STATE OF THE CORN ECONOMY

QUARTERLY ECONOMIC REPORT | END OF 2Q 2023

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REPORT PREVIEW

In the second quarter of 2023, the corn sector faced unexpected shifts with little overall change in supply side estimates. Geopolitical tensions and international dynamics continue to be factors in the market including ongoing war in the Black Sea Region, Brazil surpassing the U.S. in corn exports, and Mexico's ban on GMO corn. On the macroeconomic side, interest rates continue to climb, and economic landing remains in limbo. Despite widespread drought across the corn belt during the second quarter and a reduction in the yield forecast, the U.S. remains positioned to produce a record crop in 2023. Record corn production will be great for the industry if we have consistent demand to consume it, emphasizing the need for both existing and new uses. Within major uses ethanol, feed, and exports there are challenges and opportunities for U.S. corn. This report summarizes the State of the Corn Economy with a short perspective on aspects of the corn balance sheet, macroeconomics and related markets, international dynamics, and farm level factors.

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CORN BALANCE SHEET

Supply: In the July 2023 World Agriculture Supply & Demand Estimates (WASDE) report the United States Department of Agriculture (USDA) reduced national average projected corn yield for 2023/24 marketing year from 181.5 to 177.5 bushels per acre, which would still be a record yield for the U.S. The report also incorporated the June acres estimate of 94.1 million planted acres, up from the previous estimate of 92.0 million acres. Harvested acres rose from 84.1 million acres to 86.3 million acres. The larger increase in harvested acres indicates farmers didn't anticipate a larger than normal portion of acres unable to be harvested for grain at the time of survey in the first two weeks of June, despite drought concerns. The adjustment to yield could have been influenced by drought concerns but may also reflect expansion of acres into fridge growing areas. Estimated production for 2023/24 rose from 15,265 million bushels to 15,320 million bushels as the impact of the increase in planted acres more than offset the drop in forecast yield. ***Summary: Despite drought concerns across the corn belt, USDA forecasts a record 177.5 bushel per acre yield and 15,320-million-bushel production, surpassing the 15,148-million-bushel production record from 2016.***

Demand: In the July WASDE, the 150-million-bushel boost in expected feed use more than offset a 25-million-bushel reduction in ethanol use to push the domestic total back upwards. Despite several changes to domestic use for 2022/23, the current projection of 12,080 million bushels is less than 1% below the initial projection back in May 2022. The other demand side change for 2022/23 in the July report was a 75-million-bushel drop in expected corn exports. This was not a surprising adjustment given the actual accumulated exports in the marketing year. At the time of the July WASDE, if corn exports finished the marketing year on pace of the 5-year average for that period, exports would have ended close to the July estimate of 1,650 million bushels. There are now additional weeks of exports falling below the 5-year average for the corresponding weeks, indicating the export estimate is likely to drop again. Looking ahead to 2023/24, USDA's July forecast shows an increase in demand across all major demand categories including feed, ethanol, and exports. ***Summary: As the end of 2022/23 approaches, additional adjustments in exports may be needed. All major demand categories face industry challenges but USDA currently forecasts a rise in demand for 2023/24.***

Ending Stocks: The USDA July forecast for 2022/23 ending stocks is 1,402 million bushels, down 50-million bushels from the previous forecast. The lower ending stocks reflect the boost in feed use that more than offset declines in both ethanol and exports. Even with the reduction in the July estimate, ending stocks remain higher than the 1,377 million bushel ending stocks for 2021/22. Though demand has been challenged in 2022/23 on all fronts, the 9% reduction in supply from 2021/22 to 2022/23 is also a factor that led to demand adjustments relative to the shorter U.S. supply. Looking ahead to 2023/24, ending stocks are projected at 2,262 million bushels, about 60% larger than the forecast for this year. The forecast for a record production is outpacing the forecast increases on the demand side pushing stocks higher. In the coming months, there will be greater clarity on actual production that could lead to considerable adjustments that would impact on the ending stocks balance. ***Summary: Small changes in 2022/23 ending stocks may occur as we reach the end of the year, but bigger changes are possible for 2023/24 in the coming months as actual production numbers come to light.***

