STATE OF THE CORN ECONOMY

QUARTERLY ECONOMIC REPORT | END OF 1Q 2023

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REPORT PREVIEW

Among the many factors that impact U.S. corn, the first quarter of 2023 brought a decree from Mexico to ban GMO white corn, a resurgence in sluggish corn export pace, the one-year mark of Russia's invasion into agriculture producer Ukraine, bank failures, and interesting macroeconomic dynamics. Looking ahead, the U.S. is poised to produce a record crop in 2023, but planting is just getting started and there are many hurdles to cross to get to that point. Record production will be great for our 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 April 2023 World Agriculture Supply & Demand Estimates (WASDE) report the United States Department of Agriculture (USDA) reduced corn imports by 10 million bushels to 40 million bushels for the 2022/23 marketing year. Of more interest on the supply side is the 2023/24 marketing year. Although not included in the WASDE report until May, the USDA March Prospective Plantings Report indicates farmer intentions to plant 92 million acres of corn. Assuming the same planted to harvested acre ratio the USDA used for 2023/24 in the long-term forecast, expected harvested acres are 84 million. The USDA previously forecasted yield for 2023 at 181.5 bushels per acre. Applying that yield over 84 million harvested acres resulted in 15,248 million bushels for a production estimate. ***Summary: The 15,248 million bushels would mean a lot of corn in the market, surpassing the 15,148-million-bushel production record from 2016.***

Demand: USDA unexpectedly reduced Food, Seed, & Industrial use by 10 million bushels in the April WASDE. Ethanol makes up more than three-quarters of that category, but the deduction was unrelated to ethanol. In previous WASDE reports, USDA reduced export expectations, but no additional export changes were made in the April report. China's return to buying U.S. corn in several large daily sales over the past month drew attention, but China's total U.S. corn imports since the beginning of March at 606 MMT are short of Mexico (2,150 MMT), Japan (1,103 MMT), and Columbia (765 MMT). Current marketing year corn exports have lagged the pace of recent years and trend pace that would be needed to hit USDA's current forecast. However, USDA likely opted against adjustments to exports in the April WASDE, to evaluate potential for continued growth in export pace, particularly between now and June when Brazil begins their second corn harvest. Ethanol and feed are important components of demand, but likely to hold at or near current projections for the remainder of this marketing year. Ethanol faces challenges with slowing gasoline consumption, which has resulted in adjustments in previous WASDE reports, but there is positive momentum for policy changes to allow for higher blends. Feed demand is dependent on livestock to consume it, which is the challenge for feed use. For the first time in nearly a decade, total red meat and poultry production is forecast to decrease in 2023, despite increases in pork (+1.5%), broiler meat (+1.2%) and turkey production (+6.9%). The overall drop is driven by the forecast decline in beef production (-5.7%), given beef cattle inventories are at the lowest point in more than six decades. ***Summary: The 2022/23 demand is not likely to change considerably in the coming months. Continued efforts in existing and new uses are important for the upcoming year, particularly looking ahead at potential for record production in 2023.***

Ending Stocks: The reduction in Food, Seed, & Industrial use was an equal offset to the reduction in imports on the supply side, meaning ending stocks for 2022/23 were unchanged at 1,342 million bushels. Interestingly, the March 2023 quarterly stocks report indicated a drawback in corn ending stocks for the 2022/23 year could be expected, but USDA didn't make that adjustment in this report. Assuming little to no change in demand in the May or June reports, it will be interesting to see where June quarterly stocks numbers come in, and if that results in changes in the July WASDE as we approach the end of the marketing year. While this isn't likely to be a huge number, any downward adjustment to 2022/23 ending stocks would lower beginning stocks for 2023/24 marketing year. ***Summary: Any downward adjustments to 2022/23 ending stocks in the coming months could spur positive price reaction for old crop corn.***

Price Trends: USDA projects the 2022/23 marketing year average (MYA) farm price at $6.60. The May futures contract is currently trading in the $6.50s range. The national average basis for corn has been approximately $0.10 per bushel over May futures, putting average farm price right at the MYA projection at this point in time. Given current cash prices relatively close to the projected price and the weighting of bushels already sold in the MYA price calculation, little change in the projected 2022/23 MYA price is expected at this point. Looking ahead, USDA projects the 2023 MYA price a dollar lower at $5.60. The December 2023 futures contract has fluctuated from just above $5.40 and just below $6.80 over the past year. Currently, the trade price is very close to the $5.60 MYA price projection. For added reference, the University of Missouri Food and Agriculture Policy Research Institute (FAPRI) projects a lower 2023/24 MYA price at $5.32. ***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: In the April WASDE, USDA lowered corn production forecasts for Argentina, the EU, Serbia, and Uruguay. Those declines were partially offset by an increase for Russia due to increases in both area and yield. The biggest influence on the global market is the cut for Argentina, lowered by 3 million metric tons (MMT) to 37.0 MMT. The drought has taken a toll on Argentina's production, and some analysts still believe that could be trimmed further to the 35 MMT range. Overall changes resulted in global ending stocks dropping by 1.1 MMT from last month to 295.3 MMT. Brazil corn production wasn't changed in this WASDE report, but the nation is projected to set a record at 133 MMT, 8 million more than last year with a 1.3% increase in planted area and generally better growing weather. A new corn production estimate from Brazil's government agency CONAB is due out this week. ***Summary: Although ending stocks on the U.S. side weren't adjusted lower as the trade expected, tighter supply from the reduction in global ending stocks for 2022/23 is positive for price potential.***

