CoBank
KNOWLEDGE EXCHANGE

THE QUARTERLY

Dedicated to the industries financed by CoBank

January 2023

Inflation is Beginning to Loosen its Grip

The Fed rate hike cycle will soon end, but commodity market supplies remain vulnerable.

Executive Summary

The war in Ukraine and inflation will remain the two biggest factors for commodity markets in the first half of 2023. There are now consistent signals that inflation is softening, which should enable the Federal Reserve to comfortably relent on interest rate hikes before mid-year. However, the opening of the Chinese economy could complicate the inflation picture as increased demand for oil and gas in China threatens to upset the delicate global energy supply and demand balance.

In Ukraine, all signs still point to a long, entrenched war that will continue for months to come. The uncertainty of grain supply from Ukraine will persist as U.S. growers prepare to plant another large crop, aiming to rebuild domestic supplies of corn and soybeans. Fertilizer supplies remain relatively tight but prices have declined, which should generate good demand for ag retailers in early spring.

In animal agriculture, some supplies are beginning to grow. But broadly, production growth has been sluggish and prices remain relatively high. The egg sector is battling back from severe bird flu to replenish retail supplies, and milk production is on the rise.

California agriculture is getting too much of a good thing as multiple storms have battered the state. Water storage will improve, especially after the snowmelt, but flooding damage will be significant.

A warm winter in Europe has softened global natural gas prices, though U.S. heating and electricity prices have increased substantially. And the broadband market continues to evolve as cable operators seize on solutions to utilize existing infrastructure to compete with fiber.

Topics In this Issue:

- *The costs of China's COVID policy reversal*
- *OJ prices near record highs on historically small Florida orange crop*
- *U.S. faces another season of sky-high energy costs*

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.

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Inside this issue

SPOTLIGHT

The costs of China's COVID policy reversal

By Dan Kowalski

China's abrupt reversal of its zero-COVID policy last month is unleashing the full brunt of the virus as we've not seen anywhere else.

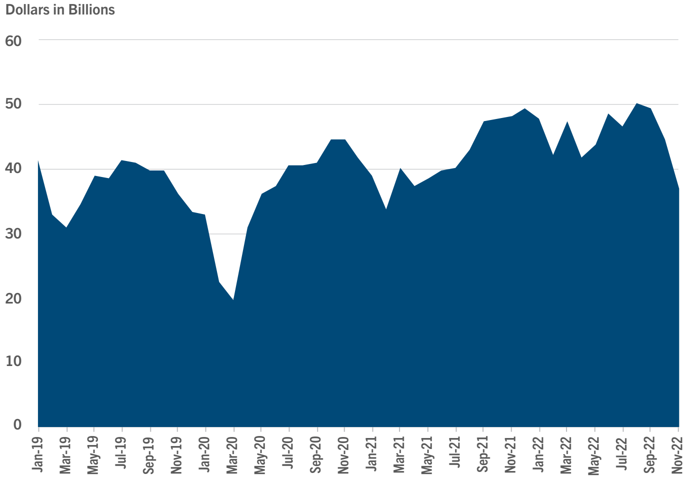
While many expected an orchestrated 6 to 9 month opening up process, the reality has been a nearly instantaneous removal of restrictions, allowing the virus to spread rapidly. The humanitarian toll has been severe, as hospitals have been overwhelmed and deaths are predicted to top 1 million.

We should also expect significant impacts on China's economy and the global supply chain. Very little data is coming out of China, but reports have estimated that in some regions up to 75% of the labor force has been infected, forcing shut downs at manufacturing plants, and causing major delays in trucking and at ports.

Predicting the path of COVID outbreaks has been challenging throughout the pandemic, but several factors make the situation in China particularly difficult to gauge. First, the lack of infection data being released by China make it nearly impossible to identify where and when COVID has spread, in turn making it all the more difficult to predict future outbreaks and impacts. Second, China has now entered

1 **Up to 75% of the labor force in some regions are infected, forcing shut downs at manufacturing plants and causing major delays in trucking and at ports.**

EXHIBIT 1: U.S. Monthly Imports of Goods from China



Source: U.S. Census Bureau

its month-long annual Lunar New Year migration, when 290 million workers in the coastal regions return to the interior to celebrate with family. Many are likely to carry COVID with them, spreading the virus to new areas that have even less sufficient medical support systems. Losing these workers for a few weeks further compounds the labor shortage created by COVID.

Third, we know that goods production and shipments are well off of levels from earlier in 2022. But we don't know how much of those declines are due to COVID or just shrinking overseas demand. Factory orders are estimated to be down 30% to 40% for several industries, which contrasts sharply with the situation in the U.S. and Europe during most of the pandemic when consumers shifted all of their spending from services to goods. This contrast will limit the supply chain gridlock felt by U.S. consumers, but there will be delays for U.S. imports in March and April that impact U.S. supply chains. U.S. exporters are feeling the impacts now, as supply chain problems have been preventing the movement of many goods into and around China.

It's possible that infections have already peaked in China, especially in larger cities. And if case numbers are as high as estimated, many cities and workplaces may have substantial near-term immunity by February. This best case scenario would allow much of the Chinese economy to meaningfully recover sooner than originally expected. This would also minimize supply chain disruptions, perhaps allowing goods to move more freely than they have since 2019.

Uncertainty will remain high for weeks to come, but whether the Chinese economy rebounds quickly or slowly it will be uneven for several months. The carry-on effects of the economic recovery are also uncertain. China's economy has been battered by a decline in domestic consumption of services as well as a global slowdown in goods consumption. And unlike other governments, the Chinese government did not issue payments to businesses or individuals to bridge the income gaps created by the lockdown. So we don't expect an exuberant post-lockdown boom like we experienced in the U.S. However, we could see significant reopening impacts in the global energy markets. The delicate energy supply/demand balance created by Russia's invasion of Ukraine could be upended by a resurgent China.

2 **U.S. exporters are feeling the impacts now. Expect delays for U.S. imports in March and April that impact U.S. supply chains.**

MACRO ECONOMIC OUTLOOK

The Fed zeroes in on services inflation

By Dan Kowalski

It's a new year, and the U.S. economy marches on. Yes, recession fears for 2023 are still high and still warranted. But with the unemployment rate at a 53-year low and inflation trending lower, forecasts are turning at least a little less gloomy. Nevertheless, the economy will progressively slow through the first half of the year.

The economic cracks that emerged in late 2022 in housing and tech are beginning to spread to manufacturing, finance, and retail. These three sectors are showing signs of weakness but not to the degree of pointing to an imminent recession. Manufacturing and retail are going through a painful normalization phase as pandemic consumption of goods has shifted to post-pandemic consumption of services. Banks are setting aside larger reserves as recession risks loom.

U.S. consumers are still spending, but doing so by increasing their dependence on credit. They are also finally pushing back on price increases on goods – a response to continuous declines in real wages and a dwindling stash of pandemic savings.

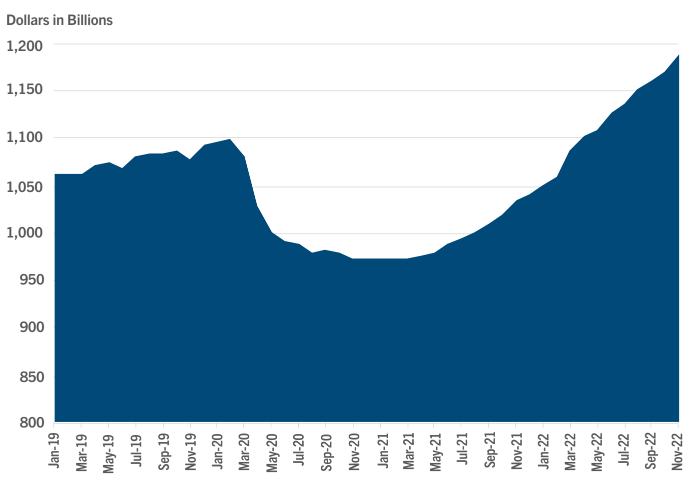
Corporations economy-wide are also pulling back on spending. The consulting firm EY estimates that U.S. businesses expanded capital expenditures by about 20% in 2022, but will slow that capex growth to 6% in 2023. Like consumers, businesses will still spend but more cautiously.

