



QUARTERLY U.S. RURAL ECONOMIC REVIEW

Agricultural Challenges Mount as Prices and Margins Wane

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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Key Points:

- *As the agricultural markets began the new crop year with adequate but not burdensome carryin stocks, the size of the coming harvest will be pivotal in setting price expectations going forward.*
- *The torrent of bearish news continues for U.S. agricultural producers. The U.S. dollar remains elevated relative to world currencies, severely hampering U.S. commodity exports which are now widely seen as much lower than the USDA's latest projections.*
- *Weaker currencies in competing agricultural exporting countries like Russia, Ukraine, Brazil, Argentina and Canada are signaling to farmers there to expand crop acreage – promising an even more intensely competitive export market for U.S. grain and oilseed farmers in the year ahead.*
- *Record animal protein production levels will pressure meat prices downward in 2016. The challenge for producers will be to maintain disciplined supply growth in sync with anticipated demand levels.*
- *The cure for low prices may well be low prices. But the key question for dairy prices is how low must they go before the cure takes effect. Dairy product prices have not yet hit bottom, in our view.*
- *With the end of California's rainy season just weeks away, the state is already much wetter than it was last year. Yet even with a strong finish to the current rainy season, the state will continue to endure the lingering effects of the multiyear drought for the rest of 2016.*
- *The U.S power sector will continue to face headwinds through the rest of 2016 as low natural gas prices compress power prices, new-builds and deliveries exceed retirements, and weak electricity demand fails to provide a much needed spark to bolster supplier's gross margins.*
- *Significant progress has been made in recent years in protecting the public from lead contamination in their drinking water. But Congress wants additional safeguards, and water utility managers across the country are braced for new, tighter regulations aimed at further reducing lead exposure.*
- *The FCC's 2016 Broadband Progress Report found that nearly 40 percent of rural Americans lacked access to broadband speeds of 25/3 Mbps compared to just 4 percent of urban Americans.*

Preparing for the 2016/17 Growing Season

With growing global commodity supplies, a stronger U.S. dollar, and weak economic growth in China and the emerging markets, the challenges ahead for U.S. agriculture in 2016 are formidable unless Mother Nature trims some of the production potential. Most grain and oilseed markets have turned their attention to the planting and growing season for the 2016/17 crop year. They began the year with adequate but not unduly burdensome carryin stocks so the coming harvest will be pivotal in setting price expectations for the next few years. The animal protein and dairy sectors are benefiting from solid domestic demand and lower feed costs; but in light of projected production increases, global demand will play a key role in limiting a buildup in domestic supplies.

Net farm cash income fell sharply in 2015, with further declines in the offing. It tumbled to \$93 billion after averaging over \$124 billion over the previous 4 years. While this is a 25 percent decline from a period of extraordinarily robust commodity markets, it is still 30 percent above the average net income in the decade of 2000-09. A further modest decline in net farm cash income is likely in 2016, but it will be mitigated to some extent by downward adjustments in input costs such as fertilizer, seeds, crop protectants, and land rental rates.

Global Economic Environment

World economic growth in 2016 will struggle to maintain a 3 percent growth path amidst ongoing concerns over the economic transition in China and the shakiness of many key emerging markets. The U.S. economy remains the principal growth engine for the global economy. The U.S. consumer can be counted on to carry the U.S. economy for much of 2016, but election year distractions will add uncertainty as the year progresses. China is now undertaking a new round of economic realignments to foster its transition to a consumer-led economy. But the results over the past three years have been disappointing and growth remains stuck in the 6-7 percent range. New economic stimulus efforts in Europe and Japan have yet to take hold, but expectations are not high.

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The outlook for the rest of the world economy is mixed. Refugee migration in Europe has become a divisive impediment to developing a comprehensive European growth strategy. The developing economies will continue to struggle with rising current account deficits, weak currencies and an inability to attract outside capital. Oil prices have rebounded based on the expectation of agreements regarding production limitations, but the industry’s outlook remains cloudy. A more stable energy price environment would benefit most regions of the world and bolster global growth. Central banks in Europe and Japan have ramped up their stimulative policies even as the U.S. Federal Reserve cautiously pursues its gradual tightening strategy.

In light of the fragile global economic environment and recent financial-market turmoil, the Federal Reserve announced in mid-March that it expects to raise its benchmark interest rate just twice in the coming year, not the four times previously announced, depending still on how economic conditions unfold as the year progresses. Though the Fed’s announcement had been widely anticipated by the financial markets, it did rattle the foreign exchange markets, and the value of the U.S. dollar fell slightly in the first few days after the announcement to its lowest level since October 2015. Once the dust finally settled, the value of the U.S. dollar remains about 15-20 percent above the average for the prior two years from October 2013 to October 2015. (*See Exhibit 1.*)

Global divergence is likely to widen in 2016 as markets and economies confront a wide range of challenges:

- We still anticipate that the value of the U.S. dollar will trend modestly higher in 2016, driven by the divergences in global growth rates and central bank policies. But later in the year, the U.S. dollar could weaken if the Fed were to delay either one of the expected rate hikes, as it did in March 2016.

- China will continue to pursue a transition to a more consumer-dependent economy. Problems persist in their property and banking sectors, but the authorities have significant room for adjustments in their fiscal and monetary policies to address most challenges and support growth of 6-7 percent.
- The divergence in central bank policies has widened recently with actions by the European Central Bank to increase their monthly purchase of government and corporate debt from €60 billion euros to €80 billion and to reduce their negative interest rate for bank deposits from minus 0.3 to minus 0.4 percent. How much this will spur European growth is in doubt, but it certainly complicates the next move by the U.S. Federal Reserve unless the U.S. economy is on a very solid footing.
- With improved springtime weather, the flood of refugees will strain policy commitments and raise doubts about the survival of the Eurozone. Overall growth in the region will be below 2 percent, but the potential border actions to address terrorism and immigration issues could be impediments.
- Rising current account deficits and volatility in currency values are undermining the growth potential of emerging markets. Capital inflows have plummeted, and the weakness in commodity export markets is likely to persist. Oil exporting countries, in particular, face substantial risk.
- Terrorism and geopolitical uncertainty will continue to cloud the global landscape. With no dominant growth driver and significant unevenness among country growth rates, the global economy is vulnerable to major shocks – economic, financial, or geopolitical – without the political consensus and fiscal policy options needed to combat these shocks.
- World energy markets will remain volatile as producing countries adjust to the new economic realities. Oil prices have recovered toward \$40 per barrel, but the main catalyst has been rumors of commitments from major oil producers to limit production.

U.S. Economic Environment

The U.S. economy is likely to hover in the same 2 to 2.5 percent growth range in 2016 that has prevailed over the past 5 years. Consumer spending will remain the economy's main growth driver with housing investment continuing to show modest improvement. Business investment will likely remain subdued until the presidential and congressional elections are complete and potential policy directions become clearer. Net exports are likely to continue to be a drag on overall growth, especially with the elevated value of the U.S. dollar. The good news is that most of the declines in fixed investment spending within the energy sector are now over. While the U.S. economy's underlying annual growth path seems solid, the quarter-to-quarter growth rates are likely to remain volatile with potentially large swings in net exports and business inventories.

Exhibit 1: Index of Foreign Exchange Value of U.S. Dollar



Source: Bloomberg

The U.S. economy continues to be a tale of divergent sectors. The domestic consumer sector, particularly autos, has been supported by rising consumer incomes, a growing job market, reduced debt levels and improved housing prices. The manufacturing, mining and energy production sectors have languished due to the weak global economy, weak oil demand, the strong U.S. dollar and growing inventories. These are all capital intensive industries and the drag on business investment has been significant. While the export sector remains weak, the access to low cost imports has boosted profitability in many consumer and industrial goods sectors.

U.S. Agricultural Markets

Agricultural markets are increasingly focusing attention on the planting and growing season for the 2016/17 crops. The harvest in the Southern Hemisphere is nearly complete and large crops are expected in most regions. At the same time, global economic conditions remain weak, and the strong U.S. dollar continues to put downward pressure on commodity prices. Most agricultural commodity markets began the 2016/17 crop year with adequate but not unduly burdensome carryin stocks so the coming harvest will be pivotal in setting price expectations for the next few years.

The animal protein and dairy industries continue to benefit from lower feed costs, but building protein supplies and weak export markets are a concern. Domestic consumer demand remains solid but supplies could build domestically if export market conditions were to deteriorate. The protein markets would welcome another large grains and oilseed harvest.

Grains, Oilseed, and Ethanol

The start of 2016 brought more despair to an already gloomy U.S. agricultural economy as commodity markets continued sinking under the weight of oversupply and waning export demand. The abundance of world grain, oilseed and energy supplies continued to bear down on agricultural markets while dampening hopes of a weather-inspired rally in the forthcoming planting season.

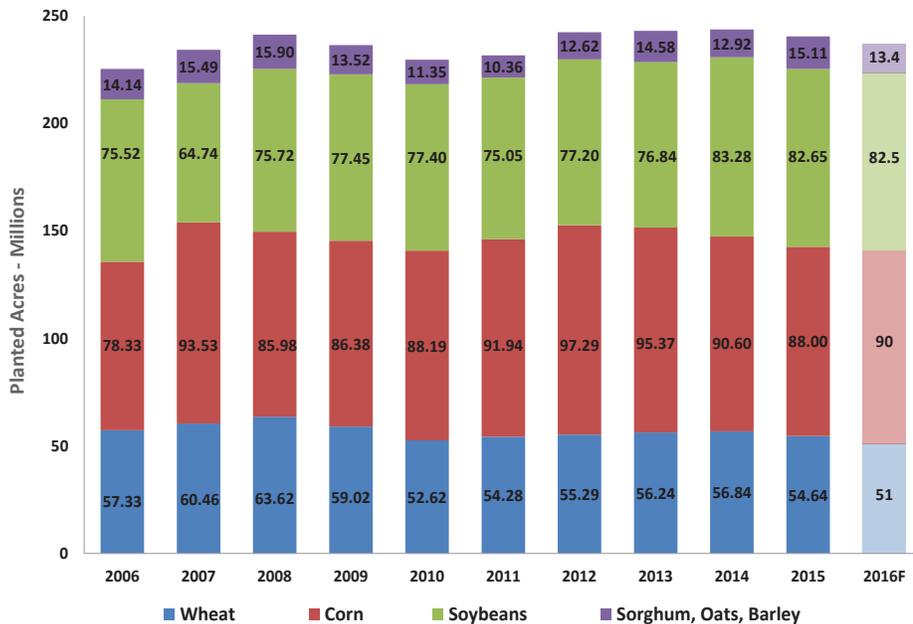
“*Weaker currencies in competing agricultural exporting countries like Russia, Ukraine, Brazil, Argentina and Canada are signaling to farmers there to expand crop acreage.*”

Unfortunately, the torrent of bearish news continues to grow for producers of U.S. agricultural commodities. The U.S. dollar remains elevated relative to world currencies, thereby severely hampering U.S. commodity exports that are now widely seen as much slower than the USDA's latest projections.

