

May 2024

Fertile ground

Investing to grow more food, sustainably



Agriculture's challenge: Feeding more people, sustainably

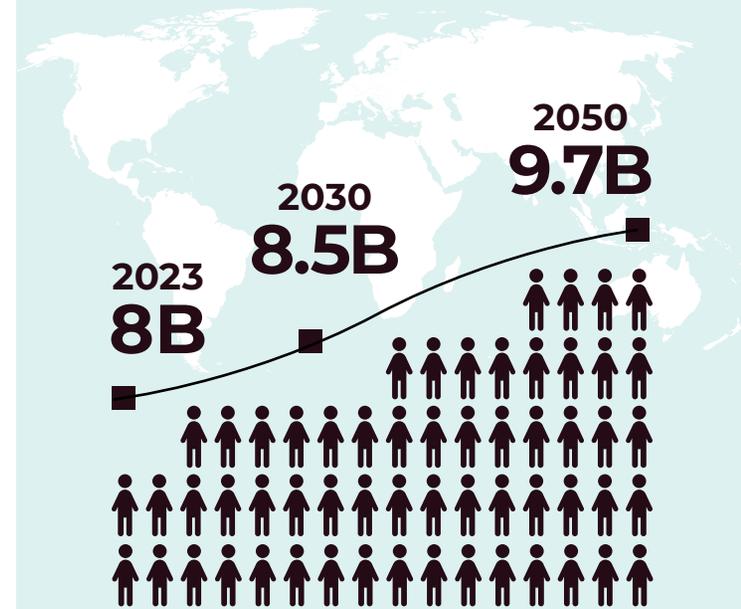
Agriculture—one of the oldest forms of human economic activity—continues to play a critical role in our increasingly urbanized world. It accounts for about 4% of global gross domestic product, the World Bank says, and an even bigger share in some economies. Agricultural transformation—advances in farming practices and yields—is a critical step to economic development and wider prosperity for many countries.

As a rapidly changing climate tests farmers across the globe, they're being called upon to feed more people with fewer resources. In less than 30 years, the global population is expected to increase by almost 2 billion. Meanwhile, the amount of land available to expand agriculture has peaked, according to an analysis of three global land studies from Our World in Data.

Meeting this challenge will require the effort of many, from farmers and food processors to governments and consumers. Investors can play a significant role, by deploying capital at scale to support sustainability, efficiency, and innovation in the sector.

In this report, we highlight targeted investments to support agriculture, along with profiles of some of the investments Ontario Teachers' has made in the space. But first, here's a look at how investment in agriculture is increasing as the sector faces four big headwinds.

The world's population is set to increase



Source: United Nations



Farmland: The (oldest) new asset class

Institutional investors are deploying more capital in key farming regions from Australia to the Americas to Europe. In the U.S. alone, the number of farm properties owned by large institutional investors has more than tripled in 15 years, according to an index that tracks farmland investment.

Agricultural assets offer diversification and inflation protection. Food-product sales provide regular returns, and food prices tend to increase in an inflationary environment. Farmland also holds the potential of significant long-term capital appreciation. It's a finite resource, and efforts to preserve biodiversity and limit deforestation will make it scarcer. While government restrictions on foreign or institutional ownership of farmland pose an issue in some markets, global agriculture is an increasingly attractive investment.

Investors see opportunity to improve returns and create value through large-scale investment. A broad agriculture portfolio increases opportunities for developing managerial expertise, expanding market access, and testing new practices and technologies. A diversified portfolio also helps spread risk, which is important given the agriculture sector's current challenges. In the next section, we highlight four.

10%

**Compound annual
growth of global
farmland values over
20 years**

*Based on average value of crop or arable land in US\$ per hectare in 15 countries

Source: Savills



Agriculture is evolving to adapt to 4 big challenges

1. Climate change

Droughts, wildfires, flooding, and other extreme weather events are increasing as the climate changes. These events are set to occur with greater magnitude and more frequency, the United Nations' Intergovernmental Panel on Climate Change predicts. Extreme weather is a major threat in the form of lost crops and livestock.