Inflation and the interest rate increases intended to combat swiftly rising prices are behind the broad slowdown. The Federal Reserve raised its benchmark overnight

1 **U.S. consumers are still spending, but doing so by increasing their dependence on credit.**

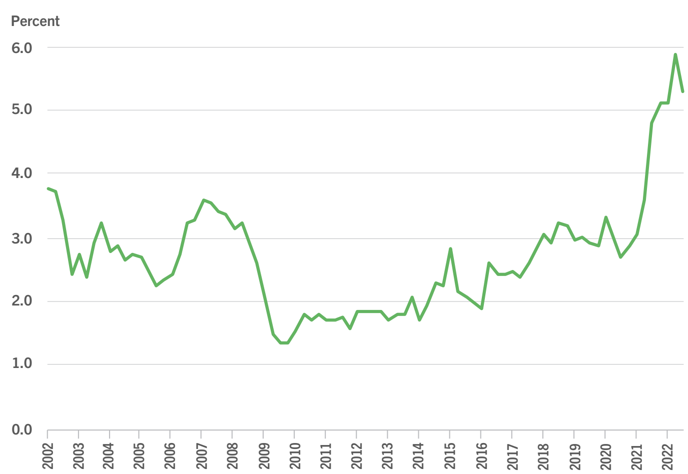
2 **With jobs growth far outpacing the availability of workers to fill them (especially in services), the scarcity of labor is cause for concern.**

EXHIBIT 1: Revolving Consumer Credit



Source: Board of Governors of the Federal Reserve

EXHIBIT 2: U.S. Services Wages, Change from Year Ago



Source: Bureau of Labor Statistics

rate by more than 400 basis points in 2022 and it is not finished hiking. The Fed has made it clear that it is focused less on headline inflation and more squarely on the labor market and core services inflation, excluding housing. The reasoning is straightforward: Supply chain disruptions are unraveling and goods inflation is slowing accordingly. But with jobs growth far outpacing the availability of workers to fill them (especially in services), the scarcity of labor is cause for concern.

The participation rate is really the culprit behind the lack of labor. If the participation rate returned to the pre-pandemic level of 63.3%, we would have 3 million more workers in the economy and a far more balanced labor market. But with few indications of a rebound in participation, we must assume that the labor shortage will remain in the absence of a moderate or worse recession. And services inflation, unlike goods inflation, is driven predominately by the overall health of the economy, the labor market, and wages. The latest data show services wages climbing at 5.3% annually versus the 2.5% historical growth rate prior to the pandemic. The leisure and hospitality sector is paying even more to attract talent, being still short 1 million workers relative to 2019 levels. We should expect that the services sector, which has battled long and hard to regain its workforce, will be reluctant to lay off workers even in the midst of a mild recession.

The financial markets and many economists have turned more optimistic in January, given the downtrend in headline and core inflation. In the fourth quarter, the annualized core inflation rate was 3.1%, indicating that inflation broadly has slowed. This is welcome news and could prevent a more serious economic slowdown in 2023. But as the Fed remains finitely focused on the services sector and committed to not repeating the mistakes made in the 1970s, we should expect interest rates to continue rising at 25 basis point increments until the federal funds rate exceeds 5%, and stay at that level through the remainder of the year. We still expect a modest recession between the second and third quarters, but if the slowdown is more severe, the Fed will begin to unwind some of its rate hikes in the latter half of the year.

3 **We expect interest rates to continue rising until the federal funds rate exceeds 5%, and stay at that level through 2023.**

GRAINS

Sector continues navigating geopolitical and economic challenges

By Kenneth Scott Zuckerberg

Grain markets balanced a plethora of challenges during the fourth quarter, spanning geopolitics, the ongoing military conflict in Ukraine, economic slowdowns in China and Europe, and continuing central bank interest rate hikes in the U.S. and other developed economies. The continuation of these factors and lingering La Niña weather conditions into 2023 will likely put pressure on grain storage and merchandising margins.

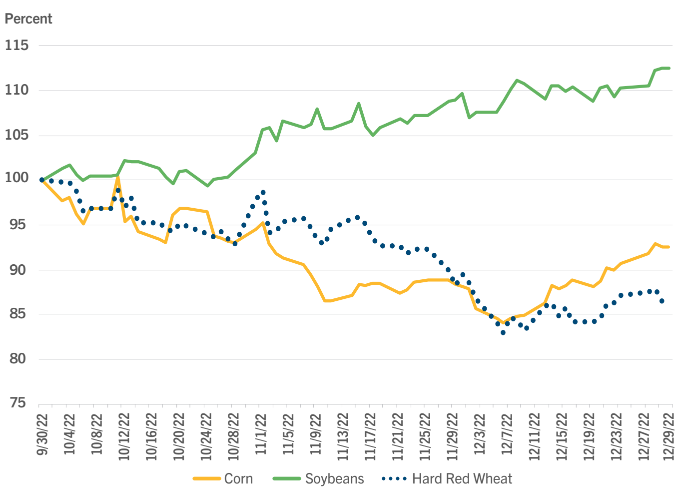
Production declined by 7.6% for corn and 2.7% for soybeans in the 2022/2023 marketing year, according to the December WASDE report. All wheat production was up 0.2%, a surprisingly positive result given worsening drought conditions in key wheat producing states.

Lower total crop production, coupled with strong domestic consumption and modest export activity, helped contribute to tight ending stocks for the three major grain and oilseed commodities. Current stocks-to-use ratios for the 2022/23 crop year are estimated at 8.9% for corn, 5.0% of soybeans, and 30.6% for wheat, all well below the 10-year peak levels of 15.7%, 22.9% and 55.5%, respectively. Based on normal weather and trend-line yields, USDA's "early release" baseline projections say the three principal crops will increase production. However, with ongoing volatile weather expected in a third year of La Niña conditions, USDA's forecast may prove to be too optimistic.

1 Grain prices were mixed in 4Q; in U.S. spot markets, corn and hard red wheat fell while soybeans gained.

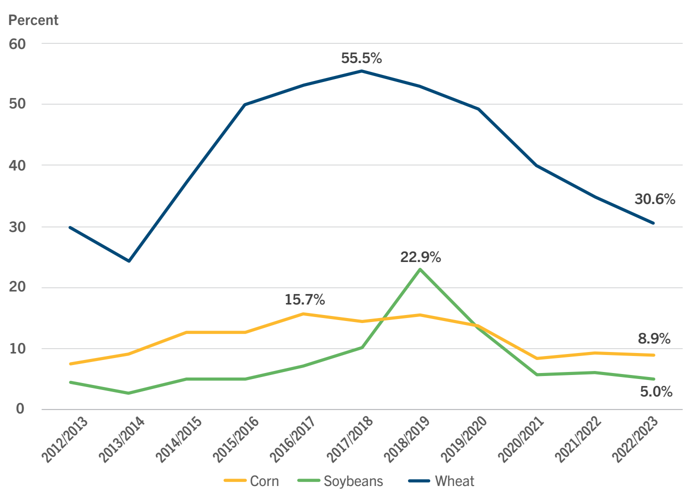
2 Stocks/use ratios for corn, soybeans, and wheat finished 2022 at multi-year lows driven by strong domestic demand.

EXHIBIT 1: 4Q Grain Spot Price Performance



Source: Barchart.com

EXHIBIT 2: 10-Year Stocks-to-Use (Current vs. Peak)



Source: USDA

As usual, basis trends varied during the fourth quarter based on local market conditions (i.e. available supply vs. demand, transportation availability and costs, and other factors). In general, domestic basis bids were stronger than at export oriented locations. The latter were negatively impacted by barge backups on the Mississippi River and some weakening in export sales by China amidst the recent downward shock to that nation's economy.

In 2023 we are focused on:

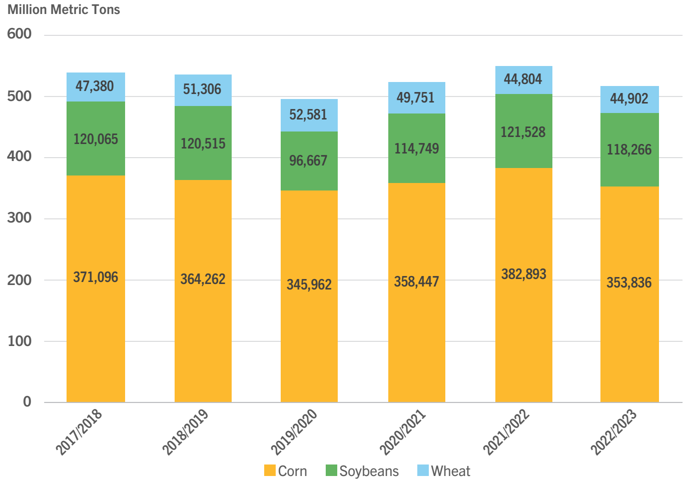
1) Russia/Ukraine – As expected, the conflict has dramatically reduced Ukraine wheat, corn, and sunflower seed/oil production. The longer the conflict continues, the greater the likelihood that global stocks will be tight among the major exporting nations, and that the United States could pick up export market share for corn (U.S. wheat continues to be less price competitive especially compared to Russia, which is expected to produce and export a record crop).

2) China – Lockdowns of major Chinese cities in 2022 and broad economic contraction dented U.S. corn and soybean exports. With the government effectively reversing its zero-COVID policy, we expect to see a rebound in U.S. grain exports to China in mid-2023. China will likely be an active seasonal buyer of Brazilian soybeans (with a record crop expected) during the first quarter of the new year.

3 U.S. grain exports are running below average but China's zero-COVID policy reversal and the recent drop in the U.S. dollar could be catalysts.