Weaker currencies in competing agricultural exporting countries like Russia, Ukraine, Brazil, Argentina and Canada, meanwhile, are signaling to farmers there to expand crop acreage – promising an even more intensely competitive export market for U.S. grain and oilseed farmers in the year ahead. Buyers of U.S. commodities like China also are experiencing weaker purchasing power with their depressed currencies, making them even more sensitive to U.S. price rises. Grain traders in importing countries shudder at the thought of further strengthening of the U.S. dollar or weakening of their own national currencies.

In the months ahead, focus will be on planting conditions and weather. A continuation of warmer than normal temperatures stretching into spring will move up planting in many parts of the country, but could limit yield potential if the unusually warm weather persists into summer. The National Weather Service, meanwhile, predicts a 50 percent chance of La Niña conditions developing in the fall after El Niño conditions weaken over the next few months. La Niña typically is associated with drier conditions in the Midwest and Pacific Northwest, with above average precipitation in the southern states.

Exhibit 2: USDA Predicts Declining Planted Acreage



Source: USDA.

Corn

Corn basis remained stagnant throughout the Corn Belt through the first quarter of 2016 amid a lack of farmer selling and a lethargic export pace that continues to haunt the market. Farmers remain tight-fisted with old-crop corn supplies, but have shown some willingness to sell on modest market rallies. Concerns will emerge over storage availability later in the season if farmers continue to remain reluctant sellers by fall harvest.

USDA currently predicts farmers will plant 90 million acres of corn this spring, up 2 million from last year with corn seen to have more profit potential than soybeans. (See Exhibit 2.) Operating costs, though, remain high and rural bankers are expected to tighten operating loans, thus raising the prospects of farmers switching to less cash-intensive crops like soybeans.

In the event of a bumper U.S. crop, an even more bearish scenario will unfold amidst growing world supplies and weakening export demand as competing countries like Brazil, Argentina and Ukraine increase shipments on price competitiveness and higher stocks.

In Brazil, farmers are responding to the weaker national currency by expanding acreage for the “safrinha,” or second-season, corn crop planted immediately behind soybeans. Brazil’s corn crop is seen near-record at 83.5-84.0 MMT, thereby intensifying export competition with the U.S. Total U.S. corn export sales commitments for the current marketing year are down 22 percent from last year’s pace. (See Exhibit 3.)

Meanwhile, China continues to sit on massive corn inventories with the government lowering price support levels and reducing the prospect of future grain imports. However, end-users remain concerned about feed quality of grain that has been held in open storage, leading to the need

for imports of higher quality grain for blending purposes. U.S. corn exports nonetheless will be shackled by the strong dollar and growing export competitiveness abroad with global and domestic stocks likely increasing.

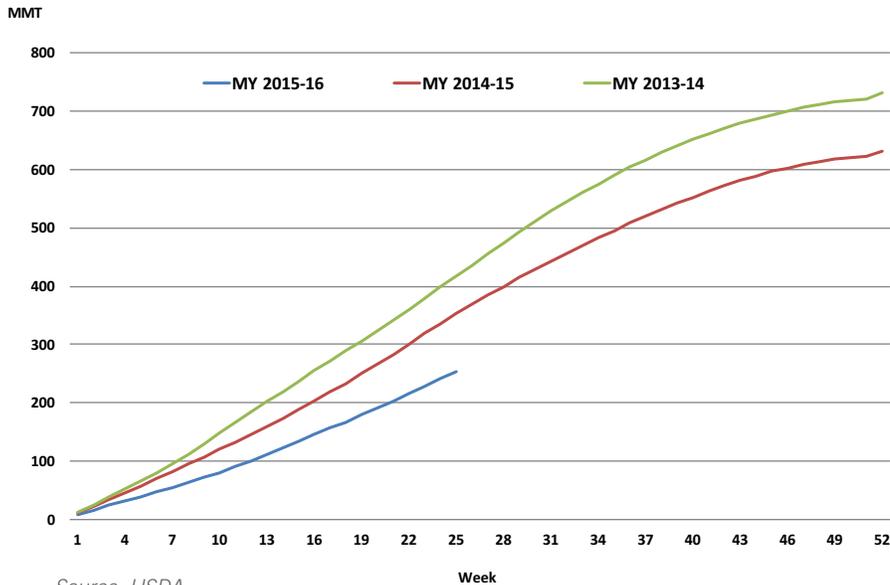
Oilseeds

Despite a record-large soybean harvest, the U.S.’s soybean export pace continues to lag behind prior years as a record South American harvest grabs a bigger share of Chinese purchases and U.S. growers are bogged down by the strong U.S. dollar.

Brazil’s soybean harvest is now approaching completion and is figured to be a record 100-105 MMT thanks to increased acreage and mostly favorable growing conditions that boosted yield. With South American farmers expanding production and benefiting from cheaper currencies in both Argentina and Brazil, U.S. growers face an uphill battle to regain market share, with competition focused particularly on the Chinese market.

China imported soybeans at a record pace at the start of 2016, defying the country’s slower economic growth. South America has been the main source for China’s quickened pace of soybean imports in recent months.

Exhibit 3: Corn Export Sales, Cumulative



USDA predicts that China will expand soybean imports to a record 82 MMT in the current marketing year with Brazil and Argentina feeding the bulk of China's increased demand as the U.S. soy export program atrophies.

Canada, meanwhile, has also increased competition in the oilseed export market with canola shipments moving at a record pace. Global stocks of palm oil also remain relatively strong despite El Niño-induced production problems in Malaysia and Indonesia. Malaysia, the second-largest palm oil producer after Indonesia, saw production in February fall to its lowest level since 2009. Impact on U.S. oilseed growers, though, was muted due to ample world oilseed stocks.

Domestically, the U.S. crush rate has slipped as Argentinian soybean processors have quickly stepped up crushing rates following the recent drop in export taxes and devaluation of the nation's currency under the new Macri government. Record ethanol production in the U.S. has also pushed more DDG supply onto the market, creating further competition for soybean meal. Global soybean meal stocks are now record large with Argentina's record crush pace. As a result, world soybean meal prices have suffered and squeezed profit margins for U.S. soybean processors.

Acres planted to soybeans in the U.S. are expected to shrink this spring, according to USDA, citing corn's greater profit potential. But farmers may choose to plant more acres of soybeans due to the cheaper production costs. The battle for acres will be fought on a cost-of-production basis.

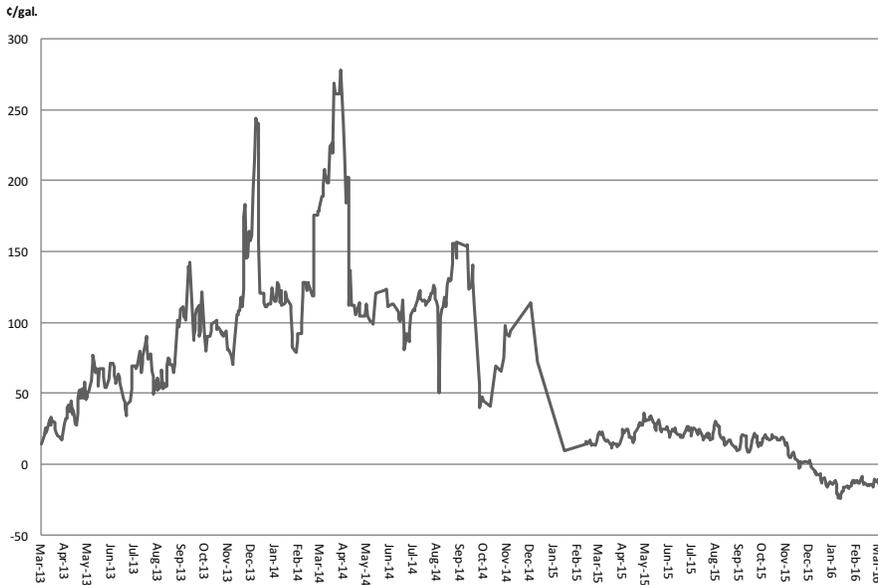
Wheat

Record global wheat inventories continue to shackle wheat prices at multiyear lows with farmers in the Southern Plains having reduced winter wheat plantings by 2.8 million acres, according to USDA. A delayed 2015 soybean harvest in eastern regions of the Plains also contributed to the loss of double-crop wheat acres.

Conditions of the U.S. winter wheat crop currently are seen as greatly improved over prior years with the Kansas crop rated 56 percent good-to-excellent, versus 46 percent last year. However, dryness is a growing concern across much of the Southern Plains. Unseasonably warm temperatures throughout the U.S. have also triggered the crop to emerge from dormancy weeks ahead of schedule, thereby increasing water demands of the crop and raising the risk of freeze damage in the event temperatures drop suddenly. Barring a weather disaster, the U.S. winter wheat crop is on track to hit trendline yields if crop conditions remain favorable through spring. The focus will be on May temperatures, as cool spring temps correlate with higher yields.

