Investing in US organic grain production

SLM Partners

White Paper

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Executive Summary

Investment returns from annual row cropland in the US are stalling, because of a sharp fall in the price of commodity crops since 2013. Investors will need to look for more active, value-add strategies to deliver attractive returns in the future. Organic grain production offers one such opportunity.

Organic food is a fast-growing, high-value market segment driven by consumer demand for healthy and nutritious food, produced in an environmentally sustainable way. Organic food sales in the US are growing at 9% per year and reached $45 billion in 2017. Mass-market retailers and large food companies are responding by launching or acquiring organic brands and businesses.

Organic row crops – such as corn, soy and wheat – are required to produce almost half the organic food sold in the US (by value). However, US farm production is not keeping pace with demand. Although organic food sales are now more than 5% of total sales, organic cropland has remained at less than 1% of total US cropland. The deficit in organic grains has led to a heavy reliance on imports, especially for feed grains. For 2018/19, the US is expected to import 75% of its organic soybeans and 29% of its organic corn. There are concerns about the reliability of these foreign supply chains. At the same time, other countries are competing for these supplies – the global organic food market has grown by 11% per annum since 2002.

There are substantial premiums for organic row crops over conventional. Over the last 10 years, premiums have averaged 2x (100% higher) for organic corn and soybeans, and 1.8x-2x for organic wheat depending on quality. Multiple published studies show that organic row crop farms are more profitable than conventional operations. SLM Partners' proprietary research in the Eastern Cornbelt and Northeast regions indicates that organic farms can deliver an income yield (before land costs) of >9% after the 3-year organic transition period.

The contrast between organic and conventional profitability has rarely been starker. Yet, there are 5 barriers holding US farmers back from transitioning: income loss during transition, secure access to land, access to credit, access to markets, and a lack of knowledge and skills. This creates an opportunity for investors to partner with farmers to scale up organic production. The size of the opportunity is large – we estimate an additional 2.2 million acres of organic cropland will be required to satisfy US demand in 2023.

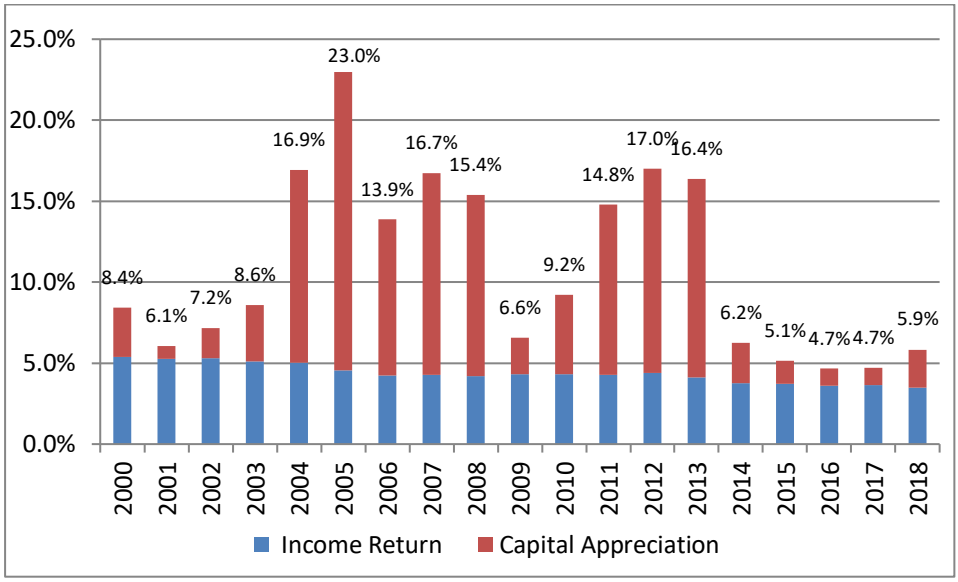
Returns from conventional agriculture are stalling

Investors are attracted to farmland as an asset class because it provides current income, downside protection, portfolio diversification and a natural hedge against inflation. US farmland also boasts impressive historical performance data relative to other asset classes. The NCREIF Farmland Index, which represents a portfolio of farmland owned by institutional investors in the USA, delivered an annualized return of 11.5% per annum between 1991 and 2017. The Index outperformed stocks and bonds, with lower volatility.[1]

The NCREIF Farmland Index is composed of two types of farmland: Permanent Cropland and Annual Cropland. Permanent Cropland refers to the production of nuts and fruit on trees and bushes. It can deliver higher returns but at higher risk, as much of the value is in the trees, bushes or vines, and once these crops are planted it is difficult to change production in response to market demand. Annual Cropland refers to the production of grains, oilseeds, vegetables, forages and other row crops. Investment returns are lower but risks are typically also lower, as it easier to shift production across crop types from year to year in response to market signals. And almost all the value is in the land itself, rather than in trees, bushes or vines.

Although Permanent Cropland has continued to deliver attractive returns for investors, the performance of Annual Cropland has stalled over the last few years. After averaging 15% per year between 2004 and 2013, annual returns of the NCREIF Annual Cropland Index fell to 6.2% in 2014, 5.1% in 2015, and 4.7% in both 2016 and 2017, before picking up slightly to 5.9% in 2018. Income returns were low, averaging 3.6% between 2015 and 2018, but capital appreciation was even lower, averaging 1.5% over the last 4 years, which represents a fall in value in real terms (i.e. after inflation). These are farm-level returns, before the deduction of investment or asset management fees, so the net return to investors will have been lower still. [2]

NCREIF Annual Cropland Index – annual returns

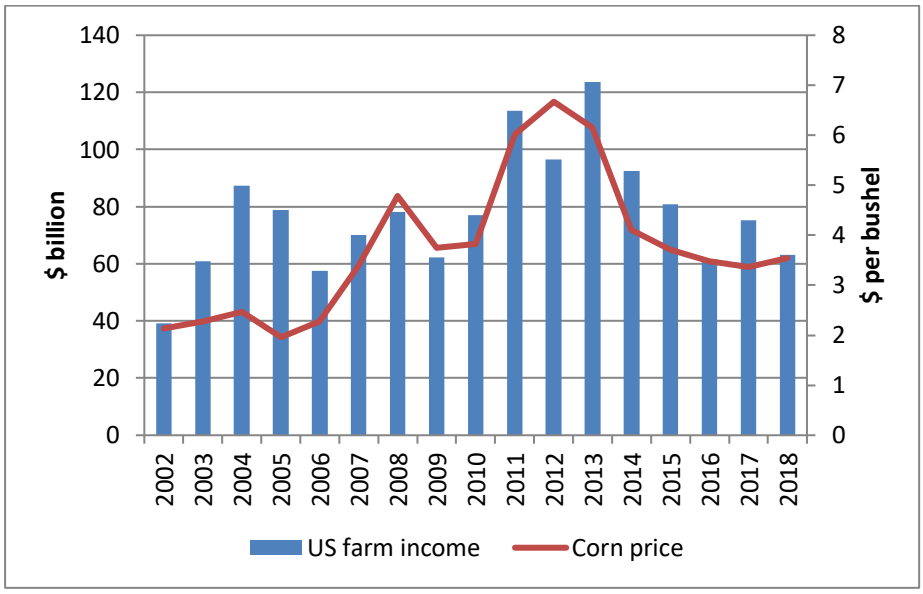


Source: NCREIF Farmland Index

[1] NCREIF Farmland Index
[2] NCREIF Farmland Index – Annual Cropland

The reason for this stalling performance is a dramatic fall in commodity prices, especially for the row crops that form the bedrock of the US farm economy – corn, soybeans and wheat. For example, conventional corn, which traded at more than $8 per bushel in 2012, was worth around $3.60 per bushel by April 2019 on the Chicago futures market.[3] Because of falling commodity prices, US net farm income halved from $124 billion in 2013 to $63.1 billion in 2018.[4]