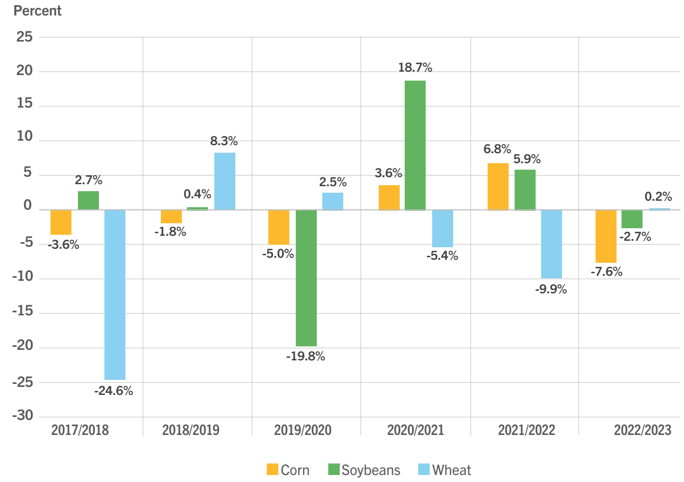
4 On a positive note, in November the Mississippi River levels began rising and Russia renewed its participation in the Black Seas grain export initiative.

EXHIBIT 3: U.S. Crop Production by Marketing Year



Source: USDA

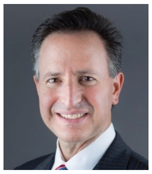
EXHIBIT 4: Annual Change in U.S. Crop Production



Source: USDA

FARM SUPPLY

Fourth quarter caps a record year for retailers



By Kenneth Scott Zuckerberg

Fall agronomy results were once again strong amidst above-average crop prices and strong farmer incomes, according to industry sources and farm supply customers. For the second year in a row, ag retailers posted exceptionally strong revenue and profit growth, driven by strong grain market fundamentals. This was driven by high fertilizer and crop chemical prices which together accounted for 84% of total retailer sales and 30% of industry revenue growth as measured by the CropLife Top 100 survey.

Interestingly, despite strong expected spring demand and tight global supplies, fertilizer prices declined during the fourth quarter amidst declining prices for natural gas and other energy prices. The latter was a function of the extended lockdown in China during the quarter, coupled with reduced purchases of Russian natural gas by Europe. The result was a sharp correction in overseas benchmark natural gas prices.

Our working assumption is that cash receipts and net incomes for row crop farmers peaked in 2022. And, although growers maintain strong cash and liquidity positions to support input purchases in spring 2023, several factors will likely compress retailer margins. The headwinds include labor shortages, wage inflation, higher interest expense, and continued high transportation costs (acknowledging recent improvements in barge, rail, and supply chain disruptions).

We are also bracing for ongoing drought and other weather-related disruptions – such as the extreme cold that hit the Great Plains – to impact spring field work and optimal planting dates. The culprit here is a third consecutive winter of La Niña conditions.

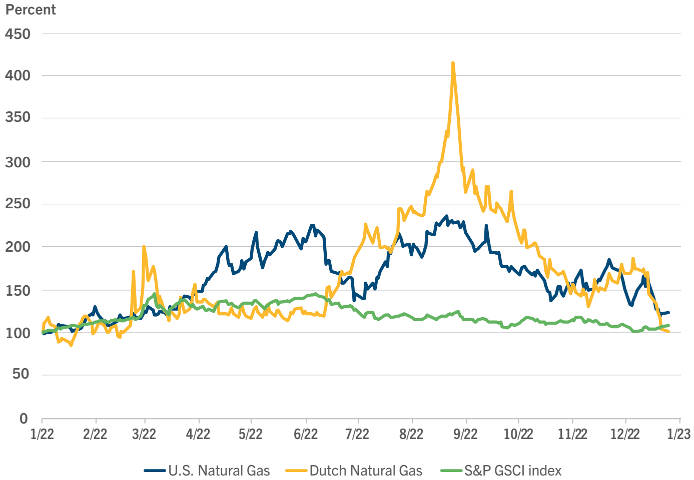
1 Retailers delivered record profits in 2022 and 30% industry revenue growth.

2 Strong farmer income and demand, coupled with higher fertilizer and crop protection prices, drove growth and profitability.

3 While the sector begins 2023 on strong financial footing, margins are likely to tighten under rising wages, higher interest rates, and continued high transportation costs.

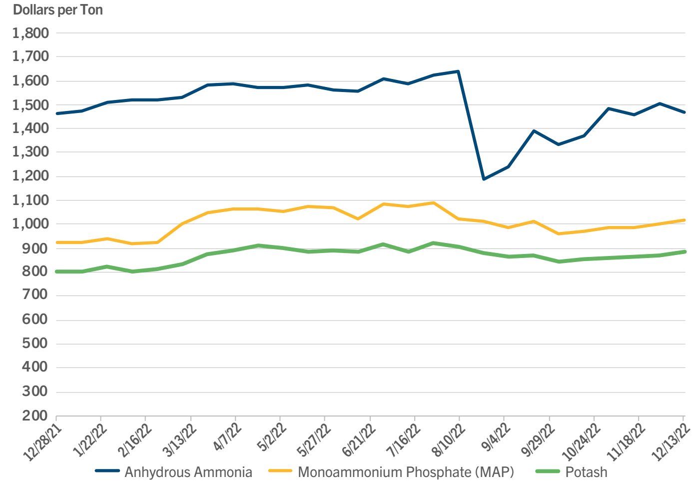
EXHIBIT 1: U.S. vs. Dutch Natural Gas

January 2023 futures contracts



Source: Barchart.com

EXHIBIT 2: Iowa Fertilizer Production Costs



USDA-AMS

BIOFUELS

Ethanol turns in solid performance amid falling prices

By Kenneth Scott Zuckerberg

The U.S. ethanol complex enters 2023 with some positive tailwinds after posting very reasonable results in the fourth quarter despite falling energy prices and lower motor vehicle gasoline demand.

Averaging 15.5 billion gallons for the quarter, ethanol production was modestly lower than its five-year average – reasonable in the context of higher ending stocks (roughly 8.5% above the five-year average) coupled with weakening U.S. gasoline demand.

Fourth quarter industry profit margins averaged $0.27/gallon compared to $0.25 for the first nine months of 2022 and in line with long-run historical average levels of $0.25 to $0.30. Profitability was well above average during October and November, but increasing corn prices, coupled with a 12% decline in ethanol fuel prices, pushed down margins in December.

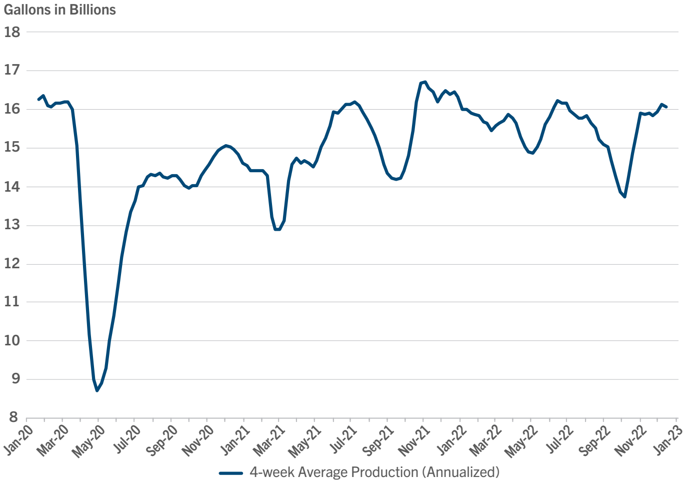
Beyond passage and initial implementation of the Inflation Reduction Act and continued build-out of renewable diesel capacity, the continued push for increased sales of 15% ethanol blended gasoline (E15) was a noteworthy finish to 2022. In early December, the White House Office of Management and Budget launched an official review to change federal law to allow permanent year-round E15 sales as requested by governors in nine corn-growing states – Ohio, Iowa, Illinois, Kansas, Minnesota, Nebraska, North Dakota, South Dakota, and Wisconsin. A few will be key battleground states in the run-up to the 2024 election. Expanded E15 would ensure continued domestic demand for U.S. corn producers as exports to China shrink and the future of exports of genetically modified corn to Mexico remain uncertain.

1 **Ethanol production in 4Q nearly caught up to pre-COVID levels (15.5 billion gallons vs. 16.0 billion gallons, annualized).**

2 **Despite downward pressure on ethanol fuel prices in December, operating margins were in line with long-term averages.**

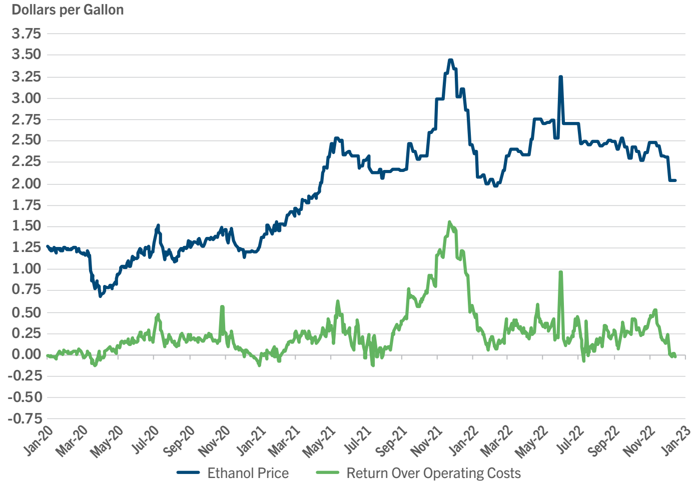
3 **Year-round sales of E15 gained momentum with the Biden administration's announcement to review states' proposals.**

EXHIBIT 1: U.S. Fuel Ethanol Plant Production: 2020-22



Source: U.S. Energy Information Administration

EXHIBIT 2: Ethanol Operating Margin vs. Price: 2020-22



Soure: ISU-CARD

ANIMAL PROTEIN

Rising production squelches meat inflation

By Brian Earnest

Several metrics leading into the fourth quarter suggested animal protein production would rise through the end of 2022. Market-ready cattle supplies were up about 1% YoY in August and broiler chicks were being placed at a rate about 5% above a year ago. And while hog supplies were down 1.5% YoY, slaughter rates were consistently climbing. The question remained as to how high weekly production totals would climb, and how prices would react.

