An Investor Brief on Impacts that Drive Business Risks:

WHEAT

ENGAGE the CHAIN
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This brief provides a summary of the main environmental and social factors that affect wheat production worldwide; however, it spotlights key players in the U.S. value chain, and provides examples of actions being taken by companies operating or headquartered in the U.S.

KEY TAKEAWAYS

- Wheat is a staple of diets around the world. Production tripled since the 1960s, propelled by global population growth and rising incomes.
- Improvements in yield made it possible for production to keep pace with rising demand without a significant expansion in the amount of land used to grow the crop.
- Increased use of irrigation water, pesticides and fertilizer drove the yield growth in large part, contributing to water scarcity and water pollution issues.
- Investors should address business risk in the wheat supply chain through direct engagement with their portfolio companies and by supporting relevant policies and multi-stakeholder collaborations.

COMMODITY OVERVIEW

Wheat is a Significant Staple of Diets Around the World, and is Also Used for Animal Feed and Biofuel

Wheat is the mostly widely grown cereal crop, farmed on more acres than any another commercial crop (nearly 20 percent of all land under cultivation).1

- Wheat makes up 20 percent of the calories people consume worldwide.2
- Slightly more than half of the 2 million bushels of wheat grown in the U.S. is used domestically, with the large majority used for food.3
- About three-quarters of all U.S. grain products, such as bread, pasta, and cookies, are made from wheat flour.4
- Outside of the U.S., wheat is also regularly used for animal feed. In the European Union, almost half of wheat production is used to feed animals.5
- Wheat is the primary feedstock for bioethanol production in the EU.6

GLOBALLY, HOW WHEAT IS USED:

Source: FAO Statistical Yearbook, 2013
Global wheat production tripled during the past fifty years, as the world’s population doubled and rising urbanization and income levels led to a shift to more wheat rich diets. However, the amount of land farmed for wheat didn’t increase, due to improvements in wheat yield per hectare. Still, the fertilizer, pesticide and irrigation use that helped propel these yield increases has created water scarcity and pollution issues.

While growth in wheat consumption in developed countries has slowed, demand for wheat flour (e.g., for wheat-based instant noodles and bakery products) is projected to increase in developing countries because of rising incomes and population. Although most wheat is consumed within the country where it is produced, globally roughly one-fifth of the annual crop is exported.
THE WHEAT VALUE CHAIN

Some Segments in the U.S. Wheat Value Chain are Highly Concentrated

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SEED COMPANIES

Monsanto, DuPont (Pioneer), and Syngenta (headquartered in Europe) are large publicly traded companies that provide seeds to farmers.

TRADERS AND DISTRIBUTORS

Archer Daniels Midland (ADM), Bunge, Cargill (privately held) and Louis Dreyfus Commodities (headquartered in Europe) control much of this link in the supply chain.18

MILLERS

Most of the milling companies that process the flour sold to bakeries and others are among the 46 members of the North American Millers’ Association.19 Two millers dominate the market, accounting for nearly 50 percent:

• Ardent Mills LLC, controls 30 percent of the U.S. flour milling industry. It was created in 2014 by combining the mill operations of ConAgra Foods Inc., CHS Inc. and Cargill Inc.

• ADM has 17 percent of the flour market.20

MANUFACTURERS

Among food manufacturers, large U.S. buyers of wheat flour are concentrated in the bakery, cereal, snack and pasta sectors.

Bakery Sector: Flowers Foods and Bimbo Bakeries make up about 45 percent of the U.S. bakery industry.21

Breakfast Cereal Sector: Kellogg Company, General Mills, Quaker (a subsidiary of PepsiCo) and Post Foods make up most of the breakfast cereal market.22

Snack Sector: Mondelez International is one of the leading companies selling wheat-based snack foods.

Pasta Sector: Barilla North America and supermarket store brands account for approximately half of the U.S. market.23

RESTAURANTS AND RETAILERS

Restaurants and retailers play an important role in the wheat value chain. These companies can indirectly influence production practices and supplier standards within their supply chain. Moreover, they are sensitive to external pressures as well as responsive to market trends and consumer preferences.

Restaurants are heavy users of wheat-based bakery products. The four largest quick-service and fast-casual restaurants in the U.S. are McDonald’s, Yum! Brands (Taco Bell, Pizza Hut, KFC), Starbucks and Subway. All are headquartered in the U.S.24 In terms of food retailers, the four largest in the U.S. are Walmart, Kroger, Costco and Albertsons.25
When assessing risks to U.S. companies, it is important to consider that most wheat-based items are produced and consumed in the U.S. However, the impacts linked to wheat grown outside the U.S. are also relevant to U.S.-based companies that operate in other markets. U.S.-headquartered food processors operate globally and U.S. imports may include wheat produced elsewhere.
1. WATER USE CONTRIBUTES TO GROUNDWATER DEPLETION

While less water is required to produce a kilogram of wheat than to produce the same quantity of many other commodities (e.g., beef, soy), the total demand for water to grow wheat is high given the significant amount of land used.26

