



## QUARTERLY U.S. RURAL ECONOMIC REVIEW

# Lower Commodity Prices Persist

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:

- *In the closing months of 2015, the U.S. grain and oilseed markets continued their gradual grind lower under the weight of unprecedented global crop production, continued strength in the U.S. dollar, falling energy prices, and diminishing Chinese demand.*
- *Cash prices remain stubbornly below breakeven across the commodity spectrum for the majority of farmers. Strong domestic demand, meanwhile, has helped drive local basis in the U.S. to historically strong levels amidst the lethargic pace of farmer selling.*
- *The EPA surprised the ethanol market in late November by finalizing the RFS mandate blending levels for 2014, 2015, and 2016 at rates higher than those proposed in May 2015.*
- *In mid-December, Congress passed an Omnibus bill repealing the country of origin labeling (COOL) requirements for beef and pork. Gone too is the threat of retaliatory tariffs from Canada and Mexico along with the attendant market uncertainty.*
- *The U.S. dairy product markets most exposed to global markets—e.g., nonfat dry milk, dry whey, and other whey products—posted major price declines on the year. Market conditions for these dairy products won't improve until EU milk producers curtail their output.*
- *The tourniquet continues to tighten on fertilizer profits. In the closing months of 2015, crop nutrient prices traced agricultural commodity prices lower, causing greater margin compression across the supply chain.*
- *The Henry Hub contract for February delivery hit a 22-year low on December 18, 2015 of \$1.87 per MMBtu, 50 percent below the price posted a year ago.*
- *Investments in new power-generating capacity across the country reflect the increasing value of gas-fired units. Of the 18.4 GW of capacity under construction and scheduled for completion in 2016, around half is gas-fired.*
- *Traffic from online video and audio services now account for more than 70 percent of downstream traffic during peak hours on fixed networks in North America, up from 35 percent just five years ago. Netflix alone accounts for 37 percent of this traffic.*

## Global Economic Environment

Global economic growth in 2016 will remain subpar – but positive provided that the Chinese economy avoids implosion. Global realignments resulting from the 2007-09 financial crisis will continue to unfold amid a wide range of economic headwinds and challenges:

- **The U.S. will be a major catalyst for global growth in 2016 despite the headwinds of Presidential and Congressional elections, a modestly tighter monetary policy, policy inaction in Congress, and growing regulatory pressures from a lame duck administration.** The U.S. consumer should continue to carry the U.S. economy, but business and residential fixed investment spending will remain subdued in the face of policy uncertainties and election year distractions. On balance, the U.S. economy should sustain growth of 2.5-3.0 percent on average, with continuing large swings in quarter-to-quarter performance.
- **China will likely maintain a 6-7 percent growth trajectory for its economy as it continues to pursue a more consumer dependent economy.** Issues remain in their property and banking sectors, but there is significant room for adjustments in fiscal and monetary policy to address most challenges.
- **Central bank policies will continue to diverge. The U.S. Federal Reserve Bank has taken one small step toward higher interest rates that is unlikely to roil financial markets.** Meanwhile, the European Central Bank, the Bank of Japan, and the Bank of China are all likely to maintain their current accommodative monetary policy stances.
- **The value of the U.S. dollar will likely move modestly higher in 2016.** The divergent global growth rates and central bank policies are likely to result in modest upward pressure on the dollar. However, in the event of a global economic shock, the dollar would likely re-emerge as a safe haven and experience a short-term spike in its value.
- **Debate over the survival of the Eurozone will likely be rekindled as stress from uneven economic growth across the member countries, terrorism and the flood of refugees will strain policy commitments.** Overall growth in the region will likely hover around 1 percent, but the potential border actions to address terrorism and immigration issues represent a wildcard.
- **Rising current account deficits and volatility in currency values are undermining the growth potential for emerging markets.** Global capital inflows have dropped sharply, and commodity exporting countries, particularly oil exporters, are facing substantial risk.
- **Terrorism and geopolitical flare-ups will continue to add volatility to the global landscape.** With no dominant growth driver and significant unevenness among country growth rates, the global economy is vulnerable to major shocks. Lack of political consensus and limited fiscal and monetary policy options to combat major shocks remain major concerns.
- **World energy markets will remain volatile as producing and consuming countries adjust to the new economic realities.** Oil prices have declined below \$40 per barrel and show no signs of ratcheting significantly higher any time soon. These lower oil prices have provided a boost to global consumers but sent shockwaves through the major producing countries. Continued adjustments are likely in 2016.

## U.S. Economic Environment

The U.S. economy in 2016 will be consumer dominated. Those sectors tied to consumers or reliant on low-cost imports will likely outperform, whereas those that are export-dependent or rely on commodity market growth will likely underperform in 2016. After growing at a solid 3.9 percent annual rate in the second quarter and 2.1 percent in the third quarter of 2015, it appears that a growth rate in the 2.5 to 3 percent range is clearly sustainable for the near future, although the quarter-to-quarter growth rates are likely to remain volatile with potentially large swings in net exports and business inventories.

Consumer spending should provide a strong growth core for the overall economy, bolstered by higher incomes, reduced debt levels, improved housing prices, and a growing job market. Consumer spending has increased by over 3 percent in five of the last six quarters, and consumer credit usage is accelerating particularly for autos. Automotive sales in 2015 are likely to approach 18 million units, the highest sales since 2001. Businesses have been adding about 220,000 jobs a month to payrolls over the last 12 months, and wage gains should begin to accelerate beyond the 2 percent rate in 2016. However, business fixed investment will remain subdued until the Presidential and Congressional elections are completed and clear policy directions begin to emerge. Net exports will also be a drag on growth as the strong U.S. dollar boosts imports and limits export potential. Congressional action in the late stages of 2016 will set the tone for government spending going forward.

### **U.S. Agricultural Markets**

U.S. agriculture has increased its dependency on exports dramatically over the past decade. The pork, beef, chicken, and dairy industries have all greatly expanded their export dependency. And so have wheat, soybean and cotton growers. The U.S. corn industry must now look to the export market for demand growth with demand from the ethanol and feed industries having leveled off.

But going forward, this greater dependence on exports will prove to be a mixed blessing. With larger global commodity supplies, a stronger U.S. dollar, and weak economic growth in China and the emerging markets, U.S. agriculture will likely find that its export markets are less receptive than in the past. The upshot will be that domestic users will have to absorb greater proportions of total output, with prices adjusting accordingly.

### **Grains, Oilseeds, and Ethanol**

In the closing months of 2015, the U.S. grain and oilseed markets continued their gradual grind lower under the weight of unprecedented global crop production, continued strength in the U.S. dollar, falling energy

“*Consumer spending should provide a strong growth core for the overall economy, bolstered by higher incomes, reduced debt levels, improved housing prices, and a growing job market.*”

prices, and diminishing Chinese demand. With corn, wheat and soybean prices dredging multiyear lows, farmers have become reluctant sellers and locked their bin doors as they await a market recovery.

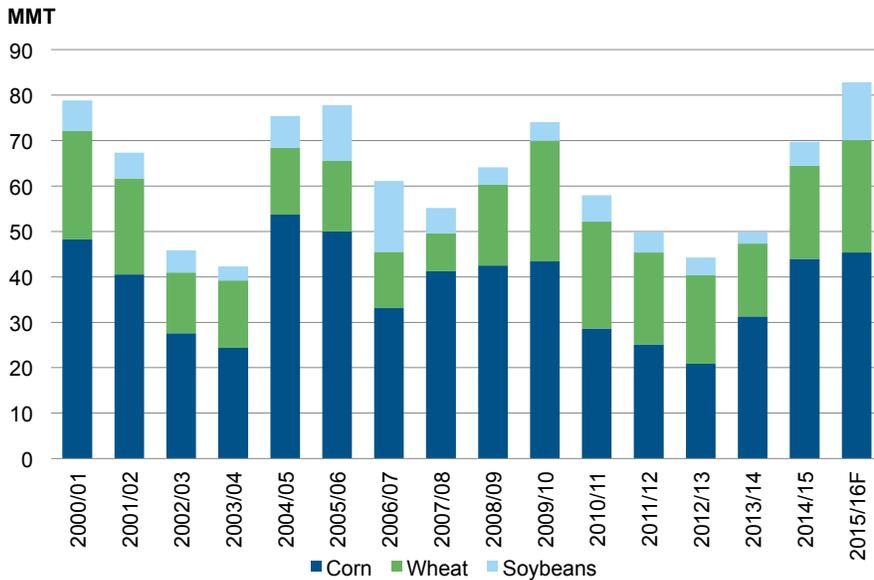
Cash prices remain stubbornly below breakeven across the commodity spectrum for the majority of farmers. Strong domestic demand, meanwhile, has helped drive local basis in the U.S. to historically strong levels amidst the lethargic pace of farmer selling. Soft shipping rates have also helped to take the edge off low commodity prices. Unfortunately for farmers, the market climate for grains and oilseeds does not look to improve with Mother Nature offering no serious threat to current growing crops in competing exporting nations, thereby promising a continuation of agonizingly low prices in the months ahead and likely through 2016.

#### **Corn**

After experiencing years of record profitability, corn producers are struggling to adjust to sharply lower corn prices. Farmers have tightened their grip on old-crop corn inventories in hopes of a global weather scare sending prices back to profitable levels.