Farmers are adopting measures to help mitigate the impact of extreme weather. They include introducing more climate-resilient crops and relying on precision farming tools to determine when to irrigate plants.

2. Sustainability pressures

Farmers are under enormous pressure to reduce their environmental impact. Agricultural production contributes 11% of global greenhouse gas emissions, according to the Center for Climate and Energy Solutions. Agriculture also places high demands on freshwater resources and is a major cause of biodiversity loss.

To improve their sustainability, farmers are turning to regenerative farming practices such as cover cropping, which reduces soil erosion and nutrient runoff while boosting soil moisture. Some are participating in carbon credit markets—essentially programs that pay them to sequester more carbon in the soil.



US\$123B a year

Value of crops and livestock lost to extreme events over past 3 decades

Source: Food and Agriculture Organization of the United Nations

3. Labour challenges

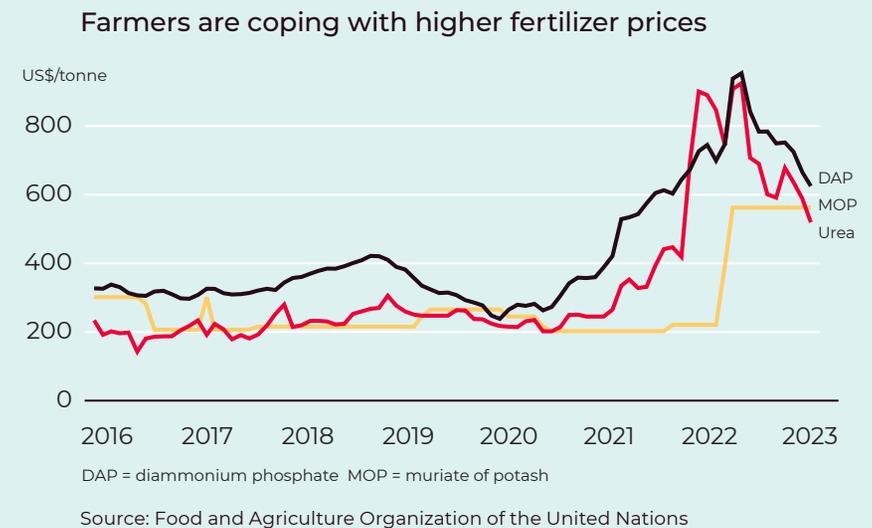
Labour challenges are prevalent across agriculture, as the sector grapples with a shrinking workforce, managing temporary (often migrant) workers, and a requirement to develop new skills essential to modern farming. What's more, many farmers are aging. In Canada and the U.S., the average age of a farm operator is over 55; in Japan it's a decade older.

The sector is turning to automation and other technologies to fill labour gaps. It also continues to invest in skills development to expand the capabilities of workers.

4. Economic constraints

Farmers occupy part of a vast food value chain that includes agricultural input suppliers, commodity traders, food processors, and food retailers. They're sometimes described as price-takers due to their relative lack of control over their own costs and the price that agricultural commodities fetch. In recent years, due to the pandemic and geopolitical conflict, farmers have been hit hard by supply-chain constraints and rising costs for inputs like fertilizer and diesel fuel.

Some farmers are turning to alternative soil nutrients or investing in more energy-efficient machinery. But lowering usage of fertilizer or fuel is often not an option.



A conversation with AustOn's Tim Lee

Tim is CEO of AustOn, an investment platform established in 2018 to manage Ontario Teachers' Australian agriculture assets. AustOn manages farm assets across Australia producing almonds, avocados, apples, and stone fruit, as well as potatoes and onions.

An experienced agribusiness professional, Tim shared insights on the challenges facing the sector and the benefits of large-scale investment in farming.

Institutional investment in farmland is increasing. Why do you think that is?

It's twofold: a need for diversification and inflation hedging. Some people forget that agriculture was the first asset class. It's what enabled people to stop roaming and gather in cities. Today, big investors view agribusiness as a unique sector with its own attractive characteristics. What's more, farmland is a really strong hedge against inflation. The value of farmland has increased consistently over time as the price of the food grown on the land has tended to rise with inflation.

What is the opportunity for large investors?