US farm income and corn prices

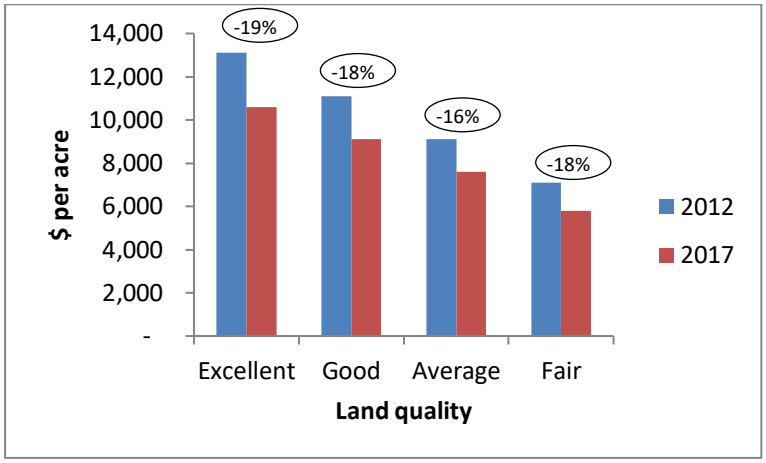


Source: USDA ERS

US row crop farmers are struggling to make money. Cash rents are coming down, but at a slower rate than commodity prices, which increases the pressure on farmers. And land prices are stagnating or falling, especially in regions such as the Corn Belt and the Eastern Plains that are dominated by commodity row crop production. For example, in Illinois, farmland values have dropped by 16-19% since 2012 depending on the quality of the land.[5]

[3] CBOT – CME Group
[4] USDA ERS, *US Farm Income Financial Indicators*
[5] Illinois Society of Professional Farm Managers and Rural Appraisers, *2017 Illinois Farmland Values and Lease Trends*

Decline in value of Illinois farmland by quality, 2012-2017



Source: Illinois Society of Professional Farm Managers and Rural Appraisers

A great deal of institutional money has been invested in US farmland over the last decade, mostly through passive 'buy and lease' strategies. These strategies rely on cash rents from tenant farmers to generate income, and land price appreciation to deliver capital gains. Returns were strong while farm incomes, cash rents and land prices were going up. But these conditions no longer apply. And few analysts expect a major improvement in crop prices or farm incomes any time soon. According to Rabobank, "U.S. growers will continue to face low growth, low margins, and thus low returns on invested capital, over the next five years".[6]

Achieving attractive returns from US row cropland during the next decade will require a different approach. Passive investing in land for commodity production is likely to deliver low single digit returns. Beating this will require more active strategies and a focus on higher value products. We believe that investing in organic row crop production represents one such opportunity.

Organic food is a higher value product

In 1990, Congress passed the Organic Foods Production Act, charging the USDA with creating a federal regulatory system for organic certification. The National Organic Standards were implemented in 2002. The standards are overseen by the USDA and applied throughout the country by accredited certification agencies. Organic products must be kept segregated throughout the supply chain: crop handling, storage, transport and processing facilities must maintain their own organic certification. USDA oversight ensures that the label 'Organic' has real meaning, which has led to strong consumer recognition. (This is in contrast to other food labels, such as 'natural', which are weakly differentiated.)

[6] Rabobank, *A Time to Evolve*, Nov 2017

Organic agriculture is governed by a strict set of regulations and guidelines that prohibit the use of synthetic pesticides and fertilizers, genetic engineering (GMOs), antibiotics, growth hormones, and artificial preservatives and colors, as well as require the use of farming methods that promote ecological balance and foster on-farm biodiversity. As a result, organic farmers tend to grow a more diverse range of crops, plant cover crops to nourish the soil, and use livestock manure or compost to build soil fertility. They rely on biology, not chemistry, to sustain production and to control pests and weeds. In most cases, farms must undergo a three-year transition before achieving organic certification.* During the transition, they must farm according to organic methods but they cannot sell their products as certified organic.

There is a growing body of scientific research showing genuine differences between organic and conventional food production. Organic food can provide certain health benefits:

- Organic food contains fewer pesticide residues
- Certain organic foods have higher levels of micro-nutrients
- Organic practices reduce the use of antibiotics in animals, thereby lowering the risk of antibiotic-resistant diseases
- Organic farming practices eliminate the risk to farm workers of pesticide poisoning

Organic farming can also have environmental benefits:

- Increases soil organic matter, which is a proxy for soil fertility
- Reduces nutrient run-off in waterways
- Stores more carbon in soils
- Supports higher on-farm biodiversity

The conventional food system in the US is beset by well-documented problems: soil erosion, water pollution, pesticide toxicity, high greenhouse gas emissions, reduction of biodiversity (such as pollinators), and over-use of antibiotics in animals. Organic farming, especially when it applies regenerative practices, can help the transition to a healthier and more sustainable food system.

Consumer demand drives the organic market

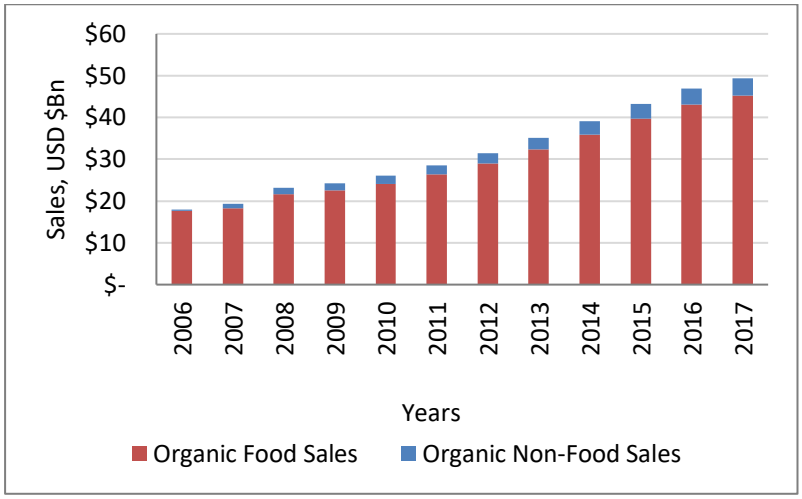
Regardless of the science on organic farming, one thing is certain: an increasing number of American consumers believe that organic food is better and worth paying more for. The organic food sector has exploded over the past decade, growing at a compound annual growth rate (CAGR) of 8.9% per year since 2006.[7] This compares with growth of the total food sector of 2.9%. Total US organic sales reached $49 billion in 2017, of which organic food sales represented $45 billion. Organic food sales now represent 5.5% of total food sales in the US.[8]

* Farmland held outside agricultural production and pasture land on which no prohibited substances have been applied for at least 3 years do not require the 36-month transition.

[7] OTA, *Organic Industry Survey 2018*

[8] OTA, *Organic Industry Survey 2018*

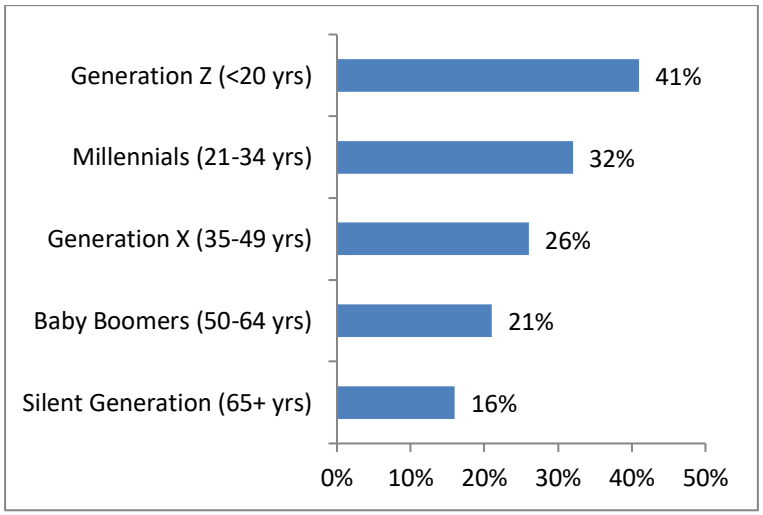
US organic sales



Source: OTA Organic Industry Survey 2018

Demand for organic food is being driven by younger people, especially the Millennial generation who make up 25% of the US population. Millennials seek out healthy, sustainable and local food, and want transparent supply chains. Millennials – and the generation behind them, Generation Z – also show a greater willingness to pay a premium for sustainable food.

