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Fertilizer Inflation Likely to Persist into Spring Planting

Key Points:

- Growers and retail input suppliers face one of the worst inflationary environments in decades, driven by a continued parabolic rise in fertilizer prices. Nitrogen production shocks, tight global supplies, rising natural gas input costs, and steady demand are pushing up prices.
- While the situation will eventually correct itself, our analysis suggests that high fertilizer costs will persist into the spring 2022 planting season at minimum. We base this conclusion in part on a recent farmer survey and university study, both of which place the odds of high prices persisting at 70% or above.
- Farm supply cooperatives appear to be better managing risk today compared to 2008-09, when a sudden drop in fertilizer prices forced some cooperatives to write down fertilizer inventory. In an environment of volatile crop and natural gas prices, the key, of course, is for retailers to match selling prices to the farmer with rising wholesale costs.



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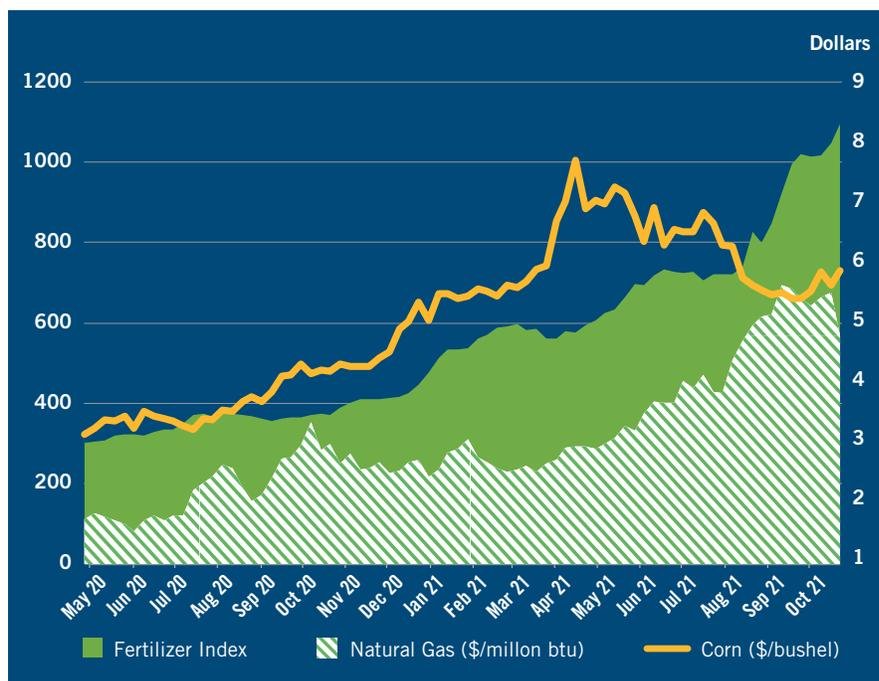
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Introduction

U.S. crop farmers and the farm supply cooperatives serving them are facing operational anxiety heading into 2022, driven by high fuel prices, shortages of agrochemicals (herbicides, fungicides, insecticides) due to COVID-related disruptions and, most importantly, the recent parabolic rise in fertilizer prices. Three issues are behind the rise in fertilizer prices and the further tightening of global fertilizer supplies relative to demand:

- Higher natural gas prices (a key feedstock used in the production of nitrogen-based fertilizers) due to production shocks that occurred between July and October 2021 in China and England. The rise in gas prices resulted in higher prices of phosphate and urea fertilizers produced in China, and higher prices of ammonium nitrate (AN) fertilizer produced in England.
- A temporary shutdown of CF Industries' Donaldsonville fertilizer facility (the world's largest nitrogen operation located in Ascension Parish, Louisiana) due to power outages caused by Hurricane Ida; and
- Fertilizer export restrictions by China and Russia, and countervailing tariffs on urea ammonium nitrate solution (UAN) imports to the United States from Russia (as well as Trinidad and Tobago), combined with economic sanctions placed on potash imports from Belorussia.

EXHIBIT 1: Fertilizer vs. Natural Gas and Corn Prices



Source: Barchart.com and Green Markets, FertilizerPricing.com © Bloomberg L.P.