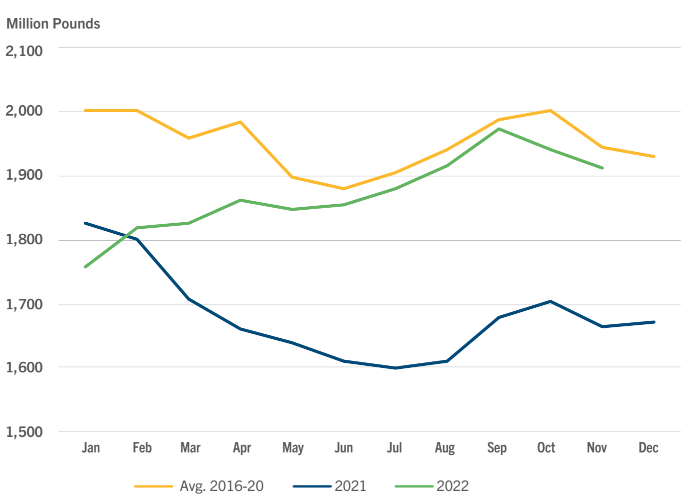
As it turned out, fourth quarter red meat and poultry production was robust. Average weekly red meat production was about even with the same period a year earlier, and rose 6% from the quarter prior. Domestic disappearance found some resistance at the elevated price levels, as evidenced by a 15% increase YoY in cold storage holdings of combined chicken and red meat at November's end. Total supplies followed seasonal tendencies, dropping 3% from the September high. The November total was still 1.5% below the five-year average, despite retail prices averaging a 19% premium for the period.

Rising red meat and chicken inventories suggest that after a prolonged period of supply shortages, domestic market conditions may finally be returning to "normal" levels, if such a thing still exists. On the other side of the equation, exports have also proved robust for animal protein disappearance (although some markets are struggling with the strength of the U.S. dollar). With meat supplies still rising at the moment and barring any unforeseen supply shocks, a period of weakening price support is likely in the months ahead. Nevertheless, we do not necessarily see prices deteriorating significantly from current conditions.

1 **Animal protein production surged in Q4,** with weekly average production up 6% from Q3.

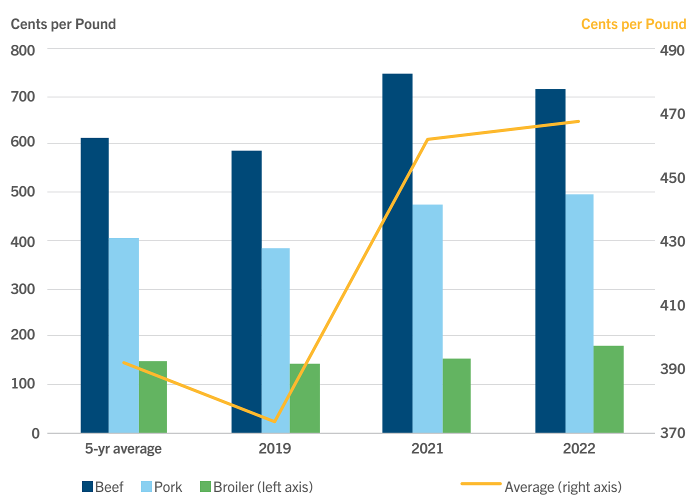
2 **While cold storage inventories edged higher through the second half of the year,** they still remain below the five-year average thanks to ongoing strength of demand.

EXHIBIT 1: Cold Storage Holdings of Red Meat and Poultry



Source: USDA-NASS

EXHIBIT 2: Retail Meat and Poultry Prices



Source: LMIC, USDA, BLS

Chicken

In a major shift from the prevailing conditions from late 2020 through mid-2022, chicken markets were well-supplied during the fourth quarter, thanks to increased placements and elevated live weights. While broiler-type hatching egg layers were down 1% YoY on Nov. 1 at 61 million head, chick placements ran nearly 5% above year-ago totals for September and October. This was a big flip from previous periods where rising layer flock totals did not necessarily translate to output growth. The return of avian influenza to flocks has depressed breeder stock levels.

Retail chicken prices remained elevated, averaging $1.85/lb for the fourth quarter. This is slightly lower than the prior period, but up 18% YoY and 22% higher than the five-year average. However, wholesale chicken prices crumbled amid the pressure of mounting supplies:

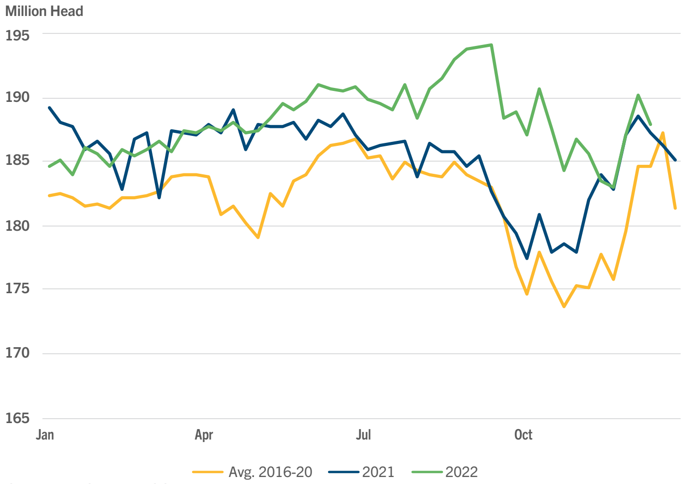
- Boneless/skinless breasts have drifted below $1.00/lb after hitting record highs above $3.60 earlier this year
- Wing values which were around $2.80/lb are now down below $0.90 – a level not seen since 2011.

While domestic markets have been shaken by rising domestic chicken production in recent months, export markets have been less affected. Through October, the U.S. exported a total of 3.2 million metric tons of chicken, up 5.2% from a year earlier. We attribute this in part to the pressure HPAI has had on global poultry supply and trade. Overall, U.S. chicken remains supported by global markets despite the weakening fundamentals at home.

1 **Improved layer flock output and elevated live weights** boosted production growth in Q4.

2 **Precipitous price declines in Q4** erased the gains amassed in prior quarters.

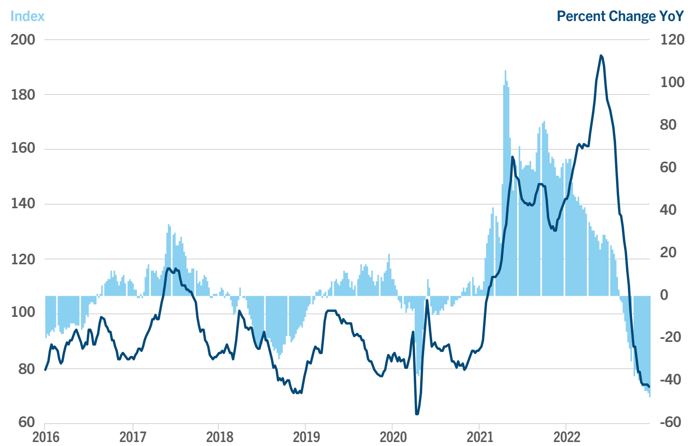
EXHIBIT 3: Weekly Broiler Chick Placements



Source: USDA-NASS

EXHIBIT 4: Chicken Wholesale Price Index

Weighted USDA average wholesale price for whole bird, boneless/skinless breast, wing, and leg quarter



Source: CoBank, USDA

Beef

Retail beef prices have largely been flat this year despite typical seasonal variations on top of the increased post-COVID consumer demand and tightening cattle supplies. While retailers provided modest relief at the meat case with pricing moderately lower than year-ago levels, consumer demand remained resilient amidst the still comparatively high prices.

While retail prices have likely peaked for now, they may not necessarily be on the decline. Plateauing prices are seen as a positive for disappearance amidst an otherwise highly inflationary environment. The consumer price index for all meats was up just 6.7% YoY during November, which compares with a 7.1% increase for all items, yet retail beef prices were down 6% YoY for the period.