Willingness to pay premium for sustainable food



Source: Nielsen Global Health and Wellness Report, Jan 2015

Millennials with young children are the most active buyers of organic food, which reflects the fact that people are more likely to buy organic when they have children. Twenty-five percent of Millennials are parents now, and this figure will increase to 80% in the next 15 years. As more members of the Millennial generation become parents, they are likely to spend an increasing proportion of their food dollars on organic products.[9]

[9] OTA, *2017 U.S. Families' Organic Attitudes and Behaviors Study*

Although Millenials are the most committed buyers, organic food is not confined to one segment of society. According to Nielsen, about 82% of US households now buy organic food.[10] Conventional grocers and mass-market stores have successfully taken organic mainstream. Mass-market retailers (such as Kroger, Costco, Target and Walmart) accounted for 55% of sales in 2016, while natural and specialty retailers (such as Whole Foods, Trader Joe's and a large number of local/regional stores) accounted for 36%. Costco is now the largest seller of organic products in the country. Its CEO said in 2016 that they "cannot get enough organics to stay in business day in and day out."[11]

The American consumer is changing and this is sending ripples through the food supply chain. Consumer Packaged Goods (CPG) companies are racing to acquire organic brands or to convert existing brands to organic ingredients.

- Amazon purchased Whole Foods, the leading natural and organic food retailer, for $13.7 billion in June 2017
- French multinational Danone acquire Whitewave Foods, the largest organic food enterprise in North America, for $12.6 billion in 2016
- Pilgrim's Pride acquired organic chicken producer GNP for $350 million in November 2016
- General Mills acquired Annie's for $820 million in 2014; it aims for $1 billion in organic and natural sales by 2019 and expects to double the acreage from which it sources its organic ingredients in this time
- Perdue purchased organic chicken producer Coleman Natural, in 2011; its organic chicken sales are now growing at 30-40% per year.

At the same time, established organic food companies such as Hain Celestial, Amy's Kitchen, Organic Valley, Clif Bar, Bell & Evans and Nature's Path continue to experience strong sales growth. Organic food is here to stay.

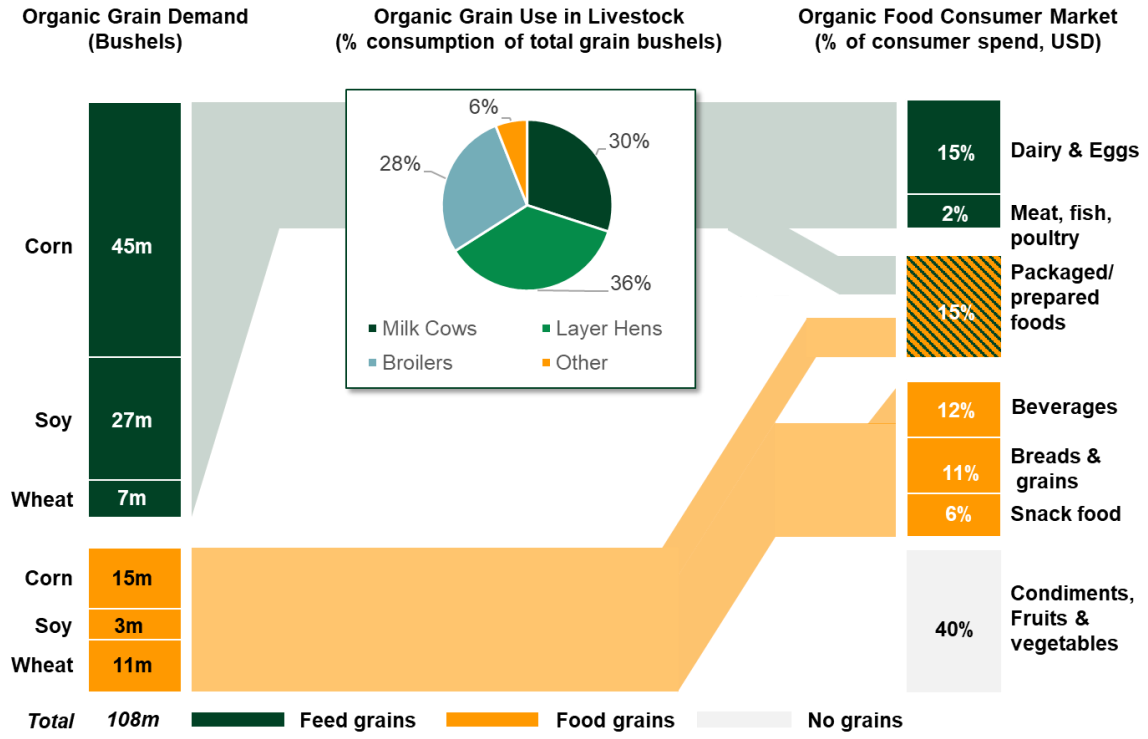
Recent cover of *Successful Farming* magazine

[10] http://ota.com/resources/organic-purchasing
[11] *Huffington Post*, "Costco Is Selling So Much Organic Produce", 13 April 2017

Organic grains underpin a large part of the market

Consumer demand for organic food has led to strong demand for organic row crops. We estimate that organic row crops are required to produce almost half of the organic food sold in the US (by value).[12] As animal feed, they underpin the Dairy, Egg and Meat categories, which together represent 20% of organic food sales. They are the primary ingredient in the Breads and Grains category (12% of organic food sales). To a lesser extent, they are also found in Snack Food (6% of organic food sales) and some Beverage products (12% of organic food sales). All the foods listed above are then found in one of the largest categories, Packaged and Prepared Foods, which accounts for 15% of organic food sales.

Organic grains underpin many food categories



Source: OTA 2017; Mercaris; SLM analysis

The most important row crops are corn, soy and wheat. The US food system consumed an estimated 108 million bushels of organic corn, wheat and soy in 2017/18, with a farmgate value of $1.4 billion.[13] Smaller quantities (an estimated 17 million bushels) of organic barley, oats, rice, sorghum, spelt, sunflowers, peas and lentils were also consumed. (In this paper, we use a broad definition of 'grains' that includes beans and oilseeds as well as true cereal grains.)

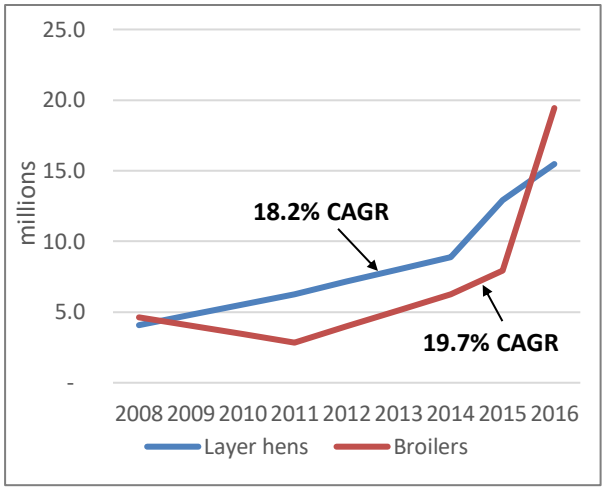
Approximately 25% of organic grains are used directly in food. They are used to make bread, breakfast foods, pasta, cookies, crackers, snack foods, tofu, prepared foods and beverages such as soymilk and beer. These 'food grade' grains are usually higher quality and require specialized

[12] SLM analysis of OTA, *Organic Industry Survey 2017* data
[13] SLM analysis based on Mercaris Organic Commodity Outlook 2018/19. Unless otherwise stated, the following data has the same source.

