



July 2017

QUARTERLY U.S. RURAL ECONOMIC REVIEW

New Crop Potential and Trade Uncertainties Driving Markets

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.

Inside this Issue...

Global Economic Environment	2
U.S. Economic Environment	3
U.S. Agricultural Markets	4
Grains, Oilseeds, and Biofuels	4
Farm Supply	8
Animal Protein	9
Dairy	12
Other Crops	14
Specialty Crops	15
Infrastructure Industries	18
Power and Energy	18
Rural Water Systems	19
Telecommunications	20

Key Points:

- The grain industry continues to grapple with large inventories. Strong demand and pockets of weather concerns, however, give reason for optimism.
- Ethanol production and stocks have risen to record levels, even as depressed DDG and gasoline prices have pressured margins. Sustaining export growth will be key to absorbing the larger supplies.
- Expansion in animal protein continues. Low feed costs, healthy balance sheets and available working capital will drive herd and flock populations higher this year and next.
- There is more milk in the U.S. right now than the industry knows what to do with. Milk is being dumped earlier and in larger quantities in the Northeast and Mideast regions than in recent years, yet profitability on the farm continues to drive expansion.
- The U.S. and Mexico have reached a new agreement regarding the importation of Mexican sugar, ending a trade dispute that has cast a shadow over the U.S. and Mexican sweetener markets for a number of years.
- The outlook for the U.S. power and energy sector remains bearish driven by cheap gas, and a massive wave of new power generating capacity that far exceeds projections for growth in electricity consumption and peak demand.
- M&A activity continues at a strong pace in the communications industry. Vertical consolidation remains the go-to strategy for small- and medium-sized providers as they look to gain synergies and scale, expand footprints and gain competitive advantages.

Market focus is shifting from the large supplies left from 2016/17 to new global crop potential, coming production adjustments in the world's livestock and dairy markets and the uncertainties in trade policy. Weather uncertainties will inject volatility into the crop sector and provide significant pricing opportunities until there is greater clarity regarding the 2017/18 crops. Animal protein and dairy producers will need to carefully align production adjustments to export market realities as the domestic market remains strong. Income to agriculture producers is likely to remain under pressure particularly in commodities with large carryovers and regions experiencing weather challenges. Wide disparities in income will persist across commodities and regions, and that will carry over into the potential for adjustments in land values and rental rates. Farmer cooperatives will benefit from larger product movement but they will be under increasing pressure to provide inputs, productivity enhancements, speed, space and risk management options at lower costs while assuming greater inventory risk.

Global Economic Environment

The global economy retains some momentum despite a weak start to economic growth in the U.S. and the surprising outcome in the United Kingdom elections. However, sustaining that momentum into 2018 will depend heavily on the nature of fiscal stimulus in the U.S. in late 2017 and steady progress on the Brexit negotiations. China growth rates have remained in the 6.5-7 percent range and are likely to do so until the National Congress meeting in late 2017. Completed elections in France and coming elections in Germany are supportive of growth in the Eurozone through 2017. Emerging markets continue to benefit from a stronger than expected global economy and some increased optimism that the worst is behind economies such as Brazil. Canada and Mexico continue steady growth despite the specter of a NAFTA renegotiation, immigration issues along the Mexican border and ongoing disputes regarding Canadian dairy and timber.

The continued divergence in central bank actions over the next 6-12 months will have implications for both currency markets and capital flows. The U.S. Federal Reserve remains committed to a normalization of interest

“*Coops will benefit from larger product movement but will be under pressure to provide services at lower costs.*”

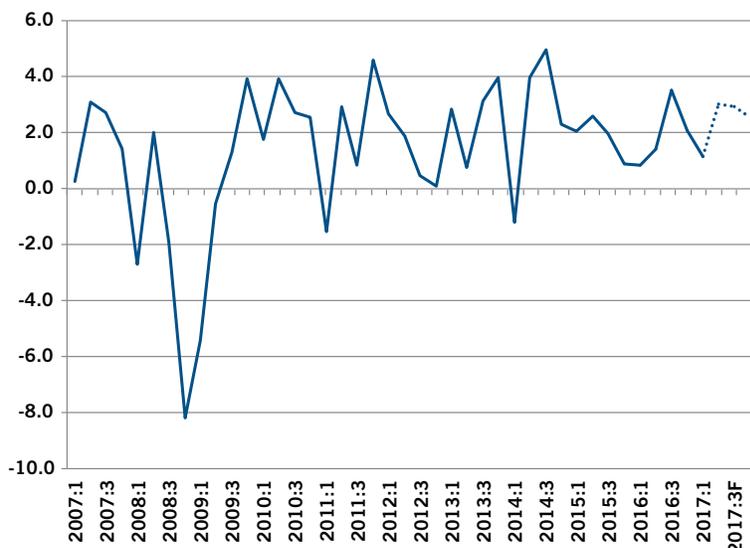
rates with the midyear increase followed by additional increases late in the year if the economy continues its current trend and fiscal stimulus appears on the horizon. Such a pattern would continue to support the value of the dollar in the short term.

Despite political uncertainties in the major advanced economies the world economy is on a steady growth path but substantial downside risks remain:

- **Much of the optimism in the global economy is linked to the ability of the Trump administration and the 115th Congress to enact meaningful fiscal stimulus in late 2017.** Tax reform, expanded infrastructure investment, reductions in regulatory burden, health care reform, and shifts in immigration and trade policies are all on the table. The eventual impact is in the detail and timing of actual legislation signed into law. Many of the impacts may not occur until 2018 but 2017 will be impacted by the progress of the debate.
- **The divergent paths of the central banks in the U.S., Europe and Japan will continue to inject volatility in financial and exchange rate markets.** Zero interest rate policies (ZIRP) have been in place approaching 9 years with little expectation of any sharp global reversal in the next three years. The U.S. Federal Reserve will be cautiously moving rates higher in 2017 but other central banks are likely to maintain current monetary policies.
- **The value of the U.S. dollar will likely remain in a narrow range with an upward bias given that the divergent central bank policies are likely to continue well into 2018.** Uncertainty over the pace of Federal Reserve policy actions and U.S. economic growth relative to the other major trading partners will continue to support the dollar in the current trading range.

EXHIBIT 1: U.S. Gross Domestic Product

Pct change from previous quarter at annual rate



Source: IHS Markit

- Leadership control in China will tighten as Chairman Xi convenes the 19th National Congress in late 2017 to appoint new leadership of the communist party.** China will remain committed to realigning its economy toward greater consumer dependence but the transition will be slow. In the short run, China will continue to stimulate its economy to maintain growth of 6-7 percent but some slowing may occur in 2018 as they attempt to address the debt overhang in the private sector, including state owned enterprises and provincial governments. The attempts to build global supply chains through the One Belt One Road initiative will be a centerpiece of establishing China in the global arena.
- Negotiations over the U.K.'s exit from the EU, the growing immigrant migration pressures, and the continuing sovereign debt issues in other EU countries will continue to generate significant political and economic uncertainty in Europe.** Overall economic growth in Europe has been better than expected but will be challenged if progress on these structural challenges is stalled.
- Emerging markets will see improving access to capital as commodity and natural resource markets stabilize.** Steady growth in China and many advanced economies will support growth in many

emerging economies, particularly those that have relied on raw material and commodity export growth to drive their economies.

- Geopolitical flare-ups will continue to add volatility to the global landscape.** Turmoil in the Middle East shows no sign of abating, and terrorist actions such as those in London will keep markets on edge. Russia, Iran and North Korea continue to engage in behaviors that are likely to have a negative impact on U.S. interests.

U.S. Economic Environment

The U.S. economy should rebound from a subdued first quarter as consumer spending recovers, business inventories enter a rebuilding phase and business investment

gains some momentum. Quarterly growth rates averaging around 2.5-3.0 percent through the balance of 2017 seems likely particularly if there is greater clarity regarding U.S. economic and trade policies. (See Exhibit 1.)

However, annual growth in 2017 will remain just over 2 percent. The Trump administration and Congress are debating major policy and regulatory changes across a wide spectrum of issues and that debate could carry into 2018 and be heavily influenced by the 2018 congressional elections. In the interim the consumer will be the principal growth driver. Consumer sentiment remains very positive and is supported by steady job and wage growth. The unemployment rate has reached a 16 year low and there is little evidence of rising inflationary pressures. The U.S. trade deficit will continue to be a drag on growth as strength in the U.S. dollar boosts growth in imports relative to exports.

Investment spending is the missing catalyst to sustaining higher U.S. growth rates. Residential investment will continue a pattern of steady growth as both single family and multifamily housing construction increase despite some concerns regarding declining affordability and labor shortages. However, business fixed investment is likely to remain stagnant as companies await decisions on tax reform and investment incentives. Real nonresidential fixed investment has not increased significantly since

2014 despite the fact that corporate balance sheets have significant liquidity and debt capital remains very affordable. Swings in inventory investment are likely to add to quarterly volatility.

U.S. Agricultural Markets

With global and domestic demand on a resilient and steady course, the commodity markets have turned their attention to global production adjustments driven by Mother Nature and shifts in agriculture and trade policies. Grain inventories, particularly for wheat, remain at elevated levels relative to recent history. However, in most cases there remains the promise of some volatility but with upside limitations unless severe production declines occur. Foreign acreages are expanding across all commodities as the strength of the U.S. dollar limits U.S. competitiveness. U.S. acreage shifts away from corn and wheat to soybeans and cotton will add to any ongoing uncertainties. The animal protein and dairy sectors will continue to benefit from lower feed costs, a strong U.S. consumer and solid export market growth. The big questions are whether the improved margin opportunities will lead to production increases that outstrip the export potential or there is some shock to export flows.

Net cash flow was supported by record harvests in 2017 but low commodity prices and static production costs pushed net farm income to the lowest level since 2009. Farmer cooperatives have navigated historically weak basis in 2016/17 and will look for improved basis trading opportunities in 2017/18. Some coops will also face increasing challenges with customer cash flow and receivables.

Grains, Oilseeds, and Biofuels

The global abundance of grain and oilseeds has remained the dominant feature through the second quarter of 2017. Global supply pressures have grown following South America's record corn and soybean harvests. However, the focus has now turned to crop production concerns developing in the U.S., particularly in the Northern Plains.