Price Trends: USDA projects the 2022/23 marketing year average (MYA) farm price at $6.60. The cash futures contract is currently trading in the $5.50s range, well below the MYA price forecast. The forecast is a weighted average based on price and when bushels are sold in the marketing year. At this point much of that is already weighed in and there were periods of price well above $6.60 during this volatile price year. Looking ahead, USDA projects the 2023 MYA price $1.80 lower at $4.80. The December 2023 futures contract has fluctuated from just above $4.80 and just below $6.40 over the past year, this is a noticeable downward shift from the one-year range last quarter. Currently, the trade price is close to the $4.80 MYA price projection. ***Summary: There is still a lot of room for movement in the 2023/24 MYA price projection; but expect lower price levels than 2022/23 unless a boost in demand or reduction in production changes the balance sheet dynamics.***

Global Corn Balance Sheet: While the supply side of the 2022/23 U.S. balance sheet has been known since the final post-harvest 2022 numbers were accounted for, the supply side of the world sheet is still adjusting given the current harvest season in other nations, Brazil in particular. Brazil is expected to harvest a record corn crop as harvest of the safrinha crop continues. Driving the record crop is a combination of a projected 3% increase in harvested area and generally better growing weather. In the July WASDE, USDA forecast Brazil would harvest 133 million metric tons (MMT) of corn, a 5.6% increase over the initial May 2022 projection of 126 MMT for 2022/23. CONAB, Brazil's government agency, released a forecast the day after the July WASDE with a lower, but still large, 127.8 MMT projection. Looking ahead to 2023/24, world production is expected to grow more than 6%. The growth is production is due to the expectation for a return to trend yields in the U.S., Argentina, and the EU after the nations suffered drought reduced losses for 2022/23. ***Summary: Brazil's final production numbers could cause movement in the world balance sheet for 2022/23 that may shift world ending stocks up or down.***

MACROECONOMICS & OUTSIDE MARKETS

Inflation: From the time most of the world began emerging from the COVID-19 pandemic in late 2021, inflation has been a top macroeconomic policy concern. The annual rate for Consumer Price Index (CPI), one measure of inflation, was 3.0% for June 2023. That is a sizeable deceleration from the 4% annual rate in May and 9.1% peak in June 2022, but remains above the Federal Reserve ("Fed") target rate of 2%. The inflation percentage rates are a year over year change in the price index. This means the June 2023 inflation rate is the current index relative to the very high price month of June 2022. The price index was virtually the same from June 2022 through September 2022. In 2023, the price index has been increasing each month, but the year-over-year inflation rate has declined because the increases in price index were smaller than the increases in price index in the same period of 2022. If the price index continues to inch upwards each month between now and September, the annual inflation rate will reverse course and begin to increase because the base index value from 2022 that it's compared to is flat during that time. Another factor to watch is Core CPI, the CPI without food and energy components. The June 2023 Core CPI is 4.8% for June. The Fed prioritizes Core CPI, which remains several points above the target 2% rate. The Producer Price Index (PPI) and Personal Consumption Expenditures Index (PCE) are two other primary measures of inflation the Fed considered. These have been trending lower but remain sticky as well. ***Summary: General inflation has been improving, but the annual inflation rate may be slow to improve or even reverse course in the coming months because of the flat price index values from June to September 2022.***

Interest Rates: Aside from inflation, labor and employment statistics are an important consideration in the Fed actions. The labor market shows signs of cooling but remains fairly strong, similar to the pattern of inflation. Prior to the Federal Open Market Committee (FOMC) meeting in March 2022, the target range for the federal funds rate was 0% to 0.25%. Currently the target range is 5.25% to 5.50%. The loan type and term influence farm loan rates but adding 4% to the federal funds rate is a gauge for operating loans. The Federal Reserve Bank of Kansas City reported that one tenth of new farm operating loans carried an interest rate of nearly 10% in the second quarter survey, compared to more than half of all loans with rates below 4.5% at the beginning of 2022[1]. The summary of FOMC economic projections indicates another 25-basis-point increase is possible in 2023, with 9 of the 18 members market a 5.50% to 5.75% target range for 2023. For reference, 3 members indicated even higher ranges, 4 members indicated staying at the current range, and 2 members indicated a 25-basis-point shift lower. The market seems less sure that another increase is coming, with market expectations at a 25% or lower probability of an increase at each of the three remaining meetings in 2023. Although the Fed indicates a longer period before lowering rates, there is a disconnect between central bank officials and financial market investors as markets are already pricing in Fed cuts. ***Summary: Another interest rate increase is possible, but it appears we are nearing the end of the rate hike cycle. Regardless of whether another increase occurs or not, a period of no change is likely before reductions are made.***