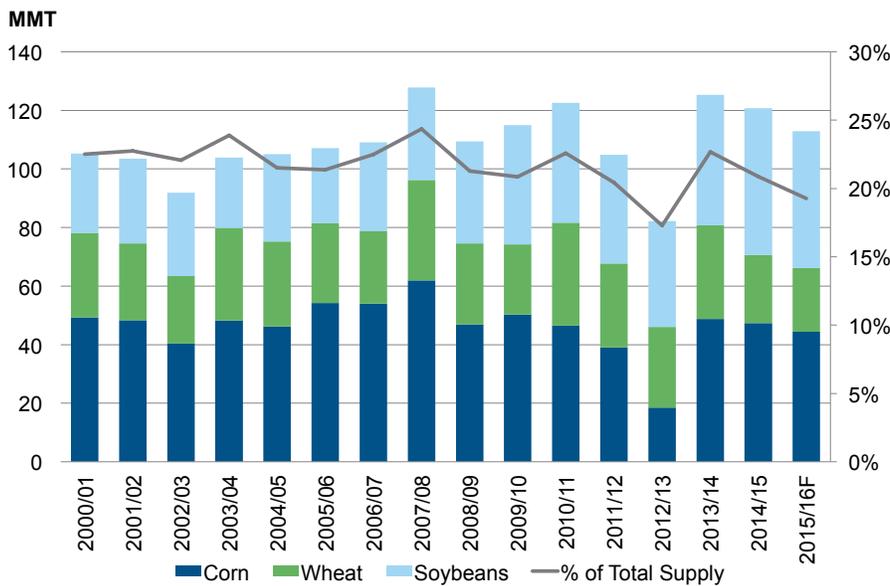
Total U.S. corn production this marketing year was down from last year's record crop due to reduced acreage and yield, with most yield reductions occurring in the eastern Corn Belt where overly abundant spring rains hampered crop development. Significant production increases of competing feed grains like grain sorghum, barley and oats, though, greatly contributed to the overall feed grain supply in the U.S., dampening prospects of improved

### Exhibit 1: U.S. Ending Stocks



Source: USDA

### Exhibit 2: U.S. Exports



Source: USDA

grain prices for the foreseeable future. Corn ending stocks are seen growing to the largest level in six years, while total feed grain stocks in the U.S. are expected to be the largest in 10 years. (See Exhibit 1.)

base in the U.S. also portends higher feed demand. The improved domestic demand picture, though, will not likely cause a substantial improvement in corn's sluggish market climate, thereby giving farmers little reason to loosen their

The export supply chain, meanwhile, is also adapting to the new “supply-push” environment that stands in stark contrast to the “demand-pull” climate of years past. The U.S. currently is exporting at a snail’s pace compared to prior years. (See Exhibit 2.) Corn’s anemic export program could face additional pressure in the first half of 2016 from increased export competition from Argentina as the South American exporter sees a reduction in the export tax and weaker national currency amid improved export capacity due to healthy crop conditions and farmers’ stockpiling of grain in recent years.

The lack of farmer sales in the U.S. is a frustration for cooperatives and commercial elevators who see reduced opportunity in grain merchandising. Grain brokers are struggling to make margin in eastern regions of the Corn Belt where basis is tight. However, merchandisers in the western belt where supplies are more abundant following an impressive harvest are enjoying significantly cheaper basis.

End users have responded to the ample supply with market-wide improvements in domestic demand. Ethanol grind is expected to increase slightly in 2016 following the Environmental Protection Agency’s (EPA) ruling in December to boost the Renewable Fuel Standard (RFS) mandate and the expanding livestock

grip on old-crop supplies. Farmers appear willing to hold out and gamble for better prices in hopes of a dramatic summer rally – but one that would likely only materialize in the case of significant drought.

### Soybeans

After harvesting a record soybean crop in the U.S., farmers face a burdensome supply scenario with record-large global inventories continuing to play out in 2016. Analysts are keeping a close eye on the ongoing dryness in central Brazil, but crop conditions in other parts of Brazil and Argentina have been mostly benign, signaling another potential record or near-record crop from these neighboring countries.

Elevated world supplies of competing vegoils like canola and palm, meanwhile, bring additional pressure to soybean values in the U.S. Expanded canola acreage in Canada portends a possible record export total for the oilseed. With limited crush capacity in Canada, much of the nation's exportable surplus could make its way into the U.S., while at the same time competing for export business abroad. Expectations of record world palm oil production will only add to the bearish backdrop of the global vegoil trade. An El Niño-induced weather disruption with the Malaysian palm oil crop currently remains a modest threat amid record stocks.

The demand side of soybean's balance sheet, meanwhile, brings little encouragement. Diminishing Chinese purchases of soybeans and other competing vegoils due to slowing economic growth could not come at a worse time for U.S. soybean producers. With China having accounted for more than half of the U.S.'s soybean sales last year, the threat of declining purchases from the U.S.'s chief customer raises the threat of a prolonged bearish supply scenario.

Expanding domestic demand and a much-improved crush rate counters the bearish world supply scenario as livestock and biodiesel usage rise year-over-year (YoY). Increased demand for soybean meal and the prospect of a greater usage rate of soybean oil for biodiesel following the EPA's ruling on the RFS mandate in December will support positive crush margins and bring additional upward pressure on crush rates into 2016.

The biggest unknown heading into the new year remains when and how much of Argentina's 15-16 million metric tons of soybeans that farmers have stockpiled in recent years will be released onto the global marketplace. The new government has announced a reduction in the export tax on soybeans from 35 percent to 30 percent and has followed through on plans for devaluing the currency, thereby promoting exports and encouraging acreage expansion in the future.

Meanwhile, debate continues over a proposal in the U.S. Senate to shift the biodiesel credit from blenders to producers. If enacted, the credit could encourage an expansion of U.S. soybean acreage for future crops.

### Wheat

Of all the agricultural commodities, wheat suffers the most depressing outlook for the near and long term. Record world wheat stocks have ballooned to an astounding level and will continue dragging on values throughout 2016 and likely beyond. The combination of ample world supplies and the strong U.S. dollar has made the U.S. noncompetitive on the export front with exports having shrunk to the lowest level in 44 years. Russia and the EU now far surpass the U.S. in share of the global export market as they benefit from cheaper currencies, ample supplies and closer proximity to export destinations. Even loyal buyers like Mexico are importing from Europe and the Black Sea as they reduce U.S. purchases. With too much supply chasing too little export demand, prices will likely continue sagging lower.

With little chance of the U.S. regaining export market share in the near term, growers' main hope for 2016 will be to stimulate more domestic demand. Cheap corn and soybean meal, though, make that a tough chore in the battle for share in the feed market.

Grain merchandisers on the plains are benefiting from significantly cheaper basis where wheat sits in storage amid lack of farmer selling. End users are also taking advantage of historically affordable basis and extending coverage up to nine months, compared to the normal three-month coverage. Of note is rising world demand. A record global usage pace remains the silver lining behind the cloud of record production.

Absent severe adverse weather in the U.S. and other major exporting regions like the Black Sea, the EU and Australia, there will be no material improvement in wheat's bleak outlook. That threat, though, appears quite distant. Crop conditions in the central and southern plains are substantially improved over prior years with El Niño bringing ample precipitation that has created the best fall establishment of the winter wheat crop in recent memory. The domestic crop shows no indication of being in jeopardy. Following years of persistent drought, current indications are that the winter wheat crop on the plains will achieve trend-line yields or greater this year. USDA reports ample subsoil moisture across the plains and very healthy crop conditions going into spring. However, wheat acreage in the U.S. will most likely decline in 2016 with most shrinkage coming from soft red winter wheat in the Midwest and hard red spring in the northern plains.

In the Black Sea region, dry conditions have raised concerns over the prospects of winter wheat production. Crop failures in Russia, though, have rarely been the result of dry fall/winter conditions. Most attention in the first quarter of 2016 will be focused on spring and summer growing conditions.

## Ethanol

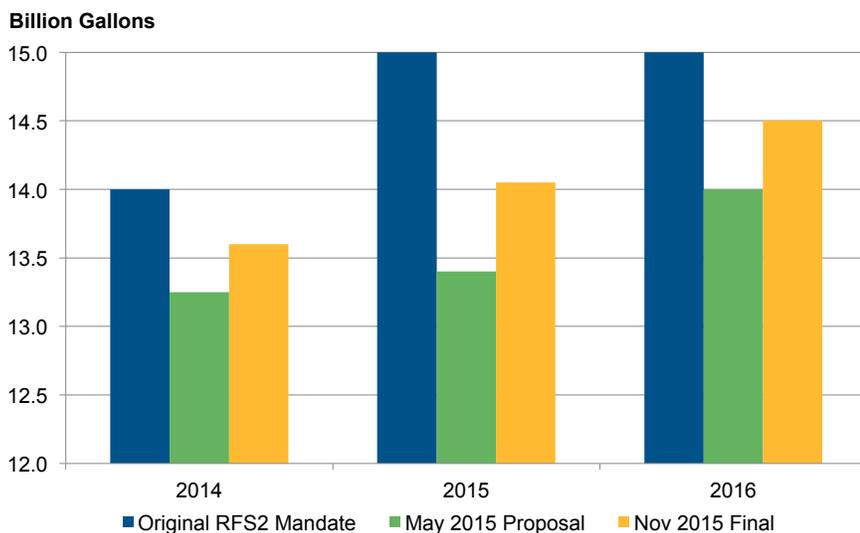
The U.S. ethanol industry remained resilient throughout the turmoil of ever-lower crude oil prices in 2015. Ethanol production will soar to a new record for the full calendar year, but inventories continue to hover near the all-time highs reached in 2012. Strong export sales and a 4 percent increase in domestic miles driven have helped to partially offset the impact of declining gasoline and ethanol prices.

The EPA surprised the market in late November by finalizing the RFS mandated blending levels for 2014, 2015, and 2016 at rates higher than those proposed in May 2015. (See Exhibit 3.) For 2015, the implied corn-based ethanol blending requirement of 14.05 billion gallons will fall below the level of actual blending, so the mandate poses no concerns for blenders. However, the conventional ethanol blending requirement for 2016 has been set at 14.5 billion gallons, which will be above the 10 percent blend wall. Blenders will have three options in the coming year – increase E15 and/or E85 blend sales, use carryover RINs from blending above the mandate in 2014 and 2015, or choose not to comply.

RIN prices have moved appreciably higher since the EPA announcement. This signals that most blenders will utilize RINs to satisfy their blending requirements above the 10 percent level in 2016. The real challenge is likely to follow in 2017, when the EPA is expected to raise the conventional blending mandate once again. The RIN supply could be exhausted by then, which would force much more difficult decisions about E15 and E85 sales.

For now, the ethanol industry continues to skirt by with roughly breakeven margins. Ethanol prices are at multi-year lows, but so are corn prices. In a relative sense not much has changed in recent months for ethanol producers. The Fed's mid-December decision to raise short term interest rates will sustain a strong

### Exhibit 3: U.S. Conventional Ethanol Blending Requirements



Sources: EPA and CoBank.

U.S. dollar and keep a lid on corn and ethanol prices in the near to medium term. Thus, producer margins are expected to vacillate between positive and negative for much of the first half of 2016, maintaining a roughly breakeven average. And most producers will navigate this type of market environment quite well, with very strong balance sheets that were fortified during the record profit environment of 2013-14.

