CoBank Knowledge Exchange

THE QUARTERLY

Dedicated to the industries financed by CoBank

October 2021

Adapting to Persistent Supply Disruptions

Businesses of all sizes and across most industries are wrestling with perhaps the worst supply chain bottlenecks to date.

Executive Summary

Entering the final quarter of 2021, the U.S. economy and rural industries seem to be transitioning into yet another phase of the COVID pandemic. As the delta variant surge subsides, and the economic recovery continues at a healthy pace, businesses of all sizes and across most industries are wrestling with perhaps the worst supply chain bottlenecks to date. Supply chain disruptions and labor shortages are adding significant costs to business operations, and consumers will feel these effects through higher prices for months to come.

Rapidly rising input costs and product shortages are hitting agriculture particularly hard, as ag commodity prices have flattened and inflation compresses margins. Robust agricultural exports have kept much of agriculture in the black, however, and credit conditions remain strong as harvest season enters full swing.

Persistent drought in the West and Northern Plains regions pose challenges for the water, power, and agricultural sectors as water shortages have threatened power generation in some areas. Natural gas prices have also soared, rising more than 150% since April, adding significant costs to many power generators.

And the communications sector continues wrestling with the multi-billion dollar question of who should pay for the necessary investments in rural broadband infrastructure. Wireless users and big tech companies are being called on to contribute more.

Topics In this Issue:

This quarterly update is prepared by the Knowledge Exchange division and cover the key industries served by CoBank, including the agricultural markets and the rural infrastructure industries.

Inside this issue

CoBANK KNOWLEDGE EXCHANGE

SPOTLIGHT

China Trade Policy: The New Looks a Lot Like the Old

By Dan Kowalski

For the first time in Biden's presidency, U.S.-China trade policy is back in focus. This week, U.S. Trade Representative Katherine Tai outlined the Biden administration's stance on China. She provided few details, but made it clear that existing tariffs on Chinese goods will remain in place and that the U.S. will enforce China's purchasing obligations under the Phase One deal. Beyond that, details were scant. Tai made it clear that other policy tools could be used to apply more pressure to China, but next steps will be determined by the outcome of upcoming bilateral talks.

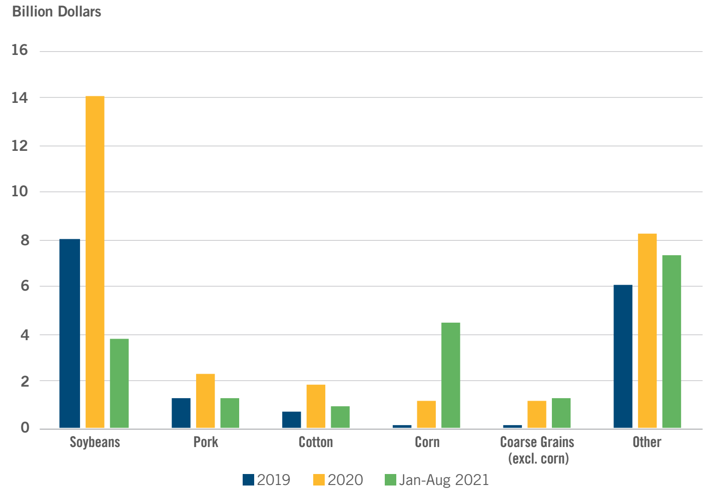
The Phase One agreement will sunset at the close of 2021, and it is unclear how the U.S. intends to enforce the deal. Chad Bown of the Peterson Institute of International Economics is widely viewed as the unofficial "scorecard" keeper on the Phase One deal, and he calculates that as of August, China was well behind pace of its two-year obligations, having purchased only 61% of its prorated commitments.

Two of the three included product categories fell even shorter, with manufactured goods at 59% of the prorated target and energy tracking at a paltry 39%. In sharp contrast, however, agricultural exports were at 85% of target, with the seasonal post-harvest peak yet to come. If soybean exports are strong before year end, China could actually meet its 2021 agriculture obligations, if not its combined two-year commitment.

The looming uncertainty for U.S. agriculture exports to China is now 2022. Without purchasing commitments and with Chinese tariffs still in place on most U.S. ag goods, U.S. agriculture will soon find out whether China intends to keep buying at the recent torrid pace. Soybeans will make up roughly two-thirds of China's agricultural Phase One purchases, so continued strong U.S. exports will depend largely on Brazil's drought conditions and the size of its harvest in early 2022.

The USDA currently projects that China will import $39 billion of U.S. ag products in 2022, up from an estimated $37 billion in 2021. Most of this increase is forecast to come from higher soybean prices, which will offset a decline in soybean export volume. USDA foresees weaker overall demand from China, even as it makes larger purchases from Brazil. U.S. soybean exporters are expected to contend with low exportable supplies and relatively high prices. So while the China trade forecast looks promising for the coming year, success will be much more dependent on prices remaining high as volume is likely to fall.

EXHIBIT 1: U.S. Exports to China



Source: USDA-FAS

MACRO ECONOMIC OUTLOOK

A Healthy Economy, Unhealthy Supply Chains

By Dan Kowalski

The U.S economy is still very much in the grips of the pandemic. Its negative influence, however, has steadily shifted from a demand-side impact to one on the supply side. Roughly 80% of the U.S. adult population has now received at least one vaccination shot, making most people feel safe enough to engage in most public activities. And consumers are still flush with cash, spending robustly on both services and goods, and keeping the economy humming.

But supply chains are arguably in the most dire condition since the start of the pandemic. Lead times for manufacturing inputs recently reached record highs, while retailers are spending millions to charter container vessels to ensure shipments reach stores in time for holiday shopping. And this scramble to keep supply chains intact is driving up costs. The latest producer price index (PPI) data for August was up 20% year-over-year (YoY). The consumer price index increased 5.2% YoY in August, meaning that many businesses are paying much higher costs and passing only a small portion of those costs on to the final consumer. Many businesses have been holding off on raising prices, but will finally do so in Q4 or Q1 2022.

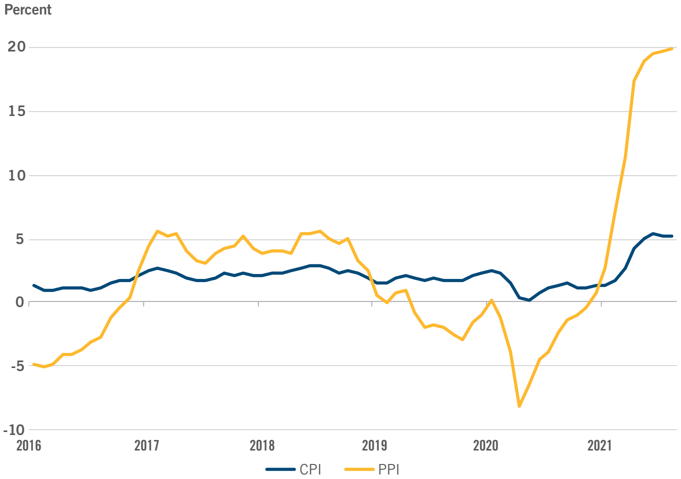
Supply chain snarls are likely to persist well into 2022, and so will elevated inflation. The Federal Reserve has adjusted its tone on inflation, with Chair Powell recently admitting that inflation is now more broad and structural than earlier in the year.

1 **Supply chains** are arguably **in the most dire condition since the start of the pandemic.**

2 **Fed Chair Powell** recently admitted that **inflation is now more broad and structural** than earlier in the year.

EXHIBIT 1: Producer and Consumer Price Indices

YoY Change



Source: Federal Reserve Bank of St. Louis, BLS

EXHIBIT 2: S&P GSCI Energy Price Index

Source: S&P and Dow Jones

The Fed will begin tapering its $120 billion per month security purchases in November, and then eye a potential rate hike in late 2022 or early 2023. One major challenge the Fed faces is that monetary policy is a very effective tool to combat demand-driven inflation. In years past, it has not been particularly effective in combatting supply-driven inflation.

Amidst all of this, energy prices have surged, with few indications of a near-term reversal. The dollar has also been steadily rising for months, and the yield curve is steepening again. All three of these factors could be interpreted as signs of a healthy economic recovery. They could also be simply reflections of the supply and inflation challenges being experienced throughout the economy. In this case, the explanations are not mutually exclusive. The economy is on a strong growth path, but inflation is hastening expectations on the Fed's timeframe to tighten monetary policy. For those in agriculture, this confluence of factors poses a headwind and creates even higher operating costs to close out the calendar year.