Globally, more than 40 percent of wheat production is grown in regions of high or extremely high water stress (e.g., China and India), meaning regions where existing water supplies face intense competition, and in some cases growing regulation.27 Where wheat production relies on irrigation, unsustainable water use can strain groundwater supplies in areas such as the Ogallala Aquifer in the United States and the North China Plain in China.28

2. FARM MANAGEMENT PRACTICES CAN POLLUTE WATER

While adding wheat to a crop rotation builds soil health, because wheat production covers vast farm acreage, the total amount of agrochemicals and fertilizers used is significant and contributes to impacts. In the U.S., nitrate fertilizer is applied to the large majority of acres on which wheat is grown (over 80 percent in 2009).33 Chemicals and fertilizer may wash off fields and the run-off can contribute to “deadzones”34 that are devoid of life, while leaching to groundwater pollutes the water supply of communities, agriculture and industry. Moreover, high levels of pesticide applications can harm water quality and local biodiversity.

3. WHEAT PRODUCTION MAY CONTRIBUTE TO GREENHOUSE GAS EMISSIONS

The use of fuel, inorganic fertilizers and pesticides in wheat production contributes to greenhouse gases that are linked to climate change. However, using farming practices such as fertilizing crops based on soil tests, reducing summer fallow frequencies, and rotating cereals with grain legumes in certain regions (semi-arid and rainfed) can lower wheat’s carbon footprint. If these practices are used, it is possible for wheat to sequester more carbon dioxide from the atmosphere than is actually emitted during its production.35
4. CONVERSION OF NATURAL HABITAT CAN LEAD TO GREENHOUSE GAS EMISSIONS & LOSS OF BIODIVERSITY

Globally wheat production is not a leading driver of natural habitat being converted to cropland. In recent years in the U.S., however, millions of acres of important grasslands in the Great Plains have been converted to wheat production, contributing to reductions in biodiversity (e.g., bird populations) and the loss of soil carbon.36

5. SMALLHOLDERS37 LACK OF ACCESS TO RESOURCES & MARKETS LIMITS THEIR PRODUCTIVITY & LIVELIHOODS

In many parts of the world, wheat is grown by smallholders. Average smallholder productivity is typically less than that of larger plantations. What’s more, smallholders often face significant challenges accessing markets, and may require additional technical and financial resources to support productivity improvements, shifts in cultivation practices, and/or record keeping. Increasing the productivity on smallholder farms could in particular help improve smallholders’ economic and food security.

U.S. SPOTLIGHT

Wheat used in the U.S. is typically produced domestically. Wheat is stored and transported through elevators and multiple aggregation points (such as rail deliveries to flour mills). This is different from other grains (like corn and rice) and can make collecting data on wheat growing systems difficult.

Most U.S. wheat is grown in the Great Plains (Kansas is the largest wheat producer in the U. S., followed closely by North Dakota).38 Nutrient pollution and groundwater depletion are significant concerns in this region, particularly where wheat is irrigated with groundwater from the Ogallala Aquifer.

In the U.S. between 1980-2011, total wheat production dropped (16 percent) as farmers switched to alternative crops offering higher returns or took their land out of production. However, yield per planted acre increased (25 percent). Over this timeframe, wheat production in the U.S. became more efficient across five indicators tracked on a “per bushel” basis, and total resource use decreased as well.39 However, on a per acre basis, resource use increased in four of those areas, linked to the greater yield per planted acre:40

- Irrigation water applied (+6 percent)
- Energy use (+9 percent)
- Greenhouse gas emissions (+21 percent).

Only soil erosion decreased by 34 percent, with improvements realized primarily in the first half of the study period.
Many players, including buyers, producers, governments, NGOs and communities understand the issues and are collaborating to ensure the long-term sustainability of wheat production. Investors should encourage companies to join these multi-stakeholder efforts to demonstrate commitment and help accelerate progress. When a company is already involved in such efforts, investors should encourage constructive participation and progress in meeting commitments.

Many of the risks affecting wheat production affect other commodities as well. Multi-stakeholder efforts that address wheat as well as other commodities include:

- **Field to Market Fieldprint Projects**
  Field to Market: The Alliance for Sustainable Agriculture works in the U.S. with grower groups, retailers and other supply chain businesses, along with civil society, academia and public sector partners to promote continuous improvement in row-crop production practices using an outcomes-based approach. Projects in the U.S. are collecting data on several key science-based indicators, with supply chain members providing support for continuous improvement efforts by growers. Its Supply Chain Sustainability Program enables companies to benchmark sustainability performance, catalyze continuous improvement and measure and report out on progress against environmental goals.