Elevators in the U.S. have struggled with relatively stagnant grain markets that have offered few opportunities to capitalize on basis appreciation in the cash market. While persistently weak basis has been a

“*Foreign acreages are expanding across all commodities as the strength of the U.S. dollar limits U.S. competitiveness.*”

sore spot for both grain traders and farmers, the healthy carry offered in corn and wheat futures has been a bright spot that has off-set the lack of profitability in a lethargic cash market. Strong soybean prices that have been supported by robust Chinese demand also offered a reprieve from low grain prices.

As expected, U.S. farmers took advantage of stronger oilseed prices and switched acres out of corn and wheat to soybeans. U.S. weather and crop conditions throughout the crop belt will remain the focus as the growing season pushes into summer. Planting delays in the eastern Corn Belt and the increasingly dry conditions in the Northern Plains have already raised concerns of lower corn, wheat and soybean yields later in the season. In the Central and Southern Plains, disease and inclement weather have also raised quality concerns over the hard red winter wheat crop currently being harvested.

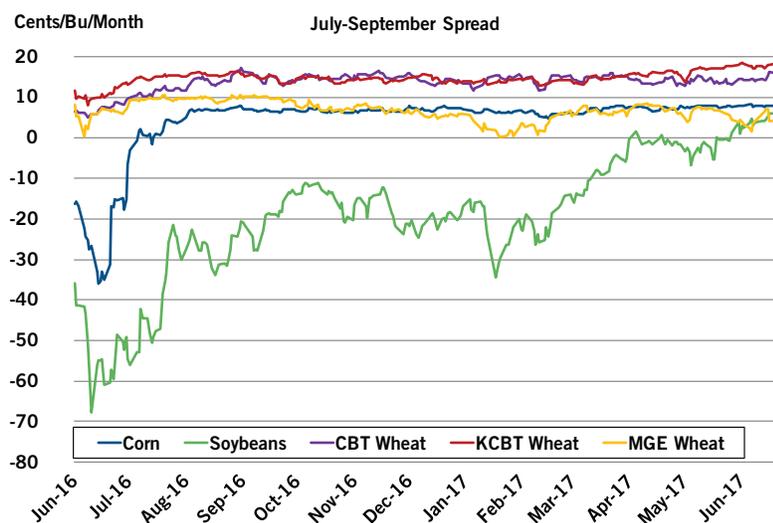
The oversupply of old-crop wheat and corn, meanwhile, will continue to pose challenges for grain elevators in the months ahead as they prepare to make space for new-crop harvests this fall. Elevators sitting on ample stocks of grain that have not been forward sold ultimately will be challenged to move inventories as the crop year closes, portending yet another steep drop in basis in the latter half of the summer as bin space is cleared and hefty grain supplies flood the market.

Corn

The record surplus of corn following last fall's extraordinary harvest in the U.S. has been a godsend for the ethanol and livestock sectors that continue to expand as they take advantage of cheap grain prices. Foreign buyers also continued to ramp up purchases of U.S. grain through the second quarter, with corn exports moving well ahead of the pace of previous years.

However, Mexico, which is by far the chief export destination of U.S. corn and accounts for more than 25 percent of U.S. corn exports, followed through on plans

EXHIBIT 2: Futures Carry



Source: CME Group; Minneapolis Grain Exchange

to diversify its corn purchases to Latin America. Concerns over NAFTA unraveling under the leadership of President Trump prompted Mexican livestock operators in May to negotiate a purchase of 300,000 metric tons of Brazilian corn to be delivered between August and October. While the purchase of Brazilian corn would be a record amount for Mexico, it would account for slightly more than 2 percent of Mexico's corn purchases from the U.S.

Despite the additional cost of transportation from Brazil to Mexico, Brazil has continued to gain advantage on the export front as Brazilian farmers harvest a record corn crop. Their currency, the real, has also continued to weaken, making their exports cheaper relative to the U.S.

U.S. farmers responded to the increased global competition and excessive supplies in the U.S. by shifting acres out of corn and over to soybeans. USDA estimates that U.S. farmers planted 90.9 million acres of corn this spring, down from last year's 94 million. Corn acreage is expected to be down in almost every state. Excessive rainfall during the planting season, particularly in the eastern Corn Belt, has raised the odds that even more corn acres have shifted to soybeans. Many fields that were flooded across Indiana and surrounding states during the key corn-planting window have likely been switched to soybeans.

With the new corn crop starting the season with less-than-ideal planting conditions, focus in the coming weeks and months will be on growing conditions and

USDA's weekly crop conditions reports. For late-planted corn, there is heightened concern the crop will enter the critical pollination phase in stressful weather conditions or suffer early frost damage later in the season.

Ample old-crop corn supplies, meanwhile, will remain an issue for grain handlers looking to clear bin space for the new crop in the months leading into fall harvest despite the generous carry offered in the futures market to store corn. (See Exhibit 2.) Should farmers and grain elevators become aggressive with summer corn sales, end users will likely enjoy further weakening in local basis.

Soybeans

China held firmly to its position as the key global buyer of soybeans through the second quarter with total imports now surpassing last year's record pace by 20 percent. Even with record large crops in the U.S. and South America, soybean prices held relatively firm through much of the April-June period. USDA expects imports from China in the 2017-18 crop year to continue growing to a record 93 MMTs, up from 89 MMTs estimated for the current marketing year.

In the battle for China's soybean market Brazilian producers are gaining an export advantage from continued weakness in Brazil's currency. The ongoing political crisis in Brazil that has resulted in the downward slide in the value of the real has added more selling pressure as Brazilian farmers cash in on the weaker currency and release crops onto the market. The scandal-plagued political crisis in Brazil is not expected to be resolved in the near term and will continue to weigh down the real.

Domestically, the U.S. soybean crush pace has slowed from prior years as crushers compete against the growing stockpile of cheap dried distillers grains (DDG) flooding the market from ethanol producers who are running at full capacity. With the increased availability of DDGs, domestic livestock and poultry operators are enticed to replace soybean meal with more DDGs in their feed rations. In April, U.S. soybean processors crushed 149.7 million bushels, down 5.3 percent year-over-year (YoY), according to USDA.

EXHIBIT 3: U.S. Planted Acreage

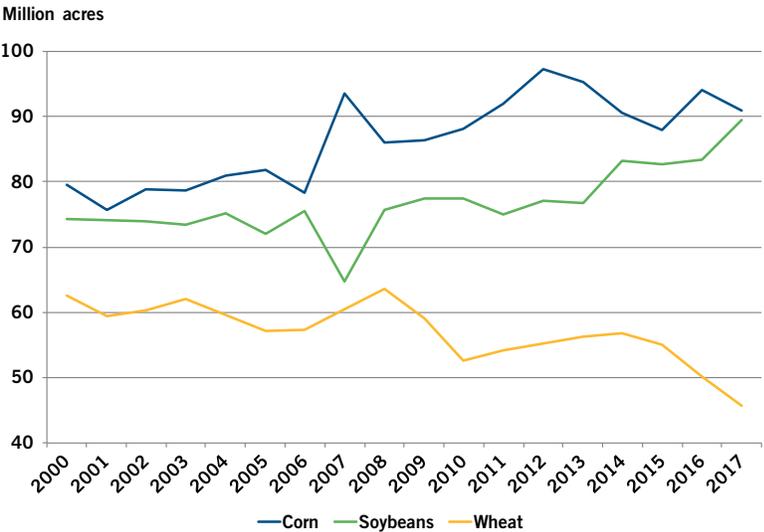
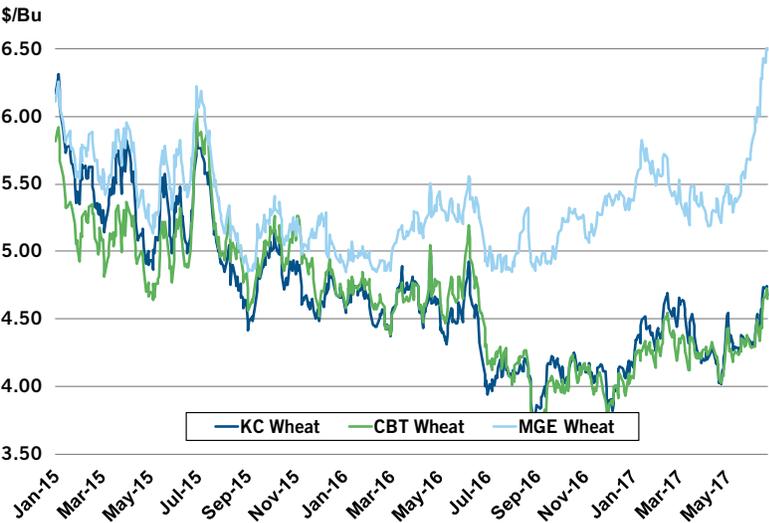


EXHIBIT 4: Nearby Wheat Futures Prices



Source: CME Group; Minneapolis Grain Exchange

Barring major weather problems this summer, the U.S. could produce yet another record soybean crop and beat last year’s record crop of 4.3 billion bushels. USDA figures U.S. farmers will have seeded 89.5 million acres to soybeans this spring, a significant jump from last year’s planted acreage of 83.4 million. (See Exhibit 3.) Planting delays with corn, however, could shift still more acres to soybeans. The expectation of possibly another major U.S. soybean crop on the heels of a record South American harvest has forced a downward correction

in soybean values. USDA currently figures ending stocks for the 2017-18 crop to rise to 495 million bushels, up 10 percent YoY.

Declining canola production in Canada, though, provides some hope for oilseed producers in the U.S. Wet fields in Canada prevented planting of canola in Saskatchewan and Alberta this spring with drought conditions there now raising concern of sharply lower crop yields and potentially more export business in the coming crop year for U.S. oilseed growers.

Wheat

Protein is increasingly becoming the central issue in the wheat market as combines roll north through Kansas and reveal low protein levels in the new hard red winter (HRW) wheat crop. Early harvest reports from Texas and Oklahoma have also been less than encouraging on crop quality. Widespread reports of crop diseases like wheat streak mosaic, freeze damage, and kinked stems resulting from a spring blizzard coalesced this year to raise quality concerns across much of the Central and Southern Plains.