In Washington, Congress has been playing with fire as it debates how to raise the federal debt ceiling. Treasury Secretary Yellen has said the ceiling must be increased by Oct. 18, or the U.S. risks defaulting on its debt payments. This potential outcome is sufficiently catastrophic that we are confident a deal will be struck, even if it is done through a Democrat-led reconciliation process. Congress will then have to approve another spending bill by early December to avoid a government shutdown. And between the two deadlines, President Biden and Senate Majority Leader Schumer will attempt to bridge the Democrats' intra-party divide to pass two bills covering infrastructure and social safety nets. In its current form, the infrastructure bill would have significant positive implications for CoBank customers across the agriculture, communications, water, and power sectors.

3 **The economy is on a strong growth path, but inflation is hastening expectations on the Fed's timeframe to tighten monetary policy.**

GRAINS

Prices Have Declined to Support; Waiting on Harvest

By Kenneth Scott Zuckerberg

Corn, soybean, and wheat prices have declined from their highs during the third quarter, but have reached critical support levels–including the psychologically important $5/bu. level for No. 2 yellow corn. Immediate price-moving catalysts include harvest data for Midwestern corn and soybeans and resumed export activities. Balancing the factors discussed below, we see grain prices stabilizing and likely rebounding from current levels after the results of harvest.

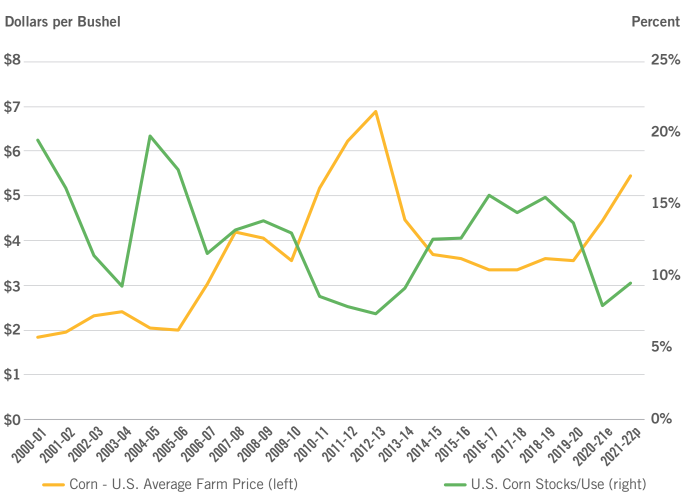
Grain prices corrected from their recent highs amidst dueling narratives over the past three months. The bullish argument for prices included extreme summer heat and drought, continued seasonal (albeit somewhat lower than 2020) grain purchases by China, and tight stocks-to-use ratios for soybeans and corn. The negative argument focused on a reduction in managed money long positions which peaked in May, a major slowdown of exports out of the Gulf since late August due to Hurricane Ida's impact on grain terminal operations, and declining ethanol production since August.

With the U.S. soybean and corn crop harvest underway, seasonal price volatility is another immediate crosscurrent. Prices tend to show seasonal weakness due to

1 **Grain prices have corrected from their summer highs** due to a confluence of factors and are generally range-bound for now.

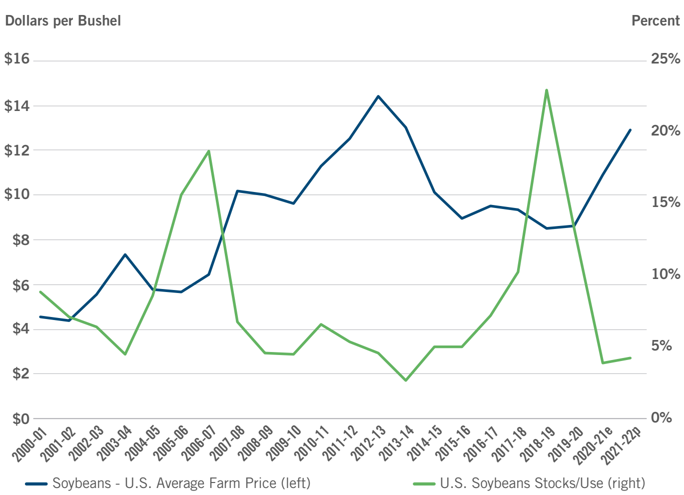
2 **The next major catalysts** for the sector are **fall harvest, normalization of Gulf port activities, and China purchases of U.S. grain.**

EXHIBIT 1: Corn Farm Price and Stocks/Use



Source: USDA data as of Sept. 12, 2021

EXHIBIT 2: Soybean Farm Price and Stocks/Use



Source: USDA data as of Sept. 12, 2021 "harvest pressure" i.e., farmers begin selling grain during harvest as yield visibility emerges. On the flipside, there are numerous fundamental drivers for price support, including continued tight supplies and rising demand for soybean and other vegetable oils for use in "green fuel" (namely renewable diesel).

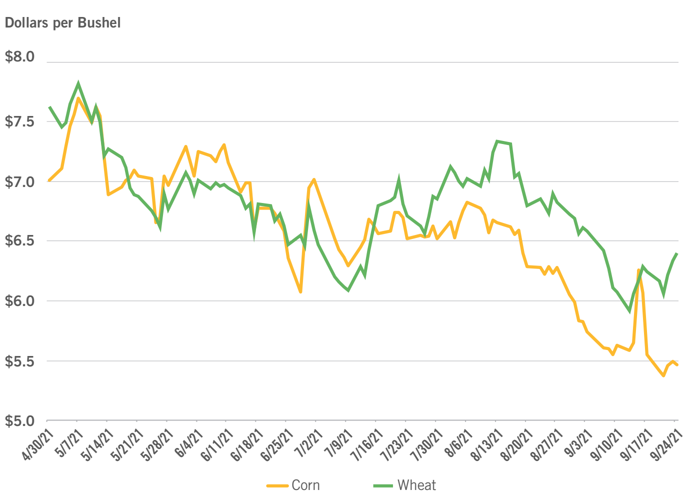
Looking forward, we remain focused on planting intentions and crop progress for South American corn and soybean production and wheat yields and exports from Australia and the Black Sea region (Russia and Ukraine). An interesting dynamic during the summer months was an abundance of global wheat supplies that provided China with a feed alternative and helped alleviate the tightness in the U.S. corn supplies. The issue now is that this summer's rise in wheat prices will alter the "feed arbitrage" situation. This ought to favor U.S. corn given current low prices.

The export picture remains cloudy in the short term as grain terminal operations in the U.S. Gulf are just beginning to open after Hurricane Ida, and export volumes remain depressed. That said, the current corn and soybean crop marketing years have just begun, thus it is too early to sound the alarm on U.S. exports to China for 2021-22.

3 **Looking beyond three months, our focus will be on planting activities for Brazil and Argentina and wheat production from Australia, Russia, and Ukraine.**

4 **Interestingly, China's rising demand and higher current and expected wheat prices may reverse the "feed arbitrage" back in favor of corn.**

EXHIBIT 3: Corn vs. Wheat Prices Since May 2021



Source: Barchart.com

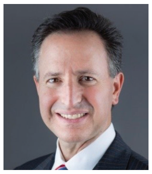
EXHIBIT 4: Private Exporter Flash Soybean Sales to China

Date	Crop Year 2021/22 Sales (Metric Tons)
9/27/2021	334,000
9/17/2021	132,000
9/16/2021	132,000
9/10/2021	132,000
9/9/2021	132,000
9/8/2021	106,000
9/3/2021	130,000
9/2/2021	126,000
8/30/2021	256,000
Total	**1,480,000**

Source: USDA

FARM SUPPLY

Is a Fourth Strong Agronomy Season on the Horizon?



By Kenneth Scott Zuckerberg

After a growing season with extreme temperatures and drought conditions, the outlook for ag retailers remains generally positive against the backdrop of strong net farm income and steady demand for crop inputs. Barring any extreme weather events during harvest, farm supply cooperatives should see a favorable fall agronomy season. In fact, ag retailers appear well-positioned for a fourth consecutive strong agronomy season for several reasons: One, farm-gate grain prices remain in excess of the current average costs of production. Two, farmer income remains quite robust, on both an absolute basis and excluding direct federal support. Three, input demand remains strong with expectations of higher planted acres in 2022. And four, prepayments of crop inputs from farmers to cooperatives are increasing, providing the latter with increased cash and liquidity heading into the fourth quarter.