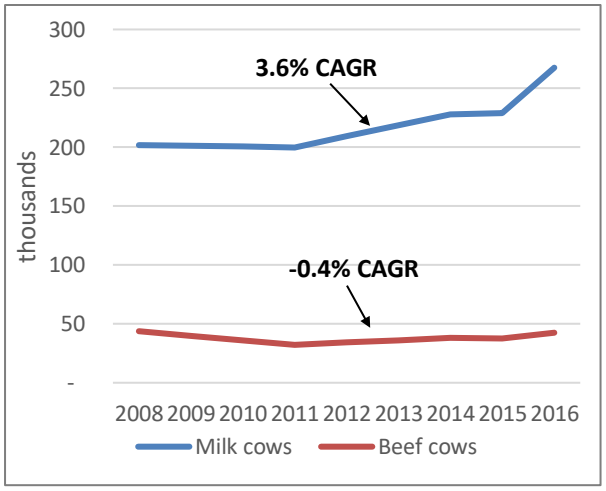
monitoring and quality-control equipment, and, potentially, milling or other forms of processing to become food ingredients.

A much larger proportion of organic grains – estimated at 75% – are used as animal feed. Corn and wheat are primarily a source of energy, while soybeans provide protein. There is a multiplier effect, as it takes many pounds of grain to produce 1 pound of meat or milk. During the early and mid-2000s, the biggest driver of demand for feed was the organic dairy industry. However, demand has slowed as the sector has matured: the number of organic milk cows grew at an annualized rate of 3.6% between 2008 and 2016. In contrast, the organic poultry sector has seen rapid growth over the last decade. The number of organic layer hens (for eggs) grew from 4 million in 2008 to more than 15 million in 2016. Similarly, the number of organic broilers (for chicken meat) grew from just over 4 million in 2008 to almost 20 million in 2016.[14] Grains are the primary diet for layer hens and broilers, so this has had a major impact on demand for organic feed grains.

Number of organic poultry



Number of organic cows



Source: USDA NASS Organic Surveys 2008, 2011, 2014, 2015, 2016. Data imputed for missing years

By 2017, an estimated 36% of organic feed grains were fed to layer hens and 28% to broilers. Around 30% was consumed by organic milk cows. 6% of organic feed grains were fed to other livestock, such as beef cows, pigs and turkeys. Organic beef has seen limited growth over the past decade; instead, consumer demand has focused on grass-fed beef, with or without an organic label.

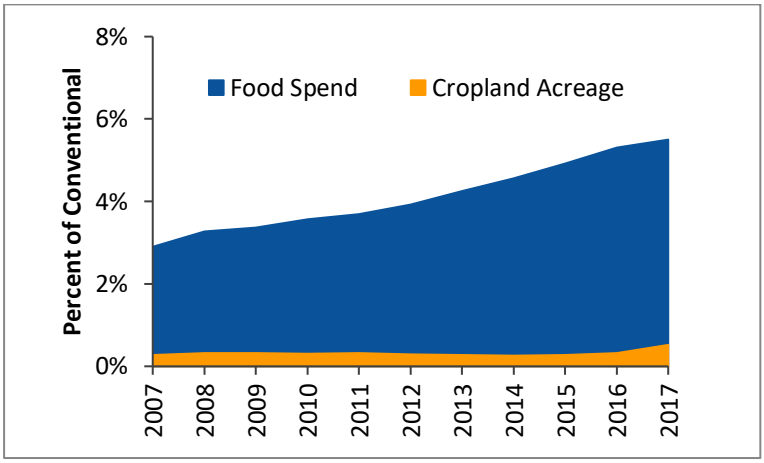
Overall, demand for organic grains tends to grow at a similar rate as the overall organic food market. In recent years, this has often exceeded 10% per annum but, as the organic food market matures, projected growth for 2018/19 is 7% per year.[15]

[14] All data based on USDA NASS Organic Surveys. These surveys tend to under-estimate actual numbers due to under-reporting.
[15] Mercaris, *2018/19 Organic Commodities Outlook*

Domestic supply of organic grains is not keeping up

Despite this strong demand, US farmers have been slow to respond. Although organic food sales now represent 5.5% of total food sales, organic certified cropland is estimated at 0.9% of total US cropland.[16] As a result, there is a large shortfall of domestically produced organic grains in the US.

US organic cropland and organic food sales as percent of conventional



Source: USDA ERS, USDA NASS & Mercaris acreage data for corn, soy and wheat; OTA Survey 2018 for food sales

According to Mercaris, an organic market data provider, there were an estimated 2,900,000 acres of organic certified cropland in the US in 2018 (see table below). Hay (including Alfalfa) was the most widely grown crop, covering 1 million acres or 36% of total organic acreage. Wheat was the second most widely grown crop, accounting for 19% of organic land. Domestic organic wheat production has largely kept pace with the growth of organic food sales. Organic wheat was grown on 1.2% of the total US wheat acreage, slightly above the average for all crops.

The situation was very different for the two blockbuster crops in US agriculture – corn and soybeans. Organic corn acreage was just 0.5% of total corn acreage, while organic soybeans were grown on 0.2% of the total acreage devoted to soybeans. This is striking, as these are the two crops in highest demand, especially for livestock feed. As a result, there is a major deficit of domestic organic corn and soybeans.

Organic crops accounted for a disproportionate amount of acreage dedicated to small grains such as oats, barley, rye and millet: around 4% to 5% of total acreage in each case. This reflects the fact that organic farmers often need to grow small grains as part of longer rotations to control weeds and maintain soil fertility. Organic acreage for dry beans, peas and lentils also accounted for 5% of total acreage for these crops. These legume crops play an important role in organic crop rotations, as they fix atmospheric nitrogen and build soil fertility.

[16] Mercaris 2018 Organic Acreage Report for organic crops; USDA NASS data for conventional

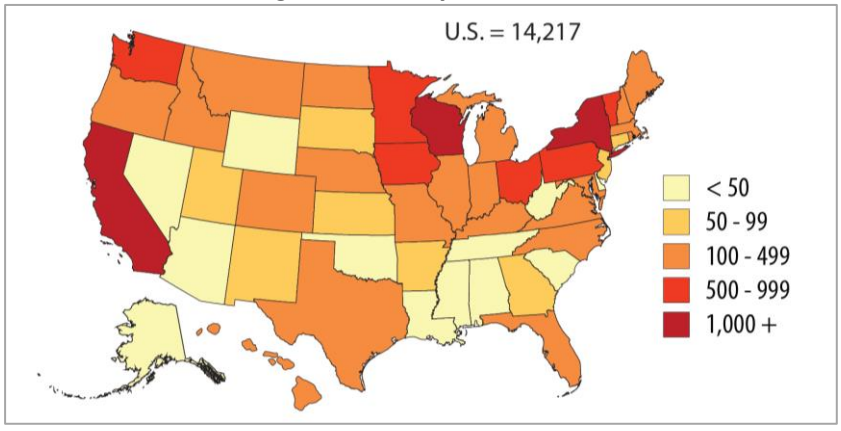
2018 organic certified acreage vs total US acreage

	Organic acres (2018)	Total acres (2018)	Organic share %
Hay/Alfalfa	1,001,570	57,076,000	1.8%
Wheat	562,426	47,800,000	1.2%
Corn	419,144	89,129,000	0.5%
Soybeans	219,662	89,196,000	0.2%
Dry beans, peas & lentils	186,033	3,744,900	5.0%
Small grains - Oats	115,262	2,746,000	4.2%
Small grains - Barley	106,107	2,543,000	4.2%
Small grains - Other*	135,863	2,587,000	5.3%
Rice	51,701	2,946,000	1.8%
Sorghum	39,130	5,690,000	0.7%
Sunflowers	40,584	1,301,000	3.1%
Other oilseeds	11,988	2,266,400	0.5%
Flax	10,571	208,000	5.1%
TOTAL	**2,900,041**	**307,233,300**	**0.9%**

Source: Mercaris 2018 Organic Acreage Report for organic crops; USDA NASS data for total acres

The 3 states with the largest number of organic farms are California, Wisconsin and New York. The major grain-growing states are in the Northeast, Cornbelt, Eastern Plains and Pacific Northwest. These areas are also closest to sources of demand, such as organic livestock and egg producers, and flour mills and food manufacturers. Organic farming is less well-established in the Southeast, as the hot, humid conditions create extra pest and weed pressures.

