



QUARTERLY U.S. RURAL ECONOMIC REVIEW

Massive Grain and Oilseed Stocks Weigh on Commodity Markets

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

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Key Points:

- The elections of Donald Trump and Republican majorities in both chambers of the 115th Congress have introduced major policy uncertainties in the year ahead.
- President-elect Trump has vowed to revamp U.S. trade policy. But beyond his promise to withdraw from the Trans-Pacific Partnership, key questions remain about NAFTA and trade arrangements with China.
- Agricultural producers across the U.S. all face a common challenge consisting of a widening imbalance between demand and supply, growing dependence on exports, and the attendant downward price pressures.
- The recent reappearance of robust grain and oilseed exports has defied expectations as the U.S. has benefited from weather-induced supply disruptions in South America and Europe, resulting in the swiftest export pace on record.
- Grain growers and traders in the U.S. will remain focused on the South American harvest in early 2017 and on the sustainability of recent optimism on global growth prospects for 2017-18.
- Ag retailers continue to struggle in a weakening farm economy. Persistently low commodity prices are forcing farmers and ranchers to cut costs wherever possible, and those cutbacks translate into reduced purchases of inputs.
- Manufacturers of fertilizer, seed, and chemicals as well as ag retailers continue to assess and evaluate M&A opportunities in an effort to cut costs, achieve economies of scale, and gain efficiencies.
- President-elect Trump is reportedly considering a wide range of policy proposals centering on the nation's power and energy industries. He is intent on dismantling the Clean Power Plan, but doing so isn't likely to improve the coal industry's prospects, given natural gas's significant price advantage over coal.
- Republican Congressmen are looking forward to exercising greater influence over the direction of the FCC during the next four years. One Republican commissioner has vowed to "fire up the weed whacker and remove all those rules that are holding back investment, innovation, and job creation."

Not Enough Buyers

Record high crop yields in the U.S. and outsized global harvests continue to dominate the commodity markets. China has given a much needed boost to global demand, particularly for soybeans, but global demand still lags behind the growth in global supplies – and worldwide grain and oilseed inventories continue to climb. Grain growers and traders in the U.S. will remain focused on the South American harvest in early 2017 and on the sustainability of recent optimism on global growth prospects for 2017-18. Continued large increases in the supplies of animal protein and dairy products will moderate any price gains in these sectors during 2017 unless export markets find new strength.

Global Economic Environment

The global economy continues to limp along without any clear growth catalyst to spark a rebound. Strong nationalistic and anti-globalization sentiment will make the upcoming 2017 elections in France (April/May) and Germany (September) contentious. At the same time, major uncertainties regarding the direction of U.S. domestic and foreign policies will also temper global capital and investment flows. China will remain a significant wildcard as it seeks to maintain growth through traditional stimulus of infrastructure and state-owned enterprises, while also seeking to expand the economy's dependency on consumer demand.

The challenges facing the global economy remain formidable. Going forward, the near term will be dominated by downside risks from policy inaction, but structural policy reforms put in place during 2017 could pay off in longer-term opportunities, particularly in the U.S.:

- **The elections of Donald Trump and Republican majorities in both chambers of the 115th Congress have introduced major policy uncertainties in the year ahead.** Tax reform, expanded infrastructure investment, reductions in regulatory burden, health care reform, and shifts in immigration and trade policies are all on the table. Their eventual macroeconomic impacts will depend on the details of

the proposals and the ability of the new Congress to move legislation forward with bipartisan support.

- **The divergent paths of the central banks in the U.S., Europe and Japan will continue to inject volatility into financial and foreign exchange markets.** The U.S. Federal Reserve Bank is the only central bank that is cautiously moving interest rates higher. Zero interest rate policies (ZIRP) have been in place for nearly nine years with little expectation of a reversal over the next three years. Negative interest rate policies now prevail in 22 countries accounting for 25 percent of world GDP.
- **The value of the U.S. dollar will remain under upward pressure given that the divergent central bank policies persist and that the U.S. begins to address economic imbalances.** Federal Reserve actions and improved U.S. economic growth expectations have pushed the value of the U.S. dollar sharply higher in recent months. Over the next three years, the U.S. dollar will be under moderate to significant upward pressure as a safe haven or as a result of more favorable growth prospects relative to other economies.
- **Leadership control in China will tighten as Chairman Xi convenes the 19th National Congress to appoint new leadership of the communist party.** China will remain committed to realigning its economy toward greater consumer dependence, but the transition will be made more difficult by the weak global economy. In the short run, China will continue to stimulate its economy to maintain growth of 6-7 percent a year as well as to limit political turmoil. The amount of stimulus will be somewhat limited, however, by growing awareness and concerns with corporate and government debt levels.
- **Negotiations over the U.K.'s exit from the EU, upcoming elections in France and Germany, the growing immigrant pressures, and the continuing sovereign debt issues in other EU countries will generate significant political and economic instability in Europe.** Overall economic growth in Europe will likely remain subdued at around 1 to 2

percent during 2017-19, with the potential for even weaker scenarios.