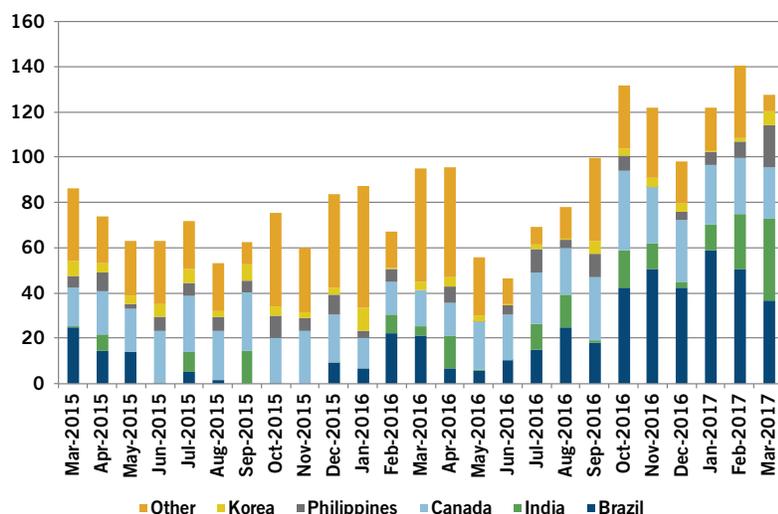
The concern over lack of quality milling wheat has continued to underpin protein premiums as millers seek out hard red spring (HRS) wheat from the Northern Plains to blend with the hard red winter crop. But, with spring wheat acreage estimated to be down 6 percent YoY at 10.9 million acres in North Dakota and the surrounding regions, and with the HRS crop starting the season on a poor

note as drought spreads across the Northern Plains, uncertainty of the size of the spring wheat crop has made end-users nervous. Yield potential of the spring wheat crop will continue to fall should hot and dry growing conditions persist in the critical weeks ahead. If crop conditions that are historically low deteriorate further, protein premiums will accelerate higher. (See Exhibit 4.)

Farmers in the winter wheat growing regions who are lucky enough to harvest a crop with higher protein values will capitalize by storing their crops on-farm and

EXHIBIT 5: U.S. Ethanol Exports

Million gallons



searching for buyers willing to pay the highest premium. Most elevators in the HRW growing region of the Central and Southern Plains do not segregate wheat by protein. Elevators that do offer premiums, though, are already reporting greater selling interest from growers outside their traditional marketing regions.

In the Pacific Northwest, white wheat acreage is expected to have dropped substantially as heavy spring rains prevented timely planting. Increased interest in pulse crops has also eaten away at wheat acreage throughout the region. As with the Plains wheat crop, concerns are rising of low protein plaguing the new white wheat crop as the market struggles with ample supplies of low protein wheat currently in inventory.

The relative strength of the U.S. dollar, meanwhile, continues to impede U.S. wheat exports while Russia's cheap currency and abundant supplies give Russian farmers the advantage in the global export market. The substantial carry offered in the KCBT and CBOT futures markets also continues to pay impressive returns for storage of HRW and soft red winter (SRW) wheat in the absence of a robust export program and weak demand for low-protein wheat.

Ethanol

Ethanol producers pushed output to record highs in the second quarter as the glut of cheap grain continues to

support profit margins. Falling ethanol and dried distillers grains (DDG) prices, though, have eroded margins in recent months.

Blend rates nationwide are now consistently above the 10 percent "blend wall" as consumer demand for fuel with higher blend rates continues to climb.

However, despite strong consumer demand, the record pace of ethanol production has also driven U.S. ethanol stocks to record highs and pushed prices lower. Record ethanol production has also resulted in an abundance of DDGs that have fallen nearly a third in value YoY. The sheer abundance of old-crop grain on the market that has held local basis at historically weak levels has also incentivized

ethanol producers to invest in plant expansions and increase ethanol and DDG production.

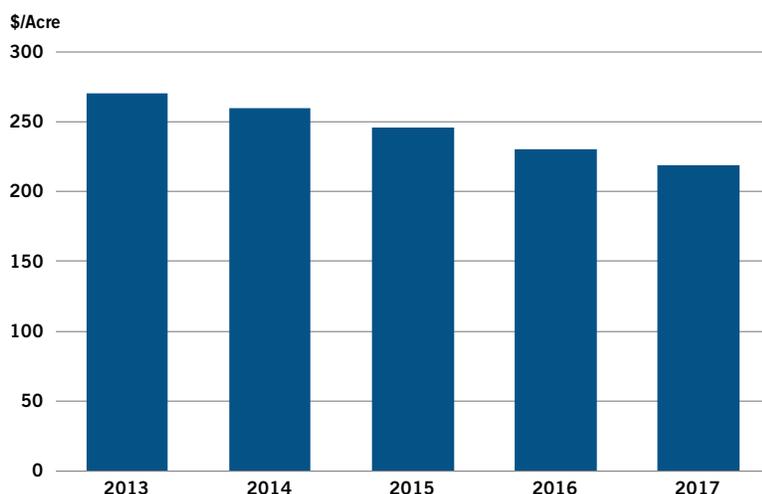
Compounding the issue of margin erosion has been the continual weakness in gasoline prices. RBOB prices have been consistently below ethanol prices. Abundant gasoline stocks will keep pressure on RBOB and ethanol prices in the weeks and months ahead.

Hopes rest on strong and growing exports and rising blend rates in the U.S. The use of E15 is gaining acceptance and the EPA is entertaining the idea of allowing E15 to be sold year-round. E15 sales are currently not allowed during the summer months.

Brazil's appetite for U.S. ethanol continues to fuel U.S. export growth. (See Exhibit 5.) In April alone, Brazil accounted for more than half of U.S. exports to meet the country's mandated 27 percent blend rate. However, U.S. ethanol exports to Brazil will soften as world sugar prices continue to correct off of recent highs.

The U.S. EPA meanwhile proposed in early July to set 2018 conventional corn ethanol blending requirements at the the statutory maximum of 15 billion gallons. The EPA also proposed a reduction in the blending mandate for advanced (including cellulosic) biofuels, which would lower the volume requirement from 4.28 billion gallons in 2017 to 4.24 billion gallons in 2018. Biodiesel requirements were also proposed for 2019, matching 2018 levels of 2.1 billion gallons. The proposals will now be posted for a public comment period.

EXHIBIT 6: Cash Rental Rates for Iowa Cropland



Source: Iowa State University

Farm Supply

Farm financial stress continues to ripple across the supply chain with ag retailers reporting sharply lower net profits and growing credit stress among their farmer customer base. While record yields last year and increased financial support from government program payments has helped bolster farmers' balance sheets, the weight of low commodity prices continues to bring financial stress across much of the ag sector. A potential drop in crop yields and a reduction in government payments this year is expected to result in further credit stress for growers, resulting in growing accounts receivables with ag retailers.

Not all news has been bad at the producer level. Farmers have benefited from a softening of cash rents across much of the crop belt. Cash rents in Iowa in 2017 have dropped 4.8% YoY, according to Iowa State University. The average cash rent paid by farmers fell to \$219/acre, down from the high of \$270/acre marked in 2013. (See Exhibit 6.)

Ag retailers have also become more hopeful in recent months, with fertilizer prices and margins showing signs of stabilizing. With fertilizer sales generally accounting for the majority of an ag retailers' annual profits, the slight improvement in fertilizer prices in the second quarter has bolstered optimism that prices have forged a long-term bottom.

Crop Nutrients

While the overall fundamentals in the crop nutrient space have largely remained bearish amidst global supply surplus, nitrogen fertilizer prices forged a recovery in the second quarter after prices hit multi-year lows at the start of 2017 as demand strengthened heading into the spring planting season. Exports of nitrogen fertilizer from China dropped significantly in the first half of 2017 following sharp reductions in production, contributing to the modest recovery in global N prices.

While the strengthening of N prices heading into the spring planting season is being followed by a seasonal drop that is expected to continue through the summer months, major declines in fertilizer prices are not widely anticipated.

However, with nitrogen fertilizer prices largely driven by corn prices, neither is a significant recovery in prices anticipated considering the abundance of supply on the market. (See Exhibit 7.)

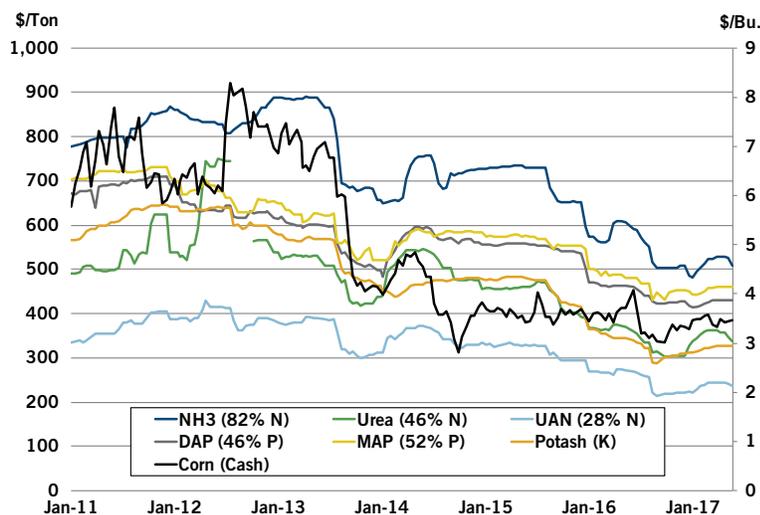
Phosphate and potash prices also showed a promising recovery driven by strong Brazilian demand where imports reached record levels as farmers significantly increased safrinha corn acreage. While some production curtailment with manufacturers has brought support to fertilizer prices, the additional production capacity coming online will likely cap any potential sharp price increases. Substantial increases in potash production in particular has dimmed hopes of the market making significant upward movements. After years of declining fertilizer prices, retailers remain gun shy about holding too much fertilizer in inventory and suffering write-downs on unsold product.

Seed and Crop Protectants

Dicamba has taken center stage this growing season as ag retailers and custom applicators weigh the legal risks of applying the highly volatile herbicide to dicamba-resistant soybeans and cotton crops and shoulder the risk of neighboring crops being damaged by spray drift or volatilization.