The U.S. wheat export pace, meanwhile, continues to languish under the strain of record world supplies and a strong dollar. Canadian, EU and Black Sea shipments have been brisk with FOB prices continually quoted well under those of the U.S. Imports of European or Black Sea wheat into the southeastern U.S. hog and poultry feed markets become increasingly likely as long as foreign wheat supplies remain abundant and cheap. U.S. wheat growers hope to compete on quality of wheat

Exhibit 4: Ethanol Production Margins, 2013-16



Source: Bloomberg.

in an increasingly competitive export market where the U.S. now comprises only 15 percent of all world wheat exports, down from 24 percent two years ago.

The intense global competition for wheat is not expected to abate anytime soon. Crop conditions in other major exporting countries are mostly favorable and pose little downside risk to world supplies. Wheat acreage in the Black Sea region and Europe is seen expanding as farmers respond to stronger prices amid weaker currencies relative to the U.S. dollar.

Domestically, the trend toward low-carb diets in the U.S. remains an obstacle for rising demand for wheat in food consumption. Wheat instead is working to find a larger place in livestock feed rations. Domestic wheat supplies are expected to remain burdensome despite a loss of acres planted in the U.S., limiting chances for a material change in market conditions in the foreseeable future.

Ethanol

A record-setting pace of ethanol production in the U.S. has continued through the first quarter of 2016 while ethanol inventories also set new records. With gasoline prices having traded below ethanol, discretionary

demand for the biofuel has waned despite being the most affordable oxygenate on the market.

Usage of ethanol, though, is projected to improve in the months ahead with the onset of the summer driving season. Ethanol supplies typically rise in the winter as gasoline usage wanes. But motorists are now spending more time on the road than anticipated because of lower gasoline prices, requiring more ethanol for blending. Monthly exports have also climbed to their highest level in recent years with the top destinations being Canada and Brazil, which was once the world's largest exporter of ethanol and now is a net importer.

Thus far in 2016, however, production has been outpacing demand. The result has been an abundance of supply that has hung over the market, keeping margins at or below breakeven. (See Exhibit 4.) But ethanol producers entered this downturn with very strong balance sheets, which has forestalled any plant closures. In recent weeks, the rally in oil prices has breathed life back into ethanol margins; and if oil and corn prices remain near current levels, the industry will eke out modest profits.

Crop Nutrients

Retailers will be cautiously holding inventories in the months ahead of spring planting season with farmer-demand for crop nutrients still less than certain due to delayed bookings. Farmers continue to hold off on farm input expenses and are expected to make their fertilizer purchases at last minute planting deadlines, thereby leaving retailers exposed to more price risk. Retailers are also concerned with over or under-booking product in the dearth of forward sales.

Under pressure from low commodity prices, some growers held off from fall fertilizer applications in an effort

to delay expenses, but may now be inclined to catch up on applications this spring. Farmers also likely will not be quick to cut nitrogen (N) needs as it is the most crucial nutrient required annually for crop production. What form of N product they choose, however, will be an important consideration for farmers as they seek to make value purchases, such as low-priced anhydrous ammonia versus higher-priced liquid fertilizer. Purchases of other macro-nutrients like phosphorus (P) and potash (K) will likely remain under pressure.

With margins on crop nutrients under pressure, retailers will be keen on not overstocking their warehouses in order to minimize inventory carryover and the attendant price risk.

Long term, fertilizer trends are expected to find support during the spring planting season, but succumb to more downward pressure afterward. After falling 10 percent in 2015, the combination of lower oil prices, a weakening world economy and a strong dollar will continue to press crop nutrient prices lower. Using cash corn prices and an estimated retail price for urea in Dubuque, Iowa, urea priced at \$360/ton is still \$30/ton too high based on the historical corn-nitrogen ratio, according to CoBank's Fertilizer Dashboard. To the benefit of wholesalers, natural gas prices continue to scrape the bottom of multiyear lows, allowing nitrogen fertilizer manufacturers more buffer for profitability.

Concern is also rising regarding customers' creditworthiness as farmers' profits are squeezed by stubbornly low crop prices. Producers' profit margins remain extremely tight, portending intense negotiations with farmers and ag retailers this spring as crop acreage is determined. University of Illinois agricultural economists estimate that farmers will need to reduce production costs by \$100/acre in 2016. Farmers will seek to cut farm expenses by switching to less costly seeds with fewer traits, reducing plant populations, applying the bare minimum of crop protectants, and shifting acreage to less input-intensive crops. USDA currently anticipates an overall decline of crop acreage in the U.S., but with corn acreage expanding.

“*El Niño has continued to weaken but still remains intact, posing a potential risk of wet weather disrupting spring planting efforts.*”

El Niño has continued to weaken but still remains intact, posing a potential risk of wet weather disrupting spring planting efforts or causing nutrient loss in the field via leaching, runoff or denitrification, as was experienced last growing season in the Eastern Corn Belt.

Animal Protein

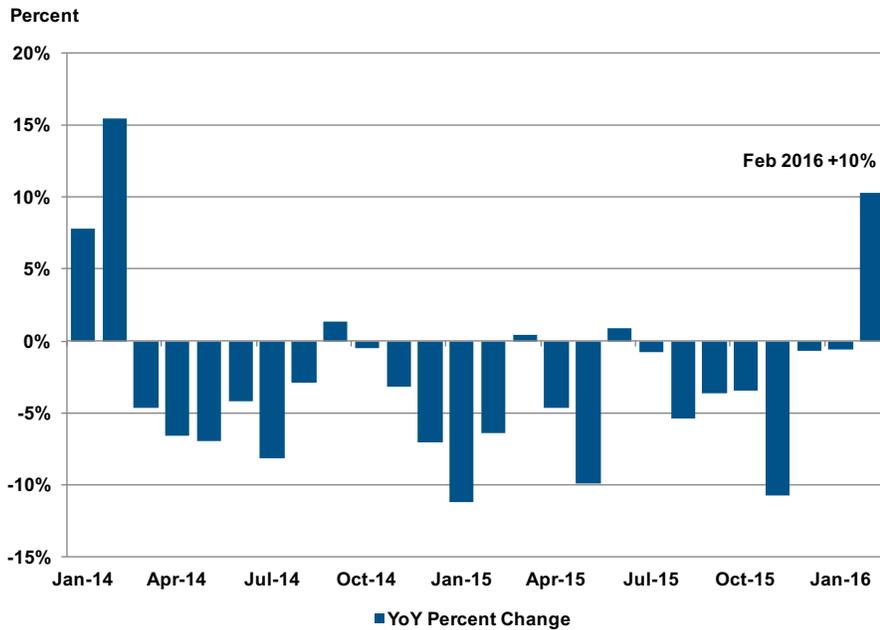
Record high animal protein production levels are expected to pressure meat prices downward in 2016. However, the protein markets are in transition from a supply-dominated environment that compressed prices and margins in the closing months of 2015 to one with a better overall balance of supply and demand fundamentals. The pace of this transition is largely dependent on demand pull-through, from both domestic and international consumers.

Beef

The beef industry is expanding at a brisk pace. USDA's annual cattle inventory report, released in late January, revealed that every class of cattle posted inventory growth in 2015. The beef cow herd increased 4 percent. The number of heifers for beef cow replacements grew 3 percent, and those heifers expected to calve in 2016 increased by 6 percent. With excellent pasture and range conditions, all regions of the country are now expanding their breeding female inventories. Restocking efforts in the Southern Plains region provided the biggest gain to the overall beef cow herd.

These aggressive herd-expansion efforts will lead to larger available supplies of cattle going forward. In turn, increases in beef production will start to show up in the

Exhibit 5: U.S. Monthly Placements in Feedyards with Capacity of 1,000+ Head of Cattle



Source: USDA, Livestock Marketing Information Center.

market in mid-to-late 2016, and gain traction into 2017. Those increases in production will create downward pressure on prices for the cattle complex from now until possibly the end of the decade.

Cow/calf producers will dictate the pace of herd expansion moving forward. Heifer retention decisions will be influenced by pasture moisture conditions and profitability. Analysts at the Livestock Marketing Information Center (LMIC) project average cow/calf returns in 2016 at just above \$200 per cow – a decent rate of return historically and enough to fuel continued expansion, but below the sky-high returns posted in the last two years. Heifer retention decisions in 2016 are expected to have major impacts on the overall level of feedyard placements and also on future production growth.

Placements into feedyards were below year ago levels for much of 2015, and supplies of market-ready cattle remained tight in the opening months of 2016. Beef production is up 0.5 percent YTD, reflecting a 1.1 percent decrease in slaughter and a bigger increase in weights. Placements posted a YoY gain in February for

the first time in several years; and they are projected to build momentum over the second half of the year, resulting in an increase of 3-4 percent for all of 2016. (See Exhibit 5.)

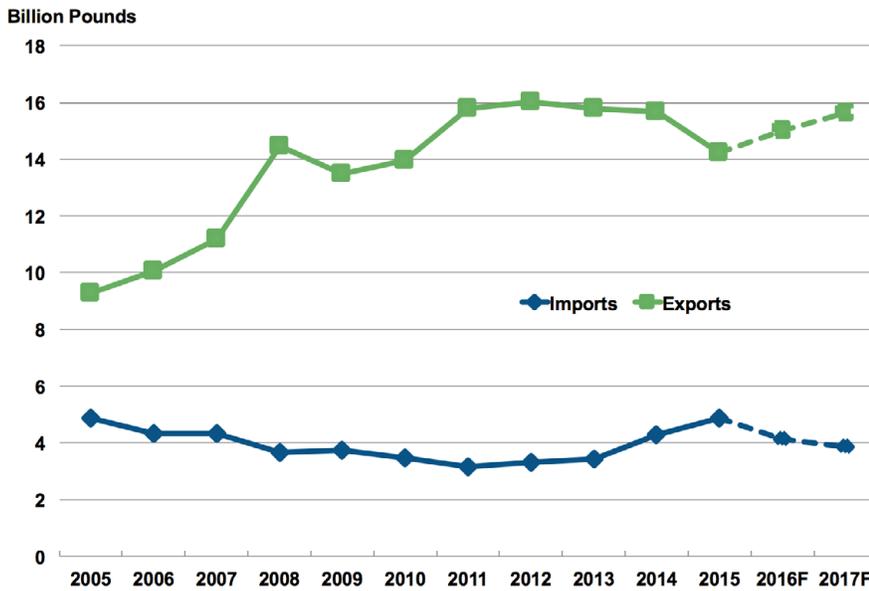
Reduced volatility and a price rally from the fourth-quarter lows of 2015 have brightened the near-term outlook for cattle feeders. Concerns about the elevated volatility in CME live cattle and feeder cattle contracts have been at the forefront of industry discussions since early 2016. CME announced changes to cattle contracts in February, in an effort to improve the integrity and usefulness of these important risk management tools. A reduction in CME trading hours was effective on Monday, February 29. A public review of the Worthing, South Dakota, delivery point is scheduled.