On the flipside, ag retailers are contending with various risks beyond weather. Fertilizer prices have skyrocketed due to rising demand, and more recently, higher costs of natural gas (a key feedstock for ammonia and urea, two important nitrogen fertilizers). The risk is valuation. For example, a retailer buying anhydrous ammonia today at elevated prices could see a downward inventory valuation adjustment for unsold product if grain/commodity and thus fertilizers correct in early 2022. Another risk is COVID-related crop chemical production and transportation disruptions in China and India that may lead to potential shortages in the U.S. If certain herbicides, pesticides, and insecticides are unavailable in 2022, farm supply cooperatives could experience sales and profit pressures.

1 **Ag retailers** are benefitting from **continued strong input demand,** supported by above-average U.S. grain prices and net farm income.

2 Beyond weather, **skyrocketing fertilizer prices and crop chemical shortages** are **two key short-term risk factors.**

EXHIBIT 1: U.S. Net Farm Income

2014 to 2021F

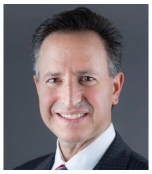
Source: USDA as of Sept. 2, 2021

EXHIBIT 2: Green Markets North America Fertilizer Index

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

BIOFUELS

Lower Corn Input Prices Drive Margin Improvement



By Kenneth Scott Zuckerberg

The U.S. fuel ethanol sector saw mixed performance in the past quarter as production fell but operating margins increased dramatically. The regulatory environment remains dynamic with recent calls for the EPA to reduce renewable fuel standards (RFS) despite the proven carbon-reduction benefits of corn-based ethanol. Ironically, this comes as EPA works on promoting other clean technologies.

Domestic fuel ethanol production declined this quarter due to planned plant maintenance, as well as economic concerns over the COVID delta variant and supply-chain bottlenecks, which weighed on U.S. business activity. The drop in production was meaningful, from a post-COVID weekly peak of 16.4 billion gallons to 14.2 billion gallons (both figures are annualized).

Despite the production decline, margins more than doubled in the third quarter from \$0.20/gallon to \$0.43/gallon (average pretax operating margins for a representative Iowa dry-mill fuel corn-ethanol production plant, July 1-Sept. 16, 2021). Higher ethanol prices, lower corn input costs, and efficiency gains more than offset the rise in natural gas prices and contributed to the increase.

U.S. biofuel policy continues to create tension between agriculture and fossil fuel interests. The latest debate is EPA's proposed RFS blending volume requirements, which would reduce total renewable volume obligations (RVOs) from the current baseline target of 20.1 billion. While the outcome is unclear, this change is causing angst for corn farmers and ethanol producers.

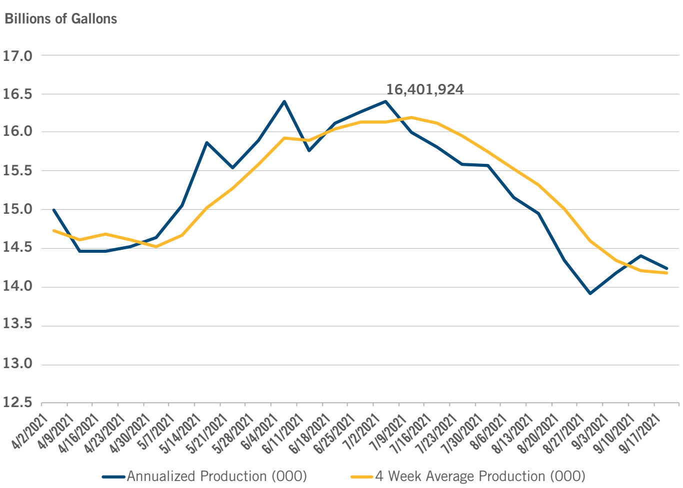
1 **Fuel ethanol production fell by more than 12%** from the July peak due to plant closures and a softer economy.

2 However, **average daily margins** during the quarter **rose sharply – from \$0.20 to \$0.43/gallon currently –** driven by lower corn input costs.

3 **U.S. biofuel policy** continues to be **an area of friction** between farmers, ethanol producers, and fossil fuel refineries.

EXHIBIT 1: U.S. Fuel Ethanol Production

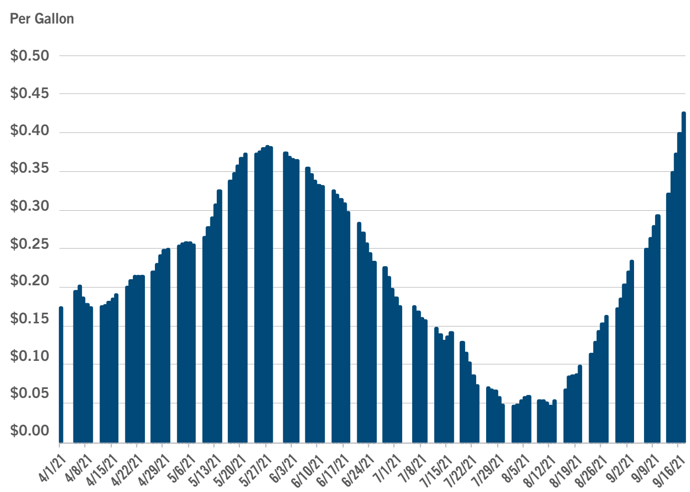
April 2021 to Present



Source: EIA, data as of September 17, 2021

EXHIBIT 2: Fuel Ethanol Average Daily Operating Margin

30 Day Moving Average



Source: Iowa State University, Data through September 16, 2021

ANIMAL PROTEIN

Re-opened Dining Tests Protein Industry Processing Capacity

By Brian Earnest

As dining restrictions eased by Memorial Day, the food service sector's returning demand strengthened the protein complex the rest of the summer. While meat prices softened after Independence Day, they remained elevated historically. Momentum carried through the end of grilling season, though processing constraints largely tied to labor shortages stifled supply growth. While pent-up demand hit the industry this summer, inflation is expected to further test consumers' meat budgets in the fourth quarter.

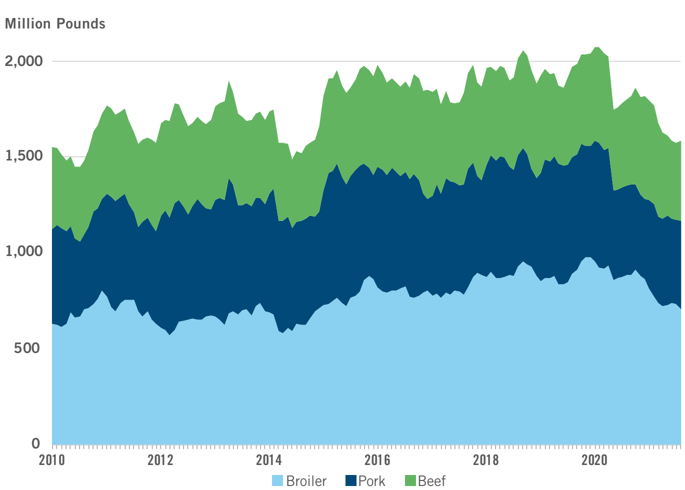
Domestic supply chains continue to deal with disruptions as food service and retail outlets contend for availability. The pressure has been twofold, as elevated domestic consumption conflicted with both rising international opportunity and tight beginning stocks. Total beef, pork, and chicken in cold storage was 20% lower YoY to kick off grilling season, and ending stocks fell another 3% by the end of July. At the same time, international demand has remained robust. Combined U.S. exports of beef, pork, and chicken are forecasted to hit records, up 3% YoY.

Labor shortages continue to dampen productivity and will remain a supply chain concern into 2022. Processors cite slower line times; notably, broiler industry year-to-date weekly processing is down about 1% from a year ago. Saturday cattle slaughter, typically clean-up day for the industry, remains elevated: It exceeded the five-year average by 80% last quarter.