Number of certified organic farms by state, 2016



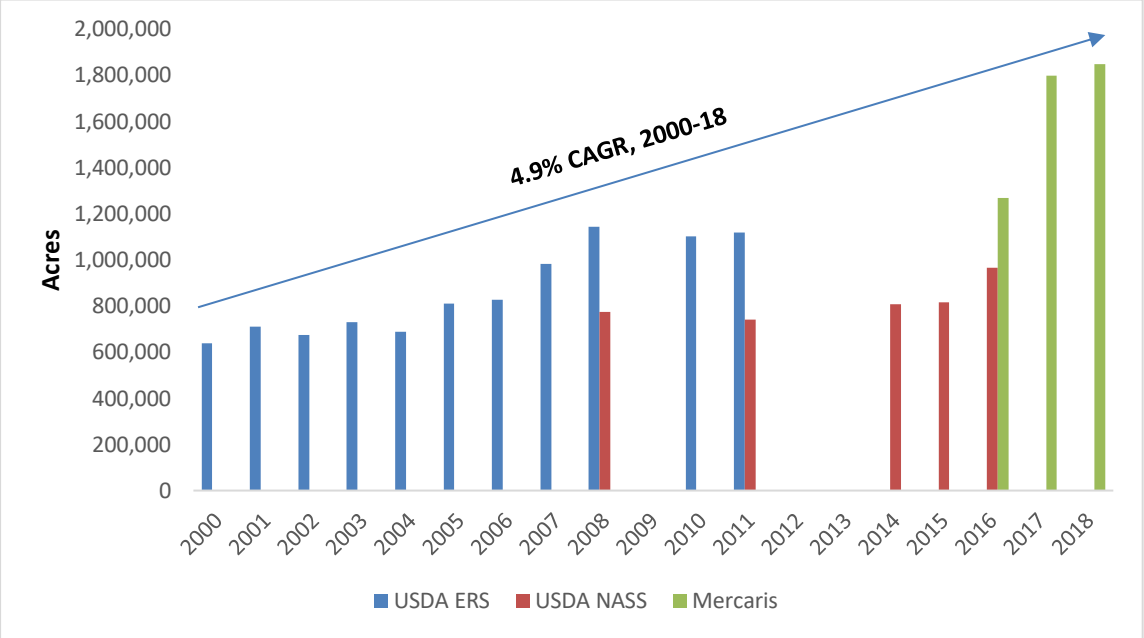
Source: USDA NASS 2016 Certified Organic Survey

How fast is organic acreage increasing? This is not an easy question to answer because of patchy data and inconsistent datasets. Between 2000 and 2011, the USDA's Economic Research Service (ERS) published annual statistics on organic acreage that are considered as broadly accurate. After

this service stopped, the USDA's National Agricultural Statistics Service (NASS) published 4 organic surveys covering the years 2011, 2014, 2015 and 2016. These surveys used a different methodology to the ERS, making it difficult to compare new data with historical data. Moreover, the NASS surveys appear to consistently under-estimate the number of organic farms and the size of organic acreage, perhaps by as much as 30%. A private firm, Mercaris, has attempted to fill the gap by providing its own estimate of organic acreage for 2016, 2017 and 2018 based on an analysis of the USDA's Organic Integrity Database.

We have consolidated these 3 datasets to show the growth in organic acreage for all grains, beans and oilseeds[17] between 2000 and 2018. Although it is difficult to draw firm conclusions, because of the differing methodologies used to collect data, the analysis indicate that the amount of organic acreage grew by an annualized rate of 4.9% during this period. It appears that the pace of transition to organic has picked up in recent years. Between 2011 and 2018, organic acreage grew at an estimated annual rate of 7.4%. But this is still lower than the growth of the organic food market over the same period. And, as we shall explore, there is a long way to go to close the gap between domestic supply and demand.

Estimated US organic acreage for grains, beans and oilseeds, 2000-18



Source: USDA ERS, USDA NASS & Mercaris Organic Acreage Reports 2016-18
Note: Uses 3 separate datasets with different methodologies - caution should be exercised when trying to identify trends

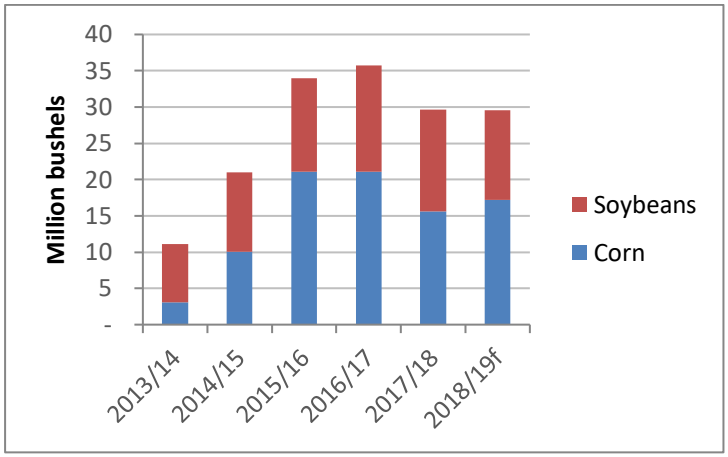
Imports are filling the gap

The shortage in supply of organic grains has led to a heavy reliance on imports, especially for feed grains. Imports of corn and soybeans jumped from 11 million bushels in 2013/14 to 35 million bushels in 2016/17. In that year, the US imported more than 42% of its organic corn and 79% of its organic soybeans. These imports were valued at approximately $450 million. Organic grain imports have fallen slightly over the last two years but remain at high levels. For 2018/19, imports are

[17] These figures exclude hay, haylage, rice, cotton, herbs and some other small field crops.

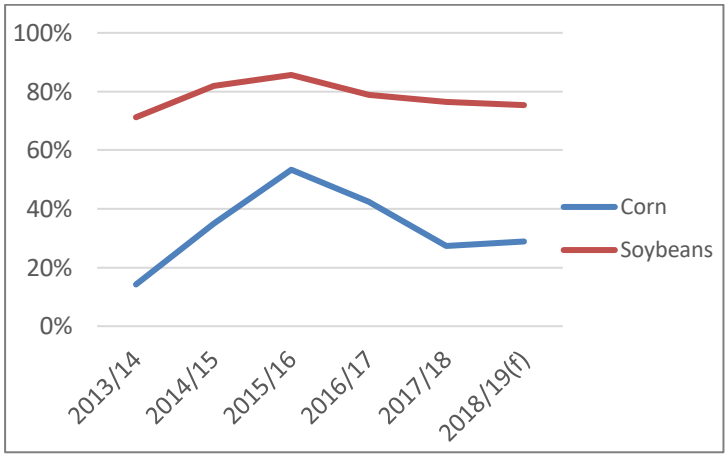
projected to fulfil 29% of total organic corn demand and 75% of total organic soybean demand.[18] This import situation is extraordinary, as the US has traditionally been the grain basket for the world.