CME has also formed a cattle market joint working group with the National Cattlemen’s Beef Association to discuss other possible enhancements to further improve market quality.

Cattle feeders are anticipating a more hospitable business environment in the coming year, following last year’s major challenges. With prices hastily retreating from their record cyclical highs in late 2014, feeders had few opportunities to place favorable breakevens during 2015. But market conditions took a turn for the better in early 2016, with hedgeable profit opportunities beginning to open up. Going forward, steady increases in the availability of feeder cattle will provide much needed improvements in capacity utilization for the feedyard sector. Development and proper execution of a sound risk management plan, however, will be paramount to the success of cattle feeders in 2016.

Beef packers posted counter-seasonal positive margins in the first few weeks of 2016, caused by a rally in the beef cutout value that surpassed the one in the live cattle market. In coming months, beef cutout prices are

Exhibit 6: Total U.S. Red Meat and Poultry Trade



Source: USDA, Livestock Marketing Information Center.

expected to follow their normal seasonal patterns, having bottomed in February and gaining strength through the spring as the summer grilling season approaches. In the short term, cattle feeders will continue to control the upper-hand over packers simply due to tight fed cattle supplies. Higher slaughter levels in the coming months will provide a much needed boost in capacity utilization for packers and should also shift the balance giving packers more favorable leverage over feedyards. The magnitude of this shift will be largely dependent on the level of consumer demand. The expectation of tempered levels of volatility is supportive of a positive margin outlook for beef packers in 2016.

Drop credit values appear to have leveled off at just over \$10 per hundredweight (cwt), and no further declines are expected in 2016. The depressed value of hides and offal has been a drag on overall beef values and packer profitability throughout the past year. Hides command the largest portion of the drop credit, and softening leather demand, especially from Asia, along with the strong U.S. dollar, made U.S. hides more expensive in the global marketplace.

Resilient demand from U.S. consumers continues to be a bright spot for the beef industry. Wholesale values of the highest-priced, middle meat items maintained their value closer to year ago levels versus other cuts during the sharp market downturn in the fourth quarter of 2015. Trim values and end meat values, for instance, were much harder-hit by the oversupplied pork and poultry situations last fall, but they too have begun to rebound in the opening months of 2016. As usual, the period leading up to the summer grilling season should provide further support to the end meat and beef trim complex. Increased featuring activity and lower retail prices will provide additional support to domestic

demand. The outlooks for upbeat consumer attitudes and a growing U.S. economy are also positive for beef demand in 2016.

Beef exports have been building momentum since late 2015, with the volume posting a 3 percent gain YoY in January 2016. Due to declining beef prices, the U.S. Meat Export Federation estimated that the beef export value per head of fed slaughter fell 11 percent YoY in January. For all of 2016, beef exports are projected to increase 3 percent from the depressed levels experienced in 2015. (See Exhibit 6.)

The recent slowdown in Australian beef production provides the U.S. industry with an opportunity to regain market share among international buyers. Likewise, lower Australian production and a normalization of cow slaughter in the U.S. contributed to the sizeable slowdown YTD in the volume of beef imported to the U.S., and these imports are projected to decline by 15 percent in 2016. The shift back to a more favorable trade balance is expected to temper per capita supply growth.

Pork

Pork production is expected to moderate in 2016, on the heels of a substantial 7 percent increase in 2015. Prices declined sharply in the closing months of 2015 to clear the market of this excess supply of pork. The resulting margin compression was great enough to curb future production plans by pork producers. For 2016 YTD, pork production was down 1.2 percent, reflecting slight decreases in both the number of head slaughtered and average carcass weights. For all of 2016, pork production is projected to rise 1-2 percent. Depending on the volume of exports, the monthly changes YoY in per capita domestic supplies could turn negative as the year progresses, adding support to prices.

Margins for hog producers and packers are off to a better than expected start in 2016. The combination of low production costs and higher than expected prices has widened margins. Mid-year lean hog futures climbed to contract highs during March and are providing producers the opportunity to hedge positive margins out front.

As warmer springtime weather approaches, the industry's concern about a return of Porcine Epidemic Diarrhea virus (PEDv) is fading quickly. Increased biosecurity and effective vaccination programs proved to be successful in containing the virus during the critical winter months. The industry has returned to normal productivity levels, following the disruption caused by PEDv in recent years.

Late last year, the industry had been worried about bumping up against slaughter capacity constraints but managed to steer clear of them. However, the industry is now concerned that those constraints will become binding in late 2016, especially if hog numbers grow faster than forecasted.

To avoid exceeding the estimated 2.46 million head per week slaughter capacity in the U.S., the industry will need to stay current on hog marketings and promote a sustained level of strong demand. The two new packing plants that are expected to come online in 2017 should alleviate capacity constraints in the future. Until then, however, the industry will face a delicate balance of holding back supply growth in 2016 and ramping up production to fill the added capacity in 2017.

Pork demand remained strong in the opening months of 2016, as reflected in the better than expected prices in early 2016. The pork cutout value is 10 percent higher than a year ago, with bellies and spareribs being the positive drivers of the increase.

Pork exports are projected to increase more than 6 percent in 2016, in response to growing global demand and more competitively priced U.S. pork. In January, these exports grew 4 percent in volume from a year ago, but lower pork prices resulted in an 11 percent decrease in export value per head slaughtered. At the same time, the volume of U.S. exports to China/Hong Kong surged 84 percent YoY. China/Hong Kong imported a record amount of pork from all of its suppliers in January, with their combined volume soaring 29 percent. Unprofitable market conditions for Chinese pork producers continue to shrink the size of the herd in China, resulting in increased domestic prices.

China remains the biggest opportunity for pork exports, but also represents the greatest uncertainty. Expanding the list of U.S. plants approved for export to China will be a focus for the industry in 2016.

Poultry

Broiler producers' concerns over a return of Highly Pathogenic Avian Influenza (HPAI) to the U.S. fade with each passing day that no new positive cases are found in U.S. poultry facilities. One minor outbreak of bird flu occurred in mid-January 2016 in a commercial turkey flock in Indiana, which was depopulated. This was the first confirmed positive case since June 2015, but it was also a different strain than the one that caused the severe losses in 2015. An additional eight nearby commercial turkey flocks were confirmed to have low pathogenic avian influenza and were depopulated as well. USDA's robust HPAI preparedness and response plan is proving to be effective in the early months of 2016 in avoiding another outbreak.

Last year's HPAI outbreak resulted in trade bans on all U.S. poultry producers, including many whose flocks were not directly affected by the lethal virus. In recent months, the majority of those restrictions have been lifted or narrowed to be more geographically specific. This is

welcome news for the broiler industry and contributes to the forecasted rebound in 2016 exports.

Chicken production in 2016 got off to a quick start – up 3.6 percent YTD reflecting a 2 percent increase in head slaughtered and a 1.6 percent gain in the average weight. Current projections call for a 4 percent increase in broiler output for all of 2016. That would be a big increase, and a strain on the protein markets to absorb. However, this figure will likely be a moving target throughout the year, due to the short production lifecycle and producers' ability to react quickly to changes in profitability conditions. In fact, the YoY growth in chicks placed tapered off to a modest 0.7 percent YTD, suggesting a fast reaction to compressed margins.

“*Lower chicken prices are expected to exert a negative drag on beef and pork values as price competition intensifies inside the meat case.*”

Prices of all chicken parts got off to a dismal start in early 2016, and the lower prices impaired the profitability outlook for big bird production. Wholesale values of breast meat, wings and leg quarters are all below year ago levels. However, whole bird prices have remained steady, and the profitability for small bird production remains very positive.

Going forward, the interplay between supply and demand in the broiler market will likely have ripple effects for the other meat markets. As the year unfolds, everyone across the entire meat complex will be carefully monitoring the growth in broiler output and the magnitude of the accompanying decline in prices needed to clear the excess supply. Lower chicken prices are expected to exert a negative drag on beef and pork values as price competition intensifies inside the meat case.

The profitability outlook for the poultry industry is mixed for 2016. Low costs of production and increases in efficiency will be positive for profitability. However, the integrators will have to exercise restraint in their production plans if they are to avoid a repeat of the recent oversupply situation. Average weights are expected to steadily increase as the shift to big bird production continues to capture a larger share of production. Increases in production efficiencies should also continue to contribute to higher average weights.

With the broiler industry's growing dependency on exports, any trade disruptions pose a greater risk to the domestic segment of the market. Total broiler exports are projected to increase over 6 percent in 2016. This expansion, however, will not offset last year's 13 percent fall in export volume. As long as the industry avoids any further HPAI outbreaks, the remaining associated trade bans will continue to be lifted and confidence will grow among international buyers. Despite the strong U.S. dollar, broiler price corrections have made the U.S. industry more competitive in international markets.

Dairy Situation and Outlook

While the cure for low prices may well be low prices, the key question is how low must prices go before the cure takes effect. Our assessment of current market conditions is that dairy product prices still have a ways to go before they hit bottom. Futures prices continue to project a modest recovery beginning in mid-2016, but we think that it will likely be postponed until 2017.

Around the globe, current milk prices are converging toward, or even slipping below, the cost of production on most dairy farms. U.S. milk prices are expected to test multiyear lows in 2016 due to oversupply in the global market and greater competition in key export products such as nonfat dry milk and whey derivatives. Granted, strong U.S. domestic demand supports Chicago Mercantile Exchange (CME) spot cheese and butter prices. But this strength is bittersweet because U.S. cheese and butter prices are high enough in relation to global prices to attract growing imports from Europe and Oceania.