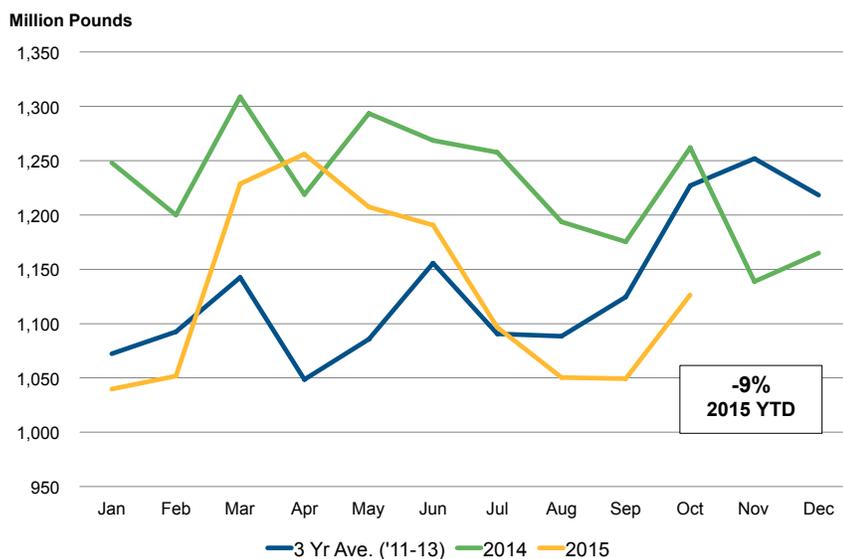
### Animal Protein Industries

U.S. meat production is on the rise. In 2015, the animal protein market had to absorb the largest increase in domestic supplies in nearly 40 years, with more to come. Pork and poultry contributed the most to last year's increase in supplies, but the beef industry is expected to record a significant expansion in output beginning in 2016. Larger meat supplies will require lower prices to clear the market over the next two years. While lower prices will erode industry profitability in 2016-17, it should also improve capacity utilization for some links in the animal protein supply chain.

In view of the increasing production and growing share of meat products sold abroad, export markets have become increasingly important. (See Exhibit 4.) However, the strong U.S. dollar and slower growth in key markets abroad may limit potential export growth. Producers are beginning to make adjustments to future production plans in response to lower margins. But the expansion phase will continue in 2016, driven by low feed and energy costs, and excellent recent profitability.

On December 18, the U.S. Congress passed an Omnibus bill repealing the country of origin labeling (COOL) requirements for beef and pork, after 15 years of extensive and complicated negotiations on Capitol Hill. Gone too is the threat of retaliatory tariffs from Canada and Mexico along with the attendant market uncertainty. Industry insiders were greatly relieved, because roughly one third of total U.S. meat exports are shipped to those two countries. Within hours of passage of the Omnibus bill, the USDA issued a statement saying that, "Effective immediately, USDA is not enforcing the COOL requirements for muscle cuts and ground beef and pork outlined in the January 2009 and May 2013 final rules."

**Exhibit 4: Monthly U.S. Meat Exports**  
Combined Beef, Pork and Broiler



Sources: USDA, Livestock Marketing Information Center

As the new year begins, animal disease concerns remain top of mind for market participants. The coming weeks and months will provide more clarity on potential impacts of HPAI and PEDv.

### Beef

The beef industry contended with increased volatility and downward price pressure in the closing months of 2015. Prices are being pressured by headwinds in international markets, large supplies of competing meats, historically large carcass weights, and macroeconomic conditions. (See Exhibit 5.)

The two major components needed to spark herd expansion have occurred over the last two years – economic incentives and improved pasture conditions. The results of these herd rebuilding decisions by producers will start to become

### Exhibit 5: December 2015 Live Cattle Futures



Source: CME Group

evident in 2016. Provided that pasture moisture conditions continue to improve, along with favorable cow-calf operator profitability, herd expansion is set to continue through 2016. Cow/calf operator profitability will likely erode in coming years, but it is currently running well above the historical trend. Average net returns per cow are forecasted above \$300 in 2016.

In the short term, feeder cattle availability will be limited and remain below year ago levels until mid-2016. The current level of heifer retention will be a determining factor for both the future pace of herd expansion and overall placements into feedyards throughout 2016.

Although placements into feedyards were lower than last year for much of 2015, the even slower pace of marketings has allowed feedyard inventories to build. Lower feed costs produced a favorable cost of gain and incentivized feedyard operators to increase days on feed substantially. As of November 1, Cattle on Feed for greater than 120 days were 14 percent higher than a year ago.

This buildup of inventory has pushed carcass weights to record highs and created a backlog of heavy cattle. The industry struggled to work through these heavy cattle in the fourth quarter of 2015. The largest weekly fed cattle

slaughter of the year occurred in early December and could be a leading indicator that fed cattle inventories are becoming more current.

Throughout 2015, cattle feeders faced a challenging business environment. Since prices began retreating from their record cyclical highs in late 2014, opportunities to place favorable breakevens have been limited. For long periods, it has been unprofitable to sell finished animals and replace them with new feeders – this situation has incentivized feedlots to feed cattle longer.

Total U.S. beef production is estimated to have eased about 3 percent in 2015, with the decline

front-loaded in the first half of the year. Slower cattle marketings have shifted previously forecasted 2015 production increases into 2016. YTD beef production was down 2.8 percent, with a 2.6 percent increase in live weights more than offset by a 5.3 percent decline in the number of cattle being slaughtered. Total beef production should begin to rebound in 2016 with a 3 to 4 percent increase in total output. The industry should experience continual YoY increases beginning in early 2016.

Beef packers wrestled with thin margins in the closing months of 2015. Downward pressure on the cutout value forced packers to limit weekly slaughter levels in an effort to keep boxed beef and trim products cleared from inventory. Larger slaughter levels beginning in 2016 will bring much needed relief in terms of capacity utilization for the packers.

Declining drop credit values (i.e., the value of hides and offal), now more than 30 percent lower than a year ago, continue to be a drag on beef values and packer profitability. Hides command the largest portion of the drop credit. Softening demand for leather, especially in Asia, and the strong U.S. dollar have made U.S. hides more expensive in the global marketplace and created price weakness for U.S. hide values.

The price of beef trimmings is weighing down the value of the cutout. Increased production of trim coming from heavier cattle and the abundance of lower priced pork and poultry have forced trim prices to the lowest levels since 2012. This price weakness is spilling into the end meat prices as well. In contrast, middle meat prices have remained closer to year ago levels as consumers continue to pay near record high prices for high quality steak and roast items. This is encouraging and supportive of strong demand from the U.S. consumer.

Consumer resilience surprised the industry in late 2014 with robust demand for beef and impressive willingness to pay record high prices. Throughout 2015, retailers were able to hold retail prices steady, compared to significant declines in wholesale values, indicating continued strength of demand. Total real per capita expenditures for beef increased 10 percent YTD in 2015.

Strong domestic demand, however, has not been enough to overcome the weakness in exports and the abundance of pork and poultry on the market. Positive attitudes by the U.S. consumer, measured by steady increases in consumer sentiment, will be supportive of beef prices in 2016.

Beef exports in October 2015 showed signs of a slight rebound from the previous month, but remained 12 percent lower YTD on total volume, along with a 10 percent decline in value. The strong U.S. dollar continues to give price advantages to global beef producing competitors. A rebound in beef exports is expected in 2016 compared to low 2015 levels. Combined with slowing imports, mainly from Australia, a shift in the net trade balance will be less burdensome on the domestic market.

Meanwhile, if successfully concluded, the ongoing Trans-Pacific Partnership (TPP) negotiations would open up new doors and opportunities for expanding U.S. exports in the coming years.

## Pork

Pork production increased over 7 percent YoY in 2015 on the heels of a much faster than expected recovery from the supply limiting Porcine Epidemic Diarrhea

Virus (PEDv). As the number of available market ready hogs hit the market, producers were able to temper the production increases by faster marketings and consequently lower carcass weights. A dramatic 30 percent price correction in lean hogs was necessary to clear the excess supply.

With the price correction, producer profitability slumped to negative territory during the summer months of 2015 and forced producers to adjust future growth plans of the breeding herd. Weights are expected to remain below year ago levels for the first half of 2016, then steadily increase to positive YoY weights in the second half. With the lowest production costs since 2007 and much more modest growth plans, 2016 producer profitability estimates are positive. Total pork production in 2016 is expected to be flat to a slight increase versus 2015. Improving export volumes could even turn YoY per capita pork supplies negative, adding support to prices.

The return of PEDv in the coming winter months is a concern for the industry. Overall herd immunity this year has declined as older sows leave the production system and are replaced with younger gilts that have not been exposed to the virus. The expectation is that increased biosecurity and successful vaccination programs will prevent the disease from spiraling out of control as it did between late 2013 and early 2014. Still, the risk remains that the virus effects could be slightly worse than last winter.

Slaughter capacity was a concern going into the seasonal peak of late 2015. Although this potential problem was not realized in 2015, producers are still worried about bumping up against seasonal packing capacity in late 2016, especially if hog numbers grow at a faster pace than forecasted. Two new packing plants that are scheduled to come online in 2017 should alleviate capacity concerns in the future – but won't help the situation in the coming year.

Overcoming several headwinds, export demand is recovering and is expected to help bolster pork prices. Whole muscle cut exports improved significantly in the most recent October data, increasing 8 percent YoY. Weak variety meat exports continue to be a negative

drag on total export volume, hog values and packer profitability. Variety meat values are nearly 50 percent lower YoY. Pork exports YTD are down 4 percent, but exports are expected to improve markedly in the latter months of the year.

The recent contraction of the Chinese pork supply and spike in Chinese hog prices create the greatest uncertainty but also the biggest opportunity for U.S. exports. October exports to China/Hong Kong increased 23 percent YoY. Several U.S. pork processing facilities were approved for shipment to China, which should boost export volume moving forward. Headwinds will remain, however, including the strong U.S. dollar and more competitively priced EU and Brazilian pork in the global market.