Despite the less volatile reformulations of dicamba and the various legal restrictions on application to prevent drift, reports of damaged crops near fields treated with

EXHIBIT 7: Central Illinois Corn & Fertilizer Prices



dicamba are up significantly over last year. In Arkansas alone, farmers-filed complaints of off-target dicamba movement are up significantly over last year, according to the Arkansas State Plant Board, which voted to pass a proposed emergency rule to ban the use of in-crop dicamba and to expedite the rule to increase penalties for misuse. Crop specialists report that education and training have not always resulted in growers and applicators using correct spray nozzles, avoiding applications during high winds or at night during a temperature inversion, or using buffer zones between fields. Even in instances when all spraying guidelines were followed, damage to crops in neighboring fields has still resulted. The legal risk of crop damage from dicamba drift or volatilization lies solely on the applicator, leaving ag retailers wary of spraying dicamba despite adhering to proper protocol.

Mega-mergers in the seed and crop protectant sectors have continued to gain approval with the Dow-DuPont, Bayer-Monsanto and ChemChina-Syngenta deals moving ahead. In May, China's Ministry of Commerce gave regulatory approval for the proposed DuPont and Dow Chemical merger while Syngenta shareholders approved the sale to ChemChina. Finalization of both deals is expected in the coming months. Bayer and Monsanto, meanwhile, are spinning off assets like the LibertyLink herbicide-resistant trait that competes with the Roundup

Ready trait in crops like corn, soybeans, cotton and canola to gain regulatory approval. The Bayer-Monsanto deal is widely expected to gain approval by the end of 2017.

Animal Protein

Expansion in the animal protein sector continues. Healthy balance sheets and available working capital are allowing meat companies to expand processing capacity, and growth in global protein demand is expected to absorb much of the increased output. Total meat and poultry supplies are slated to increase 2-4 percent annually in both 2017 and 2018.

A growing dependence on exports creates tremendous opportunities for U.S. producers.

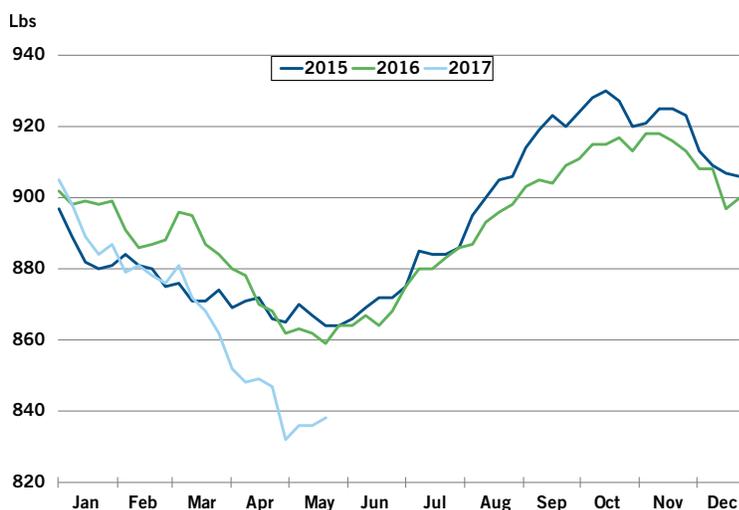
However, it also introduces a higher level of uncertainty and trade-related risk which could lead to increased price volatility up and down the supply chain.

Beef

The beef market has been in a cash led bull market since early 2017. The price rally exceeded expectations and has bolstered margins for all sectors of the beef supply chain. Exceptional demand, both domestic and global, has created brisk product throughput for processors. This has led to an increase in the pace of marketings for live cattle and an associated drop in carcass weights. (See Exhibit 8.) Year-to-date (YTD) slaughter by headcount is up nearly 6 percent in 2017. However, a 2 percent drop in weights has limited overall beef production to 4 percent YTD.

The nation's beef herd remains in expansion mode, with the beef cycle outlook changing due to strong feeder cattle prices in 2017. Estimated cow-calf returns have improved steadily throughout the first half of 2017. The presence of profitability and supportive pasture and range conditions have incentivized heifer retention, especially for high-return producers, and extended the duration outlook for the current expansion phase through the end of the decade. In early June, regional drought conditions in the Northern Plains and Florida began to force cow herd liquidation and a shifting of the

EXHIBIT 8: Weekly Steer Carcass Weights



Source: USDA-AMS

cow herd. While the national impact is currently limited, drought conditions will continue to play a critical role in determining the pace and duration of the current expansion phase.

Record strong live cattle basis levels have improved the profitability for cattle feeders in 2017 and incentivized a brisk pace of marketings. Cash-to-cash margin opportunities in the second quarter of 2017 resulted in an increased number of hedged cattle on feed. Short futures hedgers that locked in margins early in the price rally faced significant margin calls in recent months in order to hold those positions. Prudent risk management strategies will continue to be essential to cattle feeders' business plans in order to take advantage of hedging opportunities and preserve capital.

A strong cash market and elevated basis levels have provided strength to front month live cattle contracts in 2017, while the deferred futures curve remains discounted and abnormally flat. The anticipation of more supply in the second half of 2017 will pressure prices and potentially compress margins for cattle feeders. Increased availability of feeder cattle and a favorable grain price outlook will continue to be positive factors for margins going forward. Opportunistic procurement of inputs will separate high return cattle feeding operators from average to lower return operators.

Despite the strong cash live cattle prices, product values have increased at a brisker pace, resulting in strong packer margins in the second quarter of 2017. Exceptional demand has supported larger slaughter levels and the associated efficiencies that come with full utilization of packing capacity. Saturday slaughter hours continue to trend higher to support increases in the number of cattle available. Saturday hours will continue to be utilized, while simultaneously, smaller fringe plants and regional cow plants are coming online. Full utilization and healthy margins will lead to capacity expansion, current facility renovations, and supply chain integration through acquisition of further processing companies.

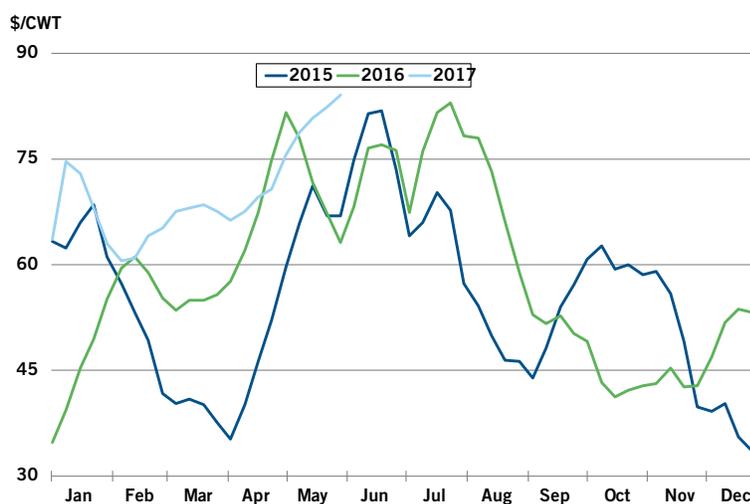
Retail beef prices trended sideways over the past quarter, insulating consumers from a surging beef cutout. However, the rally in the beef cutout has increased the spread between beef competing meats. The result is a more favorable position for pork and poultry to regain some retail featuring activity from beef throughout the summer months.

A financially healthy U.S. consumer and above average temperatures provided a kick-start to summer grilling activities and strongly supported product values. While solid domestic demand will not be enough to significantly raise prices, it will help to solidify a price floor.

Beef exports, however, can move prices significantly, and they have thus far in 2017. Beef exports through April are up 13 percent compared to a year ago and are on pace to increase 6 to 8 percent annually in 2017. Asian markets continue to fuel beef export market growth. Key export destinations have fueled the growth, with volume to Japan up 15 percent, South Korea up 8 percent, and Hong Kong shipments up 73 percent.

In mid-June, final details between the USDA and Chinese officials were released regarding the protocol to allow the U.S. to begin beef exports to China. These details included elements of traceability, boneless and bone-in product from animals under 30 months of age, and a restriction on growth promotants. The first shipment of eligible beef was shipped from Nebraska days later.

EXHIBIT 9: Weekly Pork Trimmings - 72 Percent



Source: USDA-AMS

Recent global beef market developments have the potential to modify current forecasts. India is projected to be the world's leading beef exporter in 2017. A recent federal ban on the trade of cattle for slaughter has raised concerns about their ability to maintain the top spot, leaving opportunities for other major exporters to fill the supply gap. The meat scandal in Brazil also represents significant uncertainty in current export forecasts. Australia is beginning to recover from drought driven liquidations and will likely have enough supply to compete with the U.S. in key Asian destinations as early as the middle of 2018.

Pork

The U.S. pork industry is in expansion mode. Year-to-date pork production is up 2.3 percent, and we forecast output to rise annually in both 2017 and 2018 by 2-4 percent. This is in spite of lighter carcass weights resulting from the aggressive marketing pace and reduced usage of antibiotics and growth promotants.

Five major projects, all of which should be operational by mid-2019, will lead to an 8-10 percent increase in processing capacity. The brisk pace of processing capacity expansion is driven by continued global demand growth and several years of increasing packer profitability. The processing expansion is concentrated in the Midwest, and will incentivize producers to expand at a similar rate.

The industry will experience a transition period as each new project comes online and hog supplies adjust to meet the new packer demand. Amidst these adjustments, short term price volatility is expected to increase, and bargaining leverage will shift in the favor of producers as the expansion of hog supplies lags that of processing capacity. Until a new equilibrium is established and pork demand catches up with production, some weakness in lean hog prices is possible at the regional level.