Organic corn & soybeans imports



Source: Mercaris 2018/19 Organic Commodities Outlook

Imports as percent of total demand



The source of these imports was also striking. In 2016, 70% of imported organic corn came from Turkey, although much of it was grown in Russia, Ukraine or Romania (the Black Sea region) before being shipped by traders to Turkey. Turkey was also the largest source of organic soybeans, followed by India and Argentina.

[18] Mercaris 2018/19 Organic Commodities Outlook for total demand. Soybean imports include whole soybeans and soybean meal converted to whole soybean equivalent. Marketing Year covers period from September to August of following year.

Source of US organic grain imports, 2016

Corn		Soybean	
Country	**Percent**	**Country**	**Percent**
Turkey	73%	Turkey	44%
Romania	10%	India	22%
Argentina	10%	Argentina	13%
Netherlands	4%	Ukraine	8%
Canada	3%	Canada	5%
Other	0%	Other	9%

Source: Mercaris

There were many concerns within the industry about the genuineness of these organic imports. The European Union and Canada banned some shipments from Turkey in early 2017 because of fraud. In May 2017, the *Washington Post* published an article demonstrating that 3 shipments of organic corn and soybeans from Turkey to the US, representing 7% of US annual organic corn imports and 4% of organic soybean imports, were fraudulent. The crops had been grown conventionally in Romania and Ukraine but traders had forged organic certificates along the way.[19]

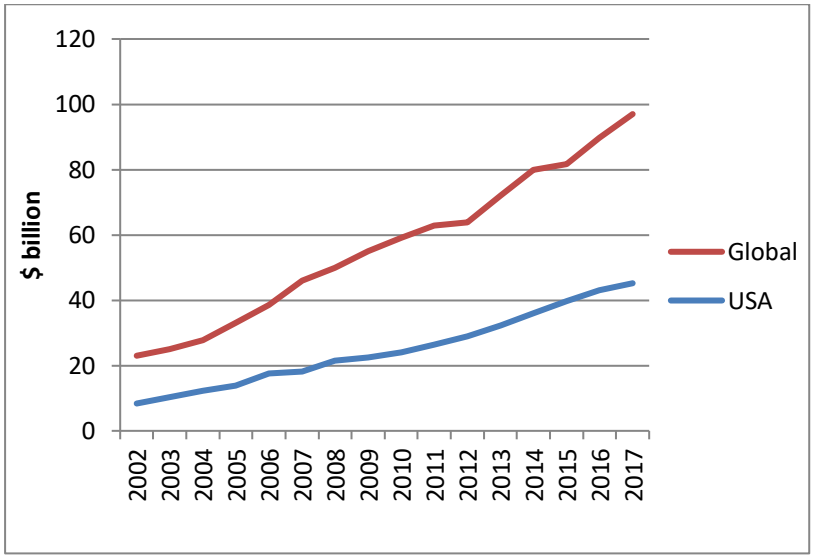
As a result of this expose, the USDA's National Organic Program revoked the organic certification of a foreign handler responsible for the fraudulent organic grain imports. The USDA has stepped up its regulatory enforcement of organic imports, backed by an increased budget in the 2018 US Farm Bill. Industry players are also taking steps to clean up the supply chain. The Organic Trade Association has formed a task force to address the integrity of organic imports. US food companies, with brands and reputations to protect, are increasingly nervous about relying on opaque foreign supply chains and would prefer to buy from American farmers. These companies are stepping up their efforts to stimulate more domestic production of organic grains, which is one reason why organic grain imports went down in 2017/18.[20]

Global organic markets are growing strongly too

The US is not the only country with an appetite for organic grains. The global organic food market was worth $97 billion in 2017. It has grown at a compounded annual growth rate of 11% since 2002, when the global organic food market was valued at just $23 billion.

[19] *The Washington Post*, "The labels said 'organic.' But these massive imports of corn and soybeans weren't", 12 May 2017
[20] OTA, *Organic Report*, Summer 2017

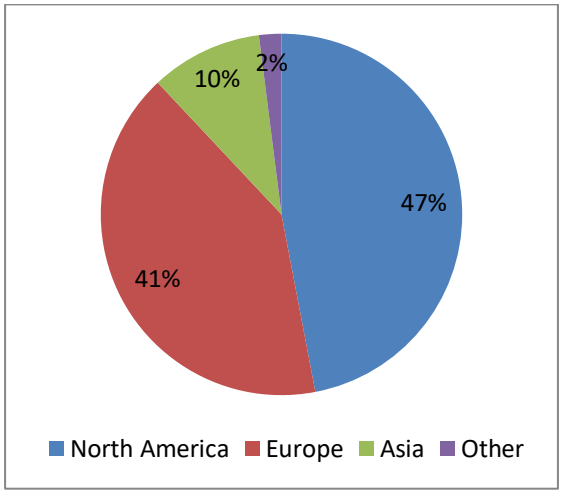
Value of organic food and drink market: global & US



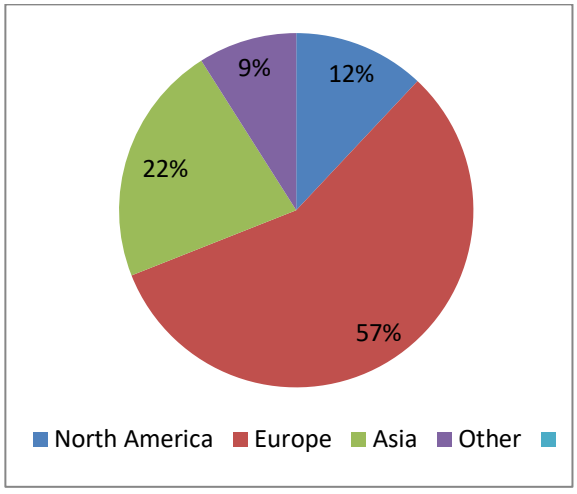
Source: FiBL/IFOAM, *The World of Organic Agriculture* reports

North America and Europe are by far the most important regions in the global market. North America represents 47% of global sales, and Europe accounts for 41%. Asia and other regions comprise the remaining 12%. But some of the fastest growth is occurring in China, where the organic market has grown 30 times over the last 10 years because of concerns over food safety. In the past, China was a major net exporter of organic food but it is now a net importer.

Distribution of organic food and drink sales



Distribution of organic arable land



Source: FiBL/IFOAM 2017

The distribution of arable land (annual cropland) is very different. Although North America accounts for nearly half of organic sales, it only contains 12% of the world's arable land. Asia contains more organic arable land than the US. By far the largest amount of organic cropland is found in Europe, which contains 57% of the global total. The European figure includes the European Union (EU), as well as Russia and Ukraine.[21]

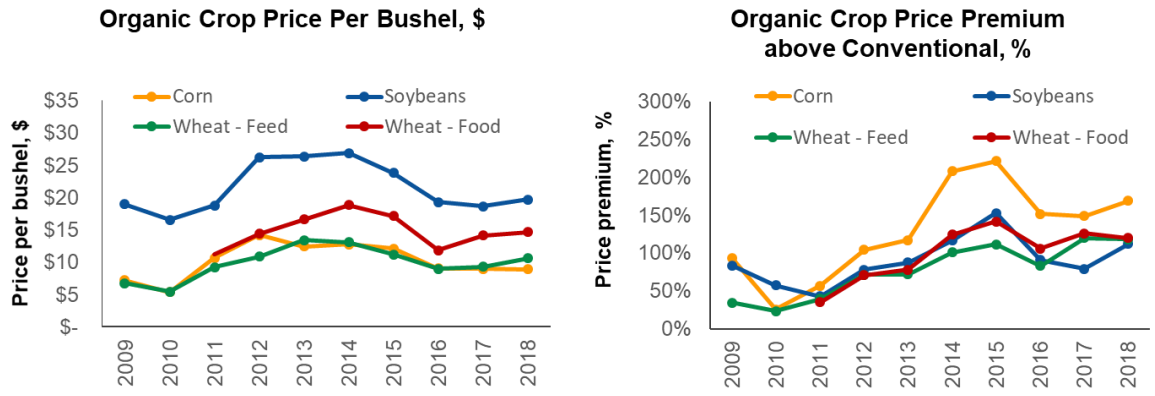
[21] FiBL/IFOAM, *The World of Organic Agriculture 2017*