*“The recent contraction of the Chinese pork supply and spike in Chinese hog prices create the greatest uncertainty but also the biggest opportunity for U.S. exports.”*

Demand for pork remained strong throughout 2015. Lower retail prices were necessary to clear excess supply; however, the level of price reductions was less than the drop in wholesale value. This disparity is evident with real per capita expenditures increasing 4 percent YTD. The retailers' ability to sell pork at higher prices is not only an indication of strong demand, but it will also allow wholesale prices to rebound without abrupt short term “sticker shock” in the meat case.

Pork packer margins have been strong and have steadily improved since mid-2015. Margins should remain positive throughout 2016, albeit at a lower per head value as pork supplies continue to increase. The level of margin health will be largely determined by disciplined supply growth, rebounding export volume, strength of demand, and the level of excess poultry supplies on the domestic market.

## Poultry

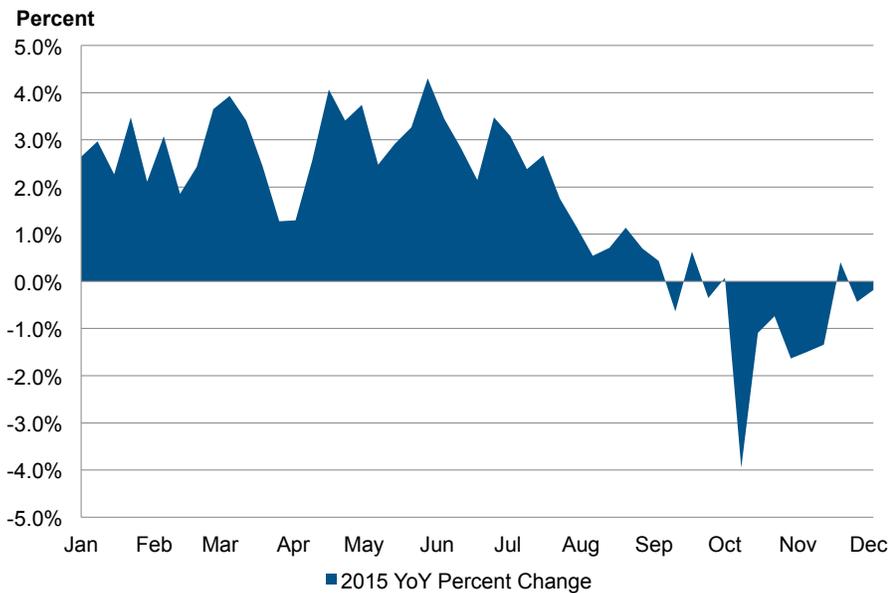
Broiler producers are anxiously awaiting the coming months and the return of seasonal migratory bird paths through the U.S. It's virtually certain that Highly Pathogenic Avian influenza will return to the U.S. However, the severity of the effects on poultry production and which sectors could be affected are the greatest unknowns. Strict biosecurity protocols on farms have been refined and implemented in anticipation of the winter months. The use of vaccination programs will be carefully considered, due to the international trade implications. The U.S. broiler industry is increasingly more export dependent and understands the importance of regaining market access that was lost due to the HPAI outbreak of 2015. A vaccination program in 2016 is viewed as an extreme last resort – to be used only if broiler production facilities are widely affected.

The price of all chicken parts slumped in late 2015 as a result of several factors that led to a supply glut in the U.S. – record production, HPAI related export bans, mounting cold storage inventories, and an abundance of pork supplies. Lower chicken prices have compressed integrator margins and applied negative price pressure onto the beef and pork complexes.

The short production lifecycle of broilers allows the industry to be nimble and react quickly to changing profitability conditions. The industry pulled back chick placements in late 2015 in response to lower margins, posting YoY declines in order to normalize short term output. (See Exhibit 6.) YTD production is up nearly 6 percent, largely due to cheap feed and heavier bird weights. Production inefficiencies in the hatchery supply flock are in the rear view mirror and are no longer a limiting factor to production growth. The forecast for production in 2016 calls for modest 2 to 3 percent growth.

The profitability outlook remains positive in 2016, pending any potential negative pricing impact of trade restrictions. Overall production costs should remain low over the next year, reflecting a favorable feed price outlook. Improvements in productivity will boost output and live weights will continue to increase as a larger share of production is shifting to big bird production.

### Exhibit 6: Broiler Chicks Placed



Source: USDA, 19 State Report

Whole bird values will remain well supported. Integrator profitability has been stronger for whole bird production and that trend will remain intact into 2016.

#### Dairy Industry

U.S. dairy product markets remain under pressure due to slowing exports, but downward pressure will not be strong enough for output to contract in a meaningful way. Exceptionally strong milk prices in 2013 and 2014 fueled expansion of milk production around the globe, which continued into 2015. In addition, the elimination of EU milk quotas in April 2015 paved the way for unfettered milk production growth in the world's largest cow-milk producing region for the first time in 30 years. The onslaught of milk collided with weaker global demand, tumbling oil prices, and the Russian trade embargo. The U.S. dairy product markets most exposed to global markets – nonfat dry milk (NDM), dry whey, whey protein concentrate, whey protein isolates, and lactose – posted significant price declines on the year.

With more than half of the U.S. NDM annual production of 2.3 billion pounds destined for export markets, U.S. NDM prices converged with ever-declining global NDM and skim milk powder (SMP) prices to maintain market

share. From peaking in March 2014 at \$2.10/lb. and bottoming near 70 cents in August, U.S. NDM prices plummeted 66 percent in less than 18 months. Global and domestic NDM prices continue to languish below \$1/lb. Judging by current futures, NDM prices are not expected to surpass \$1.25/lb. until the second half of 2016.

The collapse in U.S. NDM prices had little immediate impact on the domestic cheese market. CME Group (CME) spot cheddar cheese prices in 2015 have traded within a narrow range, compared to the prior two years. CME cheddar block prices ranged from \$1.50 to \$2.00 a pound in 2013 – and from \$1.50 to \$2.45 a pound in 2014. In 2015, Cheddar block prices opened the year at

under \$1.50/lb. and did not breach the \$1.60 level until April. Cheese manufacturers seized the opportunity to rebuild aging programs at the lowest milk costs in several years. Through the first half of 2015, Parmesan and Romano cheese production was up 16 percent and 28 percent, respectively, compared to the prior year.

Increased cheese imports put a lid on U.S. domestic cheese prices. During each of the summer months – June, July, August, and September – the CME block market took a run at \$1.75 but failed to stay there for very long. Through most of 2015, the CME cash cheese market has traded at a premium of 50 cents or more to European cheeses. The European cheese price had collapsed following the announcement of the Russian trade embargo in September 2014. Nearly one-third of Europe's 1.7 billion pounds of cheese exports were destined for Russia. In 2015, the United States supplanted Russia as Europe's largest cheese export market. Through October 2015, U.S. cheese imports totaled 346 million pounds, up 25 percent from a year ago, and 75 percent of U.S. cheese imports were from Europe.

European cheese imports are expected to continue at the elevated pace through Q1-2016, due to previous

commitments. However, the volume of new import orders will be determined by the price gap between European cheese prices and the CME spot cheese price. As 2015 ended, European cheeses were trading below \$1.20/lb. while U.S. cheese prices hovered just under \$1.50/lb. The current 30-cent premium in the U.S. cheese market and a weaker Euro provide enough financial incentive to keep imports flowing into the U.S. and domestic prices capped until there is a correction in supply.

Similar to NDM, more than half of the annual U.S. production of dry whey, whey protein concentrate, whey protein isolates, and lactose are exported. Historically, European suppliers have been the U.S. producers' primary competition in these markets. However, recent plant expansions by Fonterra, New Zealand's largest dairy cooperative and exporter, have resulted in greater output of whey protein concentrate as well as lactose, which is a by-product of whey protein concentrate production. Hence, Fonterra's increased output of whey protein concentrate has diminished its demand for U.S.-produced lactose. Since January 2015, U.S. prices in the whey, whey derivatives, and lactose markets have fallen by 50 percent.

Fewer exports and greater production have weighed heavily on the U.S. dry whey market, which has a direct impact on the Class III milk price. For every penny change in the dry whey price, the Class III milk price changes by 6 cents per hundredweight. U.S. dry whey exports through October 2015 totaled 341 million pounds, down 21 percent or 91 million pounds, from a year ago – and were the lowest January-October trade volume since 2004. In particular, exports to China –the largest market for U.S. dry whey – were off 36 percent or 50 million pounds, compared to last year. U.S. manufacturers of dry whey have been unable to throttle back production due to strong YoY gains in milk output in the key cheese-producing states of Minnesota, Wisconsin, and New York. Through October 2015, dry whey production was up nearly 11 percent or 77 million pounds. During the course of 2015, the dry whey price has declined from nearly 60 cents per pound to less than 25 cents per pound, contributing a \$2.10 per cwt. reduction in the Class III milk price.

“*A meaningful recovery in the global dairy product markets will be largely dependent on a contraction in European milk production.*”

The U.S. butter market is the only dairy market that did not receive the memo that dairy product markets are trading near multi-year lows. Since mid-year, CME cash butter prices have traded at a premium of 50-cent to \$1.50 to global prices. U.S. butter prices are high despite increased imports because foreign butter contains 82 percent butterfat and is unsalted. As a result, it is not eligible for resale on the CME cash market, which requires 80 percent butterfat, salted butter with a USDA grading certificate. In particular, the required USDA grading certificate on bulk butter is a contributing factor to record-high butter prices in 2015. Most domestic butter is graded when it is packaged into retail form and not prior to bulk storage in 25-kg and 68-lb. boxes.

Record-high butter prices offset the dismal NDM prices and supported the Class IV milk price at a level more than \$1/cwt. above Class III milk prices in Q4-2015. This improved dairy producers' margins in the West, which produces over 50 percent of the nation's NDM and one-third of its butter. But it will not be enough to turn around the financial woes of the California dairy sector. In October 2015, milk output in California, the largest milk-producing state, fell 5.5 percent compared to the prior year. Year-to-date, California milk production trails last year by 1.2 billion pounds. The California dairy sector has been plagued by the lowest milk prices in the nation, due in part to its exposure to export markets and rising drought-related costs. In contrast, dairy producers in the Midwest, who enjoyed favorable margins driven by cheese prices, expanded production, thus offsetting lower output from the West.