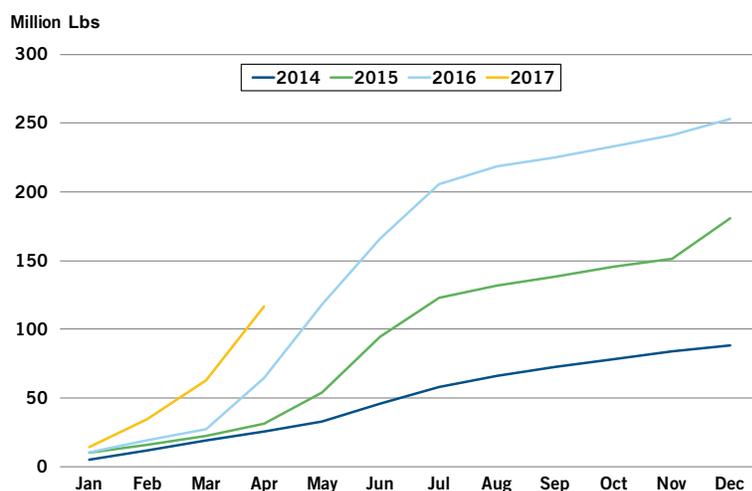
Continued global demand growth is critical to the success of the expansion. Disruptions in the export channel would quickly create a glut of pork on the domestic market, depress product values, and put additional pressure on outdated or inefficient existing processing facilities.

Hog producer margins remain positive with slight differences between high, average, and low return producers. For the remainder of the year, margins are expected to range between breakeven and 15 dollars per head. In the first half of 2017, profitability was bolstered by a strong pork cutout. Robust belly and pork trim prices have led the strength of the pork cutout. (See Exhibit 9.) Pork trim prices have benefited from exceptional beef trim pricing in recent months.

The increase in pork supply and a growing spread between beef and pork prices has created a wholesale advantage for pork. This will position pork for increased featuring activity at retail through the summer months and boost demand.

Pork exports in April were up 8 percent over last year and recorded the largest April volume on record. Pork exports as a percent of production continue to run well above year ago levels, representing 28 percent of total production in April. Mexico remains the number one pork destination as demand from China softens. Volume to Mexico in April was up 10 percent versus year ago and volume to China was down 7 percent. Other notable growth figures in key destinations include South Korea up 21 percent, Colombia up 84 percent, Philippines up 91 percent, and the Dominican Republic up 53 percent.

EXHIBIT 10: Cumulative Annual Milk Dumped



Source: Federal Milk Marketing Order, Northeast and Mideast

The global pork market is keeping a close watch on China, the planet's number one pork market. As its domestic production ramps up, local hog prices are retreating and China's imports are trending lower. U.S. exports to China are expected to be slightly lower compared to record 2016 levels.

Poultry

Broiler producers are breathing a sigh of relief as the risk of a widespread Highly Pathogenic Avian Influenza (HPAI) outbreak diminishes. A few positive cases were reported in the spring of 2017 and flocks were quickly depopulated. Strict biosecurity protocols proved effective in isolating the affected flocks and prevented a broader outbreak. Outbreaks continue in Asia and Europe, which will keep the industry on alert during U.S. migratory bird season.

U.S. broiler production has been largely unaffected by the isolated flu cases. However, regionalized trade bans were implemented and overall trade volumes were modestly affected in April. Broiler exports are up 5.4 percent YTD, and a 5-8 percent increase is expected for 2017.

U.S. broiler production continues to trend upward at a modest pace. We expect production to rise by 2 percent in both 2017 and 2018, and continuous improvement in exports should hold domestic per capita supplies steady. The slow output growth will support wholesale prices and integrator margins over the next two years. However, the growing dependence on exports not only creates

opportunity but increases uncertainty and the risk of an oversupply situation in the face of growing output.

Integrator margins remain positive and have exceeded expectations in the first half of 2017. Strong product demand and higher wholesale values of beef and pork have provided much of the price support to the broiler complex. A favorable grain price outlook will support integrator margins throughout 2017.

Export growth will be critical to absorbing production increases and support a positive margin outlook. The U.S. is well positioned to take advantage of supply gaps created by HPAI in major export destination countries.

Conversely, disappointing exports would swell domestic supplies and drag down prices.

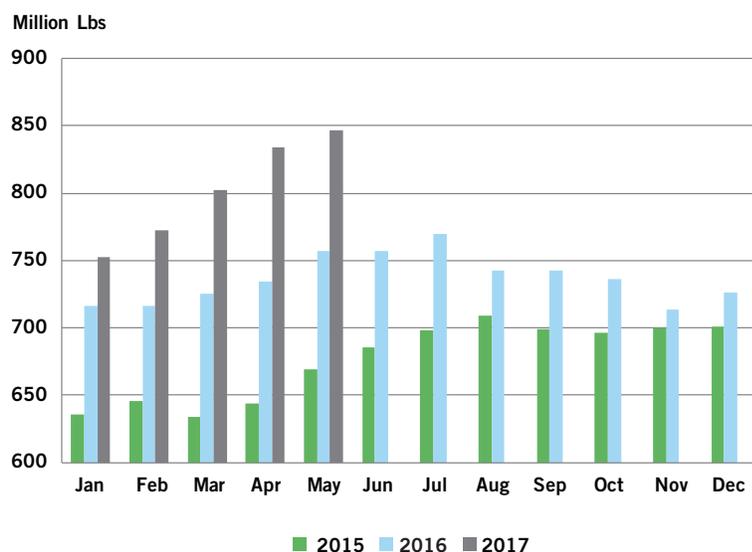
Dairy

There is more milk in the U.S. right now than the industry knows what to do with. Milk is being dumped earlier and in larger quantities in the Northeast and Mideast regions than in recent years, yet profitability on the farm continues to drive expansion. (See Exhibit 10.) In the past, surplus milk in the Northeast and Mideast may have been trucked to the Upper Midwest and sold at a discount, but with plants there running at capacity, that relief valve is no longer available.

Production of cheese has been up 4.4 percent through April this year, and demand has been down slightly over the same period. This has led to burdensome inventory levels, mostly in the form of "barrel" cheddar. (See Exhibit 11.) Wholesale cheddar cheese is generally made into either 40 pound blocks or 500 pound barrels. Forty pound blocks are usually cut into smaller blocks and then packaged for sale to consumers, while barrels are usually further processed into either processed cheese products or other products in which cheese is an ingredient. While the market for blocks is relatively balanced at the moment, barrels are trading at a heavy discount.

As cheese demand struggles, butter demand continues to impress. World butter prices are mostly higher than the U.S. right now which has sparked renewed interest in

EXHIBIT 11: Natural American Cheese Stocks



Source: USDA

exports and could continue to support prices in the U.S. going forward. For now, the strong consumer demand from domestic customers as well as demand for fat in the form of whole fat yogurts, whole milk, and other seasonal higher fat content dairy products like ice cream is the real driver of strength in the butter markets.

Following ten months of YoY declines in milk production, the EU brushed up against prior year levels in March, though it looks like they are headed back to negative territory again. France and Germany, two of the dominant milk producing regions of the EU suffered setbacks due to weather, and the Netherlands is starting to see some declines due to herd reductions to meet new phosphate regulations. After a couple years of painful on-farm economics New Zealand production is poised for a stronger 2017/18 season following their winter production break.

Powder markets are improving slightly as a result of higher international prices and slower production out of the EU and New Zealand. The intervention stocks that have been building in the EU are getting older and becoming less of a factor in current markets. Exports to Mexico continue to be strong, though concerns about trade disruptions linger in the background. Mexico is increasingly pushing to grow their own dairy industry

and increase their self-sufficiency. Farms are consolidating, dairy cattle with improved genetics are being imported from the U.S. and Canada, and investments are being made in the domestic processing industry. For now, though, there will continue to be a heavy reliance on U.S. product.

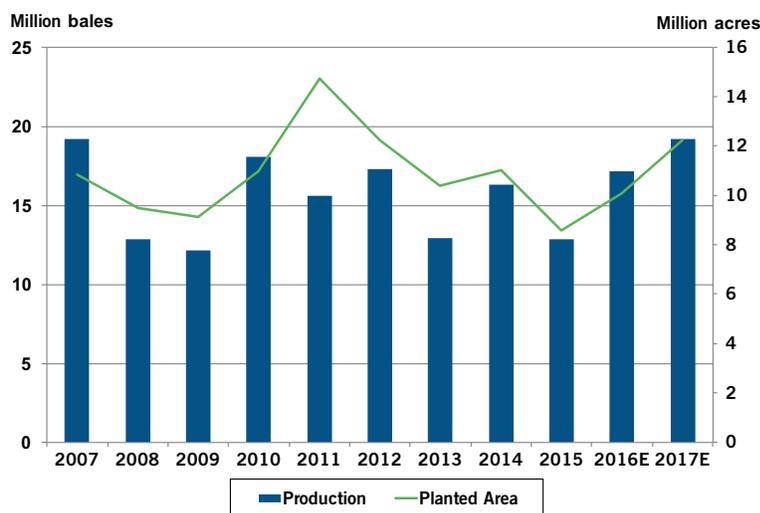
Whey prices have weakened slightly as inventories build alongside cheese. China has been back in the market, and likely has some additional need for product, but they have reportedly pushed back against higher prices.

Against the backdrop of rising world prices, improving exports, and continued strength in butter, the outlook for milk prices over the remainder of 2017 is improving, but not without major risks to the downside:

- European production has pulled back, but probably only temporarily. There is still a desire for expansion to take advantage of higher prices. If that happens alongside the beginning of a strong start to New Zealand's season, global milk supplies could feel heavy, quickly.
- There is too much cheese in inventory. This could be a temporary problem, and may be limited to just specific types of cheese, but as long as the Midwest and Northeast are running at capacity, there will be lots of cheese to deal with.
- Milk is being dumped, and farm profitability is increasing. This is not a sustainable scenario and something will have to give eventually.

With the above risks in mind, the positive outlook for improved exports and continued strength in butter should help lift milk prices above those seen in the last couple of years. Butter prices are expected to be in the \$2.50 range into the fall. Cheese prices should pick up from here as spring milk production calms into the summer months and exports pick up. Milk powders and whey will be supported by renewed export interest, but strong supply will limit upside potential. The class III milk price is expected to average around \$16.50 per hundredweight in 2017, compared to 14.87 in 2016.

EXHIBIT 12: U.S. Cotton Production and Acreage



Source: USDA ERS

Other Crops

Cotton

U.S. producers are growing a lot more cotton in 2017. They're incentivized by higher cotton prices and less optimism about the prospects for other crops like corn, wheat and sorghum. Improved water availability will also boost extra long staple (ELS) plantings in California. And favorable moisture conditions across most of the Cotton Belt during the spring are likely to result in lower abandonment rates this season. Consequently, 2017/18 U.S. cotton production will be at the highest level in a decade. Domestic cotton production will exceed domestic demand in the coming year and increased global competition will limit U.S. exports, hurting new-crop prices. (See Exhibit 12.) A bright spot has been strong demand for higher-quality cotton, which has boosted U.S. exports and old-crop prices.