To put the rise in fertilizer prices into perspective, the benchmark Green Markets North American Fertilizer Index has risen by 265% since May 2020 – to an all-time high – and there is little reason to expect it to reverse anytime soon (*Exhibit 1*).

The current situation raises three important questions for crop producers, input suppliers, retailers, grain handlers, and feed and fuel producers:

1. What effect will high fertilizer prices have on next year's crop planting decisions (should prices remain elevated during the winter) and should we expect to see a major acreage shift out of corn (the most fertilizer-intensive crop) towards soybeans?
2. What is the probability that fertilizer prices will correct before the spring 2022 agronomy season?
3. What, if anything, can we learn from the last dramatic bull market in fertilizer prices in 2008 and how it may apply today?

Soybeans Will Not Overtake Corn Acres in 2022

Recent talk suggests that U.S. farmers will plant more soybeans and less corn in 2022 due to rising fertilizer prices. While technically true compared to 2021 (i.e., that soybean acres will rise nominally and corn acres will fall nominally relative to each crop's actual planted acres in 2021), we do NOT see a crop mix scenario of higher soybean acres over corn in absolute terms for a few reasons.

We expect U.S. ethanol producers' demand for corn to remain strong amidst current high fuel prices and record blending margins, and we expect a slowdown in soybean sales to China. USDA's November 5 acreage baseline update aligns with this, forecasting 92.0 million corn acres versus 87.5 million soybean acres for the 2022-23 crop year (*Exhibit 2*). Although corn acreage is forecast to drop 1.3 million acres, this is primarily due to increased acres for wheat and cotton, both of which are currently at or near record-high price levels.

Given the above, the current price ratio of soybeans to corn, admittedly a simple tool, shows that soybean prices are currently quite weak relative to corn. At present, soybean prices are only 214% of corn prices, compared to a long-term average of 253% (*Exhibit 3*).¹ According to USDA, higher price ratios indicate that soybeans are relatively more profitable than corn, while lower ratios indicate the opposite and thus support greater planting of corn.

Using a more sophisticated analysis, researchers with University of Illinois and Ohio State University have shown² that in a high-producing region of the Corn Belt, the pro forma 2022 crop budget for corn pencils out to



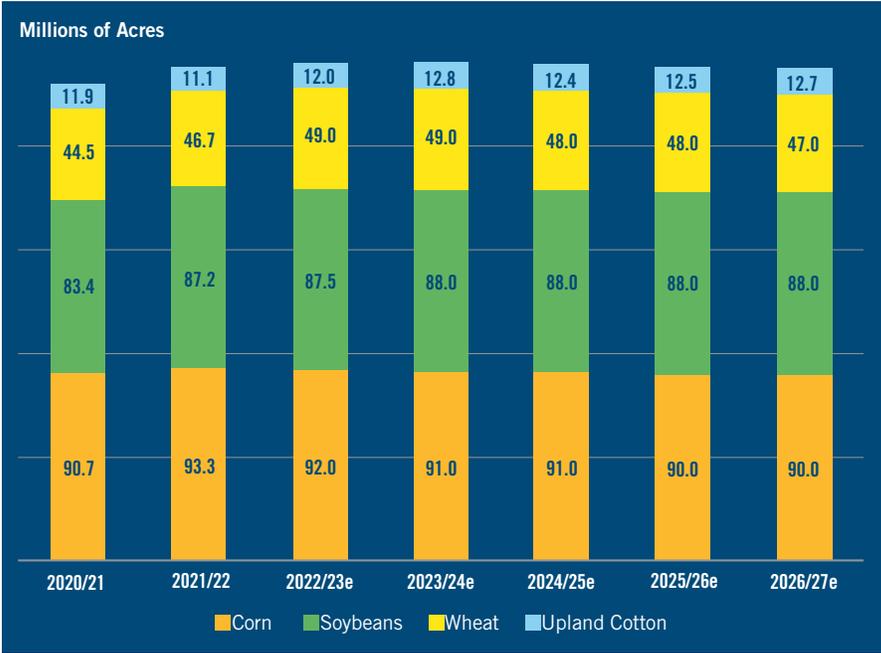
be even more favorable to corn than it was in 2021 (despite the record high fertilizer costs and given the current price ratios).

