economist (Barbarians at the Farmgate), NCREIF ([Q1 2023 NCREIF Total Farmland Index](#) Press Release)

1. Pitchbook (Q&A: UK's Cibus Fund targets tech solutions for food security)

Upstream and climate technologies

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Farm management software, robotics, and vertical farming

Robotics providers are increasingly **shifting to hardware-as-a-service models**, reducing major upfront capex for farmers with long cash cycles

Farm management software businesses attracted 35% more funding in 2022, making it the biggest winner of all segments (a rise \$430 million to reach a total of \$1.7 billion)

Funding to novel farming systems including vertical farms jumped 21% in 2022, including the \$400 million series E to US-based Plenty

- In addition to traditional land-based producers, upstream investments have included robotics, farm management and analytic companies increasing farm productivity and seeking to reduce the stress left by labor shortage
- Agricultural robots may be combined with machine vision to have applications across picking, weeding and crop transportation, reducing the labor requirement
- Harnessing software and IoT technologies alongside sensors enables farms to monitor, analyze, predict, and optimize in-field elements including feed and irrigation, weather and pest scenarios, and inventory planning
- Vertical farming has seen a number of high-profile deals. However, investor sentiment has started to deteriorate in 2023 with concerns around valuations, high cash burn rates, and notable recent troubles in the press including: (i) AeroFarms filing for bankruptcy in June 2023; (ii) AppHarvest's notice for default in May 2023; and (iii) Kalera filing for court protection in April 2023



Focus on climate

Businesses producing climate solutions are boosted by increasing farmer demand as a McKinsey survey found that:

30% of large farms plan to use “green” products such as biofertilizers due to lower costs per acre;

in Brazil, 60% of farmers have already adopted biocontrols and biostimulants



- As with the broader sustainability market, the hottest area for investments has been climate solutions
- Examples of these include microbial biofertilizers which improve plant nutrient access, and RNA-based or pheromone-based insecticides
- FMC's \$191 million acquisition of BioPhero (pheromone-based pesticide producer) in 2022 demonstrates interest from traditional agrichemical players and acknowledges these innovations as the future of sustainable food systems
- Green ammonia has also gained some attention but today its production is uneconomic without subsidies such as those provided by the Inflation Reduction Act (IRA); however, it may become cheaper as the costs for wind and solar continue to drop and production technologies improve

Weaknesses and opportunities presented by the turn in market cycle

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Susceptibility to wider market forces, particularly in the VC space

The decline in valuations is demonstrated by the **64% decline** in the FFF FoodTech index from its inception on 17 December 2021 to 30 June 2023

A lot of press over recent years has focused on venture investments and/or listings of innovative agtech and foodtech companies, particularly downstream businesses such as e-grocery, delivery, and alt-proteins.

- Amongst the broader tech market, agtech and foodtech sectors saw rising valuations in 2021 and record-breaking funding of over \$50 billion
- Both valuations and funding in took a material hit in 2022 as markets corrected
- Cyclical consumer-focused companies and early-stage tech companies were most exposed to the effects of increasing interest rates and decreasing consumer incomes in real terms amongst a high inflation backdrop
- These structural issues are likely to persist with forward curves suggesting a higher interest rate environment well into 2024

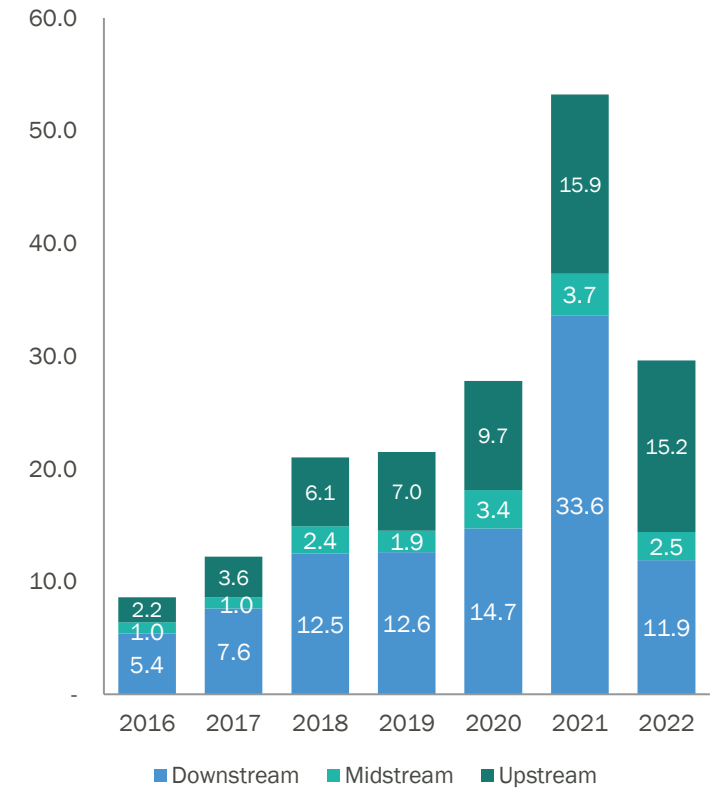


However, volatility presents opportunity for some

The market correction in earlier stage, downstream and tech-focused companies does present some opportunities:

- Consolidation and vertical integration to own larger parts of the market
- Improved supply-demand dynamic for VC investors with more companies chasing dollars than the other way around (enabling better investment selection and more thorough DD processes)
- Opportunity for providers of creative financing solutions such as venture / ARR lending and bridge financings; this opportunity set may particularly be amplified as businesses seek to avoid down rounds and banks retrench from the space (with a gap left in the market by the SVB fallout)

Agtech and foodtech investments by value chain position (\$ billion)



Capital shifting into upstream technologies and businesses

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Downstream becomes 'out of fashion'

Downstream consumer and early-stage tech companies suffered the most in the change of market

Downstream investment activity saw a drop of 65% from 2021 to 2022, compared to 32% in the midstream and 4% in the upstream

In particular, there has been an increasing hesitation to plant-based and alt-proteins (especially cell-cultivated meat). The main reasons cited by investors being:



Valuations too high



Difficulty to differentiate amongst a highly crowded branded market



High technology risk



Cyclical nature of end-market



Capex requirement to reach scale



Nascent market and regulatory framework

Instead, GPs and LPs have noted that there are more attractive opportunities midstream and upstream, and particularly the auxiliary technologies with applications focused on this part of the value chain.

There are ways to play investments into innovative foodtech further upstream (for example scalable 3D printing technologies), but these are still exposed to the above headwinds facing their buyer companies and downstream endmarkets.

Hence, in 2022 we saw agricultural-focused businesses and technologies win over foodtech. In addition to farm management software, robotics, and biotechnology. Other sectors of interest include:



Agrifinance, agricultural marketplaces



Bioenergy and biomaterials



Carbon measurement, reporting and verification, facilitators, and integration to the carbon market

Source: AgFunder, Future Food Finance

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Case studies



Proterra Sustainable Agriculture

Case study

Investment Strategy



- Look for demand-led projects to help transform the agricultural supply chain for sustainable food production
- Representative themes include: cage-free eggs, free range dairy, sustainable beef, agricultural fibre packaging, sustainable coffee, sustainable greenhouse greens
- Longstanding Cargill relationship with food companies (Proterra’s funds spun out of a subsidiary of Cargill) as a sourcing differentiator
- Provides project finance equity where the operator remains in charge and ownership ultimately reverts

“ Combined with consumer demand, there is a constantly evolving corporate food companies mandate to offer better, healthier and sustainable products ”

Key summary

GP	Proterra Investment Partners
Latest fund (vintage)	Proterra Sustainable Agriculture Fund (2019)
Size of latest fund	USD 303 million
Target sectors	Sustainable upstream producers
Geographic focus	US
Investment strategy	Project equity investments secured by offtake agreements
Background	Initially launched as a standalone investment advisor for Black River Asset Management’s PE funds, before the funds spun out. Black River is a subsidiary of Cargill, Inc.

Case study

Northwest Farms’ and Proterra’s acquisition of Willamette Eggs

Cage-free egg production in the Pacific Northwest

- Northwest Farms is a newly formed company
- Northwest Farms includes several egg farming families who also are owners in Versova Management, which has assumed day to day management of the farms
- The farms include three egg-laying sites housing more than 3 million hens in production and two feed mills
- Market underpinned by state laws such as those in in Oregon and Washington requiring all egg production to be produced by cage-free layers by January 2024
- To support the capital needed to build new cage-free facilities, Proterra worked with key food companies to establish long-term profitable supply contracts

Source: AgrilInvestor, AgNewsWire, Preqin

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Cibus Capital

Case study

Investment Strategy



- Investing through two strategies:
 - the Cibus strategy focused on providing buyout and growth equity for mid-market companies; and
 - the Cibus Enterprise strategy focused on late-stage venture in disruptive agtech and foodtech solutions
- Diversified sector focus, but significant exposure to businesses in upstream and midstream positions of the value chain including natural capital (e.g. precision pollination) or robotics and automation (e.g. automated picking and planting)
- Do not intend to invest in businesses seeking returns from farmland appreciation on a broad scale

“The Cibus Funds channel capital towards companies that are charting the future of food using innovative technology to disrupt food production, increase resource efficiency and ensure sustainability”

Case study

M2i

Pheromones for biological crop protection

- Cibus led the 2019 €60 million funding round into M2i
- Designs, formulates and produces complex molecules destined to crop biocontrol and pharmaceutical applications (animal and human health)
- European leader in the production of synthetic pheromones for the biological protection of crops against major pests
- Looks to effectively, sustainably and economically replaces chemical pesticides in agriculture
- Present in 56 countries with 50 crops treated