Going forward, the Class III milk price is expected to linger in the \$14/cwt. range through Q1-2016 – a price level not seen since January 2011 and one that will likely curb milk production growth in 2016. As it is, U.S. milk production was a meager 0.1 percent higher in October compared to last year. Lower YoY milk production is definitely possible through the first half of 2016. The potential for lower domestic output and the corresponding fear of rising prices could be enough to coax domestic buyers to cover positions. Despite the low growth rate in U.S. milk production and lower YoY output in Oceania, a meaningful recovery in the global dairy product markets will be largely dependent on a contraction in European milk production.

## Other Crops

### Cotton

The cotton industry is finally getting some good news – at least directionally. The 2015 U.S. cotton harvest came in 20 percent smaller than a year ago, due to a combination of reduced acreage and lower yields. Global production is down 13 percent YoY. Declines in output both domestically

and abroad should help to at least modestly reduce the oversupply situation that China caused in the early 2010s.

But improvement in price won't come quickly for the U.S. cotton industry. With nearly a year's worth of cotton still sitting in warehouses around the world, trade remains anemic. And with U.S. production down and the dollar up, U.S. export shipments flirted with 20 year lows in the final weeks of 2015. The result will be a serious downshift in global cotton trade market share for the world's leading exporter. In just one year (i.e., from 2014/15 to 2015/16) the U.S.'s share of world cotton exports is expected to fall from 32 to 28 percent.

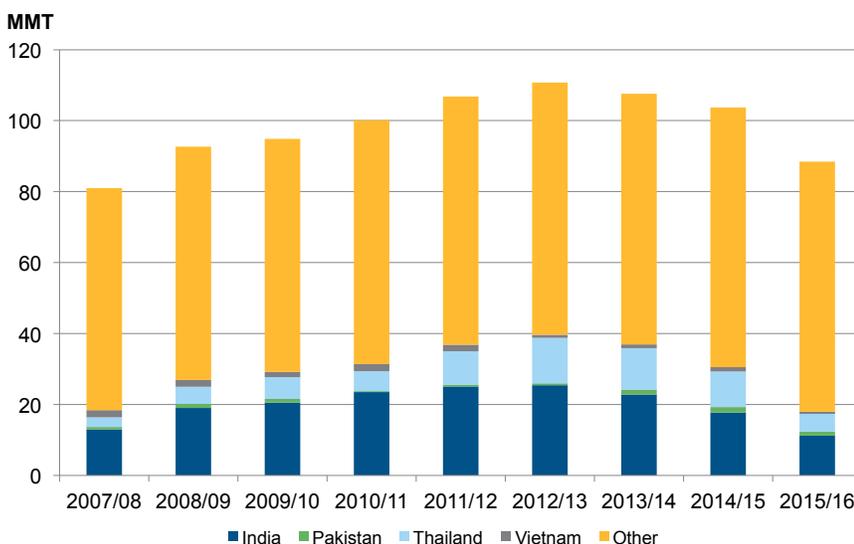
U.S. cotton producers are likely to boost plantings in 2016 by as much as a million acres, which would help to solve the lack of available exportable supplies. Clothing and accessory sales also continue to improve, pointing to renewed consumer willingness to spend. On the downside, the spread between cotton and polyester prices remains large, incentivizing clothing manufacturers to opt for synthetic fibers when possible.

Even with some bright spots emerging, the global cotton supply glut will continue to prevent rally opportunities from taking hold in 2016. Nonetheless, U.S. producers in the Southeast and Delta regions will have few good crop alternatives come next spring, so cotton acres there will rise. But 2016 will remain an uphill battle to attract new demand, and thus prices are expected to remain dormant in the low-to-mid 60 cent range.

### Rice

The world rice market is tightening. In fact, the global 2015/16 rice market is expected to be the tightest in seven years. The slump in supplies is happening mostly in Asia. The four largest exporters are located there, and collectively account for three-fourths of the world's rice exports. Rice stocks among those four countries are slated to fall more than 40 percent in 2015/16. (See Exhibit 7.)

**Exhibit 7: Rice Stocks of the Four Largest Exporters and the Rest of the World**



Source: USDA

The U.S. rice market is much more adequately supplied, in large part due to a huge carryover from 2014/15. But the shrinking supply elsewhere could present an opportunity for U.S. producers in the coming year. U.S. rice acres could bounce moderately in 2016 in anticipation that U.S. exports will be in greater demand. Even if exports make only modest gains in 2016, U.S. supplies are likely to decline and provide a boost to prices.

U.S. long grain production is expected to make the biggest comeback in 2016. Without attractive prices for corn or soybeans, many Mid-South producers will increase their bets on long grain rice. Medium and short grain acres may slip from this year's multiyear high as Mid-South growers shift more acres back to the region's traditional long grain varieties. Medium and short grain rice is grown predominately in California for export to northeast Asia, so the status of the drought there will determine how many acres are planted in 2016.

### **Sugar**

U.S. sugar producers are off to a great start in the current 2015/16 season. Total domestic sugar production is estimated to rank fourth on the all-time list this year, with the potential for a record year in beet sugar production. Persistent warm weather has presented challenges for beet producers in Minnesota and North Dakota, however. Abnormally high temperatures delayed harvest in the region and still pose a risk for spoilage of sugar beets now in storage. The typically cold region depends on freezing temperatures to preserve beet quality and sugar content of the beets. Thus far, processors are reporting good sugar content levels.

The stellar domestic crop will reduce export opportunities for Mexico throughout 2015/16. Under the standing agreement that suspended countervailing duties against Mexico, the volume of sugar permitted to enter the U.S. from Mexico is dependent on a calculation that defines "U.S. needs." Thus, with U.S. output near record levels, Mexican shipments to the U.S. are projected to fall sharply in 2015/16. Total U.S. imports are projected to decline 11 percent in 2015/16; and in that event, the U.S. sugar stocks-to-use ratio will actually edge lower, supporting prices to move higher.

### **Specialty Crops**

As 2016 begins, the drought remains the main concern for California agriculture. El Niño is still the main talking point, with Californians in doubt and wondering whether they will face a fifth year of drought in 2016. November did bring some storms to Northern California delivering rain and enough snow to allow the ski resorts to open early for the first time in years.

The lack of significant precipitation in the first half of the rainy season does not mean that El Niño has petered out. Autumn weather is often highly volatile in California; and although major storms sometimes hit California during the fall, such storms are not the norm. Instead, California typically gets most of its precipitation during the months of January to March.

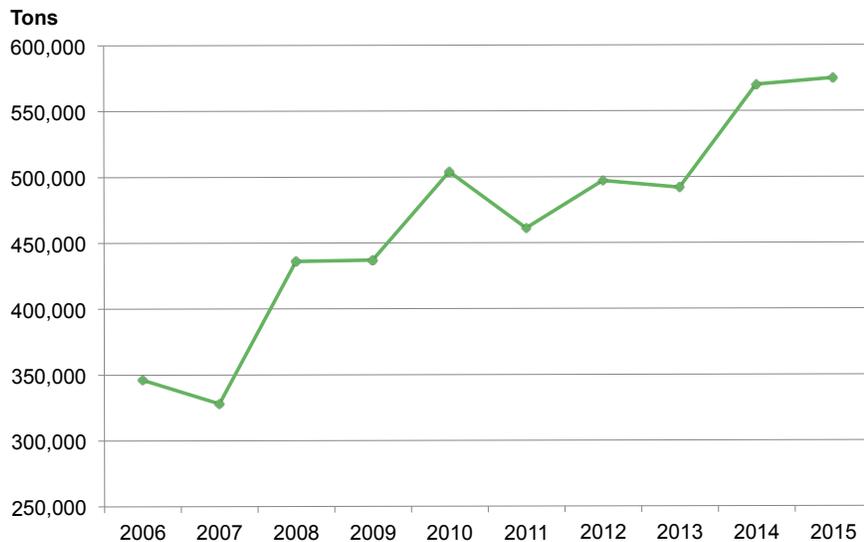
Despite a warmer than average autumn and dearth of rainfall so far this rainy season, El Niño is not only still on track, but is actually gathering strength. Ocean temperatures off the coast of Peru are now the hottest in 25 years. This El Niño is so large and strong that it rivals those in 1982-83 and 1997-98 – the two most powerful El Niño occurrences on record. Climatologists now are 95 percent sure that this El Niño will persist into the spring and will in fact result in a wetter-than-normal winter.

California's specialty crop harvests are now winding down. In many cases, the harvests are smaller this year as a result of water issues and the fallowing of more land. However, despite the prolonged drought, several California crops actually realized bumper yields. Here follows a summary of the status of a few of the major California crops.

### **Almonds**

California almond growers faced challenges during the year as a result of the drought. Almond trees started blooming in early February – one of the earliest almond blooms to date. This early bloom, along with the dry, hot summer, advanced the harvest by two weeks. Some growers, who were reliant largely on groundwater for irrigation, also reported wilting of trees and defoliation due to salt damage.

## Exhibit 8: California Walnut Production



Source: USDA NASS

Despite these problems, the 2015 crop is expected to come in at 1.80 to 1.85 million pounds, about on par with last year's crop of 1.87 million pounds. The reduced production per acre resulting from the stress caused by the ongoing drought (e.g., inconsistent chill hours and water issues) was offset by the increase in bearing acres from 870,000 in 2014 to 890,000 in 2015.

The low carryover stocks from 2014-15 in combination with this year's smaller crop mean that supplies of almonds are tight going into the 2015-16 marketing year. Despite the strength of the U.S. dollar and high almond prices, it is expected that U.S. growers will export 1.2 million pounds of almonds in 2015-16. Although early season shipments have been below initial expectations, the demand outlook for the rest of the marketing year remains strong as inventories are running low in key export markets (Europe, India and China). Furthermore, with almond prices having declined since August and at lower levels than what they were a year ago, buyers have been wary about committing to current price levels to avoid sitting with higher-priced inventories. Buyers will likely remain cautious until prices start to level off (or even increase), and await the arrival of the February bloom when the outlook for the 2016 crop becomes clearer.

### Walnuts

As of the end of November, walnut handlers reported crop receipts of 596,000 tons, harvested off 300,000 bearing acres – 4.5 percent higher than last year's crop of 570,000 tons. (See Exhibit 8.) Neither the drought nor the lack of chill hours seems to have impaired the crop, while the mild summer temperatures have had a positive impact on the quality of the crop. However, with two back-to-back years of record harvests and continued growth in global walnut production, growers expect that the price of walnuts will drop even further over the remainder of the 2015-16 marketing year with price predictions

of \$1.15-\$1.20/lb – well below the \$1.60/lb that growers received on average during the 2014-15 season.