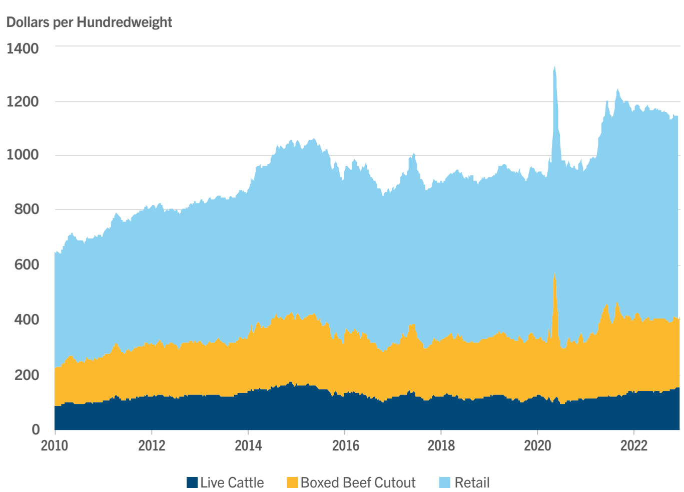
At the wholesale level, however, beef prices have had much more trouble holding at their elevated levels. From January highs to December lows, the boxed beef cutout lost 15% of its value. To round out the year, fed cattle prices moved from the mid $140s/cwt to the upper $150s and are likely to continue higher from here. Beef cow slaughter was up 11% during 2022 on top of an already shrinking cattle supply (cattle on feed on Dec. 1 were down 2.6% YoY). Fewer cattle available in 2023 is guaranteed.

Moderating beef prices combined with rapidly rising fed cattle costs are pinching processor margins – even more so when considering production costs, such as labor, capital, and transportation remain elevated historically. On a positive note, easing cattle supplies have put less stress on processor lines. Saturday harvest numbers were down 40% YoY during the fourth quarter, on average. While processor margins suffered through the fourth quarter, and are likely to remain under pressure nearby, 2022 will still be listed as one of the most profitable years on record.

1 Shrinking market-ready fed cattle supplies are bullish for cattle prices, but beef prices have drifted down from their summer highs.

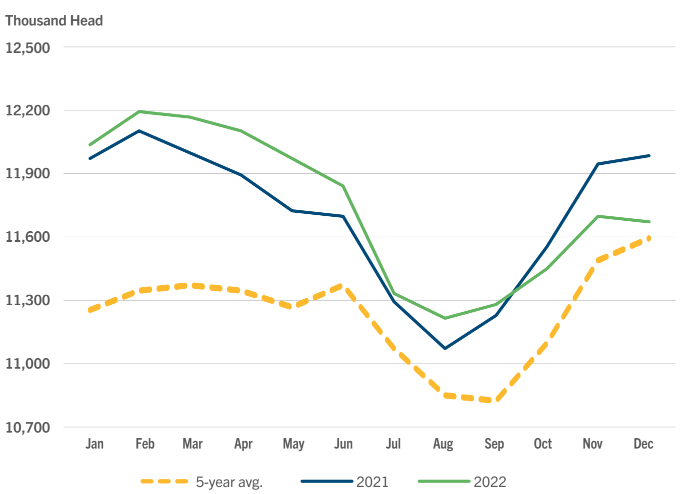
2 Before bowing to tighter cattle supplies and extreme weather conditions at year end, Q4 beef production was consistently up 2%-4% YoY.

EXHIBIT 5: U.S. Beef Value



Source: LMIC, USDA

EXHIBIT 6: U.S. Cattle on Feed



Source: LMIC, USDA

Pork

Nearby lean hog futures accelerated quickly to begin 2022 and gained 68% in value by late July, peaking at $122/cwt. Hogs retained much of that support through the third quarter, but despite tight hog supplies, prices succumbed to the pressure of seasonal tendencies and processing limitations during the fourth quarter. The lean hog index dropped into the upper $70s to end the year, and the hog market appears poised for a rather significant bounce in 2023.

Aside from the belly, most all cuts remained supportive to the composite pork cutout price during the fourth quarter. The index held a 21% premium to the five-year average. Most notably, ham values were up 80% YoY during the fourth quarter, as retailers scrambled to cover gaps in turkey availability caused by the most significant HPAI outbreak on record. Elevated pork demand has drawn ham inventories nearly 40% below the five-year average to end November.

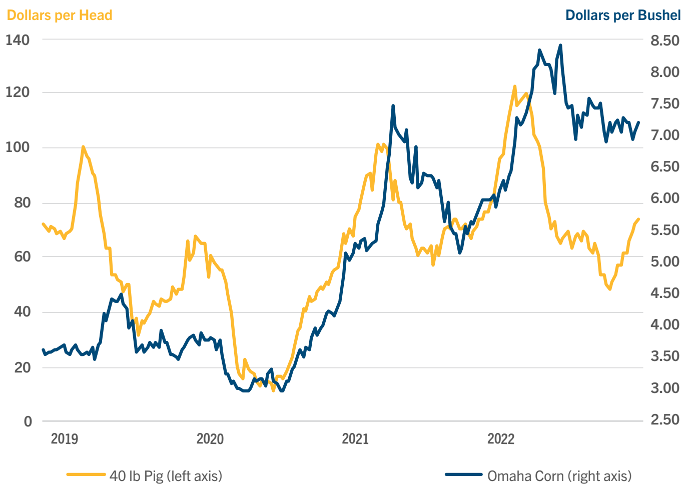
Exports had been a bright spot for global pork demand in recent years. But since mid-2021, export volumes have fallen back in line with five-year averages. Slowing demand from China has been a particular concern. U.S. pork exports to the combined destination of China and Hong Kong was down 53% YTD. However, Mexico was up 16% YTD, absorbing about half of the volume that was lost to China.

USDA's December *Quarterly Hogs and Pigs Report* generally confirmed what most expected: Hog availability will remain under pressure in upcoming periods. Total market hogs reported for Dec. 1 were at 67 million head, 2% lower than the same period a year earlier, 6% lower than the 2020 total, and the lowest since 2016. In a bearish surprise, the breeding herd was marginally higher, up 0.5% YoY on Dec. 1, despite sow slaughter increasing by 3.5% YoY during the 11-week prior period. This leads us to believe the second half of 2023 will bring increased hog supplies.

1 **The combined pressure of tightening hog and turkey supplies** resulted in an 80% increase in wholesale ham values in Q4.

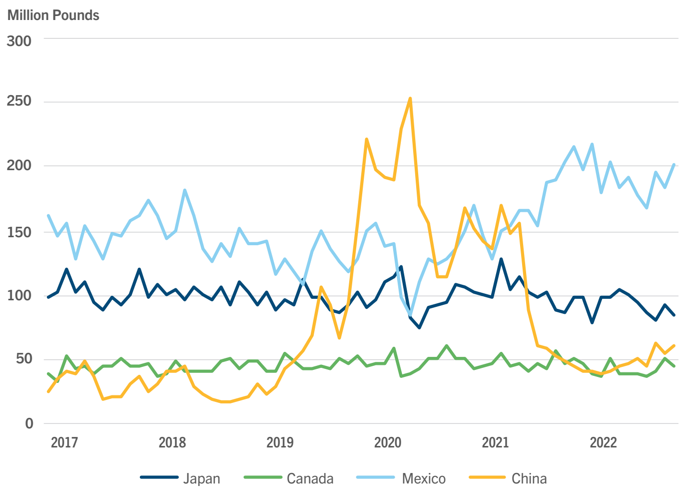
2 **A weak recovery in sow numbers muted Q4 hog supplies,** down 2% YoY on Dec. 1 per USDA.

EXHIBIT 7: National Feeder Pig Prices vs. Omaha Corn Prices



Source: LMIC, USDA

EXHIBIT 8: Top Destinations for U.S. Pork Exports



Source: LMIC, USDA-ERS

DAIRY

Global milk production forges recovery as post-holiday demand cools

By Tanner Ehmke

Production

Milk production continues to steadily grow in the U.S. and Europe as feed prices moderate. European milk production in recent months has made a surprisingly strong rebound from last year's low base. In the U.S., milk production has continued its recovery with November production rising 1.3% YoY as farmer margins are aided by lower feed costs, but expansion remains restrained by labor, energy, interest rate, and replacement heifer costs. New Zealand, the top dairy exporter, has struggled with wetter than normal weather, which is hampering pasture conditions and cow productivity during the peak production season.

As global milk supplies edge higher, U.S. milk prices continued softening last quarter with Class III milk futures falling 5%. U.S. daily production per cow will continue to rise seasonally through the first quarter into the spring flush. Paired with the U.S. dairy herd's incremental and steady growth likely persisting into next quarter, milk supplies will continue to grow just as exports face headwinds. USDA's latest forecast calls for a slight retreat in U.S. dairy exports in 2023 as global demand softens due to weaker macroeconomic conditions. The drop in milk prices amidst high production and investment costs is expected to create headwinds to expansion in milk production for both the U.S. and Europe in the first half of 2023.