Investors



Key summary

GP	Cibus Capital
Latest fund (vintage)	Cibus Fund II and Cibus Enterprise II (Raising)
Size of latest fund	USD 600 million for Cibus Fund II (target); USD 200 million for Cibus Enterprise II (target)
Target sectors	<ul style="list-style-type: none"> Natural capital; Permanent row crops; Robotics and automation; Crop and soil health; Alternative proteins and disruptive nutrition; Health and wellness; Aquaculture
Geographic focus	Western Europe. Australia, New Zealand
Investment strategy	Two strategies across private equity and venture
Background	Launched under the ADM Capital umbrella in 2016. In 2022, the advisor to Cibus Funds rebranded to from ADM Capital Europe LLP to Cibus Capital LLP

Source: Preqin, Cibus Fund, M2i

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Anterra Capital

Case study

Investment Strategy



- Focus on ag biotech and digital solutions as the two key technologies to transform the food and agricultural sector
- Within these sectors they look at themes including agfintech, B2B marketplaces, track-and-trace, crop science, animal health, human nutrition and consumer tech
- Require a clear technology, a clear impact mandate, and/or a digitalization to transform the sector
- Primarily see entrepreneurs concentrated in North America and Western Europe, but opportunity to apply technology globally
- Sectors they do not see as appealing include plant-based (crowded and lack of core technology) and cultivated (capital intensity, technology risk)

“We’re operating in an environment where deal flow volume has increased slightly but where quality has increased exponentially”

Case study

ProducePay

California-based financing, analytics, and marketplace startup focused on the global fresh produce market

- Anterra invested in ProducePay’s Series C equity funding round, which raised a total of USD 43 million
- Objective to help growers gain more access to capital
- Provides financing at every stage of the harvest cycle - ProducePay has financed over USD 3 billion of fresh produce
- Market pricing data and analytics with access to real-time produce pricing data and analytics
- Produce grower, distributor, and supplier marketplace with more than 700 vetted growers and distributors

Investors

Rabo Investments 

Tattarang  novo holdings

8[∞] EIGHT ROADS™

Key summary

GP	Anterra Capital
Latest fund (vintage)	Anterra Capital Fund II (2021)
Size of latest fund	USD 260 million
Target sectors	<ul style="list-style-type: none"> • Ag biotech; • Digital solutions; • Climate-friendly farming and natural asset management
Geographic focus	Globally with a preference for companies based in or with expansion plans in Europe and US
Investment strategy	Venture: focus on Series A-C investments but also able to incubate firms
Background	Spin-out from Rabobank

Source: Future Food Finance, Anterra Capital, ProducePay, Preqin

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Select LP feedback (1/2)

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European institutional investor with >€10 billion AUM

How they are approaching the space:

Upstream focus: see this as the most interesting part of the value chain to play, preferring B2B or B2F (business to farmer) opportunities

Downstream sectors including e-grocery and fast food delivery systems are seen as **unfavourable**

Diversification: want to see funds have a diversified spread of exposure rather than just one sub or two sub-sectors

Geographical concentration: most activity observed in North America, although noting Europe is catching up

Seeking exposure to businesses with **high barriers to entry** such as **proprietary technology**

Two additional key considerations for business models are **capital intensity (preference for low-capex)** and **scalability**

European institutional investor with >€500 billion AUM

How they are approaching the space:

Diversification across the value chain: see potential to unlock value and impact through **vertical integration**

Buyouts most attractive: better risk profile to growth and venture

'Hard' return threshold: exclude some buyout strategies with lower target returns but a real assets component (albeit recognise there may be attractive risk-adjusted returns)

Co-invest focus: mid-market funds may be more attractive as they noted co-invest is less common in the largest food and ag funds

US preference: global mandate but note the US is ahead in terms of achieving specialization at scale. Many in European strategies are smaller and more localised

Tricky sectors including **alternative proteins and dairy (crowded market)**, and **cell cultivated meat (overvaluations)**

Otherwise noted a the **lack of established track records** being a key hurdle for managers in the space

Select LP feedback (2/2)

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US institutional investor with >\$1 billion AUM

How they are approaching the space:

Target position in the value chain: looking for vertically integrated agribusiness strategies with real assets exposure including an equity kicker

Sustainability agenda: not investing into carbon intensive sectors and seeking investments with a sustainability angle (albeit retaining flexibility in approach)

J curve is a key consideration, particularly for land-based strategies

'Hard' return threshold: looking for mid-teen net returns to compensate for illiquidity risk and lock-up period

US market most mature but comes with difficulties including high land/entry prices diluting risk-adjusted returns and a small number of large corporates able to dominate the Agtech market

End-market experience: key differentiator for GPs is ability to get products to market, particularly in the US given the highly consolidated retailer landscape

US institutional investor with >\$4 billion AUM

How they are approaching the space:

Market development: market is nascent with limited exits and returned capital from specialist strategies (particularly within Agtech)

Sustainability agenda: require a specific approach to impact, for example beyond broad water savings on farms

Return target: seeking higher returns than traditional agriculture strategies; see the returns as more exciting in vertically integrated agribusiness

Regenerative agriculture: early signs of demand from underlying clients but the practical investment opportunity remains unclear



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