After five years of rising supplies, 2016/17 world ending stocks are down for a second consecutive year. Chinese policies that have discouraged production and encouraged the sale of surplus cotton stocks have left global cotton inventories at their lowest level in five years. Global production is expected to expand in 2017/18 but still fall short of consumption. And with China expected to continue reducing stockpiles, global stocks will shrink further.

Rice

The U.S. rice crop will be considerably smaller in 2017/18. Growers planted substantially fewer acres of long-grain rice in the South because of weaker rice prices and better returns for soybeans. Although improved yields will lessen the production declines in 2017/18, severe spring rains and devastating floods in the Delta will reduce total harvested acres. As a result of improved water conditions in California, the U.S. short/medium grain rice crop will be slightly larger than last year's crop. The smaller overall rice crop will support 2017/18 farm prices in the \$10.70-\$11.70/cwt range, compared to the 2016/17 range of \$10.20-\$10.60/cwt. Tighter supplies and higher prices will lower U.S. rice exports slightly in the coming season.

World rice production will contract slightly in 2017/18 as production increases in Southeast Asia will only partially offset production declines in North America and North Africa. Although the Chinese government reduced rice support prices for 2017/18, China's 2017/18 rice crop will be more or less unchanged from 2016/17. Global rice trade will pick up in 2018 in line with expectations for record global consumption in 2017/18. EU imports have been increasing since 2014 and are expected to reach a new record in 2018.

Sugar

The U.S. and Mexico reached a new agreement regarding the importation of Mexican sugar, ending a trade dispute that has cast a shadow over the U.S. and Mexican sweetener markets for a number of years now. The 2014 agreement that suspended anti-dumping and countervailing duties on Mexican sugar imports also imposed quotas and price floors to control the flow of Mexican sugar. U.S. sugar processors have since contended that excess refined sugar was still entering the U.S. The new draft agreement reduces the percentage of refined sugar that Mexico can export to the U.S., lowers the quality of Mexican raw sugar imports, and increases raw sugar imports, thus addressing U.S. sugar refiners' concerns.

Specifically, the agreement increases the price at which raw sugar must be sold at the mill in Mexico from 22.25 cents per pound to 23 cents per pound. For refined sugar, the price at the mill must increase from 26 cents per pound to 28. The new agreement also reduces the percentage of refined sugar that may be imported into the U.S. from 53 percent to 30 percent. This will result in a significant increase in the amount of raw sugar available to U.S. sugar refiners. Although there is relief that an agreement was reached, the sugar industry response has been divided, with groups in both the U.S. and Mexico critical of the deal.

Larger beginning stocks enabled the U.S. to meet higher domestic food and beverage use in 2016/17 in spite of a decline in production and imports. The reduction in total supplies and increase in use will reduce 2016/17 ending stocks and the stocks-to-use ratio. Global production was up in 2016/17, but with consumption hitting record levels, global ending stocks have contracted to the lowest level in five years. All of this has served to support domestic sugar prices in 2016/17, while world prices have slumped on indications that the world market is still amply supplied.

Looking ahead to the new-crop, 2017 domestic sugar beet production is expected to be roughly unchanged from the current season, despite a reduction in acreage. Yields and recovery rates are expected to improve in the coming season to be more in line with historical trends. Notwithstanding, early forecasts are that 2017/18 sugar production will decline for a second year in a row due to a smaller sugar cane crop.

Specialty Crops

Following five years of drought, California had an extremely wet winter and spring with precipitation totals significantly above normal across the state. The wet weather eased the drought conditions across most of the state and full reservoirs meant the best state and federal surface water allocations in years. In fact, the U.S. Bureau of Reclamation announced 100 percent water supply allocations for all contracted Central Valley Project (CVP) water users. All State Water Project (SWP) contractors north of the Sacramento-San Joaquin Delta are getting 100 percent of their requested deliveries while all other contractors will get 85 percent of their

“*Although there is relief that an agreement was reached, the sugar industry response has been divided, with groups in both the U.S. and Mexico critical of the deal.*”

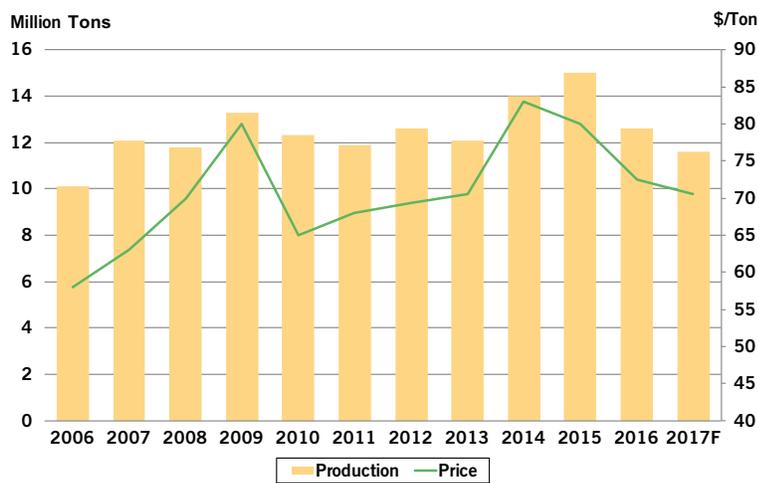
requested amounts. The last time that both CVP and SWP system demand was fully met was in 2006.

In some areas of California, the heavy rains flooded fields, orchards and vineyards. Flooding in these areas and extremely wet conditions in others delayed plantings and other crop management tasks. Wet and cold weather also delayed the bloom period of some permanent crops. Depending on weather conditions over the summer, many crops could be a week or two behind schedule and mature a little later this year. While all the rain did complicate orchard and field work, ample surface water supplies and rising water tables have certainly made life much easier for California growers this year and should help lower input costs. The statewide snowpack was at 177 percent of normal at the beginning of June, which bodes well for water supplies over the summer from snow-melt run-off.

Elsewhere in the country, growing conditions have been, and are, a mixed bag. The drought that gripped New England and parts of the northeast last summer, and which had a huge impact on production in the region, is thankfully also over. Conditions are much improved, but a very late spring in many parts of the northeast will shorten the growing season. A devastating freeze in the South in mid-March wiped out 80 percent of the peach crops in Georgia and South Carolina. With reduced peach volumes from these states, peach prices could be up to double what they were last year.

Processing Tomatoes

235,000 acres of processing tomatoes were planted under contract this season – a reduction of about 11 percent on 2016 plantings of 260,000 acres. Consequently, 2017 production will also be lower than last year. The harvest estimate for 2017 is 11.8 million tons vs the 12.5 million tons harvested in 2016.

EXHIBIT 13: California Processing Tomato Production and Price

Source: USDA NASS, CTGA

(See Exhibit 13.) But depending on yields, total production could be even lower than estimated, ranging anywhere from 11 million to 11.8 million tons. Excess inventory is the main driver in the reduction in contracted acreage and production in 2017. The hope is that the smaller crop should enable the industry to work away some of the inventory that built up in the wake of the record crops of the last few years and the slow-down in exports due to the strong dollar. Higher export volumes over the past 6 months have increased paste exports 6 percent YoY as processors have lowered prices in an attempt to reduce inventories.

The California Tomato Growers Association reached a price agreement with the majority of tomato processors just a few weeks ago. The agreed-upon 2017 price consists of a base price of \$70.50/ton. Reduced demand from processors has been a factor in the ongoing slump in the negotiated base price from \$80/ton in 2015 and \$72.50/ton last year. Late season premiums are the same as in 2016 and range from \$3/ton for tomatoes delivered from 15-21 September to \$15/ton for fruit brought in from 13 October through the end of the harvest.

Wet fields in some parts of California's Central Valley delayed tomato plantings with northern crops affected more than the crops in the south. There is a lag in crop maturity compared to 2016, but the crop is progressing well. Harvest is expected to start a bit later in the north this year, but is expected to start on schedule in early July in the southern parts of the valley.

Tree Nuts

The 2017 almond bloom was less than optimal. Cold temperatures extended the bloom and although there was some windy and stormy weather during the bloom, which had growers concerned about pollination, the longer bloom period seems to have made up for the weather-related disruptions in pollination. The almond crop is progressing well so far and the initial forecast is for a record crop of 2.2 billion pounds – a 2.8 percent increase over last year's crop of 2.14 billion pounds. At 1 million acres, bearing acreage, too, is at a new high this year. With almond prices at their most moderate and stable levels in five years, shipments continue to trend upward with April 2017 YTD shipments

up 21 percent YoY. More affordable pricing has once again positioned almonds as a value nut (compared to other tree nuts). This, together with a favorable supply outlook, continues to drive demand at home and abroad. Depending on the variety, current crop prices are ranging from \$1.85/lb - \$2.65/lb. The expectation of a record crop this year has new crop prices trending \$0.03/lb - \$0.07/lb lower.

The pistachio bloom went well. The trees received sufficient chill hours over the winter, despite some concerns on this front because of the warmer than expected winter weather. Spring growing conditions have been ideal. Early (unofficial) indications are that a crop of 570-600 million pounds is very feasible. With the large carryover from last year's record crop, the prospect of a large crop is less than ideal, though. Fortunately for the U.S. industry, Iran's crop is expected to be much smaller this year as a result of bad weather during bloom. Spurred by lower pricing that reduces the price-quality differential of U.S. pistachios in the export markets, April 2017 YTD shipments are up significantly YoY. Domestic shipments are up, too, on the back of more favorable retail prices. Average grower prices are under \$2/lb for the 2016 crop.

Cold weather delayed the walnut bloom. It's still too early to know what the size of the new walnut crop will be, but with the wet winter and increased bearing acreage, the 2017 crop should be fairly large. Numerous factors have contributed to a 21 percent increase in shipments YTD in the 2016/17 marketing year, namely strong demand

worldwide stemming from depleted stocks, increased global consumption, and moderate prices. Inshell grower prices are ranging from \$1.20/lb - \$1.35/lb.