1 The **protein industry overcame new COVID uncertainties** this summer as **both retail and foodservice demand pressured available supplies.**

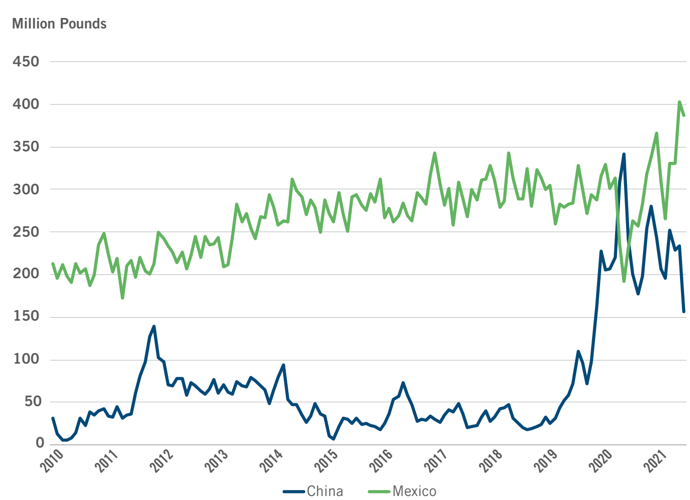
2 **Combined U.S. exports** of beef, pork, and chicken are **forecasted to hit records, up 3% YoY.**

EXHIBIT 1: Total Meat in Freezers



Source: USDA-NASS

EXHIBIT 2: U.S. Beef, Pork, and Broiler Export Volume



Source: USDA ERS

CHICKEN

Extraordinary price support brought on by a confluence of factors – including the famed "chicken sandwich wars" and the sector's limited ability to respond to this demand – has elevated the market base this quarter. Both tight supply and elevated product offtake suggest elevated prices will continue through the fourth quarter compared to what was typical for broiler integrators during 2015-19.

Insatiable domestic consumer appetite for breast meat and wings has combined with improved export demand to maintain historically low ending stocks. Freezer inventories of broiler meat were reported down 3% from the prior month to end August, and 20% below prior year. However, trade growth, or even maintaining current levels, will be a struggle. Mexico, already the largest broiler export market, increased its purchases recently, taking a record 213 million pounds of broiler meat during May, which is nearly double the three-year average. Alternatively, U.S. broiler meat export volume to China plummeted to a 12-month low during April and remains dampened.

The widely cited hatchability issues, labor availability, and elevated feed costs all support industry expectations for production to moderate. However, with only sub-optimal output from integrated broiler production systems, breeder replacements have been at or near record high levels for the last five consecutive months. This suggests that the industry is primed for additional advances to overcome or potentially correct the dampened productivity rates.

1 **Hatchability is constraining production growth.** Compared to a year ago, weekly **incubation rates are up 3-5%, yet harvest is down 1%.**

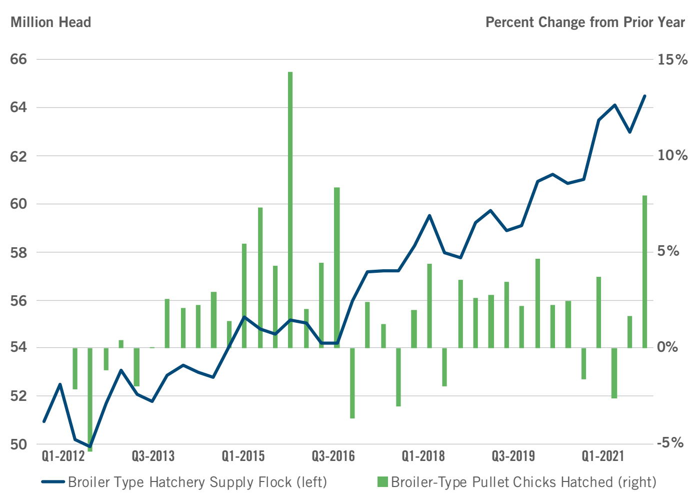
2 **Broiler integrators'** margin potential has improved **as corn and soybean meal prices softened** and **breast meat prices shot up.**

EXHIBIT 3: Wholesale Breast Meat vs. CPI Poultry

Source: USDA, U.S. Bureau of Labor Statistics (FRED)

EXHIBIT 4: Broiler Hatchery Supply Flock

Quarterly Average



Source: USDA, CoBank

BEEF

The U.S. beef industry benefitted from eased dining restrictions in the U.S. and extraordinary foreign interest in the third quarter. Per-head packer margins remain at historic highs. As a result, packers are motivated to continue processing as many head as possible, alleviating the backlog of cattle amassed in the first quarter of 2021.

Weekly harvest levels have tested capacity, and staffing shortages remain a prominent challenge. A recent processing plant fire in Grand Island, Nebraska, briefly disrupted markets, but slaughter and fabrication recovered later that week. Despite headwinds, packers continue to chip away at the remaining backlog of fed cattle. We anticipate that shedding excess cattle will close the gap between availability and processing capacity by early 2022.

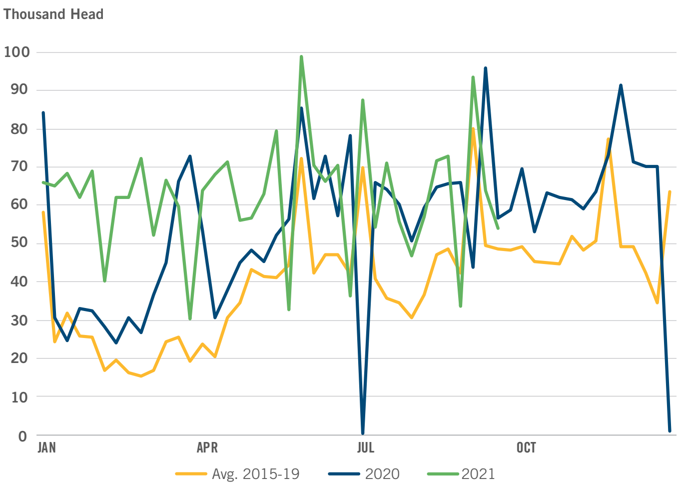
While leverage may be slipping from packers over the next 12 months, beef markets are well supported. During August, the choice boxed beef cutout valuation averaged $322/cwt., up nearly 50% YoY and well above typical. For the first time since 2014, the third quarter choice beef cutout valuation has eclipsed the second.

Exports represent a much smaller percent of beef compared to pork and poultry and is often net negative, with imports exceeding exports. However, U.S. beef exports are on pace to be record large for 2021 overall, with Korea up 17% in volume through July, and China up 137% from 2020. China recently applied for membership to the Trans-Pacific Partnership (TPP), a potential future risk to U.S. beef exports to China.

1 **Choice boxed beef cutout rose** through the third quarter to nearly **80% above the five year average.**

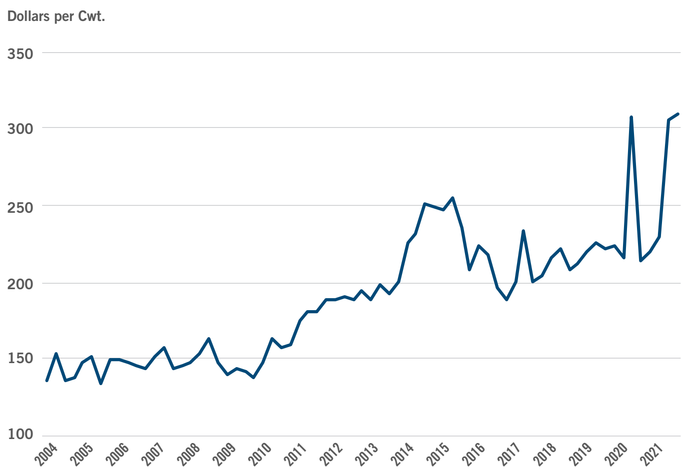
2 The **CME feeder cattle index has remained above $150** through the majority of the third quarter, **a level not achieved since 2018.**

EXHIBIT 5: Saturday Cattle Slaughter
Federally Inspected, Weekly



Source: USDA-AMS

EXHIBIT 6: Quarterly Choice Boxed Beef Cutout Value



Source: USDA-AMS

PORK

The third quarter usually has the tightest supply of hogs available for slaughter, so ample stocks are usually placed in cold storage in preparation. However, lack of market-ready hogs, tighter production schedules, and exceptional meat demand meant May ending stocks were down 160 million pounds or at 75% of average levels during the prior five years. Pork prices and hog values responded favorably to tight supplies, with the cutout up 60% from a year earlier, up 40% from the five year average. Nearby hog futures eclipsed $120/cwt for the first time since 2015.