Finally, based on anecdotal evidence compiled from ongoing conversations with CoBank farm supply cooperative customers, executives at large crop input suppliers, and farm producers, most in the industry agree that corn acres should remain dominant over soybeans in 2022 even with prices for anhydrous ammonia rising towards 1,200 per ton.

While some university and independent research may indicate a logical theoretical case for switching to soybeans from corn when fertilizer prices rise, farmers in the real world often reduce or skip fertilizer applications to manage costs rather than apply recommended levels. And as one corn farmer indicated to us, he would rather buy and apply less fertilizer in order to save money (even if yield goes down), rather than “pay through the nose for inputs.”

Many growers pre-paid for plant nutrients earlier in 2021 and subsequently applied nitrogen (N) fertilizers to their fields during the fall agronomy season. Because only corn uses and can tolerate large amounts of N in contrast to soybeans and wheat crops that use more phosphate (P) and potash (K), it would be inefficient and unprofitable

EXHIBIT 2: Planted Acreage Estimates for Major Field Crops



Source: USDA Nov. 5, 2021

EXHIBIT 3: Ratio of Soybean to Corn Prices



Source: Barchart.com, Nov. 19, 2021

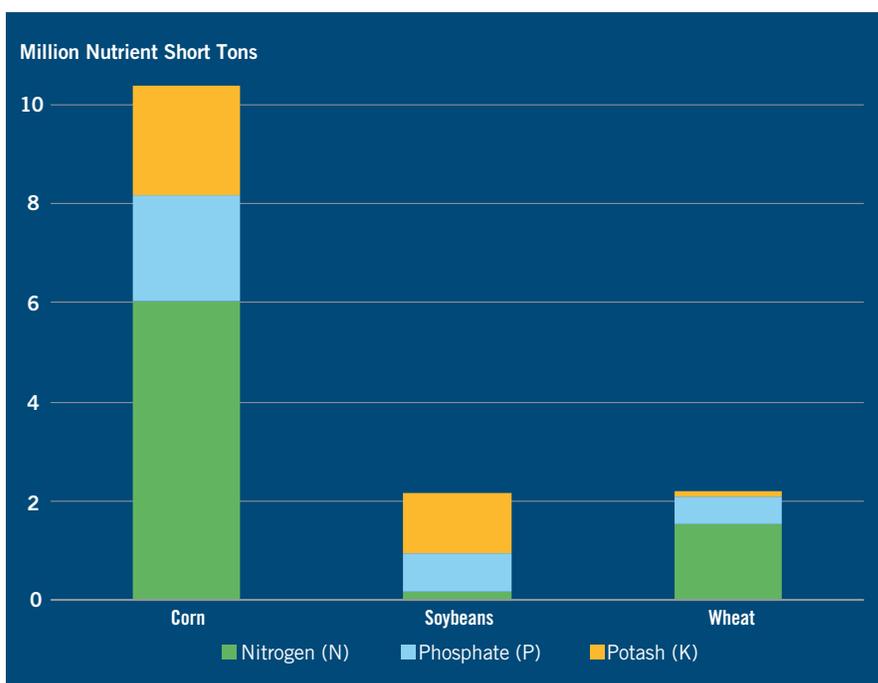


EXHIBIT 4: Estimated Average NPK Fertilizer Usage for Corn, Soybeans and Wheat Crops

to change rotations on fields that have already begun fertilizer preparations for next year (Exhibit 4).

Fertilizer Prices Will Remain Elevated Next Spring

Regardless of the marginal shifts in crop acreage for 2022, the key question is whether prices of nitrogen fertilizer – namely ammonia/ anhydrous ammonia, granular urea, urea ammonium nitrate solution (UAN) and ammonium nitrate (AN) – and phosphate will decline, given ample supplies of potash in North America. That said, we reviewed two credible sources of industry intelligence to help us answer the broader question.