In January 2016, global milk production in key dairy exporting countries and regions (Australia, New Zealand, European Union, United States, Argentina, and Brazil) continues to post YoY gains in excess of 2 percent, or 1.3 billion pounds, largely due to expanding output from Europe. In contrast, lower YoY output in Australia and New Zealand (down 187 million pounds) and below-trend gains in the United States and South America are tempering global milk production growth.

Milk production growth in both Australia and New Zealand was negative in January 2016. Australian milk output fell 3.8 percent YoY in January (down 70 million pounds) as a result of dry conditions, and New Zealand's milk output fell 2.1 percent YoY (down 117 million pounds). Fonterra, New Zealand's largest dairy cooperative and milk buyer, estimates that output for the 2015-16 season will fall short of last season by 4 percent, which represents a larger contraction than the season-to-date pace. Fonterra's latest production forecast is questionable, however, given that weather conditions have improved and farms are cash starved. As a result, dairy ingredient buyers believe there will be a longer tail

to New Zealand's milk production season and prices there will continue to languish.

European milk production growth is driving significant gains in global milk output. The EU produces 1.5 times the amount of U.S. annual milk output and six times what New Zealand produces. In 2015, the EU produced 335 billion pounds of milk, up 2.5 percent from 2014. Milk output in December 2015 and January 2016, surged 5.1 percent (1.3 billion pounds) from a year ago. (See *Exhibit 7*.) Even greater YoY increases are anticipated during the next couple of months because EU producers were stifling output to minimize quota penalties in the comparable period a year ago.

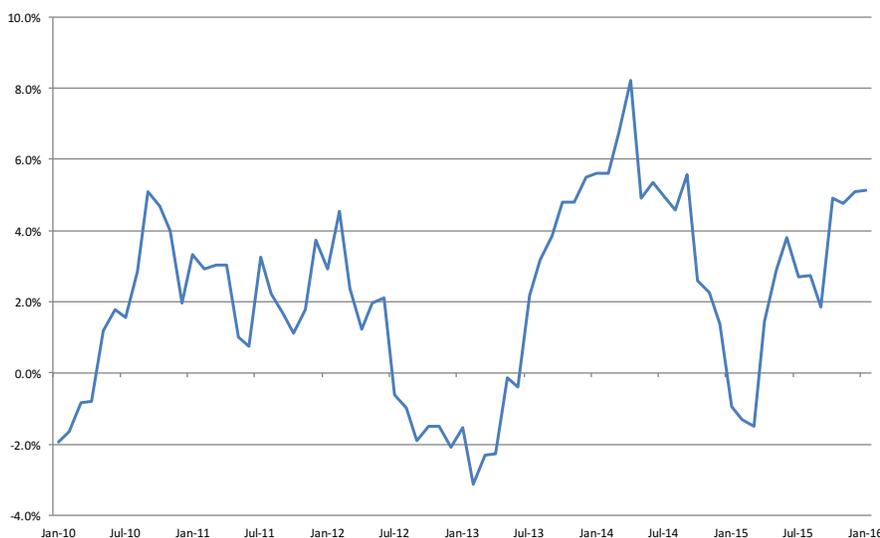
Dairy product production in the European Union (EU) exceeds the sum of domestic and export demand and is clearing to government purchase-and-storage programs. In March 2016, European cheese and butter prices fell below \$1.00/lb and \$1.20/lb, respectively. The EU's intervention price for skim milk powder (SMP) is near 85.5 cents per pound and due to decline to about \$0.70/lb in April. The EU's intervention program was supposed to shut down by year-end 2015, but it has been extended until

September 30, 2016, and continues to function as the EU's buyer of last resort, amassing huge stockpiles of excess skim milk powder (SMP).

Global dairy product market prices are not expected to increase any time soon. European milk prices have stubbornly held above 27 euro cents per liter, which hasn't been low enough to spur any meaningful correction in EU milk production growth. Going forward, a rebound in global dairy markets is unlikely to occur until YoY growth in European milk output diminishes or global demand surges, and neither one of these outcomes is likely to occur until late 2016 or early 2017.

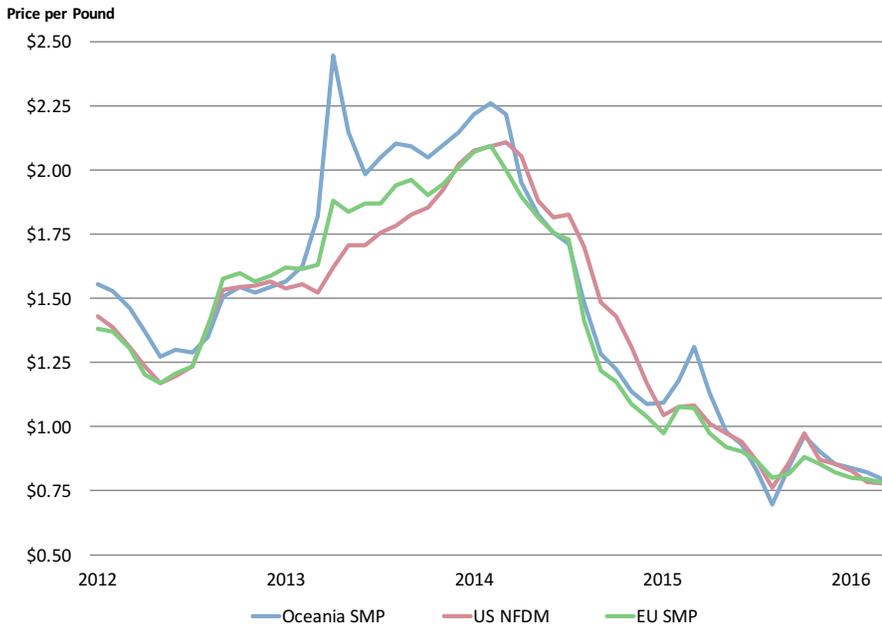
U.S. milk production totaled 16.9 billion pounds in February 2016, up 4.6 percent from a year ago. But when

Exhibit 7: EU Milk Production, Monthly
Percent Change from Year Ago



Sources: Eurostat and Blimling.

Exhibit 8: International Skim Milk Powder (SMP) Prices



Source: USDA.

adjusted for the extra day of leap year, milk production in February was up 1.0 percent from a year ago on a per-day basis. The U.S. dairy herd and milk per cow are nearly on par with last year's levels. The U.S. dairy herd was essentially unchanged in February at 9.31 million head, but down 8,000 head from December. Monthly herd losses were notable in Texas (down 6,000) and New Mexico (down 9,000) due to the walloping impact of Winter Storm Goliath.

As defined by the USDA's dairy Margin Protection Program (MPP), the margin for January 2016 was \$8.10/cwt, down \$1.46 from November-December reflecting a \$1.60 drop in the All-Milk price to \$16.10, which was partially offset by lower feed costs. The MPP margin is expected to contract by an additional \$1.50/cwt by March-April. As a result, dairy producers who enrolled in the highest level of MPP coverage are likely to receive indemnity payments in upcoming months.

Today, all U.S. producers are collecting smaller milk checks, with fewer and fewer opportunities to lock in higher effective milk prices through hedging. Meanwhile, many dairy producers with large inventories of corn silage

and contracted feeds may not realize the full benefit of falling feed costs, and those that raise their own feed are apt to have higher production costs than current spot market prices.

Commercial disappearance of dairy products (the industry's proxy for demand) was very robust in 2015. For instance, total commercial disappearance of cheese in 2015 was 3 percent higher than the prior year. In fact, total cheese disappearance has posted its tenth consecutive YoY gains since 2007. What makes 2015 commercial demand so impressive is that it includes a 2.7 percent increase in domestic production (330-million-pounds), a 23 percent increase in imported cheese (345 million pounds), and a 14 percent drop in cheese exports to 698 million pounds.

Its large, affluent domestic market is a key asset for the U.S. dairy sector. Yet it is also an attractive market beckoning world exporters. The U.S. cheese and butterfat markets carried significant premiums above world market cheese and butter prices in 2015 and continue to do so in 2016. As a result, the U.S. dairy industry lost market share in both the global cheese and butterfat markets and became the world's second largest cheese importer after Japan and the second largest importer of butterfat after China.

With more than 55 percent of annual U.S. nonfat dry milk (NDM) production of 2.3 billion pounds destined for export markets, U.S. NDM prices converged with ever-declining global NDM/SMP prices to maintain market share. (See Exhibit 8.) In January 2016, U.S. exports of NDM/SMP amounted to 94.6 million pounds, up 23 percent YoY, and the highest January trade volume on record. Mexican imports from the U.S. continue to impress, up 6 percent YoY. At 43.3 million pounds, NDM/SMP exports to Mexico accounted for 44 percent of total U.S. NDM/SMP exports in January. A recovery in the milk powder market is still

months away, in part due to large European stocks and an expected strong spring production season in Europe and the U.S. Nonetheless, the trade seems optimistic that rising demand will absorb the growing supply, though we remain skeptical about the timing.

The memory of record high milk prices in 2013-14 still lingers in dairy producers' minds. Many are optimistic that a recovery is just around the corner. Perhaps it is. But the much anticipated recovery in dairy product markets will remain elusive until end users can see that global milk and dairy product supplies are tightening.

Other Crops

Cotton

The combination of an anemic global economy and China's slowly shrinking cotton stockpile has punished the U.S. cotton sector. Global cotton consumption will fall this year for the first time since 2011/12 as China's use slows to a decade-plus low. This slowdown in China's use, and in consumption almost everywhere else, has cut the demand for U.S. cotton to a 30-year low.

Cotton futures have traded between the mid-50s and mid-60s (cents/lb) in 2015/16, and the pricing pain is expected to carry over into 2016/17. The lack of good crop alternatives for Southern growers could lead them to add up to 1 million cotton acres this spring. And if growing season weather cooperates, such a boost in plantings would add to total supplies and ending stocks, and factor in additional downside price risk.