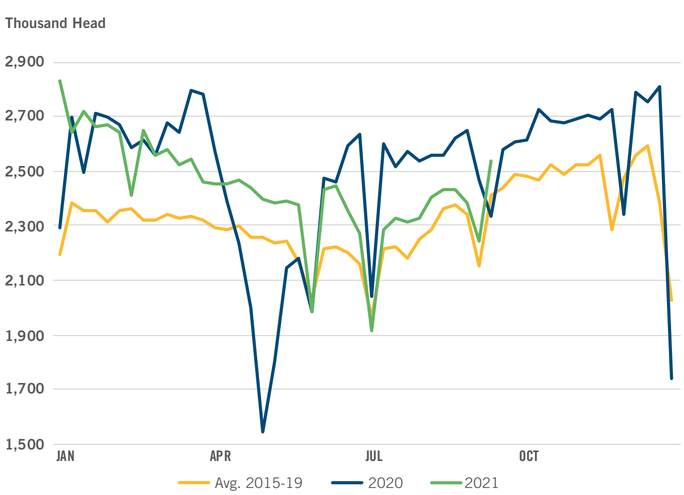
Adding to the bullish market tone, USDA reports the number of swine on U.S. farms as of Sept. 1 at 75.35 million head, 3.9% below a year ago – a surprise to the trade which expected a reduction of 1-1.7% YoY. The swine breeding herd is 6.19 million head, down 2.3% YoY. Pigs saved per litter were up slightly from a year earlier for June-August at a record 11.13 head – not surprising given record high profitability.

Global pork trade grew an estimated 5% YoY during the first six months of the year, but shipments have slowed significantly in the last three months. Exports of U.S. pork to China dropped 62% from a year earlier during July. Some of that volume shifted to Mexico. However, overall U.S. pork exports are expected to be record large this year despite July dipping 8.5% from a year earlier. African Swine Fever (ASF) was found in the Dominican Republic in August, which is a potential risk. However, the U.S. protein production shortfall is expected to continue through 2021.

1 **The discovery of ASF in the western hemisphere creates trepidation: if found in U.S. hogs, ASF could shut down exports overnight.**

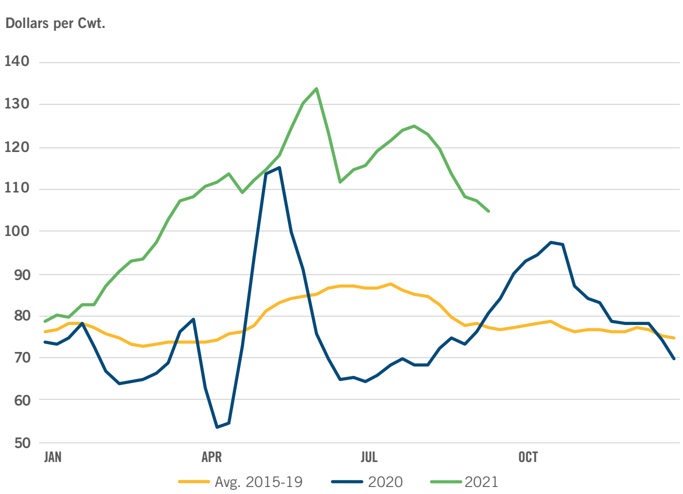
2 **The amount of pigs saved per litter has risen markedly a record of 11.13 head.**

EXHIBIT 7: Hog Slaughter
Federally Inspected, Weekly



Source: USDA-AMS

EXHIBIT 8: Pork Cutout Value
FOB Plant, Negotiated, Weekly



Source: USDA-AMS

DAIRY

Rising Costs Halt U.S. Dairy Herd Expansion

Dairy Production

Rising feed and construction costs stopped the 11-month-long expansion of the U.S. dairy herd last quarter while record hot temperatures dented milk cow productivity.

By Tanner Ehmke

The size of the U.S. cow herd dropped by 29,000 head over three consecutive months into August as dairy farmers culled less-productive animals from the herd. Volatile milk prices, rising feed and construction costs, and lofty beef prices have caused producers to put expansions on hold and instead evaluate culling herds or exiting. Labor tightness also has dairy farmers analyzing purchases or leases of robotic milkers, which have become more cost-effective in the face of rising labor costs.

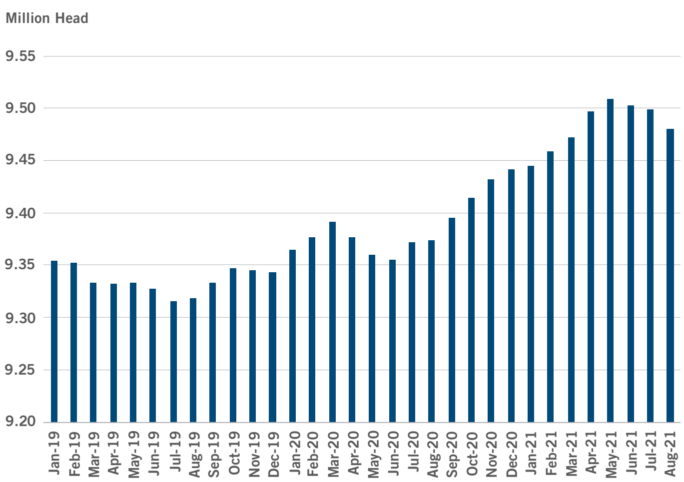
Extreme heat last quarter took a toll on cow productivity with the hottest summer on record hampering cow performance and feed intake. Among key dairy states, only Texas averted extreme heat stress. The combined drop in cow numbers and cow productivity caused nonfat dry milk and skim milk powder output to shrink, particularly in the Southwest. Nonetheless, the U.S. dairy herd is still 106,000 head bigger YoY, allowing production to hold at elevated levels over prior years.

Following a volatile year in milk prices and the resulting negative Producer Price Differentials (PPDs) caused by milk being depooled from Federal Milk Marketing Orders (FMMOs), Sen. Kirsten Gillibrand, chair of the Senate Agriculture Subcommittee on Livestock, Dairy, Poultry, Local Food Systems, and Food Safety and Security, held a

1 **The U.S. dairy cow herd shrank last quarter from high feed and construction costs while cow productivity declined due to record summer heat.**

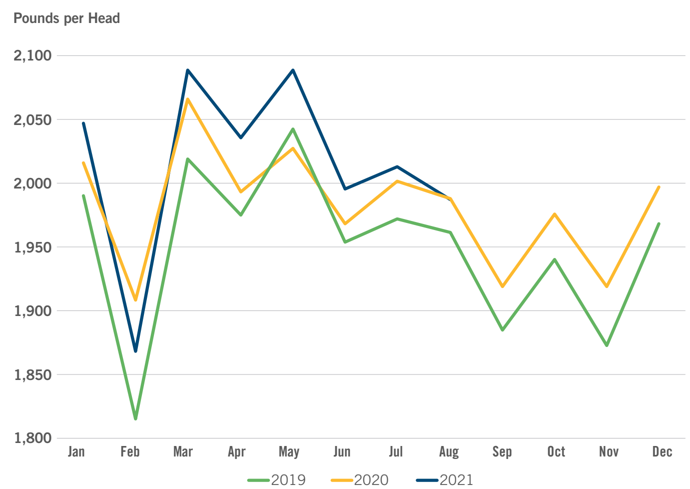
2 **Labor tightness is causing farmers to evaluate purchases or leases of robotic milkers.**

EXHIBIT 1: U.S. Milk Cow Herd



Source: USDA-NASS

EXHIBIT 2: U.S. Milk Cow Productivity



Source: USDA-NASS

hearing in August on the need to modernize the FMMO pricing system. Declining fluid milk consumption, rising production costs, and unfair trade practices from foreign countries were cited as key reasons for the need to re-evaluate uniform pricing rules. The current pricing formula has resulted in record low producer price differentials and is estimated to have cost farmers more than $750 million in lost income, according to the National Milk Producers Federation.