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[1] https://www.kansascityfed.org/agriculture/agfinance-updates/farm-lending-slows-as-interest-rates-rise/

Exchange Rates: In 2022, the U.S. dollar strengthened against nearly every other major currency to levels not seen in decades. The nominal broad dollar index, used to measure dollar value against a collection of widely used international currencies, appreciated over 12% in 2022 partly due to aggressive interest rate increases that improved return on investment for the U.S. dollar. The index has dropped about 6% from November 2022 to January 2023 and has floated around that level since. Although lower than the fall of 2022, but the dollar remains stronger than the five-year or ten-year average. If everything else is constant, an increase in interest rates fuels demand for U.S. dollars and causes the real trade-weighted exchange rate to rise, meaning it takes more units of a foreign currency to purchase U.S. agricultural commodities. From 2021 to 2022, the real trade weighted exchange rate for corn reported by USDA increased 9.9%, meaning it took 9.92% more units of a foreign currency to purchase U.S. corn. From 2022 to 2023, the real trade weighted exchange rate for corn has been virtually unchanged, dropping 0.04%. Outlook for the dollar value is mixed, but there is support for a steadfast dollar going forward. ***Summary: Neutral to declining interest rates and dollar value would help to reduce this dollar-value-effect of higher price for U.S. corn in the world market.***

Recession Indicators: Several economic indicators point toward impending recession. The Conference Board's index of leading indicators is a widely followed gauge of future economic activity. The index declined in June 2023 for the fifteenth consecutive month. This is the longest streak of consecutive decreases since the 2007-08 runup to the Great Recession. An individual economic indicator that has received added attention amid bank failures earlier this year is the relationship between the 2-year and 10-year treasury note yields. The inversion in yields of these two treasury notes challenges banks who rely on the normal positioning of lower short-term rates and higher long-term rates. This normal relationship makes sense, a greater risk would be expected when committing money for a longer period. An inversion means the opposite is true, with higher short-term rates and lower long-term rates. When that has happened in the past, a recession within two years has occurred 98% of the time. This indicator has accurately predicted the last eight recessions. The two treasury yields inverted last summer, but in early July 2023 the inversion was at the widest position since 1981. ***Summary: Production agriculture isn't always impacted by recession in the same way as the overall economy. Production agriculture is also impacted by the economic conditions of trade partners and other producers, dollar-values, weather, geopolitical relationships, and policy related to agriculture.***

Crude Oil Prices: In March, the coalition of oil producers known as OPEC+ announced it would cut oil production by 1.66 million barrels per day. Price of the nearest-term Brent crude futures, an international benchmark for oil price, had been trending upward from under $70 per barrel in mid-March but jumped to the $80 to $85 per barrel range on the announcement. But early May prices moved back near $70 and mostly remained in the $70 to $75 per barrel range until July. On August 4, OPEC+ renewed production cuts continuing the efforts to tighten supply and put greater pressure on oil prices sending crude oil prices above $85 per barrel for the first time since November 2022. Supply disruptions in Saudi Arabia and Russia, rebalancing of net oil imports, and a significant increase in U.S. oil exports are other factors impacting crude oil prices this summer. The U.S. regular gasoline price, as reported by the U.S. Energy Administration, hit the highest point of 2023 this week increasing 19.5% since the beginning of the year. ***Summary: Rising fuel prices could be a detractor in efforts to control inflation in the coming months, especially given the stable prices from June to September 2022 that will factor into the annual inflation rate calculation.***

Fertilizer Prices: Farm prices for nitrogen fertilizer set new record highs in 2022, while potash and phosphorus fertilizers came very close to the 2008 record highs but did not quite surpass those levels. Farm prices for fertilizers have dropped from those 2022 high points but remain elevated compared to 2009 to 2020 averages and compared to Fall 2020. There is considerable variation in different forms of Nitrogen farm prices relative to the historical average farm price: 28% Nitrogen solution is 78% above the historical average, anhydrous ammonia is 37% above, and urea is 13% above. Farm prices for phosphorus fertilizers DAP and MAP are 57% and 32% higher than the historical average, respectively. Potash is 21% above the historical average. USDA forecasts the average cost of fertilizer for the 2023 corn crop is 14% lower than the average cost for the 2022 corn crop. There were large swings in fertilizer prices from the fall to spring buying season for both the 2022 crop and the 2023 crop. There will be many farmers who had a higher fertilizer cost for the 2023 corn crop, as compared to 2022. Now is the beginning of the buying season for 2024 fertilizer. USDA forecasts average fertilizer costs for corn will be 17% lower in 2024 as compared to the average in 2023. Again, there is a wide range around the average for 2023. ***Summary: Current farm prices for fertilizers are much lower than the 2022 high points, but prices are still elevated compared to Fall 2020 and the longer term 2009 to 2020 average.***