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 policy concern. The annual rate for Consumer Price Index (CPI), one measure of inflation, was 5.0% for March 2023. That is a sizeable deceleration from the 6% annual rate in February and 9.1% peak in June 2022, but remains well above the Federal Reserve ("Fed") target rate of 2%. The decline in energy prices from a year ago is a big factor in the annual change in CPI in March, as compared to February. This makes Core CPI, the CPI without food and energy components, an important consideration. The March 2023 Core CPI is 5.6%, up from 5.5% in February. The Fed prioritizes Core CPI, so not seeing decline in that figure is notable. 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 improved but remains well above the 2% Fed target rate.***

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 4.75% to 5.00%. Loan type and term influence farm loan rates but adding 4% to the federal funds rate is a gauge. The added cost of financing variable costs of production for corn on an operating note at the March 2023 interest rate compared to the March 2022 interest rate equates to the value of about 1 to 2+ bushels of corn depending on time financed. Looking ahead, FOMC notes indicate another 25-basis-point increase is likely at the May or June FOMC meeting and then holding rates constant through most or all of 2023. Current market expectations put a 70% probability of that increase at the next FOMC meeting on May 2-3, which would result in a 5% shift in target range in a fourteen-month period. 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. First quarter bank earnings statements will start rolling out on Friday of this week and may also influence Fed decisions in May. ***Summary: One more interest rate increase is likely, and then a period of no change.***

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% since November 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 9.9% more units of a foreign currency to purchase U.S. corn. Outlook for the dollar varies among financial analysts, with a range from neutral to 10% to 15% depreciation in value, not surprising given the variation in future interest rate expectations. ***Summary: The potential for a 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 February 2023 for the eleventh consecutive month. The March 2023 data due on April 20, 2023, is going to be an important figure to watch. An individual economic indicator that has received added attention amin recent bank failures 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 March the inversion was at the widest position since 1981. Since the failure of Silicon Valley Bank, the inversion has narrowed some, but it still points toward recession. ***Summary: Although production agriculture runs in a race with the rest of the economy, it doesn't always follow the same course. Other factors impacting production agriculture are economic conditions of trade partners and other producers, the value of the dollar related to other currencies, weather, geopolitical relationships, and policy related to agriculture.***

Crude Oil Prices: In early April 2023, the coalition of oil producers known as OPEC+ announced it would cut oil production by 1.66 million barrels per day. Given supply disruptions in Iraq and elsewhere, the actual cut to current global production would actually be closer to 1 million barrels per day. The nearest-term Brent crude futures are the international benchmark for oil prices. Prices had been trending upward from under $70 per barrel in mid-March but jumped on the announcement and have maintained in the $80 to $85 per barrel range. The U.S. regular gasoline price as reported by the U.S. Energy Administration indicates gasoline prices jumped 17.5 cents per gallon in the two-week period from March 27 to April 10, 2023. The potential impact on gasoline prices is a concern for CPI and efforts to control inflation. After the initial jump in oil futures prices, prices have remained fairly level so far as opposed to continued upward movement which would lead to greater concern about inflationary pressures. ***Summary: This could be a sign of higher fuel prices for this year.***

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. Anhydrous ammonia and 28% Nitrogen solutions are more than 80% above the historical average while urea is 50% above historical average. Phosphorus fertilizers DAP and MAP are 56% and 46% higher than the historical average, respectively. Potash is 30% above the historical average. The have been large swings in fertilizer costs across the normal buying season for both the 2022 and 2023 crops. ***Summary: USDA is projecting lower corn fertilizer costs for the 2023 crop year, but that will only be true for farmers who purchased in the spring of 2022 and 2023. Farmers who purchased in early Fall 2021 for the 2022 crop and early Fall 2022 for the 2023 crop who have higher fertilizer costs for the 2023 corn crop. The University of Missouri Food and Agriculture Policy Research Institute (FAPRI) projects very little change in average fertilizer costs for corn from 2022 to 2023. On average, this is more accurate.***