Source: USDA-ERS, the Fertilizer Institute

Note: Averages are calculated based on data from 2010 to 2018

EXHIBIT 5: Potential Fertilizer Price Drivers

Potential Tailwinds (Higher Prices)	Potential Headwinds (Lower Prices)
Global supply constraints of nitrogen due to European plant shutdowns, lower production and/or restricted fertilizer exports by the Chinese and Russian governments.	A jumpstart in production at U.S. and Canadian fertilizer production plants due to U.S. government intervention and influence to alleviate panic buying in the marketplace.
Higher natural gas costs during winter 2022 due to rising demand (cold temperatures and continued economic activity) would keep ammonia and urea prices high.	A dramatic reduction in forward orders of nitrogen by U.S. crop farmers and increased speculation of a major shift of acreage out of corn into soybeans and wheat acres beginning in 2023.
Expansion in U.S. and Brazilian crop acreage to satisfy grain export demand by China and biofuels consumption.	A series of “black swan” events: a) an unexpected drop in energy prices due to increased global production; b) warm winter temperatures that curb natural gas demand; c) restrictions/mandates on fertilizer usage; d) adverse weather which disrupts planting.
Labor shortages, principally a shortage of domestic truck drivers to deliver fertilizer across different parts of the U.S.	An unexpected beginning of aggressive rate tightening by the Federal Reserve to rein in general inflation, something that would derail the “long energy and other commodities trade as an inflationary hedge” strategy.

Source: Kenneth Scott Zuckerberg of CoBank ACB

The first was a survey conducted by FarmFutures.com (cited in its September 2021 print magazine) which indicated that 87% of producers expect input prices will be higher in spring 2022 compared to fall 2021, decreasing the likelihood that farmers will delay current year fertilizer purchases until next spring. The second was a university study covering 14 years that found that the price of anhydrous ammonia increased 72% of the time between October and April, while falling 28% of the time.³ Looking at this data and our own analysis of potential price drivers (*Exhibit 5*), we conclude that fertilizer prices will likely remain elevated through at least the spring planting season.

What's Different Now Versus 2008

During the fertilizer spike of 2008, several U.S. cooperatives that had built and held sizeable inventories faced large negative valuation adjustments and /or inventory write-downs once fertilizer prices pulled back to average levels. In certain cases, the financial penalty was quite large, mirroring the drop in nutrient prices. (To provide context, average prices of diammonium phosphate – DAP – fell 67% and granular urea fell 51% between 2008 and 2009, while average prices of anhydrous ammonia fell 41% between 2009 and 2010.)⁴ In recent discussions with several CoBank customers, the system seems better positioned today for several reasons. One, given the current market dynamics, few cooperatives are attempting to capture a carry in fertilizer markets. Two, most retailers more actively manage risk by contracting with farmers at specific price terms or ranges depending on wholesale fertilizer costs (“back-to-back” sales contracts).

Conclusion

Over the next six months, CoBank believes there is a high probability that fertilizer prices will remain elevated against a backdrop of record general inflation, above-average natural gas prices, tight global nitrogen supplies and continued strong farmer demand. Further, we do not forecast that soybean acres will exceed corn acres due to high nitrogen-based fertilizer prices, although that will likely change in the longer term as biofuel production leans more towards soybeans (for use in renewable diesel) versus corn (used in ethanol). Finally, in contrast to the 2008 to 2010 period, farm supply cooperatives appear more focused on managing the risk of write-downs of fertilizer inventories should a rapid drop in prices occur. ■

References

- ¹ Zulauf, C. and A. Lines. “Soybean – Corn Ratios Since 1974.” *farmdoc daily* (11):35, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, March 10, 2021.
- ² Schnitkey, G., N. Paulson, K. Swanson and C. Zulauf. “Planting and Acreage Decisions in 2022.” *farmdoc daily* (11):150, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, November 2, 2021.
- ³ Schnitkey, G., N. Paulson, K. Swanson and C. Zulauf. “Management Decisions Relative to High Nitrogen Fertilizer Prices.” *farmdoc daily* (11):147, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, October 26, 2021.
- ⁴ The World Bank, *Commodity Markets Outlook*, October 21, 2021 <https://www.worldbank.org/en/research/commodity-markets>

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