The cotton sector continues to wait for the world economy to gain traction and for China to wind down its enormous stockpiles of cotton. Until at least one of these factors changes, cotton demand and prices will continue to struggle.

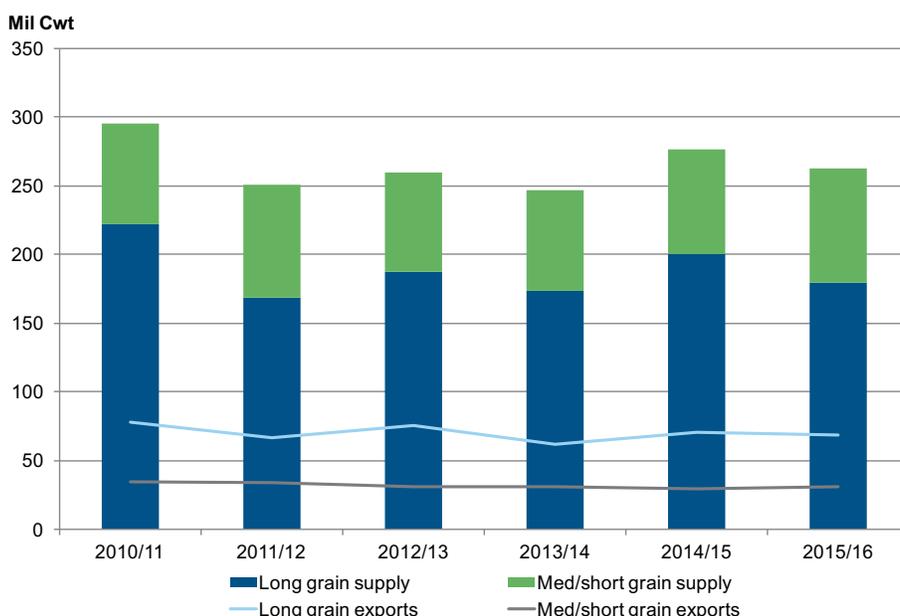
Rice

U.S. rice supplies have tightened in 2015/16. Domestic supplies remain ample, however, and continue to keep prices under pressure. Beginning stocks were huge coming into the current marketing year, and have kept domestic supplies large even as production slumped due to smaller plantings. (See Exhibit 9.)

Exports have been surprisingly robust despite U.S. dollar strength. El Niño has trimmed world supplies by cutting production in India and several other key Asian countries, leaving the door open for U.S. exports.

Divergent situations persist for the different classes of U.S. rice, with long grain output down significantly in 2015/16 and medium/short grain supplies hovering at 33-year highs. Market fundamentals should converge for the three classes in 2016/17 as long grain acreage rebounds and medium/short grain supplies are whittled down. Prices should respond accordingly with those for medium/short grain strengthening and those for long grain sliding marginally.

Exhibit 9: U.S. Rice Supplies and Exports by Class



Source: USDA.

Sugar

Thanks to policy agreements with Mexico, U.S. sugar supplies and prices are settling in for a more stable future. The suspension agreement that was formalized between the two countries in 2015 will limit Mexican sugar imports and more effectively balance U.S. supplies in 2016 and beyond.

One change on the horizon, however, will likely come from consumer and manufacturer preferences. Hershey has committed to making all of their products non-GMO by 2017, and other manufacturers will likely follow in its footsteps. The catch is that nearly all beet sugar is “Roundup ready,” a genetically modified seed variety sold by Monsanto. Most cane sugar is non-GMO, which makes it the better alternative. Despite sufficient sugar supplies, this shift in the market could cause a price divergence for beet and cane sugars in the coming year.

Specialty Crops

Update on the California Drought

The much-anticipated winter storms drenched California in December and January. However, up to now, El Niño hasn’t brought about the deluge of precipitation that everyone had expected. Despite the hype about the strength of this El Niño, so far it has only delivered average precipitation and snowpack. California typically gets half of its annual snow and rain during the months of December, January and February; and although December and January saw above average snowfall and rainfall, precipitation levels in October, November and February were well below normal.

Actually, February was abnormally warm and dry, lessening the headway made by the rain and snow that fell in December and January. But even though the rainfall and snowfall year-to-date are a vast improvement over those of the previous four years, the precipitation that California has received to date will not spell the end of the drought. Granted, the 2015/16 rainy season is not yet over (April 1st marks the usual ending date for the season), and wet conditions returned in March and are projected to continue into April. Californians still hope for

“Up to now, El Niño hasn’t brought about the deluge of precipitation that everyone had expected.”

material drought relief during the remainder of this rainy season, but a lot more rain will have to fall before the end of winter to take the edge off the drought.

The latest statewide summary shows that this year’s snowpack stands at 83 percent of the March 1 average and 72 percent of the April 1 average. The snowpack is critical because in normal years it supplies 30 percent of California’s water needs when it melts in the spring and early summer. Admittedly, this is the best snowpack reading for early March since 2011, but it is still far below what is considered sufficient for a decent recovery from four years of drought.

Bolstered by the recent March storms, the winter rains have meant that reservoirs are refilling, but the overall volume of water in reservoirs is still below average for this time of year. The California Department of Water Resources (DWR) reports that water storage of California reservoirs is currently at 84 percent of its historical average. Of the eight state reservoirs with capacities of 1 million acre-feet or more, only Folsom Lake, Lake Shasta, and Lake Oroville have water levels above the historical average. Groundwater storage is also recovering, but underground aquifers recharge much more slowly than the reservoirs. Many groundwater basins in the Central Valley remain at record low levels.

Given the improvement in the water supply outlook for 2016, the DWR has increased its State Water Project (SWP) delivery allocation to 45 percent of requests for the calendar year for most recipients. This is very good news for many farmers as SWP deliveries were reduced drastically since the start of the severe drought in 2012. SWP allocations in 2014 and 2015 were only 20 percent and 5 percent, respectively, and many farmers have had zero water deliveries for two years straight.

Irrespective of the precipitation total at the end of the current rainy season, the current calendar year is sure to be substantially wetter than last year – and a welcome change from the parched conditions that have dogged the state for the last four years and resulted in approximately 430,000 and 540,000 acres of farmland being fallowed in 2014 and 2015, respectively. Yet even with a strong finish to the current rainy season, the state will continue to endure the lingering effects of the multiyear drought for the remainder of 2016.

Citrus

The citrus harvest is progressing well in California and Florida, and both regions are reporting good crop quality. The navel season is over in Florida and about 50 percent done in California while the Valencia harvest is just starting in both states. The latest USDA all-orange forecast for Florida is up 3 percent while the California crop estimate is 1 percent higher than the previous forecast due to an expected increase in the Valencia crop volume. The new estimate for Florida anticipates an

all-orange crop of 71 million boxes in 2015-16, which is about 27 percent lower than the 2014/15 crop. The current Florida crop will consist of 36 million boxes of Navels and 35 million boxes of Valencias.

The new forecast for the California crop is for 42 million boxes of Navels and 10.5 million boxes of Valencias. At 52.5 million boxes, California’s 2015/16 all-orange crop is up 7 percent over last year’s crop of 49 million boxes. In January 2016, USDA reported that equivalent on-tree prices for California and Florida Navels were \$14.44/box and \$7.44/box respectively. With the larger California navel crop this season and strong competition from mandarins and tangerines in the domestic market, Navel orange prices are slightly lower this season than at the same time last year.

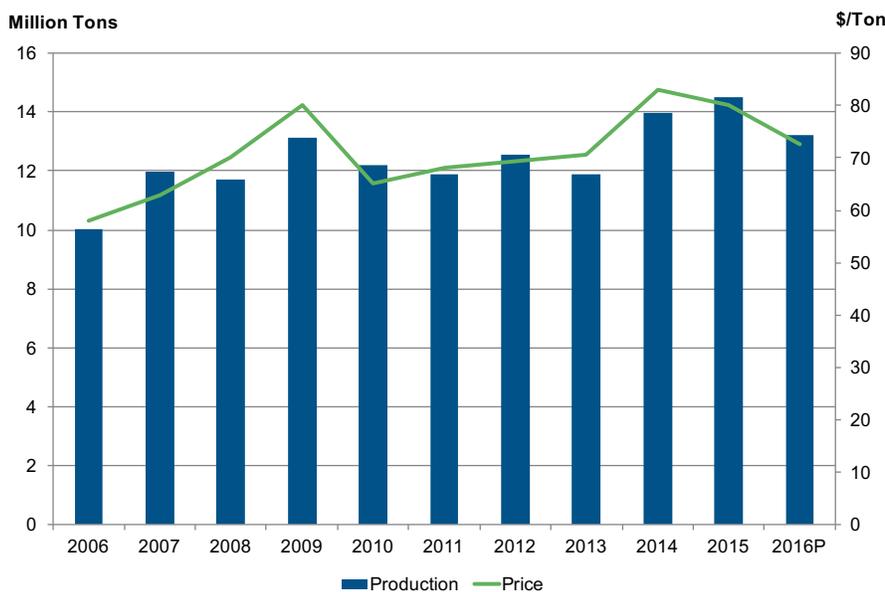
Processing Tomatoes

According to a survey of California’s tomato processors conducted by the USDA-NASS Pacific Regional Office, as of January 2016, California’s tomato processors will have contracts for 13.2 million tons in 2016, down about 9 percent from the previous year. (See *Exhibit 10.*) This contracted production for 2016 is likely to be harvested on 271,000 acres with an estimated average yield of 48.7 tons per acre. Regarding price expectations, the California Tomato Growers Association recently announced a base price of \$72.50/ton for 2016 (below the 2015 contracted price of \$80/ton) along with a series of late season premiums. These premiums range from \$3/ton-\$15/ton for a series of later delivery dates starting on September 15 and running through the end of the harvest.