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 response to the decree to ban use of GMO white corn for human consumption issued by Mexico in February, the U.S. initiated technical consultations in early March. This is the first procedural step that could lead to a dispute resolution. 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 January for which global data is available, the U.S. only accounted for 75% of Mexico's corn imports. ***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, largely for livestock feed. More than a quarter of U.S. corn exports went to China in the past two marketing years. China's current market year purchases lag recent years. China gained Brazil as a corn source, importing corn from Brazil for the first time in November 2022. In the past month, China's large daily purchases have drawn attention, after a major slowdown in purchases for a period earlier this year. However, recent weekly totals haven't exceeded China's average weekly purchases this marketing year. China likely returned to the U.S. market for a several reasons. Brazil is now between peak harvest seasons. The March U.S. corn price was cheaper than China's nearly $10.50 per bushel price at the time, and competitive globally with Brazil and Ukraine. While price and supply influenced decisions, China also finally reopened from COVID earlier this year boosting demand. Brazil will bring new supply on the market when corn harvest begins in June, but price competitiveness will remain a factor for China. A major use of corn in China is hog feed. After herds recovered from African Swine Fever the 2018 disease outbreak, there are new reports of infections, but status of the outbreak remains conversional. ***Summary: China's strong current demand could be impacted if ASF infections reduce herd size. China added Brazil as source and will seek supplier with the lowest cost available corn. Brazil will have new crop before the U.S., but weather impacts in both nations will be important in the coming months.***

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 over one-quarter of world corn exports forecast for the 2022/23 marketing year. The U.S. is also expected to supply approximately one-quarter of world exports this marketing year, trending 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 and will likely continue to grow by expanding into new markets, such as the recent deal with China. ***Summary: Brazil as a market for China adds huge competition as a supplier in the world marketplace for corn.***

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 53.1 MMT of grain, primarily corn, wheat, and barley. Ukraine's grain harvest is likely to fall further in 2023, with harvested grain forecast at 44.3 MMT, just over half of the pre-war record 86 MMT in 2021. 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. Renewal of the agreement pushes expiration to May 18, 2023, notably before Ukraine's summer wheat harvest when an influx of grain will be available. Announcements from Russia in recent weeks indicate another renewal of the agreement is not likely if their demands for removal of sanctions are not met. ***Summary: If Russia refuses to renew the agreement blocking grain exports from Ukraine it would boost demand for U.S. grain but could also limit supply of nutrient and energy commodities from Russia, Ukraine, and Belarus in the world market.***

FARM FACTORS

Planting Progress & Weather: The latest USDA crop progress report shows corn planting at 3% complete for 2023, ahead of the 2% five-year average and last year's pace. Planting is ahead of average across most of the seven states with planting progress, North Carolina and Tennessee are exceptions. Across much of the corn belt weather conditions are fit for planting this week and look positive for next week, indicating rapid rise in progress numbers can be expected. The northern corn growing regions hit with early spring snowfall are now warmer than normal, allowing remaining snowpack to melt and potential for planting sooner than what may have been expected a few weeks ago. If good planting conditions are realized between now and mid-May, farmers are less likely to make delay related changes, increasing likelihood of hitting or surpassing the USDA planting intentions 92 million corn acres. Looking ahead to growing season weather, La Nina conditions that persisted in recent years have moved out and building of El Nino conditions is apparent. Going back to 1992, above trend yields have occurred in more than 60% of El Nino years, while below trend yields were within one standard deviation of trend in those years. The years with the greatest yields above trend have all been El Nino years. The USDA yield projection of 181.5 bushels per acre is above a historical linear trendline projection, but atmospheric conditions that could support that yield level seem to be aligning. ***Summary: Across much of the U.S. corn belt weather has been cooperative for a good start to planting, and growing season weather could be optimal for a record yield.***

Income Outlook: The latest FAPRI projections, released in late March, show net farm income for 2023 and 2024 lower than record highs of 2022. For corn, FAPRI projects average variable costs of production for 2023 to be almost the same as 2022; both years round to $475 per acre. Fertilizer is about 45% of variable costs in both years. Given fluctuation in fertilizer prices during the normal purchase period, actual farm fertilizer costs will vary greatly depending on timing of fertilizer purchases. FAPRI corn price and yield projections for 2023 are lower than USDA projections, with farm price at $5.32 and yield at 181 bushels per acre equating to a $963 per acre gross market revenue for corn. After variable costs, this results in a market return of $488 per acre, almost 30% lower than FAPRI's market return for 2022 at $685 per acre. Overhead and land costs would be deducted from the market return to calculate total net returns per acre, though FAPRI does not show those projections by crop. USDA projects farm overhead at $245 per acre for 2023 and opportunity cost of land at $165 per acre. Combining these figures, average net returns for corn are expected to be $77.40 per acre. Land costs vary significantly across farms and regions. On average, the 2023 breakeven land cost given these figures comes out to $243 per acre compared to $437 for 2022. ***Summary: 2023 net farm incomes are expected to be lower than the record high incomes of 2022. Costs and expected returns for corn still provide opportunities for profitability but margins will be tight on high-cost land and farms with higher priced fertilizer purchases. But market year average price assumptions may also differ from the actual farm price received.***

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.***