Citrus

As the citrus harvest winds down, it appears that the 2016/17 all-orange volumes will come in close to the estimates, i.e., 68 million and 51 million boxes for Florida and California, respectively. The Florida crop is down 17 percent from last year with a 9 percent decline in non-Valencia orange volumes and a 23 percent reduction in the Valencia crop. Although citrus greening remains the main driver for the ongoing production declines in Florida, post-bloom fruit drop (PFD), which struck last Spring, is largely to blame for the dramatic drop in the 2017 Valencia crop. By some estimates, as much as 8 million of the 10.6 million box reduction in Florida's Valencia crop can be ascribed to PFD. In California, rain delayed harvesting in February and March, but momentum picked up when the weather improved. California's all-orange crop is down about 13 percent on the 2015/16 crop, though, due to lower fruit sets in both navels and Valencias and a 2,000 acre decrease in Valencia bearing acreage.

Citrus greening, along with a normal seasonal production variation has also had a negative impact on Florida grapefruit volumes. The combination led to a 16 percent drop in total U.S. grapefruit volumes from 2015/16. Reduced production has firmed grapefruit prices this season. The U.S. lemon crop is about 9 percent smaller this season mainly because of production declines in California, but with higher imports, grower prices have come under pressure. With increased consumption driving acreage expansions in recent years, the 2016/17 tangerine crop is the largest on record.

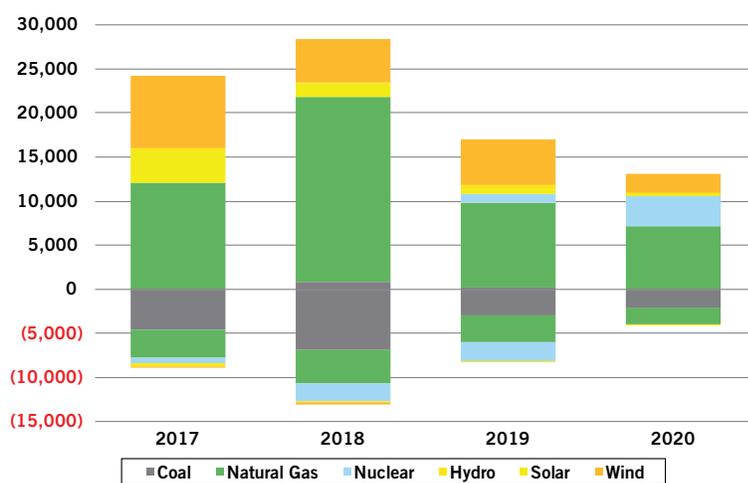
Florida citrus packouts were much the same as last year, and although grapefruit sizing was a challenge this year, orange and grapefruit quality was very good this year. The sugar content of oranges was also much improved this season. As a result of considerably lower fruit volumes and quality improvements, Florida growers received record prices this season. Grower prices have averaged \$2.70 per pound solids for non-Valencia and Valencia oranges – a 21 percent increase over the

“*Although there is relief that an agreement was reached, the sugar industry response has been divided, with groups in both the U.S. and Mexico critical of the deal.*”

2015/16 average price of \$2.24 per pound solids. With good demand, fresh orange prices are higher too, this year. The overall 2016/17 average shipping point price across all orange classes and sizes is \$18.33 per 7/10 bushel carton vs the 2015/16 price of \$17.90.

In late December 2016, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) published a final rule that allows lemons from northwest Argentina to be imported into the U.S. Although the rule became effective on 23 January 2017, it was stayed twice. The rule went into effect on 26 May 2017, when the last stay expired. Consequently, after a 16-year ban on imports, Argentine lemons can once again enter the U.S. The new rule contains numerous requirements that must be met before imports will be permitted. In addition, for 2017 and 2018, Argentine lemons can only be imported into the northeastern U.S.

A bright spot has emerged for the U.S. citrus industry: The EU recently suspended its requirement that U.S. groves be inspected for citrus canker before fruit can be exported to the EU. Although the new EU directive still requires that countries with citrus canker have a disease management program in place, the new directive means that the EU is satisfied with the APHIS disease management program. This will equate to a savings of \$5.6 million a year for U.S. growers, and is especially welcome news for Florida grapefruit growers who have been battling rising costs due to citrus greening. The majority of the Florida grapefruit crop is exported to the EU, and the industry is hopeful that the removal of the trade barrier will help restore U.S. citrus trade with the EU to historical levels. Estimates suggest that U.S. citrus exports to the EU could increase by 25 percent in the first year alone after the implementation of the new policy in mid-November.

EXHIBIT 14: Proposed Annual New Builds and Retirements (MW)

Source: ABB Velocity Suite

INFRASTRUCTURE INDUSTRIES**Power and Energy**

The outlook for the U.S. power and energy sector remains bearish driven by cheap gas, and a massive wave of new power generating capacity that far exceeds projections for growth in electricity consumption and peak demand.

Across the U.S. there are 82.7 gigawatts (GW) of proposed generating capacity in various phases of development: under construction (49%), in a testing phase (3%), beginning site prep (5%), or have received all permits (43%). These proposed new builds are dominated by natural gas, and the majority of this capacity will be in the ground by 2018. (See Exhibit 14.)

New capacity builds will offset the 34.3 GW of proposed retirements, but the growth in supply stands in contrast to consistently declining load forecasts across the U.S. The largest energy markets in the country including California ISO, Midcontinent ISO, PJM RTO, and New England ISO have all revised their load forecast downward in the last year. Many of these grid operators have referenced weak demand and growing supply as the main drivers of weak wholesale energy prices, which fell to record lows in 2016.

The trend in low energy prices has been well documented and is largely led by low natural gas prices. This is not likely to change. Average prices at Henry Hub are likely to

remain below \$3.50/MMBtu through 2020 due to booming supply, mostly from the Northeast.

Since 2014, natural gas production out of the Northeast has climbed nearly 5 Bcf/d to just under 23 Bcf/d, accounting for almost a third of the country's total natural gas production. Breakeven costs in the Appalachia region currently range from \$0.50 - \$1.50/MMBtu, supporting production even in extremely low price environments. If prices at the Henry Hub were to contract and average around \$3.10/MMBtu over the next five years, production out of the Northeast could easily grow by an additional 9 Bcf/d by 2022.

Expanding takeaway capacity from the Northeast will ease pipeline constraints and help low-cost Appalachian gas reach demand centers across the country. Currently there are upwards of 20 projects totaling 17.5 Bcf/d of additional take-away capacity that are very likely to come online before 2020. All of these pipeline projects have received the necessary permits and many are under construction.

Power developers are taking advantage of ample gas supply in the Northeast, with 13.6 GW of combined cycle gas units currently under construction in PJM. Construction of highly efficient combined cycle units will continue to place downward pressure on power prices in PJM, and lead to additional coal plant closures or the conversion from coal to gas for plants that are close to gas pipelines.

Natural gas combined cycle units in PJM have become baseload resources, and coal-fired units have shifted to an intermediate role. Coal steam units recorded a 32.5 percent capacity factor in 2016, down sharply from 43.8 percent the year before. Combined cycle plants had a 62 percent capacity factor in 2016, almost unchanged from 2015.

Coal units in the Great Plains region and Texas are facing pressure from increasing amounts of wind energy. The Lone Star State set a new record when it reached 50 percent wind penetration on March 23, according to ERCOT. Shortly thereafter the Southwest Power Pool set its own record for wind penetration at 54 percent.

An average power purchase agreement for wind energy in the Great Plains is currently around \$20/MWh. Most coal-fired plants in the region have operating costs higher than \$30/MWh. The cost difference between wind and coal power is driving coal generation up the dispatch curve and into early retirement. The negative effect of wind energy on merchant coal units has been evident for several years. Moving forward, analysts at Moody's Investors Services believe low-cost wind resources in the Great Plains region could drive even regulated coal-fired power plants into early retirement.

The dynamics driving low prices across the U.S. power and energy sector are likely to result in potentially 40 GW of coal retirements, beyond the 16 GW that are already proposed through 2020. Regulators will likely allow utilities to rate-base the cost of these coal assets to reduce the risk of stranded assets. There could also be a push to provide state-level subsidies to un-economic coal units, similar to what is currently going on with nuclear units.

The transition towards lower cost, more efficient, and cleaner energy is well underway. The fundamentals that are driving prices lower are not going to wane. Average gas prices should remain below \$3.50/MMBtu, energy demand is sure to be flat, and the efficiency of wind turbines is set to improve. Don't forget about solar. The installation cost for utility-scale PV solar dropped below \$1/Watt for the first time ever earlier this year.

Rural Water Systems

The health of the U.S. water industry is at its lowest level in over a decade according to the American Water Works Association's (AWWA) annual State of the Water Industry survey. This trend is concerning and it highlights the immense challenges faced by water utilities today: earn enough revenue to maintain infrastructure, keep water affordable for the lowest income levels, and do so while selling less of their product.

Roughly 40 percent of water utilities report declining total water sales in the last 10 years, with an additional 26 percent reporting flat sales. In many parts of the country, residential customers that historically purchased 6,000 to 7,000 gallons per month are now using half of that amount. The issue is even more acute for small rural water systems that typically have lower average per capita water use and

“*The cost difference between wind and coal power is driving coal generation up the dispatch curve and into early retirement.*”

higher per capita costs than systems serving more densely populated areas. Research suggests that systems serving more than 10,000 people require roughly \$2,500 in capital costs for each residential connection. This number balloons to over \$11,000 for small systems that serve a population of 500 or less.

Weak sales contribute to financial strain across the industry. Roughly one-third of water utilities reportedly struggle to cover the full-cost of providing service; this includes operation and maintenance expenses, debt service, adequate working capital and required reserves. In addition, 12 percent of utilities are unable to cover the full cost of providing service, up from 9 percent two years ago.

A growing number of water utilities are recovering more costs by shifting toward fixed fees and relying less on consumption-based fees, to alleviate the effect of lower volumetric sales on revenues. Greater reliance on fixed fees enhances revenue stability - the ability to generate adequate revenues to cover costs, not only on a day-to-day basis but during an uncertain situation such as drought or disruption to a water supply source.