If you've got a small farm there can be a substantial amount of volatility. If you've got scale, you've got opportunities to diversify your crop, your location, and more. That helps spread risk. In Australia, there are opportunities across a range of sectors. AustOn's focus is currently on horticulture, which has been underinvested by institutional investors. In apples, we're one of the first to take what has been a very fragmented market with lots of small orchards, with lots of aging farmers, and create one large, consolidated business.

What are the biggest challenges to investing in agriculture?

The obvious one is weather risk. Most farms in Australia are owned by families and if you've inherited the family farm, you didn't get to choose your location. Institutional investors have more choice in what and where they farm. And they tend to have stronger balance sheets, meaning they can better manage their exposure to extreme weather by investing in things like irrigation, netting, and rain covers.

Another challenge is people. When a crop is ready, it needs to be picked right away and you need to hire a lot of people. Finding and retaining harvesting labour is not easy. As a bigger farm owner, you can offer more work over longer periods and often be more attractive to people looking for work. In regional areas where all our farms are, it's not always easy to get the right talent.

What about inflation and the cost of inputs?

Yes—diesel, fertilizer, electricity and even transport are all trending upwards, so we need to be smarter about what we're doing, and how we're doing it.

Are you using technology to address some of these challenges?

In our apple operations, we're deploying picking platforms. They have an important safety advantage because they lower the chances of our workers getting hurt when climbing up and down ladders while carrying heavy bags of fruit. We're designing and building our new orchards as a single wall of trees in readiness for when robotic picking technology becomes commercial. We use drones to evaluate crops and to safely keep birds away from our fruit trees at peak season. We use soil moisture probes that help us use just the right amount of irrigation water, and we use soil and leaf sampling to help us apply just the right amount and type of fertilizer. Data plays a key role in our decision-making.

Talk about the pressure on farmers to improve sustainability.

Being sustainable makes good commercial sense. If you're eroding or depreciating your major assets which include your land and trees, it's going to cost you in the long term. For the most part, farmers have always had an eye on sustainability as they've tended to pass the farm down through generations.

At AustOn, we've started measuring our carbon footprint. There's pressure to reduce emissions but it's going to be tough in agriculture. We use diesel in our tractors and electricity to pump irrigation water and run our large fridges where we store apples for nearly 12 months a year. We apply a lot of fertilizer too. The common nitrogen-based fertilizers used on lawns also help make orchards more productive. And it just so happens that the production and use of these fertilizers contributes to greenhouse gases. However, we need to continue to use fertilizer so that we can grow enough food for the growing global population. These are industry-level problems that need industry-level solutions.

At our orchard level, we need to look at smarter ways of measuring how much fertilizer we need to apply, and when is best to apply it, and also things like different types of fertilizer which might be less impactful from a GHG perspective. We need to look at solar and different sources of electricity.

Talk about AustOn specifically.

We farm about 2,500 hectares of almonds and 600 hectares of avocados, which each produce about 9,000 tonnes annually. We have 500 hectares of apples, stone fruit, and cherries, producing 20,000 tonnes. We employ 160 people on a permanent basis and about the same number of seasonal workers. Most of the almond crop is exported. The other products are largely consumed domestically although we did export around 20% of our avocado crop this year because new markets opened up to Australia after free trade agreements were signed. Our potato and onion business has 36,000 hectares of irrigated farmland it uses in rotation and grows 150,000 tonnes annually.

What is the benefit of managing different types of farms under the AustOn umbrella?

Part of our role is to enable cross-collaboration, which is an advantage of being owned by an institutional investor. If there's new technology or chemical or fertilizer which will help us with our carbon footprint, we can spread the adoption of these across the group.

Our structure provides the on-ground people resourcing in Australia that would be difficult to do from Toronto. We provide oversight, governance, and reporting. However, we still need smart people, based locally, to manage the farms day-to-day.



Four ways in which investment can support agriculture

Ensuring the world produces enough healthy food—in a sustainable manner—will require changes in how we grow and harvest, transport, process and consume food. Success will require efforts from government, industry, and people. Investors can play a part by making targeted investments to support sustainable food production. Here, we highlight four strategies: investing in innovation, investing in regenerative agriculture, investing in healthy foods, and investing in people.