The EU has done a better job than the US of growing organic land at a similar pace to market demand, partly because of generous government subsidies for organic conversion. The EU is self-sufficient in organic food grade grains, as well as the small grains (wheat, barley, oats, etc) that provide the energy component of animal feed. However, the EU has a major deficit of animal protein feed, which is usually supplied by pulses, soybeans and other oil seeds. The EU imports approximately 50% of its organic animal protein feed, competing with US importers for the same supplies. This is likely to continue into the future.[22]

Could the US market be flooded with genuine organic grains from other regions? With the right price signals, it is conceivable that countries such as Argentina, India, Romania, Russia or Ukraine could increase their amount of organic certified cropland. Because of the higher value of these commodities, the cost of shipping per bushel is not prohibitive. For example, shipping grain from the Black Sea region to the US east coast only represents around 5% of the delivered price.[23] Nonetheless, farmers in these countries will face many of the same barriers to organic transition as US farmers (see below). The situation in Ukraine and Russia is complicated by political risk, which has curtailed investment in agriculture. Any increase in organic cropland in other regions is likely to be gradual. And growing organic markets in the EU, China and elsewhere will continue to compete for supply.

Price premiums for organic grains are attractive

Because of strong demand and limited supply, American farmers can sell organic grains at a substantial premium to conventional grains. Over the last 10 years, organic corn and soybean prices have averaged 2x conventional prices (i.e. a 100% premium). Over the last 8 years (the longest period where data is available), food grade wheat prices have also averaged 2x conventional. The average premium for feed grade wheat over the last 10 years has been slightly lower at 1.8x (or 80% higher). The same premium levels for corn, soybean and feed grade wheat emerges if data is analyzed over a 20-year period to 1999.



Source: SLM research; USDA; Mercaris

[22] Rabobank interview
[23] Rabobank interview

These average premiums mask volatility. There was a contraction of organic premiums in 2010, as the financial crisis led to a temporary slowing of growth in organic food sales, and buyers stepped out of the market. This discouraged farmers from going organic, which led to an even greater supply deficit in following years. By 2014 organic corn was selling at 3 times the price of conventional. The emergence of large import volumes placed downward pressure on organic prices in 2015 and 2016. Organic grains prices also tend to track conventional prices, which fell during this period. However, by the middle of 2017 organic grain prices were moving higher again, because of a greater desire among US food and livestock companies to source domestically. At the beginning of 2019, organic corn was selling for $9.50-10.50 per bushel, whereas conventional corn was priced at $3.60.[24]

Are these organic price premiums likely to continue? There are risks that could put downward pressure on prices. They include:

- A fall in organic demand, following a food scare or consumer loss of confidence in the benefits of organic food
- A surge in organic grain imports, following increased organic conversion in other regions
- Increased domestic supply if US farmers shift towards organic production in large numbers

Nonetheless, there are also factors that could support or boost these premiums. They include:

- Continued growth of the organic food market at current rates (7%+ per annum)
- A fall in imports because of concerns over reliability or increased demand in other regions
- Continued reluctance of US farmers to transition to organic production[25]

The current situation is certainly attractive to farmers. One Iowa producer transitioning 1,100 acres to organic certification told journalists in July 2017, "I know organic farmers who say they feel they are now price-makers, not price-takers because of the demand. That's got to be a pretty good feeling for a farmer." [26]

Organic farms are more profitable

There is consistent evidence from multiple published sources that organic farms are more profitable than conventional operations. This was the conclusion of a major USDA study on *The Profit Potential of Certified Organic Field Crop Production* in 2015.[27] It has been the conclusion of side-by-side field trials conducted by Iowa State University and the Rodale Institute for more than 20 years.[28] These results have been confirmed by multiple academic papers over the past decade based on meta-analysis of dozens of individual studies in the US and other countries.[29]

[24] SLM research – interviews with market participants
[25] RaboResearch, *Don't Panic! It's Organic*, Feb 2018
[26] "Missing the train on organic", *Farm Futures*, 17 July 2017
[27] McBride, et al., *The Profit Potential of Certified Organic Field Crop Production*, ERR-188, USDA Economic Research Service, July 2015
[28] Long-Term Agroecological Research Experiment at ISU; Rodale Institute, Farming Systems Trial brochure (2015)
[29] D. Crowder & J. Reganold, "Financial competitiveness of organic agriculture on a global scale", PNAS, June 2015; K. Delate et al, "A Review of Long-Term Organic Comparison Trials in the U.S.", *Sustainable Agriculture Research*, Vol. 4, No. 3, 2015; V. Seufert & N. Ramankutty, "Many shades of gray—The context-dependent

These academic studies show that organic farms tend to have lower yields than conventional, on average 10-30% lower depending on the crop. But the yield gap is highly dependent on the skill of the farmer. Studies show that application of organic best practices (e.g., diverse crop rotations, cover crops, good mechanical weeding) can reduce the yield gap to less than 10% for many row crops. Any yield gap is more than offset by the price premium for organic crops. Operating costs per acre are often similar. Certain costs are lower because of the elimination of GM seeds, most pesticides and chemical fertilisers. On the other hand, organic farms usually require more labor and machinery operations to control weeds and to handle more diverse rotations.

There is also evidence that organic farms with healthier soils are more resilient to extreme weather event, thereby reducing yield volatility. Soils with a higher percentage of Soil Organic Matter and improved aggregate structure are able to hold onto water longer during dry periods, while resisting the erosive forces of heavy rainfall. For example, the 30-year farming systems trial carried out by the Rodale Institute in Pennsylvania showed that yields were up to 30% higher in the organic system compared to the conventional system during periods of severe climatic disruption (droughts and floods)[30].

How profitable can organic US row crop farming be? Surveys of 'average returns' (as carried out by the USDA) can be misleading, as there are many small scale organic farmers with a higher cost base and non-commercial goals who drag down the results. As a result, these surveys often underestimate potential profitability. On the other hand, data from small field trials may not reflect the realities of largescale commercial row crop farms. To address this, SLM Partners has developed a proprietary database of organic farming economics based on the farm enterprise budgets of more than 19 organic farmers in the Midwest and Northeast, combined with all publicly available data from research institutions. We use this to assess the likely economic performance of a '75th percentile farmer' – this represents an average of the top 50% of organic farmers. These are full-time, commercial organic farmers operating at an appropriate scale.

Our model assumes that conventional farmland in the Eastern Cornbelt is purchased for $9,500 per acre. The land is transitioned to organic certification. By year 3, crops are certified organic, since by the time of harvest it is 36 months since the last application of prohibited chemicals. The 4-year rotation consists of corn, soybean, wheat and hay. Net operating income (NOI), i.e. the return to land and management before land costs, is low in the first two years of transition, at $154 per acre. But NOI increases to $713 per acre from year 3, and continues to increase in the following years, mainly because improved soil health and farming skills allows for slightly higher yields. Cash yields in real terms as a percent of the original land average ~9% after organic certification. In addition, land values should appreciate, which is an extra source of financial return for a landowner.

performance of organic agriculture", Sci. Adv. 2017;3: e1602638, 10 Mar 2017; J. Reganold, "Organic agriculture in the twenty-first century", *Nature Plants*, Vol 2, Feb 2016; Ponisio LC, M'Gonigle LK, Mace KC, Palomino J, de Valpine P, Kremen C., "Diversification practices reduce organic to conventional yield gap", *Proc. R. Soc. B*, 282, 2015 20141396.