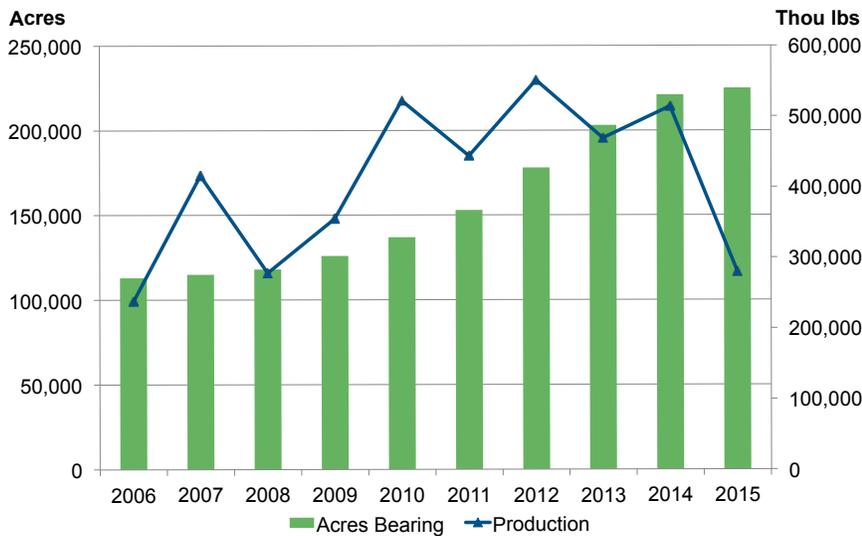
### Pistachios

Pistachio growers have not been so lucky. Not only was 2015 a down-year in the pistachio cycle, but water availability and quality issues as well as insufficient chilling hours last winter all contributed to an almost 50 percent decline in yields from the previous year. (See Exhibit 9.) The 2015 crop, harvested from 225,000 bearing acres, produced only 279.7 million pounds versus the 513.6 million pound harvest of 2014. (Given the alternate bearing nature of pistachios, 2016 should be an on-year in terms of production.) The higher than normal carryover from 2014 will boost inventories; but with exports and domestic demand likely to continue growing as they have done in recent years, growers expect to see prices increase from now until the end of the 2015-16 marketing year.

### Processing tomatoes

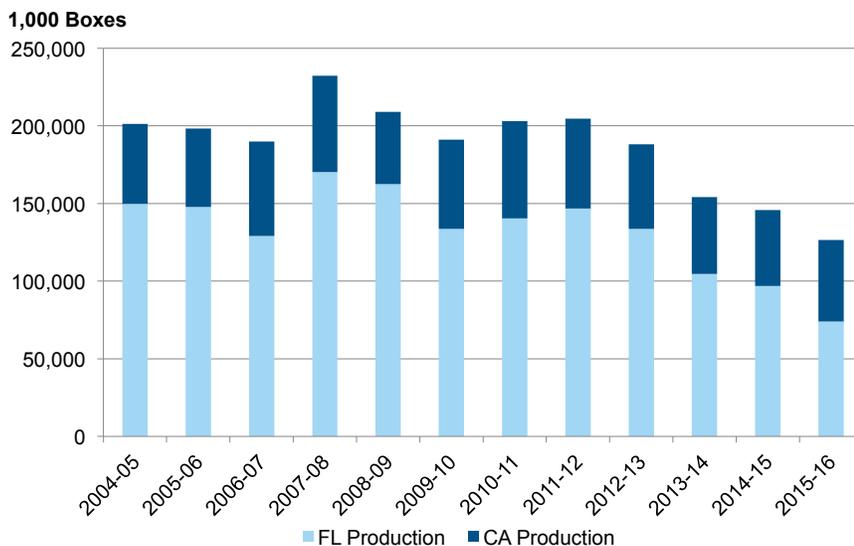
This past year (2015) has been another record year for California's processing tomatoes, with the total crop of 14.36 million tons slightly higher than last year's record-breaking crop of 14.01 million tons. The 2015 crop

### Exhibit 9: California Pistachios: Bearing Acres & Yields



Source: Administrative Committee for Pistachios

### Exhibit 10: Florida & California Orange Production



Sources: USDA NASS, Florida Dept. of Ag & Consumer Services

benefitted from good weather and few pests and diseases. In spite of water issues causing California farmers to fallow more acres in 2015, processing tomato harvested acreage increased 3 percent to 293,000 acres this year in response to processors' contracted volume requirements.

At this year's price of \$80/ton, growers will receive \$3/ton less than they did for their 2014 crop.

#### Citrus

California's navel harvest is underway. The current consensus projection calls for a harvest of 86 million cartons, up 13 percent from the 2014-15 harvest of 76 million cartons. (See Exhibit 10.) The drought meant that this harvest was produced on 2,000 fewer bearing acres than last year because California's top three citrus growing counties had no surface water allocations during 2015. Good fruit set and large fruit sizes, due to recent rains, have boosted production volumes while warm temperatures over the summer produced a sweet, flavorful crop. Additionally, recent cooler temperatures have aided the crop's color formation. All in all, California growers have fared well in 2015, thanks to the high-quality citrus crop and the above-average prices for the larger fruit.

The citrus situation in Florida is a whole different story, though. Florida citrus growers continue to feel the ill effects of citrus greening. The USDA's December estimates of the 2015-16 Florida orange crop call for 69 million boxes, comprising 36 million boxes of Navels and 33 million boxes of Valencias. This total represents a 29 percent contraction from last season's production and will be the smallest crop in 52 years. Bearing acres are down, and Valencia fruit sizes are below average while navel fruit sizes are near minimum. The Florida Agricultural Statistics Service estimates an average processed on-tree price for all fresh and

processed orange varieties (early/mid-season, Valencia and Navel) of \$16.84/box and \$10.58/box respectively.

As the majority of the Florida citrus crop is processed into orange juice (OJ), the decline in the 2015-16 crop is expected to bring about a 14 percent reduction in Florida OJ production, in particular not-from-concentrate (NFC) products. NFC products make up about 60 percent of total OJ sales with the majority of Florida oranges processed into NFC products. Brazil's OJ availability is also expected to drop by 19 percent, thus limiting export volumes to the U.S. The slightly higher Florida OJ beginning inventories are not sufficient to make up for the declines in OJ availability with the result that we should see a rise in retail prices.

But the limited supply of oranges is not the only factor that will put pressure on retail prices. A smaller crop means smaller volumes processed thereby increasing processors' production costs. Processors will be pushing for higher retail sales revenues (prices) to cover their increased costs. A hike in OJ prices can only serve to dampen consumer demand: retail OJ sales are projected to be 6.7 percent lower than they were last season based on an expected 3.2 percent increase in the price of OJ in 2015-16.

### ***Wine grapes***

Owing to untoward weather (i.e., the unusually cold, wet month of May and the dry, warm winter), this year's harvest of wine grapes is not only light, but also one of the earliest and shortest on record. Industry insiders are projecting that the 2015 crop will come in at 3.7 million tons, about 5 percent below the 2014 crush. The good news is that the quality of the crop is considered to be exceptional. While limited volumes will undoubtedly affect grower returns, the short crop should help wineries work through inventories built up over the last three years of bumper crops while at the same time strengthening prices – especially for north and central coast grapes. In fact, the lack of grapes has already boosted prices of certain varieties as wineries have turned to the spot market to source grapes.

The situation is not quite as rosy in the San Joaquin Valley (SJV). Due to economic pressures resulting from unsustainably low prices, many producers in this bulk wine

“*Despite a warmer than average autumn and dearth of rainfall so far this rainy season, El Niño is not only still on track, but is actually gathering strength.*”

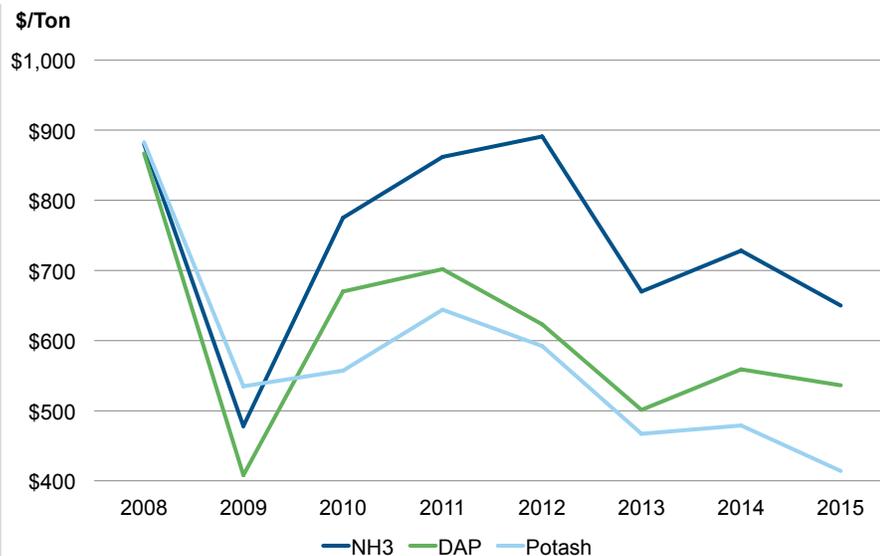
producing region have been pulling out wine grape vines, with about 25,000 acres of wine grapes having been pulled in 2015. Allied Grape Growers foresees that this trend will continue in the SJV and expects that anywhere from 25,000 to 45,000 acres will be pulled out in the next year and replaced with more profitable crops, like nuts. It makes no sense for SJV wine growers to continue producing wine grapes for which there are no certain offtakes.

### **Crop Nutrients**

The tourniquet continues to tighten on fertilizer profits. In the closing months of 2015, crop nutrient prices traced agricultural commodity prices lower, causing greater margin compression across the supply chain. (See Exhibit 11.)