Tree Nuts

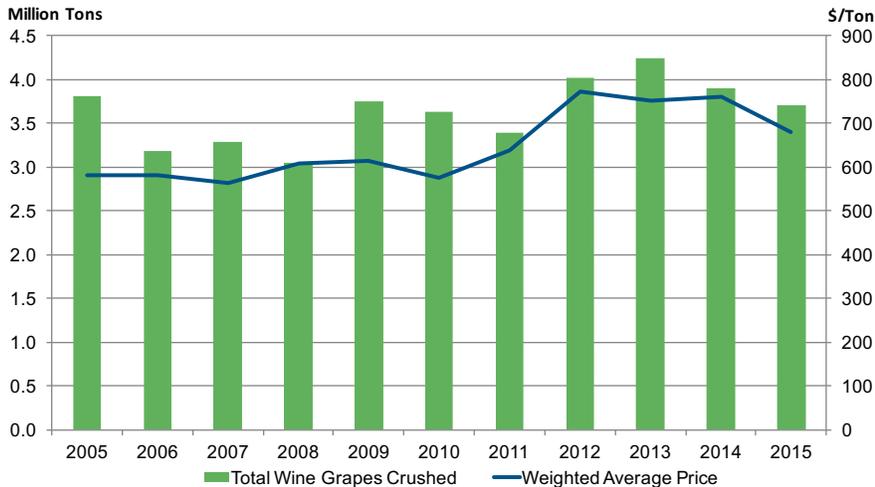
The 2016 almond bloom has concluded. Almond orchards are turning increasingly green and crop development progresses. The weather during bloom was perfect and the

Exhibit 10: California Contracted Processing Tomato Production and Price



Source: USDA/NASS, CA Tomato Growers Association.

Exhibit 11: California Wine Grapes Crushed and Weighted Average Price



Sources: CDFA, USDA/NASS-CA.

bloom density was high. These conditions, along with adequate chilling hours, portend well for a large almond crop in 2016. All expectations are for yields to be similar to last year's, although a very wet spring could increase the threat of diseases and hamper production. Walnut orchards will begin flowering in the late spring, but some of the early pistachio varieties are showing bud swelling. After the dismal 2015 pistachio crop of only 275,000 pounds, 2016 should deliver a more normal crop as it is an "on" year.

Almond prices have been falling since August last year and are at levels today not seen since 2012. Flagging demand as a result of record prices and an abundance of nuts have meant that average almond prices are down from highs of over \$4/lb last summer to about \$2.50-2.70/lb currently. With almond prices returning to more moderate levels, export shipments to the EU, China and the Middle East have started to pick up. Domestic shipments are still lagging, though, reflecting the impact of the higher retail prices for snack almonds. It remains to be seen how much demand will recover in the remainder of the 2015/16 marketing year, but the price corrections are timely in terms of recouping demand, especially in light of the larger crops expected in coming years.

Walnut prices have also tumbled. A glut of walnuts due to bumper Chinese and U.S. crops in the last couple of years, the strength of the U.S. dollar, and the Chinese

crackdown on grey market activity all contributed to substantial downward pressure on prices. Current prices across all walnut varieties are averaging \$0.75-0.85/lb, down from \$1.60-1.80/lb a year ago.

Wine grapes

According to the USDA's final 2015 grape crush report, last year's crush of wine, table and raisin type varieties totaled 3,867,710 tons – a reduction of 7 percent from the 2014 crush. 2,040,781 tons of all grapes crushed were red wine varieties and 1,663,790 tons were white wine varieties.

Average prices, however, were also lower in 2015 than in 2014. The average price of red wine grapes was \$789/ton – down 12 percent from 2014; the average price of white wine grapes was \$540/ton – down 9 percent from 2014. (See Exhibit 11.)

It's still too early to predict with any accuracy how the current 2016 season will fare. The unseasonably warm, dry weather in February meant that bud break occurred earlier than normal in some parts of Napa Valley. Accompanying an early bud break are concerns about subsequent frost or heavy rains, both of which can be harmful for young shoots and reduce flower fertility, leading to problems with the 2016 crop. Barring the occurrence of frost and major rainstorms, early bud break usually means an early growing season and an early harvest. However, when grapes ripen earlier, wine quality could be impaired. Ideally, grapes should ripen when temperatures are milder (in September/October as opposed to August) so that there are no fast changes (like sugar levels suddenly shooting up) when winemakers have to make picking decisions.

Infrastructure Industries

Power and Energy

Oil prices have surged 46 percent since mid-February, with the WTI approaching \$40 a barrel from a low of \$26 a barrel in February, which seems to support a brighter

outlook for oil producers. Indeed, the run-up in oil prices may encourage increases in U.S. shale production and capital expenditures in the oil patch. However, if U.S. crude inventories do not begin to fall by early May, the rally could peter out just as quickly as it began.

The rally in crude oil has not carried over to the U.S. natural gas market. During the week ending March 11, gas prices at the Henry Hub dropped to the lowest level in 20 years to \$1.57 per million British thermal units (MMBtu). Weak heating demand coupled with YoY production growth of 2 percent in March 2016 exacerbated expanding inventories. Total U.S. gas storage inventories amounted to 2,479 billion cubic feet (Bcf) – or 41 percent – above the five-year average storage level of 1,752 Bcf. If weekly gas withdrawals continue to follow historic norms, inventory levels at the end of heating season could be just below the record level of 2,470 Bcf posted in 2012.

The natural gas market anticipates higher prices with the 12 monthly futures contracts between April 2016 and March 2017 averaging \$2.32/MMBtu. However,

these prices are still relatively low, and reflect persistent structural imbalances that are likely to continue weighing on the U.S. natural gas market.

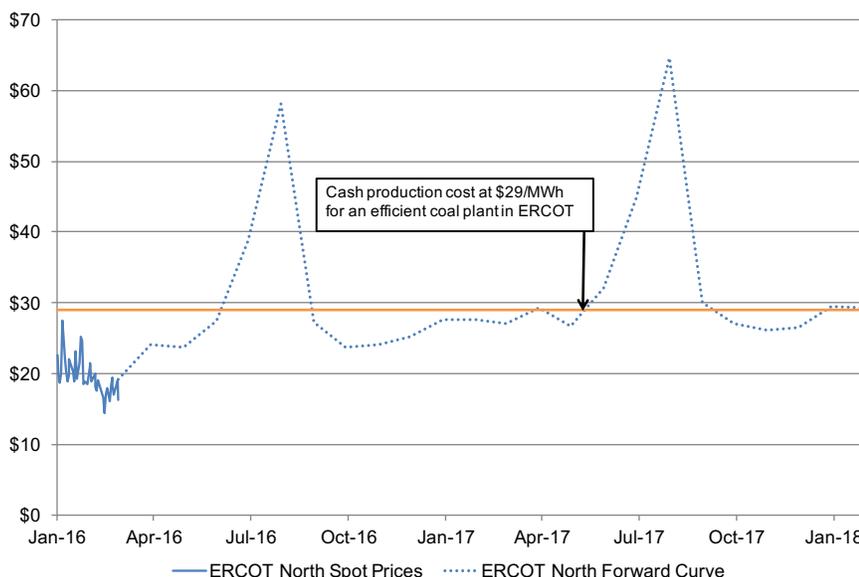
Coal-fired generation continues to lose its market share of U.S. power supply as cheap natural gas prices entice generators to switch fuels. With Henry Hub natural gas spot prices hovering at about \$1.60/MMBtu, even inefficient gas fired power plants are cheaper to run than efficient coal plants.

The delivered cost of coal to the Electric Reliability Council of Texas (ERCOT) market averaged \$1.90/MMBtu in December 2015. This equates to a fuel cost of approximately \$18 a megawatt-hour (MWh) for an efficient coal plant with a 9,500-BTU heat rate. Operating expenses add about \$7 and capital spending about \$4, pushing total production costs to \$29/MWh. (See Exhibit 12.) When compared to average on-peak power prices of \$19/MWh in early 2016, it's clear that gross margins of many coal-fired generators selling into the ERCOT wholesale market have been crushed. The forward curve offers little reprieve. Other than brief summer peaks,

power prices in ERCOT remain below \$29/MWh through January 2018. Diminished competitiveness of coal-fired generation is a reality in markets across the country, but persistent weakness in power prices has been most acute in ERCOT.

New generating units coming online will continue to displace more expensive coal-fired generation. Analysts at the Energy Information Administration (EIA) report that 8.4 gigawatts (GW) of gas-fired capacity are currently under construction along with an additional 9.8 GW and 6.8 GW of utility-scale solar and wind capacity, respectively, all planned for completion in 2016. Currently, new capacity additions for 2016 exceed planned retirements by over 18 GW, compared to the same time last year when the difference was only 3 GW.

Exhibit 12: ERCOT Power Prices (\$/MWh)



Source: EIA.

On January 25, 2016, the U.S. Supreme Court issued a ruling that upheld the Federal Energy Regulatory Commission's (FERC) authority to regulate demand response (DR) programs operating within the wholesale electricity markets. At issue was FERC's Order 745 which "stipulated that demand response providers must be compensated for reducing electricity load at the same rates as if they [had] met that demand with generated electricity," according to a report written by Robert Walton for utilitydive.com. Consequently, DR will reduce short-term energy market prices and constrict cash flows for all generation units that are bid into these markets. The same wholesale generators that will experience reduced energy revenues because of DR are also responsible for the costs associated with implementing a DR program. Therefore, the lost revenues and additional costs experienced by wholesale generators will likely show up later as a corresponding increase in long-term capacity payments that must ultimately be paid by all electricity customers, according to William Hogan with the John F. Kennedy School of Government.

The market's response to the Supreme Court's ruling on FERC Order 745 was muted with forward contracts for power in key markets indicating no change with DR participation.

The U.S. power sector will continue to face headwinds through the rest of 2016 as low natural gas prices compress power prices. Furthermore, supply and demand for energy will remain out of balance as new-builds and deliveries exceed retirements, and weak electricity demand fails to provide a much needed spark to bolster supplier's gross margins.

Rural Water Systems

Public consciousness has been accosted by the specter of lead contamination from tainted drinking water. The events occurring in Flint, Michigan, have heightened people's awareness of a long-standing public health issue that continues to plague communities, urban and rural, around the country. Citizens, regulators, public health officials, and water utilities are all discussing ways to better control lead exposure through drinking water.