[30] Rodale Institute, *The Farming Systems Trial - celebrating 30 years* (2011)

Projected returns per acre from organic conversion in Eastern Cornbelt

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Land price	9,500									
Net operating income (NOI)	154	154	713	713	861	866	866	866	922	922
Income yield	1.6%	1.6%	7.5%	7.5%	9.1%	9.1%	9.1%	9.1%	9.7%	9.7%

Note: NOI does not include land cost, i.e. represents net return to land and management. Assumes 10-year average crop prices. All farming operations budgeted at custom farming rates. Costs of crop insurance, property taxes, working capital interest and repairs & maintenance also included. All returns are in real terms, before inflation.

Source: SLM Farm Enterprise Budget Database

Because of low conventional commodity prices and strong organic premiums, the contrast between organic and conventional profitability has rarely been starker. This can be seen when comparing the economic returns of conventional corn (based on University of Illinois Crop Budgets for 2017) with the economic returns of organic corn (based on the SLM Partners Farm Enterprise Budget Database). Once the cost of rent is taken into account, a conventional operator lost $99 per acre in 2017, whereas an organic operator earned $823 per acre. These budgets include all farming costs and overheads. All machine operations are costed at custom farming rates, which should cover all labor, fuel, repairs, and depreciation.

Net returns per acre for conventional vs organic corn, 2017

	Conventional	Organic
Revenue		
Corn yield (bushels)	200	179
Price per bushel	$3.65	$9.5
Total revenue	*$730*	*$1,701*
Expenses		
Seed	$116	$119
Fertility	$124	$89
Pesticides	$60	$0
Farming operations	$173	$283
Crop insurance	$24	$21
Interest (non-land)	$19	$16
Other overheads	$45	$82
Total costs	*$561*	*$610*
Net operating income	**$169**	**$1,091**
Minus land rent	$268	$268
Net return to operator	**$-99**	**$823**

Source: For conventional, University of Illinois Crop Budgets 2017; for organic, SLM Farm Enterprise Budget Database

5 barriers hold farmers back from going organic

If the case is so compelling – on economic, environmental and health grounds – why isn't everyone doing it? Why are American farmers so slow to transition to organic production? We believe there are 5 barriers holding farmers back:

1. **Income loss during transition**
   Although organic production is more profitable after certification, this is not the case during the 3-year transition. Yields can be poor, as it takes time to build soil fertility and wean the land off its chemical dependency. A farmer may need to invest in new equipment. Organic price premiums are not available. There have been efforts to develop markets for "transitional" or non-GMO grains, but they do not pay large premiums to farmers currently. As a result, farm income may drop or turn negative during the first 2-3 years, especially if a farmer has to pay market rent for the land. Most farmers do not have the balance sheet to support losses during the transition period.

2. **Access to land**
   There are two ways that farmers can access land – through purchase or leasing. Farmland has become so expensive that acquisition is out of reach for many farmers. 40% of US cropland is leased and farmed by a non-landowning operator; the figure rises to 60% in states such as Illinois. But most leases are 1 to 3 years in length. There is little incentive for a farmer to embark on a 3-year organic transition process, or to invest in soil fertility, on leased land, when the land could be taken away soon after certification. Organic transition requires long-term, secure access to land.

3. **Access to credit**
   Farmers rely heavily on the farm credit system for operating loans to buy seeds, fertilisers and other inputs each year. But many agricultural lenders do not understand organic markets or farming systems, because they are niche. They may also be unwilling to finance farmers through the 3-year transition. Organic farmers can find it hard to secure operating loans, as well as mortgage loans to finance land purchases, at reasonable terms.

4. **Access to markets**
   Organic farmers must sell their crops through specialist elevators, mills and traders that hold organic certification. Organic grain infrastructure is lacking in certain areas, requiring farmers to transport crops over large distances at great cost. In addition, sustainable organic farming involves more diverse crop rotations, including small grains, which increases the time spent on marketing.

5. **Knowledge, skills and mindset**
   Perhaps the greatest barrier is a 'soft' one, related to how farmers see the world. Organic farming requires a deeper understanding of soil biology, a new set of skills and a fundamentally different way of managing land. Farmers need to jettison the chemical-based farming approach that they may have learned in agricultural college and grown up with. The average age of US farmers is 58 years, and older farmers may be less willing to try a new system. Organic farming may go against the beliefs of parents, friends and neighbours – making the transition can be

socially isolating. Research and training on organic farming is limited, and farmers usually have to learn by trial and error.

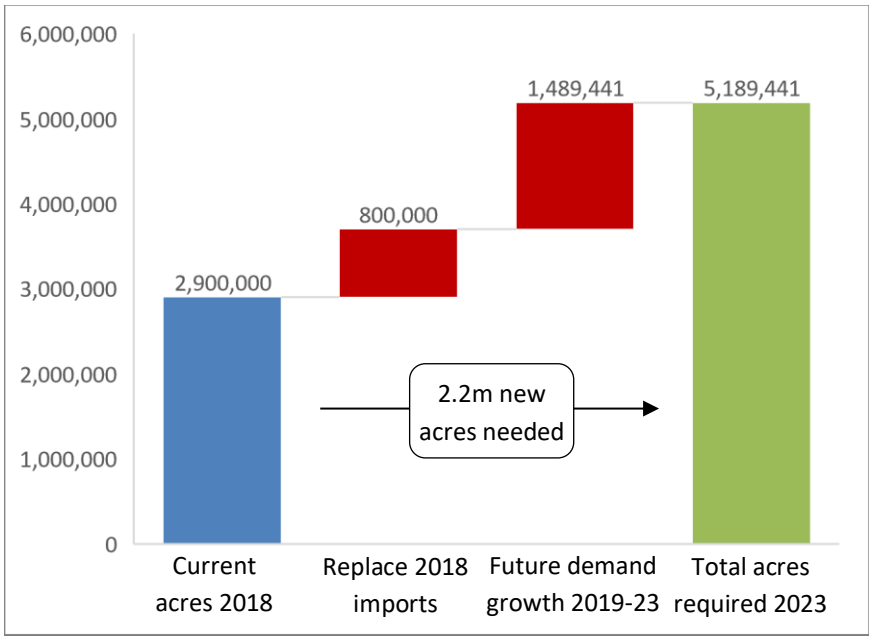
Investment capital can play a role in scaling up organic farming

There is a strong economic case for organic row crop farming in the US, and this is likely to continue for some time into the future. But there are reasons why individual farmers may see it as too risky to convert to organic. The situation creates an opportunity for investors and investment managers to play a role. Investors seeking a return from real assets over the long-term can help finance the organic transition. They can share some of the early risks with farmers while participating in the greater economic rewards later on.

How big is this opportunity? How many more organic acres will be required over the next 5 years to meet demand for organic grains? We estimate that almost 2.2 million additional acres will be required by 2023. The assumptions behind this estimate are as follows.

- Total organic acreage for row crops in 2018 is estimated at 2.9 million acres
- Replacing imports of organic soybeans and corn in 2018 would alone require an additional 800,000 acres. This is based on taking the total number of imported bushels (24.8m bushels of soybeans, including soybean meal expressed in whole soybean equivalent; 17.2m bushels of corn) and dividing by average US yields per acre (124 bushels for corn, 37 bushels for soybeans) to calculate the number of acres needed to grow these crops (670,000 acres for soybeans; 140,000 acres for corn)
- Projected future demand growth of 7% per annum between 2019 and 2023. This reflects the current rate at which demand for organic grains is growing

Additional organic cropland acres required by 2023



Source: SLM analysis

There are many ways in which investors can support the transition of more US cropland to organic certification. SLM Partners is developing investment strategies to take advantage of this opportunity.