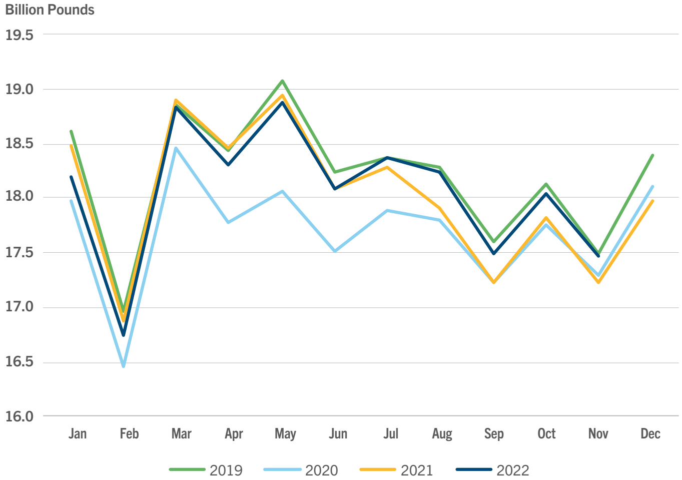
Processing

Butter prices have fallen quickly off the highs in a faster-than-expected retreat. Spot butter prices are down nearly 10% from the record highs scored in October as record-high prices

1 **Milk production will continue seasonal recovery** **in the U.S. and Europe through Q1, putting downward pressure on prices.**

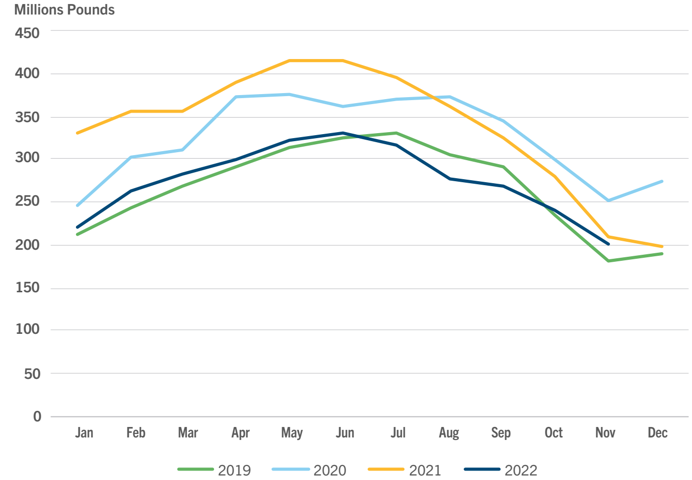
2 **The climbing number of COVID-19 cases in China, the world's biggest dairy importer,** **is creating economic headwinds and dampening the outlook for U.S. dairy exports.**

EXHIBIT 1: U.S. Milk Production



Source: USDA-NASS

EXHIBIT 2: Butter in Cold Storage



Source: USDA-NASS

pared demand and slowed the seasonal draw-down in butter inventories. Consumption slowed to the lowest level in six years for October as U.S. consumers trimmed purchases amid record high prices, compared to U.S. cheese demand that improved YoY for the month. As a result, Class IV milk futures (for butter and nonfat dry milk production) have fallen below Class III milk futures (for cheese and dry whey manufacturing).

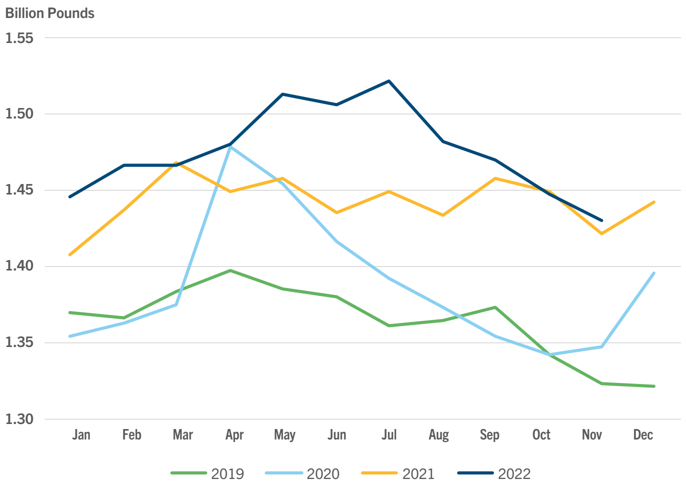
However, Class IV still has the potential to trade at a premium to Class III despite the recent retreat in butter prices. This is because U.S. cheese inventories in cold storage started the new year at a record high just as new cheese manufacturing capacity comes online and U.S. butter supplies in cold storage still remain tight. Processors note that labor shortages and delayed deliveries of production supplies continue to thwart operations, limiting the production potential of some dairy categories.

Record large total U.S. dairy exports for 2022 carried into the fourth quarter, underpinned by recent weakening of the U.S. dollar. However, the outlook for U.S. exports in the first half of 2023 is deteriorating as inflation erodes consumers' purchasing power and more competitive prices in Europe and Oceania dampen demand for U.S. product. Rising global economic uncertainties – particularly in China, which has struggled with reopening its economy after several months of COVID-19 lockdowns – have clouded the outlook for demand for dairy products. China's Lunar New Year celebrations in January traditionally drive an increase in Chinese dairy demand, but surging COVID-19 cases will restrain demand growth as some consumers self-quarantine.

The U.S. Trade Representative Office announced it is requesting new dispute settlement consultations with Canada over violating USMCA obligations by limiting tariff-rate quota allocations to U.S. dairy products. Canada previously had rescinded some policies that favored Canadian dairy processors over U.S. processors, but other TRQ policies have remained in place to the detriment of U.S. companies.

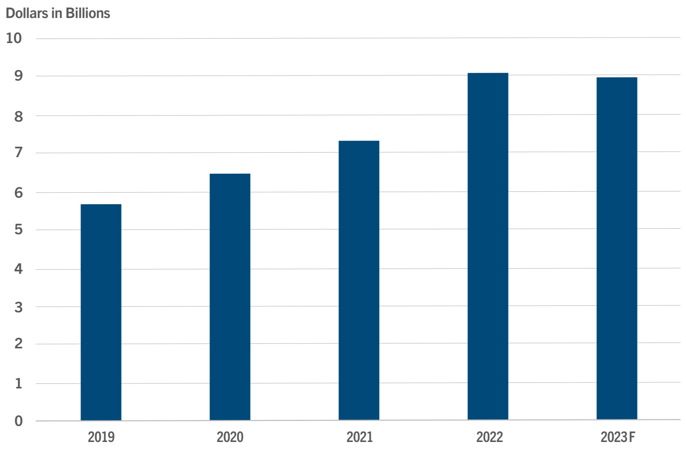
3 Dairy product prices are expected to grind lower as post-holiday season demand wanes amid uncertain global demand.

EXHIBIT 3: Natural Cheese in Cold Storage



Source: USDA-NASS

EXHIBIT 4: U.S. Dairy Product Exports



Source: USDA-ERS

COTTON, RICE AND SUGAR

Cotton and rice struggle while sugar industry thrives

By Rob Fox

By Tanner Ehmke

Cotton

USDA has responded to the deteriorating global economic outlook following the invasion of Ukraine by continually lowering its monthly 2022/23 MY global cotton use forecast from the initial 122.0 million bales in May to 111.6 million bales by year end. Over that time frame, cotton futures fell by 50% from $1.40/lb to $0.70/lb before stabilizing to the mid-80s range where it now sits. It has been a most disappointing year for an industry that slowly but steadily battled to recover the demand it lost following the 2008 financial collapse.

As recently as early December, our view was that the worst of the global macroeconomic tales had been told and that retailers would need to start placing orders and rebuilding inventories for a return of economic growth by late 2023. But fate dealt another joker when China reversed its official zero-COVID policy and, not surprisingly, the country's infection rates spiked. China represents about one-third of global mill use and textile exports, so widespread and/or long-lasting mill shut-downs would send cotton prices lower yet again.

Of course the steep decline in prices will impact 2023 cotton planting decisions and ultimately, global supply. Looking at the expected value of cotton production, consider the value of cotton lint and seed production per acre. Depending on marketing and ginning arrangements, producers often do not directly receive the full seed value after the ginning process. Nevertheless the value of the seed share of production has been

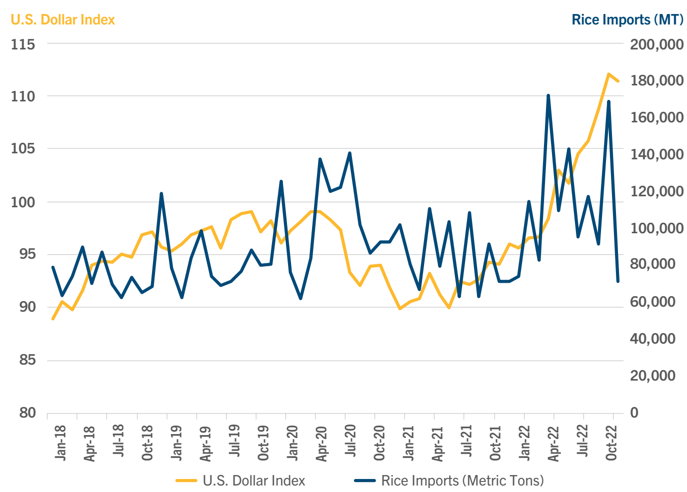
1 **China's COVID situation adds yet more uncertainty** to cotton markets.

2 **Rice imports into the U.S. reached record highs last quarter,** boosted by the strong dollar and the smallest U.S. rice harvest since 1993.

EXHIBIT 1: Forecast Cotton Lint and Seed Value per Acre

Source: USDA Economic Research Service, USDA Foreign Agricultural Service, WHO GATS treaty, and CoBank forecast
Note: Assumes lint represents 42% of boll weight and using actual and forecast national average yields.