“Public consciousness has been accosted by the specter of lead contamination from tainted drinking water.”

The first quarter of 2016 has seen a flurry of legislative and regulatory activity aimed at protecting the public against lead exposure. On February 9, 2016, the House approved legislation to clarify the Environmental Protection Agency's (EPA) authority to notify the public about dangers posed from lead in drinking water. In addition, Senators Sheldon Whitehouse (D-RI), Charles E. Schumer (D-NY), and Bob Casey (D-PA) introduced legislation in March to help Americans cover the cost of removing lead from their homes by providing refundable tax credits. Additionally, the EPA is considering long-term revisions to the Lead and Copper Rule. This rule currently requires public water systems to take certain actions to minimize lead and copper in drinking water. These actions reduce water corrosivity to prevent the leaching of lead and copper from pipes into drinking water supplies. The proposed long-term revisions to the Lead and Copper Rule aim to (a) improve the effectiveness of the corrosion control treatment in reducing exposure to lead and copper, and (b) trigger additional actions that equitably reduce the public's exposure to lead and copper when corrosion control treatment alone is not effective.

These proposed measures would bolster the significant progress already made in protecting the public from lead exposure. According to data from the Center for Disease Control and Prevention (CDC), the proportion of young children with blood lead levels at or above 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$) has declined nationally from 7.61 percent in 1997 to 0.63 percent in 2014. (Any reading above 5 $\mu\text{g}/\text{dL}$ is considered to be elevated, and according to the CDC, "no measurable level of blood lead is known to be without deleterious effects, and because once engendered, the effects appear to be irreversible in the absence of any other intervention.")

Over 1,440 counties in 27 states reported case data on blood lead levels to the CDC in 2014. Almost 40 percent of counties reported zero children with any sign of blood lead levels. The remaining counties reported rates ranging from 0.1 percent to as high as 58.3 percent in Houston County, Alabama. (However, Houston County only tested 12 children.) States voluntarily report the number of children with high blood lead levels in each county, based on information gathered during routine doctor's appointments. Due to small sample population sizes in some counties and lack of uniformity in testing methods, some researchers question the CDC's data on blood lead levels.

Despite the data's statistical shortcomings, they still provide valuable insight. Most importantly, it is clear that the public remains exposed to lead, albeit at much lower levels than in the past. But there are no clear trends that indicate higher incidences of lead exposure based on population or socioeconomic status. Moreover, in the case of Flint, Michigan, the data clearly point to increased lead exposure after the city switched its water source from the city of Detroit to the Flint River in April 2014. In 2013, Flint reported 0.3 percent of children having blood lead levels above 10 µg/dL, an incidence that was below the national average. But by the following year, the percentage jumped to 0.9 percent, and then increased further in 2015 to 1.1 percent. Fortunately for Flint residents, and based on testing done in early 2016, lead exposure in the city's children declined to 0.5 percent after switching back to the city of Detroit's water supply.

Water utility managers across the country are braced for new, tighter regulations aimed at controlling lead exposure through drinking water. They're anticipating new, stricter requirements related to tracking, testing, reporting, and mitigating lead exposure. However, clarity of how new regulation will affect water utilities will not likely materialize until the EPA has finalized the long-term revisions to the Lead and Copper Rule, which are not expected until 2017 at the earliest.

Communications Industry

The first quarter was very busy on the telecom policy front. Congress and the Federal Communications Commission (FCC) unveiled several new initiatives designed to advance a ubiquitous national broadband network while simultaneously protecting consumer rights, safety and privacy as well as national security. Court decisions are pending on a number of significant cases that will also have major impacts on the nation's communications policy.

Meanwhile, consumers' seemingly insatiable appetite for streaming video and business users' rapid adoption of cloud technology are impelling the communications industry to construct robust networks and infrastructure to transport and house the ever-expanding data volume. Fiber transport companies will continue on the steady course they have traveled for a number of years, leveraging the high volume of data traversing their networks. Data center providers will also continue to benefit from growing data volumes and further developing their cloud offerings, including managed services.

Gigabit networks, well established in many metropolitan cities, are now extending into rural America, with more than 50 rural communities today having access to gigabit speeds. At year-end 2015, 75.1 percent of American households had a broadband connection, and the national average connection speed was 11.7 megabits per second (Mbps). Providers are experiencing solid take rates as they roll out faster speed tiers, and the U.S. topped 100 million broadband subscribers in late 2015. However, the overall number of wireline broadband subscriptions in the country is leveling out. This plateau suggests users are becoming more sensitive to high-cost monthly service fees, and are either switching to acceptable wireless substitutes or simply going without broadband service at home.

Broadband adoption trends and deployment are occurring unevenly across the U.S. While more than 95 percent of households with \$150,000 or more in annual income have a broadband connection, the take rate falls to 48 percent for low-income households making less than \$25,000.

“Broadband adoption trends and deployment are occurring unevenly across the U.S.”

Similar disparities are seen in broadband deployment. Rural areas with low population density are costly to serve, provide little or no business case and therefore often receive network speeds well below the national average. Analysts and the U.S. government are increasingly concerned about this “rural/urban digital divide.”

In its 2016 Broadband Progress Report, the FCC deemed broadband deployment across the U.S. to be inadequate. In particular, it concluded that nearly 40 percent of rural Americans lacked access to broadband speeds of 25/3 megabits per second (Mbps) compared to just 4 percent of urban Americans. Despite months of Congressional pressure to address the urban/rural digital divide, it was the report’s findings that evidently prompted the FCC to solidify its reform of the Universal Service Fund (USF) for small rural carriers in order to spur broadband deployment in rural America.

Within weeks of releasing the Progress Report, the FCC circulated an Order that is the culmination of proposed USF updates that have been under consideration for more than a decade. The reform details are still unclear as the Order has not yet been released. However, trade groups involved in the final round of discussions anticipate that small rural carriers will be able to choose between a model-based support mechanism or a modified version of the current support mechanism. Insiders also expect that the Order will explicitly support stand-alone broadband service and address issues such as re-prescription, competitive overlap policies, and certain expense limits.

Even more importantly, the Order is expected to provide the stable and predictable regulation that the telecommunications industry has long sought, along with increased financial support for smaller rural carriers. In coming months, rural wireline carriers will be focused on determining the impact of the FCC’s USF reform and choosing the support mechanism that best sustains their businesses. Wireless carriers, meanwhile, will be lobbying the FCC for similar reform that will maximize its support under a Mobility Fund Phase II program.

The FCC also addressed the high/low-income digital divide in its latest proposal to overhaul the Lifeline Program.

This program has historically helped to bring telephone service to low-income households. The new proposal looks to shift that support to broadband, and includes a \$9.25 monthly subsidy for eligible households. The proposal requires that the supported connection be at least 10 Mbps, and also includes a number of provisions to prevent abuse. The program revisions should help rural carriers gain subscribers, as many rural areas include a disproportionate number of low-income households.

Privacy and security continue to be major concerns for consumers, businesses and the government. The FCC announced it will release a set of proposed privacy rules that would require broadband companies to better protect private customer data and seek permission to use a consumer’s data for cross-sales and other marketing related endeavors. In an effort to thwart digital security attacks, Congress passed the Cybersecurity Information Sharing Act of 2015 to encourage private entities to share important cybersecurity details with the government in order to facilitate stronger digital security. Yet at the same time, Apple is currently embroiled in two separate lawsuits with the Justice Department, which insists that the technology giant unlock two devices involved in specific crimes. Apple contends that unlocking its encryption controls for these two investigations would put their hundreds of millions of users at greater risk of security breaches.

To protect privacy and make data more secure, application providers have begun to encrypt more and more data. Experts believe that nearly 80 percent of all data will be encrypted by the end of the year. While this is a welcome move from a cybersecurity perspective, encrypted data traffic is much more difficult to prioritize. Network providers will need to develop

innovative approaches, new technology and considerable computing power to effectively manage encrypted data.

Although the burgeoning Internet of Things (IoT) market has yet to hit mainstream use, largely owing to cost, some segments of IoT are seeing rapid growth. The use of connected health monitoring devices, for example, doubled from 2013 to 2014, and is expected to continue to grow as individuals become more familiar and comfortable in using devices prescribed by health care providers. Home monitoring and automation are another successful IoT offering, contributing upwards of \$14 per month in additional revenue per user for providers. However, high costs and issues with interoperability of smart home devices and apps continue to hamper this service offering.

“*Nearly 20 percent of U.S. households have either dropped or never subscribed to a pay-TV service.*”

According to a recent report from Pew Research, nearly 20 percent of U.S. households have either dropped or never subscribed to a pay-TV service. While live-TV remained the most popular form of video entertainment in 2015, viewership declined for the second straight year owing in part to over-the-top (OTT) services like Netflix. In fact, Netflix's 44.7 million U.S. subscribers streamed 29 billion hours of video last year, and 49 million homes are streaming video. Nearly half of young adults stream video on a second screen (smartphone or tablet) during commercials on their first screen (TV).

In order to stem cord-cutters and entice millennial subscribers, the large traditional pay-TV providers are rolling out low-cost streaming-only packages. Some tier two providers are following suit, while simultaneously augmenting their TV footprints, suggesting that a video offering is still an integral component of the communications bundle. Ultimately, the market has turned to broadband to lead the business. However, viewing trends support a pay-TV model, albeit one that focuses on a solid TV-Everywhere platform, robust on-demand content and new technologies including UHD and 4K TV.

While the wireless sector is currently at a standstill with many players having to abide by the quiet-period imposed by the FCC's Incentive Auction, merger and acquisition (M&A) activity across the rest of the communications industry remains strong. A number of deals were announced during the first quarter, ranging from consolidators' acquisitions to neighbors combining to streamline operations. Chief among the common goals sought by these M&A transactions are increased scale, expanded footprint and revenue growth – suggesting that economies of scale are indeed a vital necessity within the communications industry. Going forward, those smaller telecom companies that wish to remain independent but are unable to grow on their own will need to forge strategic partnerships to gain the necessary scale to sustain their operations. ■

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.

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