INTERNATIONAL DYNAMICS

Mexico GMO Corn Ban: Mexico has become an increasingly important trade partner over the past two decades. In the 2021/22 marketing year, 27% of U.S. corn exports went to Mexico. In February 2023, Mexico issued a decree calling for the immediate ban on genetically modified (GM) corn in the masa or tortilla flour food sector. In response to the decree, the U.S. initiated technical consultations in early March. In June, the Office of the U.S. Trade Representative requested consultations under the U.S.-Mexico-Canada Agreement dispute settlement procedures. From an economic standpoint, buyers of white corn in Mexico could demand non-GMO white corn, if that was their preference, without a decree to manipulate normal market flows. Although this decree wasn't in effect until mid-February and it only applies to GMO white corn, the U.S. market share for corn in Mexico has declined. Over the last decade, the U.S. has fulfilled an average of 95% of Mexico's marketing year corn import needs. For the 2021/22 marketing year, the U.S. was the source of 97% of the corn Mexico imported. In 2022/23 marketing year through May for which global data is available, the U.S. has accounted for 85% of Mexico's corn imports. Notably, total exports to Mexico through May are 4.9% behind last year but market share is 12% lower because Mexico has increased their corn imports relative to last year. Through May, U.S. white corn exports to Mexico were 84.5% lower than the same period a year ago. ***Summary: Mexico is an important export destination of U.S. corn, and it is important to reach a resolution on the GMO issue.***

Chinese Corn Demand: China's demand for corn more than doubled over the past decade leading up to 2021/22, largely for livestock feed. More than a quarter of U.S. corn exports went to China in the past two marketing years. Through June of the 2022/23 marketing year, U.S. corn exports to China are only 56% of the same point in time in the 2021/22 marketing year. China's current market year purchases of U.S. corn are lagging recent years for a few reasons. China gained Brazil as a corn source, importing corn from Brazil for the first time in November 2022. Through June of the 2022/23 marketing year, 14% of China's total corn imports are from Brazil compared to 0% in the previous marketing year. Another contributing factor is that China is importing less total corn this year. China's total corn purchases through June of the 2022/23 marketing year are 15.7 MMT, 76.5% of the 20.5 MMT of corn China had imported at the same point last year. Not only are China's imports of corn down this year, but China's total imports of all commodities and products are down 12% of last year, and their exports are down 14%. The economy has struggled to gain traction since the nation reopened from COVID last year and is showing signs of moving into recession which could be bearish for global commodity prices. ***Summary: U.S. exports of corn to China has been lower this year, not only attributable to competition in the world corn market, but also their weak post-COVID economy.***

Brazil Corn Exports: Brazil is expected to surpass the U.S. as the largest corn exporter by next year, if not this year. Brazil supplied just 7.9% of world corn exports in the 2008/09 marketing year and is projected to supply nearly one-third one-quarter of world corn exports forecast for the 2022/23 marketing year. The U.S. is also expected to supply nearly one-third of world exports this marketing year, but the U.S. has trended in the opposite direction as Brazil over the last fifteen years, down from 62.8% of world corn exports in 2008/09. Production has increased in Brazil, but exports have grown at a faster pace than production. Most corn in Brazil is grown as a second crop to soybeans. For 2022/23 corn prices have been low, putting corn in Brazil near break-even for this year and possibly decreasing the appetite for expansion of corn. Infrastructure and transportation issues are another factor that may deter farmers in Brazil for planting more corn acres in the short-term. In alignment with this, USDA forecasts Brazil will have a lower corn production in 2023/24 than 2022/23. ***Summary: Brazil has grown to become a major competitor in the world market for corn and will likely remain a competitive exporter, but several factors may keep further expansion at lower levels than experienced over the last fifteen years.***