Dairy Processing

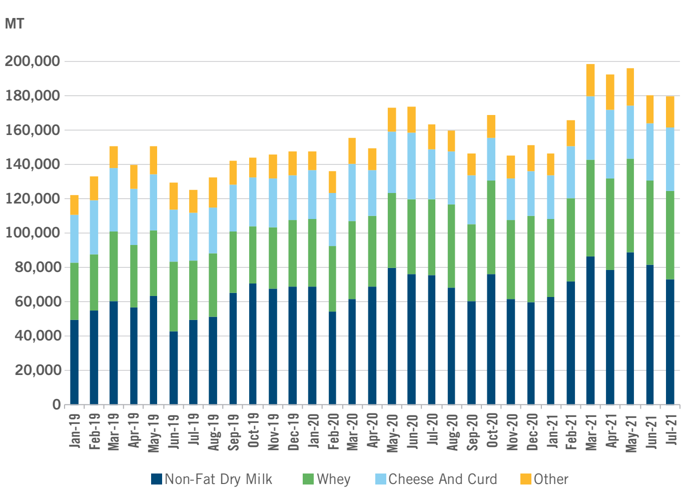
Despite congestion in global supply chains, exporters continue to move big volumes of dairy products, particularly milk powder and cheese to Mexico and Asia. Escalating freight and container costs and recent strength in the U.S. dollar are raising concerns over the durability of the current record export pace.

Domestic demand for dairy products also remains resilient. The return to school is lifting fluid milk demand, and the expanded cheese processing industry's demand for milk is constant and growing. New cheese vats are pulling milk supplies from Class IV manufacturers of powder. In the absence of cheap milk in spot markets, cheesemakers have fortified vats with nonfat dry milk, driving nonfat dry milk prices higher.

Cheese production continues to meet new record highs with the U.S. on track for a record-breaking output year. If cheese makers pull back on production in the quarter ahead as school lunch programs absorb more milk, there is little risk of cheese shortages as inventories of both cheese and butter in cold storage are ample heading into peak usage through the holiday season. The surge in delta variant COVID-19 cases, though, raises concerns of potential school cancelations impacting fluid milk demand in the quarter ahead.

3 **Logistical constraints and dollar strength threaten the durability of the record U.S. dairy export pace.**

EXHIBIT 3: U.S. Dairy Exports*



Source: USDA-FAS
**Excluding Fluid Milk and Cream*

EXHIBIT 4: U.S. Butter and Cheese in Cold Storage

Source: USDA-NASS

COTTON, RICE AND SUGAR

Cotton Prices Continue to Thrive During COVID Recovery

By Rob Fox

By Tanner Ehmke

Cotton

Outperforming both corn and soybeans, U.S. cotton prices have continued their slow but steady escalation over the past 18 months, rising more than 20% since the beginning of the year.

The market shrugged off USDA's September 2021-22 crop report that raised forecast U.S. production by 1.2 million bales to 18.5 million bales. USDA raised projected yield by a whopping 95 lbs/acre to 895 lbs/acre – that would match 2017's record high if it holds. The core growing areas in Texas and the Southeast have had excellent growing conditions, with Texas expected to post its second-largest crop in history. Although acres planted were smaller than in 2020, abandoned acres are forecast at only 11% compared to 31% last year.

A very strong export pace drove 2020-21 U.S. ending stocks-to-use ratio to a tight 16%, compared to the prior five years' average of 27%. Assuming the great yields do come about, USDA's 2021-22 ending stocks are forecast at 21% which should still provide some price support. Exports to China, in conjunction with the Phase One trade agreement, had been on a torrid pace since the beginning of 2020, but have stalled over the past two months. However, other markets have picked up the slack as world mill use has outpaced production for two years in a row driven by strong apparel sales in the U.S. and abroad.

The cotton price shocks in 2008 and 2010, combined with the financial crisis, drove clothing manufacturers to use cheaper synthetic fibers. The industry was again rocked by the pandemic in 2020, and only now is global cotton demand recovering to near 2006-07 levels. For those old enough to remember, it has been a long time coming.

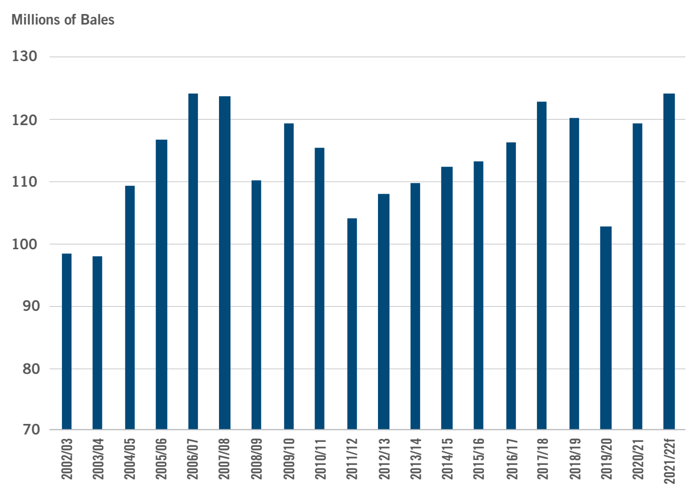
Rice

Rice harvest is well underway, as producers have brought in just over half the crop at the end of the quarter. Hurricane flood damage has reduced harvest prospects on a crop that was already set to be smaller YoY on lower planted acreage as farmers switched acres to corn and soybeans. USDA's

1 **Cotton prices are staying strong** as global demand outstrips production for the second straight year.

2 Hurricane flood damage has **lowered U.S. rice harvest prospects.**

EXHIBIT 1: Global Cotton Use



Source: USDA-FAS

latest estimate put the U.S. all-rice harvest at 190.5 million cwt, down 16.3% YoY. Concerns over flood damage lifted rough rice futures late in the quarter.

Global rice supplies remain ample and have dampened rice's export and price outlook. India, the world's top rice exporter, is expected to produce a record-sized crop this marketing year with help from ample government subsidies. The global stocks-to-use ratio of rice outside of China is now the highest in nearly a decade. Logistical constraints, though, have importers worried over availability. South American and Mexican buyers indicate concern over arrival of U.S. shipments, especially following recent power shut downs in New Orleans. Record-high container costs have also slowed rice shipments into the U.S., with imports since January down 17% YoY.

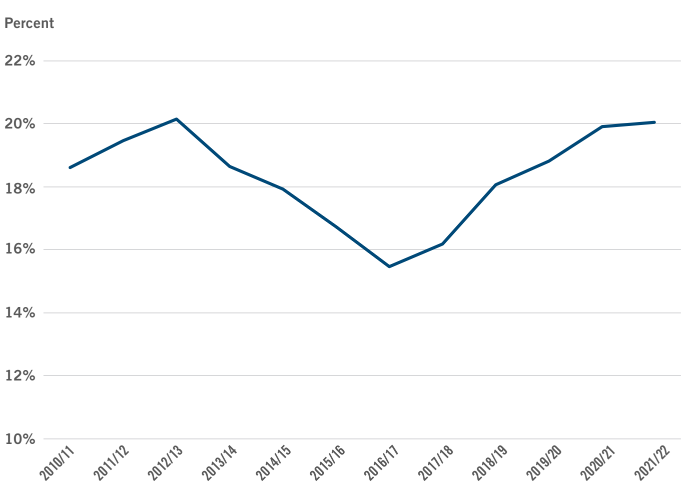
Sugar

Given that almost all of the U.S. sugar beet crop was under severe drought conditions until the last few weeks, it is somewhat surprising that USDA is forecasting 2021 yields to be above last year (30.1 tons/acre versus 29.4 tons/acre) and right in line with the 10-year trend line. With those yield expectations, USDA raised its 2021-22 beet sugar production estimate by 2.4% in its September crop report. However, Hurricane Ida passed through Louisiana's sugarcane region in late August. Although crop damage was modest, it will likely take a small bite out of local yields and extraction rates. Louisiana provides about 20% of the total domestic sugar production.

The bigger story at the moment is the fact that Hurricane Ida temporarily shut down the sugar refining facilities in New Orleans, adding another supply chain problem for end users to deal with. Spot wholesale cane prices have spiked to the mid-50 cent range, compared to the 2015-19 average of 35 cents/lb.

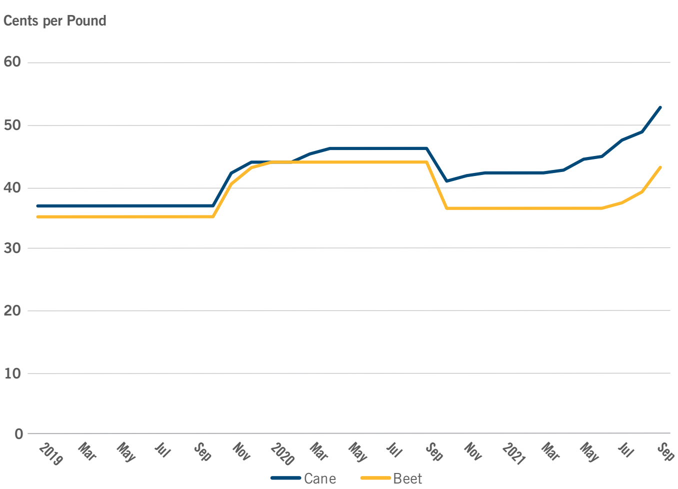
3 Spot **sugar prices are spiking after Hurricane Ida** shut down refineries.