1. Investing in agricultural innovation

Agriculture has a long history of innovation that enabled the growth of cities and freed up people to pursue other occupations. In the past century, developments including the light gas-powered tractor, synthetic fertilizer, and drip irrigation have driven remarkable efficiencies in farming. Now, new technologies deliver data directly to farmers' mobile devices, enhancing their real-time decision-making. Agricultural inputs are being derived from living organisms to protect or strengthen crops in a more sustainable manner. Due to innovations like these, the agritech and foodtech markets are booming, and despite a dip from 2021, investment in startups in these areas totaled almost US\$30 billion in 2022, according to AgFunder.

Continuous investment in agricultural innovation will be critical if we are to feed a growing global population while safeguarding more of the world's finite resources.

CASE STUDY

Cran Chile: Thriving on a history of innovation

 **Location:**
Valdivia, Chile

 **Under cultivation:**
700 hectares of
cranberries

 **Annual production:**
~530,000 barrels
(~25,000 tonnes)

Cranberries are native to North America, and the U.S. and Canada dominate global production. But the world's single largest cranberry grower is almost 10,000 kilometers south of key North American production regions in the Patagonia Lake District of south-central Chile. The story of how Cran Chile became a cranberry-growing giant is one of innovation, starting with outside-the-box thinking to help meet a global cranberry shortage.

Three decades ago, Cran Chile's founders believed the cranberry, a fruit rich in nutrients and antioxidants, could grow in Chile with adaptation to local conditions. While cranberries are traditionally grown in relatively small, irregular shaped bogs,



Cran Chile pioneered their production in large rectangular fields. It also engineered the local soil and ground conditions to mimic the sandy deposits in which the low-lying vines naturally thrive.

Cran Chile also designed and built machinery-equipped mobile bridges that span its fields, enabling it to prune, fertilize, and harvest its cranberry crop while minimizing physical labour and direct stepping on the vines.

Under Ontario Teachers' ownership since 2021, Cran Chile and its team of agronomists continue to prioritize new ideas, including diversification into raspberries. In recent years the company has deployed technology, including sensors, to measure environmental variables and soil and vine conditions. Learning from more data—including by using artificial intelligence—will enable it to cut water usage and energy costs, thereby improving its sustainability.

About a decade ago, Cran Chile joined Ocean Spray, a cooperative collectively owned by about 700 cranberry growers in several countries. The partnership positioned Cran Chile as the Ocean Spray's largest single grower-owner. It also gives Cran Chile access to innovations across the cooperative, including university-led research.

“

A few years ago, we formalized the R&D function in order to give more follow-up to our innovation efforts. There are always 20 to 30 projects on the go. Some of them are small ones, but some of them are really meaningful to the future of the company. ”

Fernando Casari, CEO of Cran Chile



2. Investing in regenerative agriculture

Regenerative agriculture is the umbrella term for a set of principles centered on farming in harmony with nature. It aims to reduce farming's impact on the environment, and to bolster a farm's resilience to changing environmental conditions, such as extreme weather.

Conventional agriculture relies heavily on outside inputs (fertilizer, pesticides and so on) and lots of horsepower. While this has produced a bounty of food, it's hard on soil and exacerbates erosion and loss of biodiversity. Regenerative agriculture leans on practices such as cover cropping and less tillage to improve soil health. Healthier soils absorb more water and carbon and are more productive even as they are more resilient to erosion and drought.

Regenerative agriculture is still in its infancy, but adoption is increasing. Governments are providing financial support—the U.S. government alone has earmarked more than US\$20 billion in what it terms “climate-smart” agriculture. Global food companies are also investing billions; many see deploying regenerative agriculture in their supply chains as a way to advance their sustainability efforts.

CASE STUDY

Vayda: De-risking the transition to regenerative agriculture

 Location: Mississippi Delta, U.S.	 Under cultivation: Corn, soybeans and rice	 Annual production: Corn 135,000 bushels, soybeans 92,000 bushels, rice 6,700 bushels
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If regenerative agriculture holds the potential to transform farming for the better, why isn't it practiced more widely? The explanation lies in the risky nature of farming. Simply put, farming entails committing a significant part of your expected revenue on inputs and equipment at the start of the season but having limited control over your output and even less control over the price your products fetch. In this context, relying on tried-and-true methods to minimize risk is the logical approach. Overhauling core farm-management practices can be too risky a business move—even if there's a need for change as extreme weather events multiply and sustainability pressures increase.