War in Ukraine: In the three marketing years prior to the Russian invasion, Ukraine supplied 15% of world corn and ranked as the world's fourth largest corn exporting nation. Aside from damages to ports and grain storage facilities, estimates indicate about one-third of Ukraine farmland is contaminated with land mines. In 2022, Ukraine harvested 27 MMT of corn. For 2023, Ukraine's expected corn production is 25 MMT, 40% lower than their pre-war record of 42.1 MMT in 2021. Similar declines are expected for wheat and other grains. When the war began, Ukraine's vital food and fertilizer exports halted. As part of the Black Sea Grain Initiative brokered in July 2022, Russia permitted Ukrainian exports from certain ports. Russia did not agree to extend the agreement when it came up for renewal in July 2023. Initially it seemed Ukraine could utilize other routes, but Russia has also attached several of Ukraine's ports and grain storage facilities damaging their grain supply and their ability to utilize some alternative routes. ***Summary: Russia's refusal to renew the agreement and attacks on Ukraine have reduced grain supplies available for the world market.***

FARM FACTORS

Crop Conditions & Weather: Corn planting progressed smoothly across most of the corn belt and areas with initial delays ended with fitting conditions to get the crop planted in a timely matter. Since planting, crop conditions have been of high interest as drought spread across the corn belt. Crop conditions have improved in recent weeks, currently 57% rated good or excellent as of August 6th, compared to 58% at this stage last year and 65% average of the last five years. Throughout this growing season conditions have lagged the comparable week last year by anywhere from 4% to 17%. This week good or excellent rated corn jumped 2%, while conditions dropped 3% in the same week last year. As of August 1st, 57% of corn production was within an area experiencing drought. The peak corn production area within drought was 70% as of June 27th. Much needed rain throughout the month of July brought relief to drought-stricken regions. Overall, the corn crop is progressing slightly ahead of normal pace. In the most recent report, 93% of the corn is silking compared to 91% five-year average, 47% of the corn is in the dough stage compared to 46% five-year average, and 8% is dented, equal to the five-year average. Given the combination of improved weather, improved crop conditions, and on-target progression in crop stages, there isn't likely to be as much pressure on corn yields as was anticipated in late June and early July. ***Summary: Timely rainfall brought relief to some corn production areas and will help mitigate lost yield potential, but there will likely be a lot of regional variation in corn yields depending on where and when rain was received.***

Income Outlook: Both USDA and FAPRI project net farm income for 2023 and 2024 lower than record highs in 2022. For 2023, USDA forecasts 2023 net farm income of $136.9 billion while FAPRI forecasts $131.3 billion. The Ag Economists' Monthly Monitor reports the responses of nearly 50 agriculture economists from private and public sectors. In June, respondent projections for net farm income varied by $51 billion from the highest to the lowest estimate. In July, the average survey expectation for net farm income was $132.8 billion, lower than UDSA, but higher than FAPRI. Both USDA and FAPRI will update their baseline projections in late August providing additional insight. USDA updated corn cost of production forecasts in June for 2023 and added 2024, following a May update of the 2022 figures. Total operating costs for corn were $481 per acre in 2022, with costs expected to drop to $446 per acre for 2023 and $409 per acre for 2024. Fertilizer was 46% of operating costs in 2022 and makes up approximately 40% of operating costs in both projection years years. Given fluctuation in fertilizer prices during the normal purchase periods for the 2022 and 2023 crop, actual farm fertilizer costs will vary greatly depending on timing of fertilizer purchases. Total costs were $911 per acre in 2022, with projections for $888 per acre in 2023 and $856 per acre in 2024. Land cost is another substantial cost figure that varies significantly across farms and regions. For 2023/24, USDA is projecting a 177.5 bushel per acre corn yield and $4.80 per bushel price. On average, the breakeven land cost given these figures comes out to -$36.23 per acre compared to $247 for 2022. ***Summary: 2023 net farm incomes are expected to be lower than the record high incomes of 2022.***

Safety Net: Federal spending on farm-related programs has been high in recent years, largely due to short-term, ad-hoc programs, not assumed for 2023 crop year. Given the price and yield outlook for corn, Title 1 farm programs also would not add to income for 2023. ***Summary: While government programs have boosted farm income in recent years, government funds are not likely to be a major contributor to farm income for 2023.***