EXHIBIT 2: Global Rice Stocks/Use
Excluding China



Source: USDA-FAS

EXHIBIT 3: Wholesale Refined Sugar Prices



Source: Sosland Publishing, Milling & Baking News

SPECIALTY CROPS

Worsening California Drought Crimps Tree Nut and Wine Grape Harvests

By Tanner Ehmke

Tree Nuts

California growers of almonds, walnuts, and pistachios are in the early stages of harvest and anticipate a much smaller crop following last year's record-sized harvest. Intense drought conditions trimmed bearing acreage and yield potential this growing season, but total tree nut production is still expected to be the second-biggest on record. Should drought conditions persist into the next water year starting in October, growers will be bracing to reduce acreage more in the months ahead to ration scarce and expensive water.

Despite logistical constraints, tree nut exports remain record large, aided by last year's mega crop and a weaker U.S. dollar. The combination of an expanded global market of U.S. tree nuts and a smaller harvest is widely anticipated to lift tree nut prices in the marketing season ahead. Some marketers anticipate nut prices to nearly double YoY.

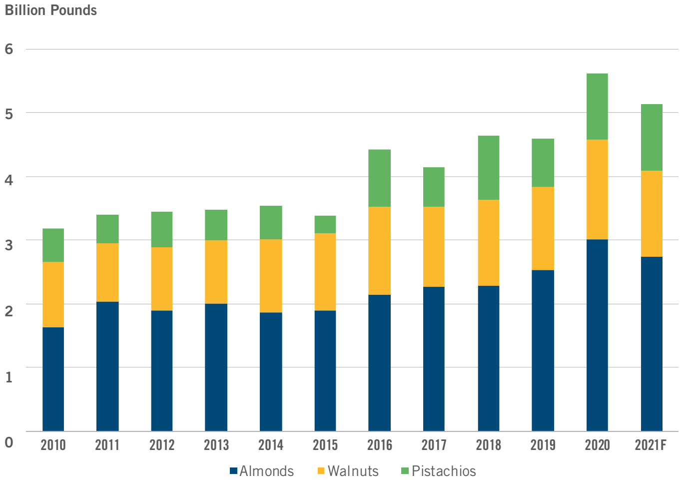
Wine Grapes

This year's California wine grape harvest is figured to be bigger and of better quality after wildfire smoke taint impacted the quality and tonnage of last year's harvest. As grape growers struggle with water shortages this year, USDA estimates California wine grape production at 3.6 million tons, up 5.4% YoY but still below average harvests of nearly 4 million tons. Yields this year are reported to be well-below average with acreage also lower due to the extreme drought conditions that continue to plague the Western U.S.

1 **California tree nut** growers anticipate a **smaller crop** but **sharply higher prices.**

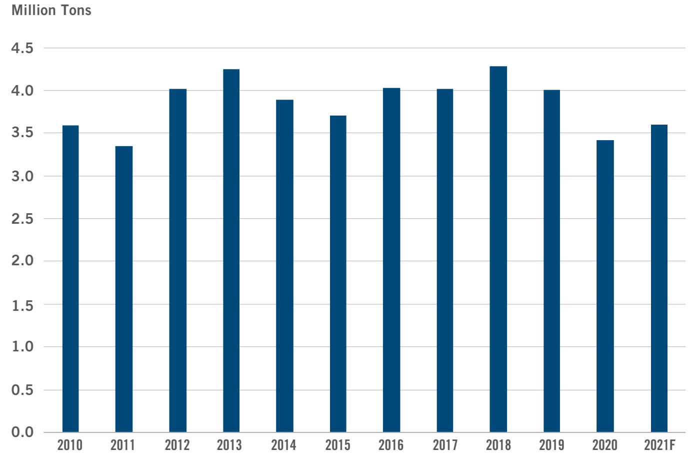
2 **Wine grape production** will be smaller, but growers note a **very high quality of harvest.**

EXHIBIT 1: California Tree Nut Production



Source: Almond Board of California, The California Walnut Board, Administrative Committee for Pistachios

EXHIBIT 2: California Wine Grape Production



Source: USDA-NASS

As commonly occurs in drought years, winemakers are reporting a high-quality harvest. Smaller grapes are resulting in higher skin-to-juice ratios and greater concentrations of aromas and flavors, while wineries are also reporting higher acidity levels with this vintage. The dry conditions throughout the growing season also limited mildew and rot, while smoke has not yet become the widespread issue experienced in 2020.

Wine demand remains highly uncertain with the surge of the delta variant of COVID-19. Falling sales from weaker restaurant and holiday demand in the months ahead may leave total U.S. wine sales flat to lower YoY. As a result, wine buyers have been cautious with the uncertainty of delta.

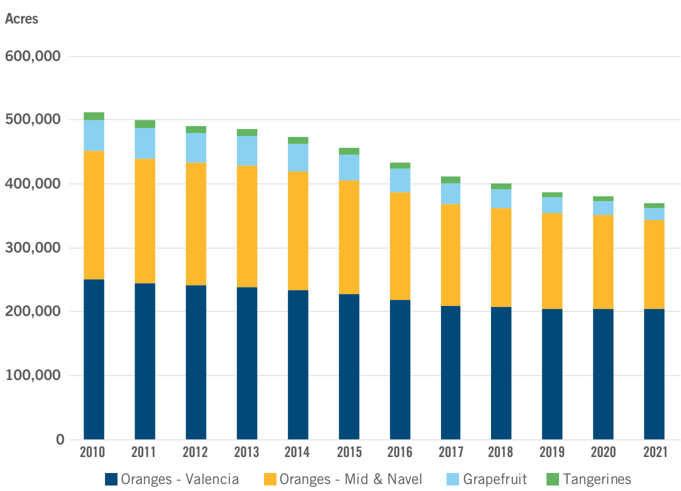
3 Florida citrus acreage continues to fall, but growers are optimistic about groves in the CUPS program.

Citrus

Florida citrus acreage continues to fall, with USDA-NASS in September reporting a 3% decline in total citrus bearing acreage. Total Florida orange acreage in USDA's Commercial Citrus Inventory Preliminary Report fell 3%, while grapefruit acreage dropped 11% from the previous season. Acres of specialty fruit like tangerines rose 3% YoY. USDA will release its first forecast for the 2021-22 season on Oct. 12.

The long-term trend of declining citrus production remains intact under the pressures of the citrus greening disease and falling per-capita consumption in the U.S. of juice. Florida growers who have invested in the citrus under protective screen (CUPS) program, which prevents the psyllid fly from infecting groves with the citrus greening disease, will be harvesting their first crop of citrus this fall. Most fruit grown in the CUPS program will be for the higher value fresh-pack market. Growers anticipate significantly higher yields in groves protected by the netting, which also protects trees from damaging hurricane winds and extreme heat. If results are favorable this fall, Florida citrus growers are expected to invest in more CUPS projects in 2022.

EXHIBIT 3: Florida Citrus Bearing Acreage



Source: USDA-NASS

POWER, ENERGY AND WATER

The Cost of Self-Sufficiency and a Rising Natural Gas Floor

By Teri Viswanath

The price for taking winter delivery of natural gas is trading at a seven-year high as global scarcity concerns and a measured return to domestic production growth have fueled early buying.

U.S. natural gas futures for January delivery have doubled since April, now touching above $6/MMBtu. Natural gas prices haven't been this expensive since early 2014 when sustained cold winter temperatures spiked gas demand for heating. This demand rapidly reduced inventories enough to warrant scarcity pricing to curb even greater use from other price-sensitive sectors. The 6% rise in electricity demand in early 2014, for example, was met entirely by additional coal dispatch, as gas units were priced off the market.