In one study, farmers who implemented 3 practices (no-till, cover crops, diversified crop rotations) could

boost profit by 11%
and
**reduce cost/
hectare by 37%**

vs conventional practices

Source: World Economic Forum



Vayda hopes to address this challenge by de-risking the transition to a more sustainable way of farming. The regenerative farming startup was launched in 2020 with the help of Ontario Teachers' venture studio, Koru, and the general partners of another portfolio company, Goldcrest. Vayda is working to build and commercialize the technical and agronomic knowledge that will help farmers adopt more sustainable practices while improving production and profitability.

Central to its efforts is the farming of a 2,800-acre multi-crop farm in the Mississippi Delta region of the U.S., followed by a second 2,600-acre rice farm entering production in 2024. Vayda leases agricultural assets from institutional landowners and is working to make them more profitable by testing regenerative agriculture approaches and applying precision agriculture technology. By demonstrating to farmers that they can reduce inputs starting in year one while still achieving the same or higher yields, Vayda is working to drive wider adoption of regenerative agriculture.

Vayda has begun sharing its findings with other local growers in the Mississippi Delta via a pilot project that aims to encompass up to 250,000 acres by the end of 2024. It is also commercializing that know-how in the form of regenerative agriculture transition that are customized to a particular farm and market conditions.

“

By doing the right thing at the farm level to drive profitability and to increase the financial and physical resilience of the farm, you're also doing something that's great for society and the environment. ”

Mike Shoemaker, CEO, Vayda



3. Investing in healthy foods

In survey after survey, consumers say they try to eat healthy foods and limit sugar and processed foods. Many follow plant-centered diets. Food and beverage makers and restaurant chains have responded with a plethora of healthy eating options.

Eating healthy is a key goal for millions. For others, it's a luxury. While the world had made progress in reducing hunger since 1990, the Food and Agriculture Organization of the United Nations says more than 700 million people face food insecurity, or lack of access to safe and nutritious food. And even in places where food security is less of a problem, the cost of healthier food options is a concern.

For big investors, helping to meeting rising consumer demand for healthy food is a way to make a positive social contribution as they generate returns.

CASE STUDY

Aggraria: Expanding production of a Mediterranean staple

 **Location:**
Portugal

 **Under cultivation:**
~3,000 hectares of olive orchards leased and operated (+~3,000 hectares operated on behalf of 3rd parties)

 **Annual production:**
3.5 million kg of extra virgin olive oil from own orchards

Nutritional experts recommend the Mediterranean diet—rich in fruits and vegetables, whole grains, and legumes—for its health benefits. As its main source of fat, olive oil occupies a central role in the Mediterranean diet. In addition to being versatile and full of flavour, olive oil contains antioxidants that can help reduce inflammation and protect against heart disease and cancer. Despite these benefits, olive oil ranks 9th among the most consumed vegetable oils globally.

Of the global population

10% are hungry

25% are overweight/
obese

25% are micronutrient
deficient

Source: United Nations Environment Programme



Producers are poised to benefit from growing global awareness of olive oil's health benefits and cooking attributes. One such producer is Aggraria, an olive tree plantation operator in the Iberian Peninsula in which Ontario Teachers' acquired a majority stake in 2022.

Aggraria's farms lie in Portugal's Alqueva region—traditionally considered a good place to grow olive trees due to its hot, dry summers and mild wet winters. The benefits of that location grew after the nearby Alqueva dam was built two decades ago, creating Europe's largest agricultural reservoir. Because all of Aggraria's farms are connected to the Alqueva irrigation system, they are well positioned to weather one of the biggest challenges facing the olive industry, which is the risk of severe drought linked to climate change. The Alqueva system has the storage capacity to withstand at least three successive years of drought.