Rural systems are well suited for heavier reliance on fixed fees given their tendency to have higher per capita costs and lower demand. The Environmental Finance Center Network, an organization that provides utility management services to rural systems, suggests that small systems enhance revenue stability by figuring out how much revenue is required to cover operating costs and capital investment needs, and collect the maximum amount of this revenue through a fixed fee. The remaining portion should be collected through a uniform rate per 1,000 gallons which can be adjusted based on the customer's total demand. This structure aligns revenues more closely with fixed costs, provides protection against an unforeseen drop in demand, and promotes conservation.

Revenue stability is crucial in an environment defined by growing uncertainty and rising costs, and will play a large role in reversing the trend that suggests the health of the U.S. water industry is in decline.

Telecommunications

After dominating headlines for the past couple of years, regulatory actions at the Federal Communications Commission (FCC) took a back seat to news from communications providers during the second quarter. Recent technological progress, strategic investments among broadband providers, new and improved service offerings in the over-the-top (OTT) video sector, and merger and investment announcements across the industry are likely to have a noticeable impact on the communications industry for years to come.

Demand for faster internet speeds continues to rise as more consumers adopt streaming and 4k video, cloud-based technologies and the number of internet-enabled devices rises. Home broadband service is now viewed as “essential” or “important” by 90 percent of Americans. Accordingly, wireline and wireless providers alike are focused on new technologies (such as DOCSIS 3.1, G.fast, millimeter wave, spectrum aggregation) and network improvements that will advance overall network capacity and end-user speeds. Several tier one and tier two wireline companies will roll out gigabit speeds in the coming months. Although the cost to increase internet speeds is considerable, increased speeds are necessary for the companies to remain relevant in the marketplace, especially as most providers have concentrated on broadband service in the face of declining revenues from legacy telephony or cable TV services.

As of June 2016, the number of traditional telephone access lines in the U.S. fell to 62.2 million, a nearly 9 percent YoY drop, while VoIP and wireless voice continue to experience growth. Meanwhile, the total number of broadband subscriptions has grown steadily in the U.S. and reached 369 million in June of 2016, up nearly 10 percent from the same time in 2015. The double-digit increase during that 12-month period is largely attributed to improved mobile broadband accessibility; however,

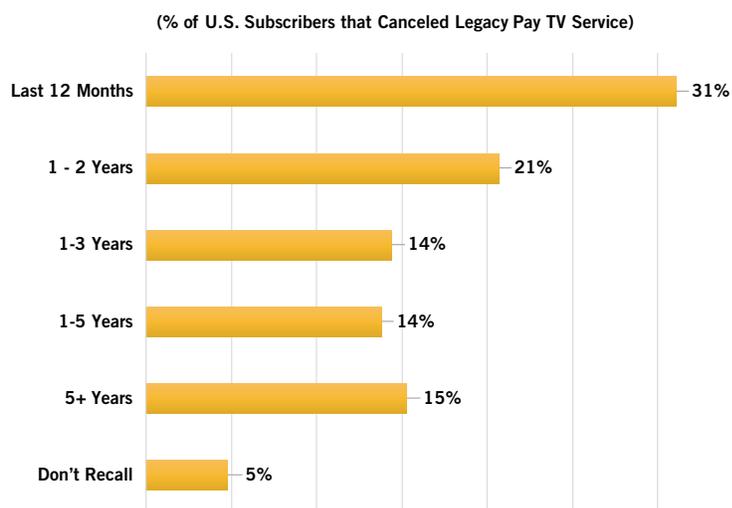
“Pay TV providers experienced yet another aggregate subscriber loss in the first quarter of 2017

rural providers have also been deploying broadband service to previously unserved areas. Roughly 80 percent of Americans have access to broadband speeds of at least 10 megabits per second (Mbps), including the 17 percent (or 56 million) that have access to gigabit speeds.

The future of the pay TV market remains hazy as consumer trends offer little clarity and OTT providers strengthen their competitive edge. On one hand, consumers are combining broadcast, pay TV, video-on-demand (VOD) and streaming OTT to create their ideal entertainment experience. In fact, the average North American spends 10 percent more on subscription TV services than they did five years ago. On the other hand, consumers that subscribe to a pay TV package and one or more OTT services are twice as likely to cut their pay TV in the next six months. The top pay TV providers are downplaying the impact of the slow and steady cord-cutting trend. Nevertheless, analysts suggest that top providers experienced yet another aggregate subscriber loss in the first quarter of 2017, a recurring trend since 2013. (*See Exhibit 15.*) Although these providers employ a broadband-first strategy, the continued roll out of value-adds to retain current subscribers, as well as skinny and pre-paid bundles to attract new market segments, indicate that the subscriber losses are a concern. Some companies are looking to diversify revenue with new offerings involving WiFi and mobile service.

With 2.4 connected TV devices versus 1.7 pay TV set-top boxes in the average U.S. household, the opportunity to access OTT platforms now outweighs that of pay TV platforms. Additionally, OTT providers are morphing into what industry insiders are calling virtual multichannel video programming distributors (virtual MVPDs), as they enter agreements to stream or integrate over-the-air broadcast content into their offerings. Other value-adds, including cloud DVRs and popular original

EXHIBIT 15: Length of Time Since Cutting the Cord



Source: The Diffusion Group

content, position OTT as a viable replacement for pay TV packages rather than just a supplemental option. While OTT is typically less expensive than a traditional pay TV package, and most currently do not require contracts, the availability and cost of a stand-alone broadband connection will weigh heavily in a cord-cutting decision. Rural players may have some insulation against OTT; a recent study shows rural consumers stream nearly 40 percent less than the national average. However, this applies only to rural areas with population bases with an older average age and fewer children in homes. For rural providers lacking a video offering, the low adoption rate could provide opportunity to partner with a virtual MVPD.

Mobile wireless market penetration in the U.S. reached 121 percent or 396 million devices in 2016, a 4 percent YoY increase from 2015. Much of the growth came from secondary device subscriptions, and the Internet of Things (IoT). Although many regional wireless carriers have exited the business, half of the 50 successful 600 MHz Incentive Auction bidders are smaller, regional companies. The auction winners are expected to utilize the new spectrum to expand network capacity and eventually deploy 5G technology. The race to 5G has been underway for some time, and carriers are expected to roll out enhanced 4G technologies with 5G branding before the end of the year. True 5G technology is unlikely to hit the market before 2020, as the standards have yet to be

solidified. Analysts speculate that 5G may cause a shakeup in the mobile industry as nationwide wireless carriers currently lack the dense wireline network required to support the smaller cell coverage areas. Though the nationwide carriers are certainly working to overcome this hurdle, industry insider Craig Moffett of MoffetNathanson, LLC, postulated that legacy cable providers could ultimately win the wireless market due to their significant wireline backhaul capacity. Regional wireless players with ILEC roots may have a competitive advantage in ready access to both spectrum and wireline assets in their coverage territory – if they can hang on until 5G is deployed.

As expected, merger and acquisition activity continues at a strong pace. Vertical consolidation remains the go-to strategy for small- and medium-sized providers as they look to gain synergies and scale, expand footprints and gain competitive advantages. Tier one companies are more likely to leverage vertical transactions to gain strategic assets and horizontal acquisitions to diversify revenue, and strengthen internal capabilities. Fiber transport consolidation also continues at a brisk pace. Most transactions expand the footprint and provide a competitive advantage by connecting metro locations with more geographically diverse secondary and rural markets. An uptick in consolidation is in-part due to the merger-friendly regulatory environment. Wireless may also contribute to the transaction count now that the 600 MHz auction quiet period has ended.

Carriers are finding that data center assets are an exception to consolidation synergy. Following a trend that started in late 2015, Verizon and CenturyLink both sold data center assets during the second quarter. As with previous spin-off deals, these divestitures included provisions to allow the seller to continue offering data center services. These transactions indicate that cloud services are a critical component of the communications service mix, but that data centers require knowledgeable and focused leadership as well as economies of scale to flourish.

As promised, FCC Chairman Ajit Pai led efforts to repeal “heavy-handed” regulatory actions of the previous administration and moved forward to resolve issues with a lighter regulatory touch. In April, the FCC took the first step to repeal the Open Internet Order that re-classified broadband as a telecommunications service, allowing for increased regulatory oversight of broadband providers. Both Pai and his Republican colleague, Michael O’Rielly, argue that the re-classification hinders private broadband investment. Pai received support from rural advocates for the FCC’s decision to amend a merger condition to require Charter Communications to bring broadband to one million unserved locations. Looking ahead, the FCC is expected to continue to streamline and remove regulatory barriers and place more authority at the state level, and put the newly assembled Broadband Deployment Advisory Committee and Rural Broadband Auctions Task Force to work.

Congress and President Trump stepped in with legislative action to repeal Obama-era internet privacy rules, and prohibit the FCC from reissuing new rules in the future that are substantially the same. Representatives in both the House and Senate introduced bills aimed to help spur broadband deployment through increased Universal Service funding, tax breaks, spectrum leasing, and additional subsidies for low-income and displaced workers. Additionally, grassroots advocacy efforts for broadband infrastructure legislation are gaining traction. Congressional representatives are increasingly supportive of including broadband as a significant component of any infrastructure spending bill. Rural advocates are also pressing for any new support to be dispersed through the existing FCC funding mechanism to allow quick dissemination of funds and ensure that deployment standards are upheld. ■

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. Analysts at Plus One Strategic Communications LLC prepared the overview of the communications industry.

Trevor Amen

Economist, Animal Protein

Daniel Kowalski

Vice President, Knowledge Exchange

Terry Barr

Senior Director, Knowledge Exchange

Ben Laine

Senior Economist, Dairy Processing and Production

Tanner Ehmke

Manager, Knowledge Exchange

Christine Lensing

Senior Economist, Specialty Crops

Taylor Gunn

Lead Economist, Power, Energy, and Water

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

Disclaimer: The information provided in this report is not intended to be investment, tax, or legal advice and should not be relied upon by recipients for such purposes. The information contained in this report has been compiled from what CoBank regards as reliable sources. However, CoBank does not make any representation or warranty regarding the content, and disclaims any responsibility for the information, materials, third-party opinions, and data included in this report. In no event will CoBank be liable for any decision made or actions taken by any person or persons relying on the information contained in this report.