EXHIBIT 2: U.S. Dollar Index vs. Rice Imports



Source: USDA-FAS, Barchart.com

steadily rising over the past few years (in line with other oilseeds). Using current market prices and average national yields, cottonseed represents roughly 22% of the total boll value. We expect that strong oilseed prices in coming years will continue to add a bit of much-needed support to cotton acreage.

3 **The U.S. sugar industry is poised for another strong year in 2023.**

Rice

Rough rice prices climbed last quarter as USDA continued shrinking its estimate of the U.S. rice crop amidst tightening global supplies. The 2022 U.S. long grain crop is down 8.9% YoY (currently estimated at 131.7 million cwt), while the medium/short grain crop is down 30.7% YoY (at 32.7 million cwt) as California struggled through another year of intense drought and reduced water allocations. The combined production of 164.4 million cwt is the smallest since 1993.

The small U.S. crop and strong U.S. dollar have stimulated imports of rice to a record fast pace, mostly of the fragrant jasmine and basmati varieties. Thai jasmine continues to dominate rice imports into the U.S., followed by basmati from India. Imports of medium-grain rice from China, Thailand, and India are also substantially higher as they fill the void in Calrose production in California. Exports, meanwhile, have fallen as U.S. rice is priced out of the world market. Political crisis in Haiti, a key U.S. rice market, further limited exports.

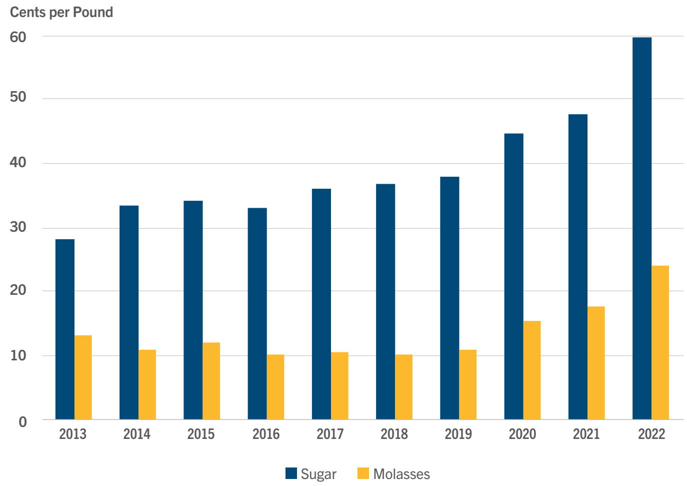
The omnibus legislation Congress passed on Dec. 23 appropriated $250 million for rice farmers to help offset the financial impact of record high input costs without a proportionate increase in market prices. The one-time payment will be made at a rate of 2 cents/lb using a farmers' crop insurance actual production history. Payment rates will be the same for all varieties of rice grown and geographical regions. Payments are expected to arrive in late spring or early summer.

Sugar

Sugar has been one of the best-performing U.S. farm commodities in 2022. Wholesale refined sugar prices averaged the year near 60 cents/lb, nearly double the long-term average. And the 2023 outlook is for continued price strength and resilient consumer demand for groceries, particularly in the sweet snack and confectionery categories.

With both sugarbeet refiners and cane mills now running at full seasonal capacity, reports from the respective segments suggest that extraction and recovery rates are both running above pre-harvest expectations. Plus, co-product molasses prices are also very strong, given strong demand from the animal feed sector. This is just more good news for an industry that is already experiencing strong profitability — we see more of the same in store for 2023.

EXHIBIT 3: U.S. Wholesale Refined Sugar and Molasses Prices



Source: USDA Economic Research Service, USDA Foreign Agricultural Service, WHO GATS treaty

SPECIALTY CROPS

OJ prices near record highs on historically small Florida orange crop

By Tanner Ehmke

Citrus

Frozen orange juice concentrate prices ended 2022 at the highest level since 2016 and near an all-time record high. USDA estimated Florida's crop in December at a sparse 18 million boxes, down 56% YoY and the lowest since 1937 due to damage from Hurricanes Ian and Nicole, a freeze early this year, and the ongoing struggles with citrus greening disease. While the domestic supply of oranges has dropped significantly, processors are filling their needs with increased purchases of imported concentrates from Mexico and Brazil.

California's orange harvest is expected to exceed Florida's for the first time since 1945 at 46 million boxes. Total grapefruit production for 2023 is also expected to drop sharply, down 46% YoY at 1.8 million boxes, while the tangerine and tangelo harvest is expected to be down 33% YoY at 500,000 boxes due to losses in Florida.

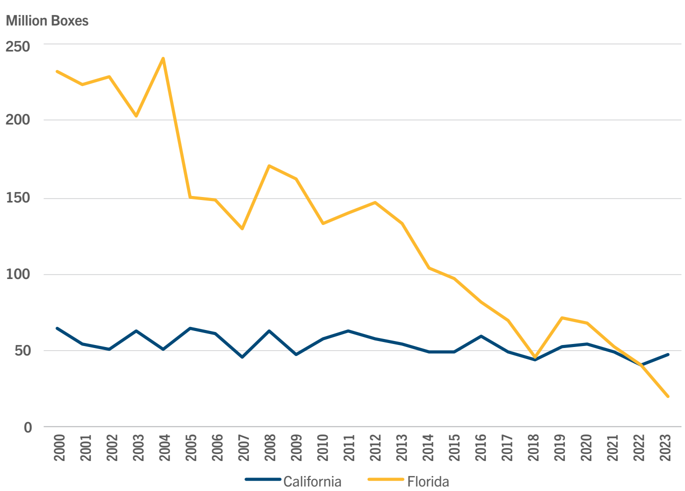
Tree nuts

For the first time in more than two decades, California's almond acreage has decreased, according to Land IQ, an agricultural and environmental research and consulting firm. Based on data collected through Aug. 31, total almond tree acreage was figured at 1.64 million acres, down from 1.66 million acres in 2021 as California struggles with tight water restrictions amid a historic drought. Many orchards, though, will be replaced with trees with improved genetics.

1 **Florida's smallest orange crop since 1937 has sent frozen orange juice prices to near record levels, while imports of concentrates rise.**

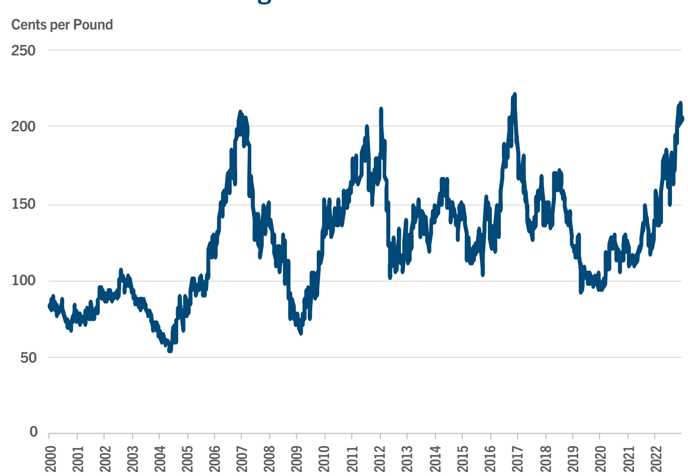
2 **Tree nut exports lag last year's pace as the strength of the U.S. dollar impedes foreign sales.**

EXHIBIT 1: U.S. Orange Production



Source: USDA-NASS

EXHIBIT 2: Frozen Orange Juice Concentrate Futures



Source: Intercontinental Exchange, Inc.

Low nut prices amid record carry-in stocks, lagging exports, and water scarcity have exacerbated the current economic outlook for tree nuts. Almond, walnut, and pistachio exports for the current 2022/2023 marketing year are all sharply lower YoY as export sales remain sluggish amid the strong U.S. dollar and weakening global economic conditions.

Other produce

Sales of organic apples accounted for 15.9% of total retail apple sales in 2021 and represented 8.6% sales of all organic produce, according to IRI data. Organic apples sales in 2021 grew 7.2% YoY. Consumer age is the No. 1 factor in organic apple sales as younger shoppers drove the growth. Just 3% of consumers over 60 said they purchase organic apples exclusively, compared with 21% of those 30-39 years old, and 22% of those from 18-29 years old.

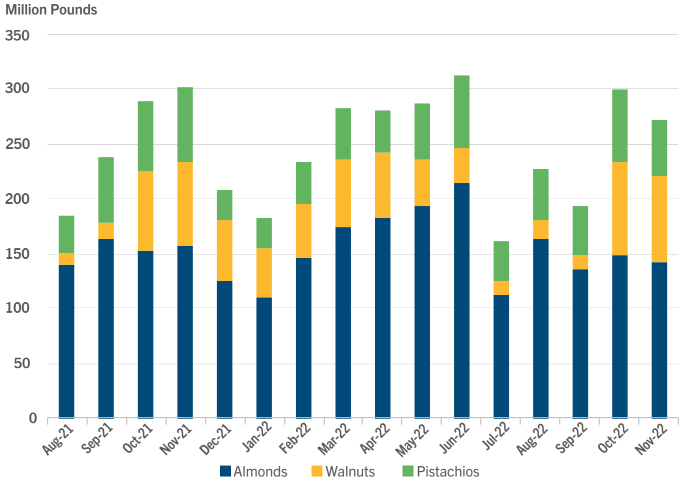
Water

California's new water year starting Oct. 1 began strong as storms brought heavy rains and snow to the region in early December and an atmospheric river flooded the region at the start of 2023. Statewide snow water equivalent for the state started 2023 at 199% of normal at an average precipitation of 22.4", according to the California Department of Water Resources. Reservoir levels are still below historical averages across most of the state. A continuation of elevated precipitation will be needed to break the three-year long drought as the water year enters the drier months of January and February.