“

Even though olive oil is seen as one of the most beneficial oils for our health, it is still one of the least consumed oils globally. We are excited by the tailwinds supporting extra virgin olive oil and aim to continue expanding our investment in this sector. ”

David Hutchinson, Aggraria board member and Managing Director, Value Creation and Analytics, Infrastructure and Natural Resources, Ontario Teachers' Pension Plan



4. Investing in the people that make agriculture work

The developed world's agricultural labour challenges have many causes. They include increasing urbanization and an aging population, including a large cohort of farm operators on the cusp of retirement. There are also high barriers to entering into agriculture, notably steep costs for land and capital equipment. While productivity improvements and innovation have enabled fewer people to produce more food than before, there is a chronic shortfall of agricultural labour across many countries. Another challenge lies in training the agriculture workforce to work with the new technologies—and reams of data—on which farming increasingly depends.

Ensuring that all countries have a stable agricultural labour force is a complex issue. Investors can play a role by working to build and retain talent in the sector. They also have the responsibility to ensure that the workers who perform the physical labour of harvesting enjoy safe working conditions.

CASE STUDY

FirstFruits: Placing employee stability at the core of farming



Apples are big business in Washington State. Almost two-thirds of the apples produced in the U.S. come from there, and the sector generates US\$7.5 billion for the state economy, according to the Washington State Tree Fruit Association. And one of the biggest producers in the state is FirstFruits Farms LLC, a 40-year-old vertically integrated grower of apples and cherries that Ontario Teachers' acquired in 2019. FirstFruits operates three locations, including the Prescott Orchard, which at 4,600 contiguous acres is one of the largest orchards in the U.S.

>100M people

Decline in global employment in agriculture since 2000

Source: Food and Agriculture Organization of the United Nations



Harvesting fruit is a labour-intensive business. And in addition to growing and picking 11 apple and 6 cherry varieties (organic and conventionally grown), FirstFruits handles storage, packing, and sales and marketing for its production. Attracting and retaining staff is a key issue for such a big operation, which employs more than 2,500 workers at peak season and about 1,000 full-time employees the rest of the year. That's a challenge that FirstFruits started taking seriously decades ago.

To promote retention and wellbeing, the company started an onsite daycare in its early years, then realized some of its workers had trouble accessing stable housing in the area. That prompted the company to build a community to help those workers. Today, FirstFruits offers permanent and affordable housing for 134 families in addition to temporary accommodation for seasonal workers. In addition to housing and childcare, the company offers educational supports, including language classes for employees and university scholarships and farm internships for children of employees.

“

This is a community. When employees take pride in living in a place like this, it shows in everything they do. ”

Eva Madrigal, Housing Manager,
FirstFruits Community LLC



This is a critical time for the agriculture sector

Climate change threatens not only crops and livestock but also established farming methods. Many farm operators are aging out of the sector. And food producers are under pressure to demonstrate they are using critical resources like water wisely. Yet the world continues to need more and better food. New technologies and farming approaches hold promise to help the sector address these concerns, but the challenge is significant. And meeting it will require the attention and participation of a host of stakeholders, from governments and food companies to consumers. In the report, we've highlighted the role investors can play in supporting agriculture's evolution.

At Ontario Teachers' Pension Plan, investing in agriculture is just one of the ways in which we are deploying our capital to make a lasting, real-world impact as we create value for our members.

“

Ontario Teachers' has built a robust and diversified portfolio of about 130,000 acres of farmland around the world, with a focus on assets that are more likely to be resilient in a changing climate. These assets offer strong inflation protection and therefore will help us pay pensions over the long term. We're working to improve the sustainability and returns associated with this growing portfolio. ”

Christopher Metrakos, Senior Managing Director, Natural Resources,
Ontario Teachers' Pension Plan



A snapshot of Ontario Teachers' food portfolio

Our food portfolio is managed by Ontario Teachers' [Natural Resources team](#).



FirstFruits Farms

U.S.



Goldcrest Farm Trust

U.S.



Vayda

U.S.



Atlantic Aqua Farms

Canada



Agrícola Cran Chile

Chile



Agrícola Fresno

Chile



Aroona Farms

Australia



Jasper Farms

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