The steepest retracement was recorded in phosphorus (P) and potassium (K) with growers backing off new bookings while looking to mine existing nutrients in the field to rein in production costs. Growers are expected to be less likely to neglect nitrogen (N) requirements this spring compared to P and K requirements. Nonetheless, with corn prices sinking well below \$4 a bushel and with no post-harvest rally materializing, the corn-nitrogen ratio suggests that N is priced about \$100/ton too high at the retail level based on historical trends. Farmers' reluctance to sell corn could indicate a lack of eagerness to make a financial commitment on fertilizer and instead push purchases and applications to last-minute corn-planting deadlines. The slow pace of year-end pre-purchases by farmers points to a much slower sales pace waiting on the horizon next spring. Agronomy divisions at cooperative elevators largely anticipate a 10-percent to 25-percent reduction in margins for 2016.

### Exhibit 11: Illinois Fertilizer Prices in December



Source: USDA-AMS

In regions experiencing a wet winter, retailers anticipate a potentially strong sales pace in the spring. Warmer weather associated with El Niño in the Midwest could also bring an early start to spring by as much as three weeks, leaving an open invitation for earlier-than-normal demand for product. Ample rail capacity has been a blessing for wholesalers who plan to use rail cars for staging fertilizer in the market ahead of spring season. Retailers who are anticipating early movement of product are securing product despite the lack of farmer bookings – thereby exposing them to risk of overloading on product that might not sell, or paying prices that are above the market for cost-conscious farmers. Nitrogen today is priced above its historic average, and market fundamentals currently do not signal a significant deviation from the recent trend in prices on the horizon for the remainder of the winter.

For manufacturers, historically low natural gas prices are buffering losses in product values. Natural gas prices are now the lowest since 1993. With record large domestic supplies, price risk for the main feedstock in fertilizer production is minimal. Greater consolidation, however, looms across the supply chain from fertilizer manufacturers to wholesalers and retailers as profits tighten in the next 18 to 36 months in the event corn

prices and retail fertilizer prices see further deterioration.

## Infrastructure Industries

### Power and Energy

Working natural gas inventories on November 20 reached their highest recorded level at 4,009 billion cubic feet (Bcf), according to the Energy Information Administration (EIA). Stored supplies of U.S. gas have been above the norm since May. The Henry Hub contract for February delivery hit a 22-year low on December 18, 2015 of \$1.87 per million British thermal units (MMBtu), 50 percent below prices a year ago. Nevertheless, U.S.

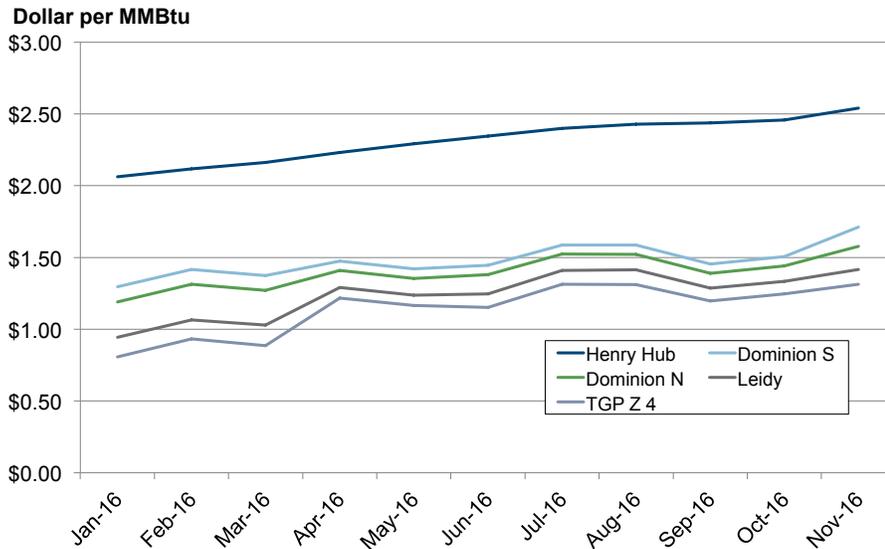
gas production has been humming along near 73 billion cubic feet per day (Bcf/d), more than 3.0 Bcf above a year ago and about 1.0 Bcf below the all-time high earlier this year.

Shale plays in the Northeast will continue to drive natural gas production growth in 2016. This is largely attributable to the 30 percent decline in production costs in the last year, as drilling companies do whatever it takes to compete for the wells that are still being drilled.

Production growth, coupled with what is shaping up to be a mild winter, will keep benchmark natural gas prices well below \$3.00/MMBtu through 2016. (See Exhibit 12.) Weak gas prices will be even more pronounced in the Appalachian region, the epicenter of the nation's natural gas glut, where futures prices at several Appalachian gas hubs are trading below \$1.75/MMBtu through 2016.

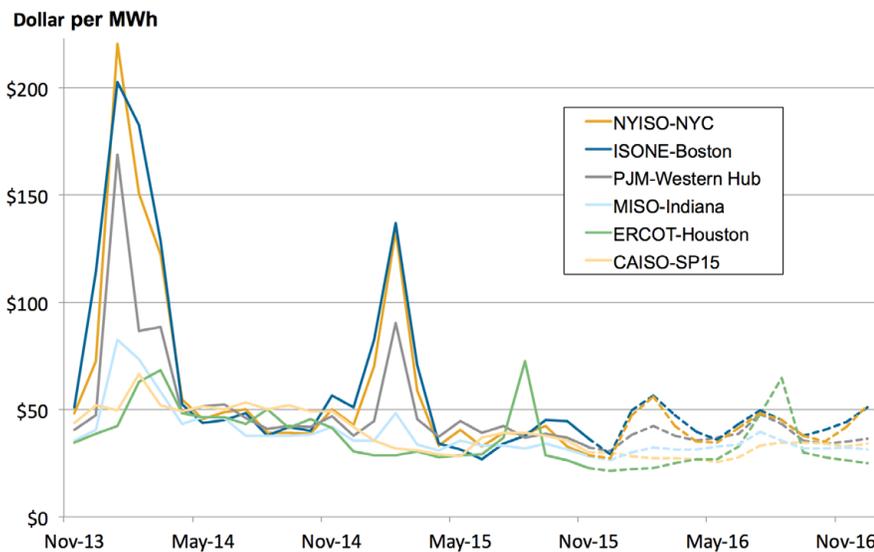
Depressed gas prices offer no hope for the nation's beleaguered coal industry. U.S. coal consumption from the power sector is estimated to have fallen from 851 million tons in 2014 to 766 million tons in 2015, mainly due to a 10 percent drop in electric power-sector consumption. Additional coal retirements and low natural gas prices will likely further reduce electric-sector coal demand by an additional 89 million tons by the end of 2016.

### Exhibit 12: Natural Gas Futures Prices Through 2016



Source: SNL Energy

### Exhibit 13: Historical and Forward Power Prices



Note: Dashed lines represent forward power prices as of Dec 11, 2015.  
Source: SNL Energy

Central Appalachian coal is not currently competitive with natural gas, with spot coal prices around \$40 a ton. Even demand for Powder River Basin (PBR) coal, which is currently around \$11 a ton, will be capped due to

low natural gas prices. PBR forwards now sell below \$12/ton through 2020, with only modest growth from today's pricing. Weak price growth reflects flat-to-declining volumes sold into shrinking domestic coal markets.

Weak fuel prices for natural gas and coal will continue to put downward pressure on power prices in 2016. Power prices across all regions have been declining since 2014, and forward prices for on-peak power indicate little support in 2016. (See Exhibit 13.) Price spikes due to extreme cold during the last two winters are also less likely to materialize in early 2016 as El Niño weather patterns help foster mild temperatures for large swaths of the Eastern half of the country.

Weak earnings due to low power prices, coupled with the EPA's Mercury Air Toxic Standards, triggered retirements of around 13 GW of coal-fired generation in 2015. Through 2016, an additional 7.3 GW of generating capacity are scheduled for retirement, of which over 80 percent is coal-fired. Due to low power prices in 2016, announced retirements will increase through the year as more inefficient, high-cost coal units that were operating on the margin can no longer compete economically.

Furthermore, as the industry moves from coal on the margin to gas on the margin, the values of those gas plants is going to increase. Evidence of this already exists in the PJM Interconnection, where in the first nine months of 2015, generation from coal units decreased 13.6 percent and generation from natural gas units increased 29.9 percent compared to the first nine months of 2014. The dispatch

of natural gas units has increased and gas units set the price for more hours as marginal resources in PJM's Real-Time Energy Market, compared to coal.

Investments in new power-generating capacity across the country reflect the increasing value of gas-fired units. Of the 18.4 GW of new capacity under construction and scheduled for completion in 2016, around half is gas-fired, and approximately 45 percent of all the new gas-fired capacity scheduled to come online in 2016 will be located in PJM.

New power-generating capacity based on renewable energy, namely wind and solar, is also poised for exceptional growth in 2016. A rush to complete solar projects before the step-down of the Investment Tax Credit (ITC) at the end of 2016 drove solar developers and utilities to fill their 2016 pipelines with solar photovoltaic (PV) installations. However, in mid-December, Congressional leaders reached agreement on a \$1.1 trillion spending bill that includes extensions for renewable energy tax credits. The bill was approved by Congress and signed into law on December 18.

The extension allows solar projects that are under construction by December 2019 to qualify for a 30 percent ITC. The credit will fall to 26 percent for projects starting construction in 2020 and 22 percent for projects starting construction in 2021. Projects that are under construction before these deadlines must be placed in service by December 2023 to qualify.

Wind developers will have through December 2016 to start construction of new wind farms to qualify for 10 years of production tax credits at the full level. Projects that start construction in 2017, 2018 or 2019 will qualify for 10 years of tax credits at reduced levels. The levels are 80 percent for projects starting construction in 2017, 60 percent in 2018 and 40 percent in 2019.

The U.S. solar industry is on track to have a banner year in 2016. Currently under construction are 4.3 GW of utility-scale solar projects across the country, and this total could reach a record level of 10 GW by the end of the year. Approximately half of the PV projects under construction are located in California, highlighting the

state's outsized role in the U.S. solar market. This growth is driven largely by California's aggressive Renewable Portfolio Standard (RPS) of 50 percent by 2030.

However, with power purchase agreement prices for utility-scale PV solar now ranging between \$40 per megawatt-hour (MWh) and \$60/MWh, utility PV's value proposition is evolving beyond simply meeting an RPS obligation. In addition to RPS-driven demand, centralized PV is proving to be an economically competitive resource to meet utilities' peak power needs in regions outside California.