California's Department of Water Resources' state water project allocation for 2023 currently is 5% of all water supplies requested from the SWP. The threshold affects more than 23 million people and 750,000 acres of farmland. The allocations are updated monthly as snowpack and runoff are assessed, with final allocations usually confirmed in May or June. Farmers are looking to convert more acres to annual crops that offer more flexibility with acreage and water.

3 California reservoirs are at historically low levels, implying another year of tight water allocations for growers.

EXHIBIT 3: U.S. Tree Nut Exports



Source: Almond Board of California; California Walnut Board; Administrative Committee for Pistachios

POWER, ENERGY AND WATER

U.S. faces another season of sky-high energy costs

By Teri Viswanath

As consumers begin the new year, it is hard to tell whether 2022's cost pressures are finally beginning to ease. Core inflation declined again in December, creating a multi-month trend. An encouraging sign for 2023, but it is the pesky non-core components of CPI — namely, high utility and grocery bills — which most consumers will continue to struggle with this year. Of the two budget busters, energy prices will likely remain elevated and prove to have longer lasting power for 2023 and beyond.

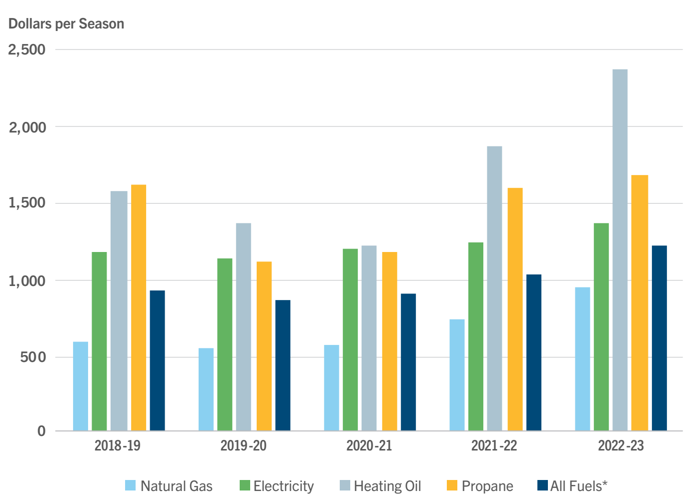
Admittedly, the summer-time pain at the pump has significantly eased. The arrival of the winter driving season, when fewer people hit the roads due to less daylight and more inclement weather, has coincided this year with rather impressive gasoline stockpiling. Larger than expected inventory builds since early November have steadily pressured retail prices, with the national average for a gallon of regular gasoline falling to just $3.16 as of Dec. 29 compared to the record of $5.02 set June 14 and $3.23 at year-end 2021. Balancing global supply disruptions against the specter of a global recession in 2023 means that oil and petroleum product prices might remain within reach of current prices for some time, with the national average for gasoline capped around $4.00 for next summer.

Setting aside transportation costs, it is the outsized winter-time heating and electricity bills that most consumers are currently grappling with. Nearly half of all U.S. households heat primarily with natural gas and they will spend 28% more to do so this winter according to the U.S. Energy Information Administration (EIA).[1] In the event of a very cold winter, household expenditures could increase by 51% compared to last winter. The cost of electricity this season is also set to increase, with consumers likely to notice a 10% seasonal adjustment in their bill with upward guidance of a 20% colder-than-normal premium.[2]

1 **Nearly half of all U.S. households heat primarily with natural gas and they will spend 28% more to do so this winter.**

2 **Roughly 1 out of 6 households in the U.S. are already behind on their utility bills.**

EXHIBIT 1: Estimated Residential Winter Heating Costs



Source: EIA
** collective weighting of fuels*

In the first year of the pandemic, 34 million U.S. households (27%) reported some form of energy insecurity, according to EIA's most recent Residential Energy Consumption Survey. While this is less than the 37 million (31%) reported in the 2015 survey, updated guidance suggests that the trend toward greater affordability for U.S. households is reversing, with many states reporting a significant rise in applications for energy assistance. According to the National Energy Assistance Directors Association, roughly 20 million households in the U.S. – 1 out of 6 homes – are already behind on their utility bills.

Fortunately, new policy tools emerged in 2022 that could lighten the load for a few households in 2023 and beyond. Congress included a record $6 billion in additional funding for the Low-Income Home Energy Assistance Program (LIHEAP) in the omnibus spending bill passed in December. Passed in August 2022, the Inflation Reduction Act includes an additional $9 billion for energy efficiency programs with extensive rebates targeted for low-income households. Taken together, these programs will help buffer some of the financial stress for the most vulnerable households. Yet, from our vantage point, energy costs pressures will continue to squeeze the majority of U.S. consumers this year. And, unfortunately, these high energy costs have a cascading effect, feeding inflation and hampering economic growth.

3 **Unfortunately these high energy costs have a cascading effect, feeding inflation and hampering economic growth.**

[1] *"Winter Fuels Outlook", EIA, Dec. 6, 2022. https://www.eia.gov/outlooks/steo/report/WinterFuels.php*

[2] *The agency's updated full-year guidance as of Dec. 11 sees average residential electricity price in the U.S. rising to 15.39 cents per kilowatt-hour in 2023, up from 15.02 cents in 2022 and 13.66 cents in 2021. If EIA's 2023 forecast is accurate, that would indicate an almost 13% increase in electricity prices in the three-year period.*

COMMUNICATIONS

Cable doubles down on existing HFC infrastructure

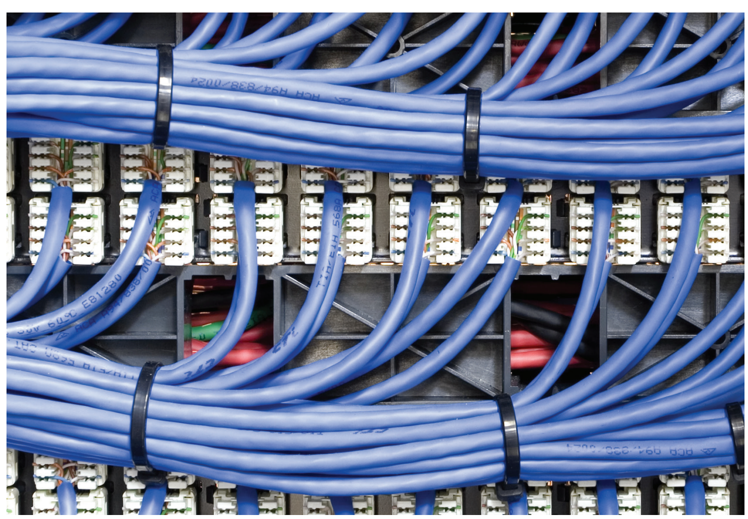
By Jeff Johnston

Charter Communications announced a three-year plan to deploy DOCSIS 4.0 across its cable footprint, bringing top speeds of 10Gbps by 2025 at a cost significantly less than fiber. DOCSIS 4.0 utilizes existing hybrid fiber-coaxial (HFC) infrastructure which is enabling Charter to upgrade its network at a cost of $100 per passing, considerably less than the $500-$1,500 for most new fiber builds. Comcast has also voiced its support for DOCSIS 4.0 and recently completed a trial in Philadelphia. The cable giant plans to begin deploying symmetrical multi-gig services in the second half of 2023 and has pegged the cost to upgrade its HFC network at approximately $200 per passing.

These announcements are important to the broadband industry because they represent a meaningful competitive threat to companies deploying fiber to the home. Fiber deployments have been red hot over the last several years and investors have been paying top dollar for these assets. And while it's likely many of these deployments have been done in unserved or neglected DSL markets, to the extent new fiber builds are targeting legacy HFC markets, fiber operators could run the risk of falling short of their market share expectations. With an advantageous cost structure over fiber, and speeds that should meet the needs for most consumers, cable operators that deploy next generation DOCSIS infrastructure will be in good shape to defend themselves against new fiber build competition.

Supply chain woes continue

A tight labor market and access to critical equipment continue to negatively impact operators' ability to meet their network build schedules. The tight supply of fiber, electronics, and cabinets forced some operators to "double order" in the fourth quarter in hopes of securing enough equipment to meet their build schedules for 2023. If operators' orders are met, they will end up with excess inventory in the first half of the year but it is a risk operators see worth taking given the current supply environment. On the labor front, construction vendors came well short of meeting their obligations a number of times in the fourth quarter because of the tightness in the market. Smaller communication operators are competing for resources with the national operators, who are known for offering financial incentives to secure labor and equipment supply, something that isn't always an option for smaller operators.



1 **Charter and Comcast are doubling down on HFC,** a lower-cost, high-performing competitive threat to new fiber builds.

2 **Operators are missing deadlines due to continuing supply chain issues,** forcing them to take on extra inventory.

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.

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