- **Midwest Row Crop Collaborative**
  Announced in 2016, this coalition of companies (Cargill, General Mills, Kellogg Company, Monsanto, PepsiCo and Walmart) and conservation groups (Environmental Defense Fund, The Nature Conservancy and World Wildlife Fund) is focused on supporting and accelerating sustainable solutions that address various environmental impacts from farming. The coalition will focus on three states: Illinois, Iowa and Nebraska, which produce nearly 44 percent of corn, soy and wheat. This region also sends 422 million kilogram/year of nitrogen downstream, which ultimately contributes to the annual Gulf of Mexico dead zone.\(^{41}\)

- **Saginaw Bay Watershed Regional Conservation Partnership**
  This regional partnership in Michigan, which includes the U.S. Department of Agriculture, The Nature Conservancy and the Michigan Agri-Business Association, focuses on improving farmers’ conservation practices to improve soil and water quality and stem nutrient runoff into the Great Lakes. Kellogg Company is one of the companies supporting this effort because the soft white winter wheat (and sugar beets) for its cereal and other products are grown in this watershed.\(^{42}\)
2. ENGAGE DIRECTLY WITH PRODUCERS

When supply chains are transparent, companies can work with suppliers and supporting industries (e.g., farm equipment, soil amendment or irrigation companies) to promote better management practices. Opportunities to engage include providing loans and other financial incentives, or developing joint projects with wheat producers to promote conservation tillage and appropriate application of agrochemicals.

For example, General Mills collaborates with wheat producers in Idaho’s Snake River watershed to implement sustainability metrics on production factors such as water and fertilizer use. It worked closely with producers over several years to gather data using a tool developed by Field to Market, which enabled producers to create a baseline and discuss their findings. As another example, several companies including Campbell’s, the Kellogg Company and General Mills are collaborating upstream with United Suppliers (a cooperative of agricultural retailers that’s part of Land O’Lakes) to give wheat growers access to a platform called SUSTAIN that provides field-tested products, technologies and agronomic practices for improving nutrient use efficiency, soil health and enhanced productivity.

3. SUPPORT GOVERNMENT POLICIES

Companies can support sustainability policies in producer countries. In the U.S., for example, this includes promoting funding of voluntary conservation programs to ensure technical and financial assistance is available to producers.

4. ENCOURAGE USE AND DEVELOPMENT OF SUSTAINABILITY STANDARDS

There are no third-party wheat-specific sustainability standards. However, organic standards can be applied to wheat production.
General Mills committed to source 100 percent of its U.S. wheat by 2020 from growing regions that demonstrate continuous improvement using the Field to Market framework. As of FY2015, 24 percent of spend is sourced sustainably.46

Kellogg Company is committed to responsibly source wheat (as well as other commodities) by 2020 through a combination of certification, direct investment in programs on the ground and/or documented continuous improvement in the places where these ingredients are grown.47

Mondelez International committed that by 2015, 75 percent of biscuits in its Western European biscuit business would be made with wheat grown based on its Harmony program, which involves using precision technology to efficiently use and limit fertilizer and pesticide use. This goal has been met. The partnership includes more than 2,200 farmers across Europe.48
• The U.S. Department of Agriculture (USDA) conducts research on multiple commodities, including wheat. This includes data on production and consumption, prices and trade and is published through the Economic Research Service, Foreign Agricultural Service, and National Agricultural Statistics Service.

• The Sustainability Consortium offers high-level insights and analysis about potential risks and opportunities for some products made with wheat (e.g., bread).

• The International Maize and Wheat Improvement Center (CIMMYT) provides resources to strengthen national agricultural research and extension services in wheat (and corn/maize) growing nations. It partners with researchers and farmers to develop and promote more productive and precise wheat (and corn/maize) farming methods and tools that save money and resources such as soil, water and fertilizer.

• The Plowprint Report (2016) by World Wildlife Fund tracks year-to-year grassland conversion to cropland across the focal regions of the Mississippi River Basin and Great Plains.

Engage the Chain offers briefs on seven other key commodities, a compelling case for sustainable agriculture and opportunities for action that cut across all types of agricultural commodities.
1 International Development Research Centre, Facts & Figures on Food and Biodiversity, http://www.idrc.ca/EN/Resources/Publications/Pages/ArticleDetails.aspx?PublicationID=565
4 USDA as noted by Grains of Truth, Wheat Foods Council
12 1961-2011; from 222 million tonnes to 704 million tonnes


25. Note: Ranking is based on sales of consumables, as reported in Supermarket News. http://supermarketnews.com/rankings-research/2015-top-75-big-picture


30. Note: Represents the combined “blue” and “green” footprints of wheat


34. Note: “Dead zones” are created when a body of water becomes enriched by inorganic plant nutrients, especially phosphates and nitrates, and the resulting growth of algae reduces oxygen for aquatic plant and animal life.


Note: Most sources define smallholders as growers with a planted area of 50 hectares (just under 125 acres) or less, where the farm provides the majority of income to the family and, in turn, the family provides the majority of labor on the farm.

Grains of Truth, Wheat Foods Council

Note: Total land use (-33 percent), total soil erosion (-57 percent), irrigation water applied (-12 percent), energy use (-26 percent), and greenhouse gas emissions (-17 percent). Note: For the indicators other than land use, wheat use/impact were allocated between wheat and straw using an economic allocation method.


Notes: Organic standards are developed at the national and/or regional level through relevant organic standard setting bodies


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