Looking ahead, the combination of sustained low fuel prices for natural gas and coal and increased capacity from highly efficient gas-fired and renewable capacity will render many older units that are operating at the margin of profitability, to be uneconomic. Moreover, mild winter temperatures through much of the country will provide little support for power prices, further exacerbating an already dire situation for high-cost power producers in 2016.

### **Water Utility Industry**

According to the 2015 Global Water Intelligence Tariff Study, Americans pay 41 percent more for wastewater services compared to water. On average U.S. consumers pay \$8.2 per thousand gallons for wastewater services, compared to \$5.8 per thousand gallons for water. Despite lower levels, water rates grew at a faster clip than wastewater rates over the last year. This is particularly true in regions affected by drought, where rate hikes were implemented to offset the drop in demand due to conservation efforts.

However, faster growth in water rates is not the norm. Historically, water utilities have had a harder time raising rates compared to their wastewater counterparts. This will continue to be the case as higher water rates push up users' monthly bills, and consumers cry foul for not reaping the benefits of their conservation efforts.

The challenge that water utilities have in raising rates could explain why capital expenditures on wastewater have remained more buoyant than those on water. The latest data from the U.S. Census Bureau's Construction

Put in Place Survey shows spending on wastewater has grown by 6.2 percent over the last year, versus 4.5 percent for water. The long-awaited recovery in water and wastewater infrastructure spending which began in March 2014 is now in full swing. The general economic recovery occurring in the U.S. has helped support higher tax revenues and an increased willingness to borrow for infrastructure investments.

According to the Census Bureau's survey, total annual spending on water and wastewater projects is around \$6 billion below where it should be, based on the pre-crisis trend. If the U.S. economy continues growing, this capex spending could grow by 7-8 percent annually over the next couple of years before settling back to the 3-4 percent long-term norm, according to analysts at Global Water Intelligence.

Paralleling the rise in capital expenditures is a growing focus on putting these dollars to better use by investing in energy-efficient equipment, buildings and processes to bring down operating costs. In an environment defined by weak revenue growth and hostility towards rate hikes, water and wastewater utilities view energy efficiency as a critical component to long-term financial sustainability.

Currently, drinking water and wastewater systems use an estimated 56 billion kilowatt-hours (kWh) or about 3 percent of the nation's total energy consumption. Water and wastewater facilities are considered energy intensive operations, accounting for more than one-third of municipal energy use, according to the EPA.

The National Environmental Services Center (NESC) recently completed a case study on a small water system that serves 3,000 customers. The NESC's recommendations yielded annual savings of \$77,000 by investing only \$17,000 in energy efficiency upgrades. Additionally, these investments reduced annual electricity demand by 780,000 kWh, and lowered CO2 emissions by more than 1.7 million pounds.

In the "new normal" within which water and wastewater utilities are operating, the winners will be those utilities that are creative enough to provide their core services at a substantially lower cost.

## Communications Industry

Mass consumption of streaming video and the steady decline in traditional, wireline telephone usage continue to propel the communications industry toward an all-encompassing Internet Protocol (IP) network which, when realized, will interconnect all telecom users and providers. The communications industry is broadband focused, with companies vying to deliver the fastest speeds possible and diversifying with products and services that add value to the high-speed connection.

Internet traffic continues to soar with no signs of slowing any time soon. Cisco reports that in 2014, the average Internet household generated 36.8 gigabytes (GBs) of Internet traffic per month, which is roughly the equivalent of downloading sixteen episodes of your favorite one-hour TV show. At the same time, the average fiber-to-the-home (FTTH) household generated an additional 75 percent of data traffic or 61.4 GBs per month, or 27 one-hour episode downloads. By 2019, the average FTTH household will generate 120.1 GBs of traffic, or nearly 52 of those one-hour shows.

Broadband speeds continue to ratchet higher. Akamai, a cloud-services provider, reports that the national average broadband speed in Q2-2015 was 50.4 megabits per second (mbps), more than a five-fold increase from the 9.23 mbps average in 2007. The Fiber to the Home Council's latest study reveals that FTTH deployment increased by 13 percent in 2015 and that fiber connections are now available to 26 million U.S. households. Broadband speeds should continue to improve, as communications companies continue to roll out fiber, gigabyte service, and unserved and underserved rural areas are addressed by Federal funding programs and local providers.

Strong growth in mobile traffic also persists. As of August 2015, 77 percent of the mobile market, or 191.1 million people in the U.S., owned a smartphone. Ericsson estimates that smartphone users will consume 22 GBs of data each month by 2021, more than five times the 3.8 GBs average users generated in 2015.

Streaming video remains the major driver behind these growth trends. Traffic from online video and audio

services now accounts for more than 70 percent of downstream traffic during peak hours on fixed networks in North America, up from 35 percent just five years ago. Netflix alone accounts for 37 percent of this traffic. Though consumers stream less often on mobile networks, streaming media is again the dominant traffic category on wireless networks, representing 40 percent of downstream data. New mobile streaming apps from large communications companies are expected to launch in early 2016 and may provide an additional boost in mobile data usage.

In view of the latest trends, many industry insiders are questioning the viability of the traditional pay-TV model. The average consumer between the ages of 16 and 45 years old splits video watching equally between TV and streaming media. “Cord-cutters” (those who dropped their pay-TV subscription in favor of over-the-top programming) now account for ten percent of U.S. households, and another seven percent have become “cord-shavers” (those that have reduced their pay-TV subscription) in recent months. Finally, three percent of U.S. households are “cord-nevers” – a category that is expected to grow as millennials mature into the head of household role. With the booming North American video-on-demand market estimated to have reached \$100 billion in 2015, competition from over-the-top providers will further intensify. Netflix’s move to double its original content lineup in 2016 and the release of Apple’s fourth-generation platform, which utilizes voice command/search and the app concept, may spur another round of cord-cutting.

Early third-quarter reports provide some suggestions that pay-TV providers have finally stemmed the cord-cutting subscriber losses that have been plaguing the industry in recent quarters. Analysts caution, however, that this industry segment still ended the quarter in the red with a net loss of 92,000 subscribers. In fact, the two largest IPTV providers both posted losses for the first time ever. Perhaps more telling is a recent comment from Cable ONE’s chairman and CEO, Tom Might, that the company has found “...very little need to have video.” Cable ONE, along with the majority of other legacy cablecos, large and small, has shifted focus to gaining and maintaining

“*In view of the latest trends, many industry insiders are questioning the viability of the traditional pay-TV model.*”

broadband customers. A number of the other pay-TV providers are introducing the skinny TV bundle, or a monthly subscription package with fewer channels offered at a deep discount from the basic pay-TV package. The catch is, these providers are requiring that customers take their broadband service to get the skinny TV package. Despite these bleak statistics and trends, the majority of U.S. households still subscribe to a pay-TV package, and providers still have a relatively stable customer base in the near-term enabling them to retool the pay-TV model to suit the shifting marketplace and ensure long-term sustainability.

While a few large mobile providers are already cashing in on the commercial use of the Internet of Things (IoT), the small business and residential IoT market has been slower to start. The high cost of smart home technology and consumers’ hesitance to install the devices on their own have proved to be formidable barriers. Technical support for installing and maintaining home networks, including IoT technologies, is viewed as having high growth potential. Consumers, especially seniors, see clear value in IoT but have been slow to delve into the new technologies without assistance.

Data centers and fiber transport companies continue to perform well because they benefit from increased data traffic traversing the networks and the ever-expanding use of the cloud. These two data trends are also favorable for wireline and wireless broadband providers, although the opportunities are tempered by the extraordinarily capital intensive costs to deploy and maintain high-speed networks and fierce competition. Additionally, the nation’s most sparsely populated areas seldom present a worthwhile business case without government support; but some rural providers have been able to leverage broadband trends and implement new services, business

models, partnerships and other creative strategies to further monetize the network, despite the challenges of serving these high-cost areas.

Mergers and acquisitions continue throughout the industry, from the largest national companies to the smallest rural providers. Companies are looking to build greater economies of scale, enhance efficiencies and further monetize the network. Acquiring cable assets continues to be a popular way for legacy telephone companies to enhance network speeds and diversify into video, as it is generally accepted that cable plant is easier to upgrade than telephone plant and many assert that a triple-play offering is imperative.

Broadband policy discussions are likely to ramp up in the new year as Tom Wheeler, Chairman of the Federal Communications Commission (FCC), pushes to finalize important details for broadband universal service funding (USF) before the 2016 election and the inevitable FCC leadership changes and slowdown that will follow. The FCC released a third version of the rate-of-return cost model during the fourth quarter that is vastly different than the original model released in early 2015. In releasing the third version, Wheeler reminded the industry that the goal is to get USF right but not necessarily perfect. He also reiterated his hope to have a plan in place by the end of 2015. Rural local exchange carriers (RLECs) contend that the “right” model will provide long-term, predictable support needed to deploy and maintain high-speed networks in high-cost rural areas, and that the inaccuracies and fuzzy details in the most recent model fail to accomplish this goal. The FCC is also expected to host a reverse auction sometime in 2016 to disburse upwards of \$1 billion, which represents the portion of the Connect America Fund that was declined by price-cap carriers. The White House’s Broadband Opportunity Council has also recommended that all existing relevant Federal programs be modernized to open up additional financing resources and make available \$10 billion for broadband.

Carriers looking to bolster their wireless business are gearing up for the 600 MHz Broadcast Incentive Auction, which is being described as the most complicated auction ever conducted by the FCC. The auction is expected to be the last to offer high-grade spectrum for the foreseeable future. Due to the complexity of the auction and stringent bidding requirements, participating carriers will likely be fully occupied with the auction for at least the first half of 2016.

The controversial Net Neutrality debate may also reignite in early 2016, as the district court assigned to hear the case against the FCC’s latest set of rules began hearing arguments this December. At least one of the judges hearing the case was involved in the previous ruling that struck down the FCC’s prior attempt to foster an “open Internet.” The FCC maintains that its latest set of rules was carefully crafted with a solid legal foundation, though opponents argue the policies overstep the FCC’s purview. In the meantime, the FCC has signaled it will begin to tackle the many details that were excluded from the original order. Small and rural providers will push for permanent exemption from the newly enhanced transparency requirements, a stance that is supported in a recent Senate bill. This group will also advocate for the FCC to avoid imposing overly-burdensome regulations that will disproportionately harm smaller communications companies. ■

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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