Now, the market appears to be concerned that demand for U.S. natural gas exports is so strong that there's little flexibility in meeting domestic demand come another cold winter. Domestic consumption remained flat through mid-year, but exports have risen significantly. The U.S. now exports about 10% of its dry gas production, a 30% increase compared to year-ago levels. This year's unanticipated jump in global demand coupled with a slower-than-anticipated recovery in domestic production will leave the industry with only about 3.6 trillion cubic feet of inventories at the end of October, or about 5% less than the five-year average.

The U.S. is in reasonable shape ahead of winter compared to Europe, where stockpiles in the northwest region of the continent have been about 24% below

1 **U.S. natural gas futures** for January delivery **have doubled since April,** now touching above $6/MMBtu.

2 **In previous winters, the U.S. could call liquefied natural gas supplies away from the global market.** That option is now largely off the table.

EXHIBIT 1: Precipitation Forecast, Dec 2021-Feb 2022

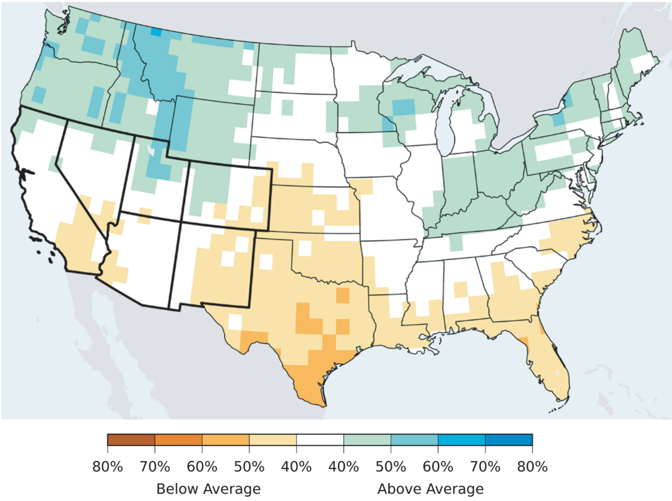
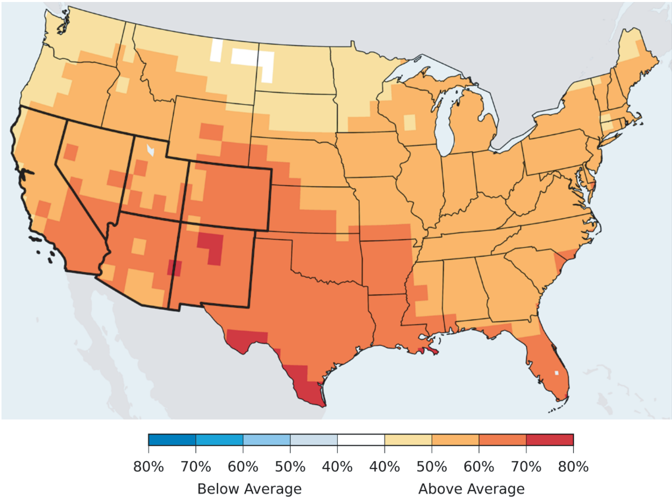


EXHIBIT 2: Temperature Forecast, Dec 2021-Feb 2022



Source: NOAA Drought Task Force Report on The 2020–2021 Southwestern U.S. Drought, pg. 14. (North American Multi-Model Ensemble forecast made in September 2021. Colors show the likelihoods of above- or below-average conditions.)

average. By extension, European consumers are also paying about $28/MMBtu for their gas supply, more than a six-fold increase from a year ago. And, herein lies the problem for domestic consumers.

In previous winters, the U.S. could call liquefied natural gas supplies away from the global market – Europe, in particular – should conditions warrant. That option is now largely off the table, given tight global supplies. Two years ago, total U.S. energy production exceeded consumption for the first time since 1957, providing some amount of buffer. This year, the country will test this independence, with a heating premium likely to linger until the market is satisfied that domestic production is up to the task. For now, the floor for natural gas prices has risen with Europe possibly setting the ceiling, depending on Mother Nature.

2022 Water Year Ushers in New Western Conservation Efforts

The new 'water year' starts on Oct. 1. In the West, thus begins precipitation and snowfall, which is then stored and eventually melted or converted into run-off. For the 2021 water year, low snowpack, rapid melt out, and poor runoff efficiency compounded the underlying drought, setting in motion a particularly challenging year for water resource managers. With 94% of the region currently registering moderate to extreme drought as we head into the next cycle, there is a collective intake of breath hoping for a wet year ahead.

Unfortunately, NOAA's recently published report on the Southwest's historic drought foresees little relief on the horizon, with the forecast La Niña event and persistent low soil moisture leaving little room for rebalancing in 2022.

Already the country's largest reservoirs in the West have tipped to crisis, threatening the region's water supply and hydropower generation. In August, the federal government declared a water shortage on the Colorado River for the first time, triggering mandatory water consumption cuts for Southwestern states. Under the drought contingency plan signed two years ago, the western states and Mexico agreed to take less water should reservoir elevation fall below certain minimum levels. Conditions have now degraded to levels that trigger the restrictive conservation covenants. The cuts, set to take effect during the next water year, will primarily affect Arizona but could expand to other states should conditions worsen.

Similarly recognizing extreme reservoir storage levels, California also adopted "emergency curtailment" orders for the Sacramento-San Joaquin Delta watershed. The Delta watershed comprises approximately 20% of California's land mass and constitutes the state's largest source of surface water, supplying some amount of water to two-thirds of Californians and millions of acres of farmland. There are no easy solutions to the water challenges now gripping parts of the West, a region that has always been characterized by aridity and shaped by water.

3 **NOAA sees the Southwest's historic drought continuing through 2022.**

COMMUNICATIONS

USF Reform Momentum Grows in Washington, Targets Big Tech

By Jeff Johnston

The Universal Services Fund (USF), the primary funding mechanism for the FCC's rural broadband grant programs, has been criticized for its unsustainable structure. The USF is funded from fees applied to telecom bills, which have been in a perpetual decline and do not offer a large enough revenue base to fund future broadband programs. Critics argue that USF fees should also be applied to broadband bills and/or have big tech pay into the fund as they are the ones benefiting from the growth in broadband usage and the FCC's funding efforts to expand coverage.

In July, three Republican Senators introduced the Funding Affordable Internet with Reliable (FAIR) Contributions Act, a bill to explore collecting USF contributions from internet edge providers such as YouTube, Netflix, and Google. This bill followed a Newsweek op-ed from FCC Commissioner Brendan Carr who argued that big tech has been enjoying a free ride on U.S. broadband networks, and that it was time they help pay for FCC's broadband grant programs.

In wireless news, private LTE wireless networks continue to gain momentum as school districts and cities see it as a cost-effective way to help bridge the digital divide. Cities are leveraging their light poles and roof tops and partnering with equipment manufacturers and system integrators to build private wireless networks using Citizens Broadband Radio Service (CBRS) spectrum. For example, Tucson – which estimates that 32% of its residents did not have access to high-speed internet – is building a network that consists of 40 radio access points that will eventually serve 5,000 households. The city is building the network in conjunction with JMA Wireless.

Last year the FCC made available a large amount of unlicensed spectrum in the CBRS band, which enables small organizations to build carrier-grade wireless networks. Prior to this, if small organizations wanted high-speed wireless coverage, their only option was to beg a large wireless operator to build it for them.

1 **Momentum is gaining for USF reform.** A Senate bill directs the FCC to look into having big tech pay into the fund.

2 USF critics believe that **big tech has been enjoying a free ride on broadband networks for too long** and it's now **time for them to pay up.**

3 **Private wireless networks are growing in popularity** with towns and cities seeing it as **a lower cost way to bridge the digital divide.**

This quarterly update is prepared by the Knowledge Exchange Division and covers the key industries served by CoBank, including the agricultural markets and the rural infrastructure industries.

Brian Earnest
Lead Economist, Animal Protein

Tanner Ehmke
Lead Economist, Dairy and Specialty Crops

Rob Fox
Director, Knowledge Exchange

Jeff Johnston
Lead Economist, Communications

Daniel Kowalski
Vice President, Knowledge Exchange

Christina Pope
Research Editor, Knowledge Exchange

Teri Viswanath
Lead Economist, Power, Energy and Water

Kenneth Scott Zuckerberg
Lead Economist, Grain and Farm Supply

CoBank's Knowledge Exchange Division welcomes readers' comments and suggestions. Please send them to KEDRESEARCH@cobank.com.