- **Emerging markets will continue to have difficulty in attracting capital as demand growth in commodity markets remains subdued.** Slower growth in China and advanced economies will limit the potential growth in many emerging economies, particularly those that have relied on raw material and commodity export growth to drive their economies.
- **World energy markets will likely remain a source of uncertainty as OPEC production limits are tested and the new U.S. President pursues more fossil fuel-friendly energy and climate policies.** Going forward, the combination of a more self-sufficient North American energy market, sluggish global growth and potential OPEC production limitations may move energy prices into a modestly higher trading range.
- **Geopolitical flare-ups will continue to roil the global landscape.** Turmoil in the Middle East shows no sign of abating, and Ukraine's problems are likely to worsen. Russia, Iran and North Korea continue to engage in behaviors that are likely to impinge on U.S. interests. Subpar economic growth in many other regions will likely exacerbate political turmoil.

U.S. Economic Environment

U.S. economic growth is likely to remain in the range of 2 to 2.5 percent well into 2017 until fiscal stimulus is forthcoming and greater clarity emerges on major policy initiatives. The consumer remains the driving force for the U.S. economy. Over the last five years, real personal consumption expenditures have increased by nearly 2.5 percent a year on average compared to just 2 percent growth in the overall economy. Steady job growth, rising wages, and continued improvements in the housing and equity markets will continue to support strong consumer confidence and spending.

Fixed investment spending, however, is likely to remain subdued. Growth in residential construction is likely to slow as sharply rising housing prices and higher interest rates impair affordability. Growth in business

“*Translating President-elect Trump's campaign rhetoric into actual administrative and legislative actions will be challenging.*”

fixed investment is likely to remain tepid until there is greater clarity on the details and timing of fiscal stimulus, tax code changes and profit repatriation. Uncertainty over trade policies will impact trade flows and also limit investment commitments. Inventory swings will continue to add volatility to quarter-to-quarter growth rates.

The Trump Agenda: Proposing and Disposing

Translating President-elect Trump's campaign rhetoric into actual administrative and legislative actions will be challenging. As we look ahead to the next four years, it's clear that President-elect Trump and the Republicans will be in control of the nation's political/economic agenda. From all that's been said during the past year and the political sparring of the past four years, we have a pretty good idea of the Republicans' key legislative goals and objectives. Here are their eight highest priorities:

1. **Repeal the Affordable Care Act (ACA):** President-elect Trump and many Congressional Republicans vowed to repeal the ACA. However, there is little consensus on what would replace the ACA, and we doubt that Congress would eliminate Obamacare without an alternative health care plan and a plan for the transition. Congress could adopt a piecemeal approach to unwinding components of the ACA as a new overall approach is developed over the next few years. Another option may be to pass legislation to repeal ACA at some future date once an alternative plan is in place.
2. **Reform the personal and corporate tax code:** Frequently mentioned tax reforms include reducing the personal tax code brackets to three, reducing the corporate tax rate, and removing the tax disincentives

for U.S.-based companies to repatriate foreign profits. However, tax code reform will entail a comprehensive review of the entire tax code with virtually every constituent group then hiring a battery of lobbyists to influence the outcome in their favor. The greatest challenge will be to decide whether the tax reforms will be required to be budget neutral or otherwise constrained by some dollar limit on their impact on the budget deficit – and then to remain within that limit. Under current law, the budget deficit is projected to increase from around \$400 billion a year to over \$800 billion during the Trump presidency.

- 3. Increase infrastructure investment:** The President-elect has proposed a ten-year \$1 trillion infrastructure investment initiative to rebuild the nation's highways, tunnels, bridges and airports. While this proposal has broad bipartisan support, many analysts are wondering about the initiative's funding, the potential success of the public-private partnership approach linked to tax code changes, and the actual job creating capacity of these public works projects.
- 4. Reduce regulatory burdens:** President-elect Trump has promised to reverse any administrative actions of the previous administration that have resulted in excess regulatory burden. "For every new regulation proposed," promised the president-elect, "two old regulations must be eliminated." Additionally, he will seek legislation to reverse any regulatory requirements that have resulted in an excess burden. Prominent targets include EPA actions involving the Clean Power Plan, the Waters of the U.S. (WOTUS), and the Keystone pipeline. Repealing Dodd-Frank has also been mentioned, but the new Congress is more likely to take the lead on this regulatory front.
- 5. Reform immigration policies:** Addressing immigration reform will be a lengthy process. Building "the wall" and accelerating the deportation of illegal immigrants with criminal backgrounds could be early initiatives, but Congressional reform of immigration policies will be contentious and take time.
- 6. Revamp U.S. global trade policy:** Trade policy seems to be the most uncertain part of the Republican agenda. The President-elect has promised to withdraw from the Trans-Pacific Partnership (TPP) on his first day in office. But beyond that one promised action, there is little clarity. Other possible actions could include labeling China as a currency manipulator, threatening tariffs, and initiating a renegotiation of NAFTA. (Trade experts report that President-elect Trump could withdraw the U.S. from NAFTA fairly readily, and without Congress' approval. Article 2205 gives each signatory an exit clause, albeit with six months' notice.) Going forward, extensive bilateral discussions and new memorandums of understanding are likely to be the new strategy to dialogue with our key trading partners.
- 7. Re-direct energy policy toward fossil fuels:** Energy policy will take a sharp shift toward fossil fuels. Nominees for Administrator of the Environmental Protection Agency, Secretary of Energy and Secretary of State all have extensive ties to the fossil fuels industries. Reductions in regulatory burden and increased tax incentives for the fossil fuel industries could also be forthcoming.
- 8. Nominate a Supreme Court Justice and appoint a new Federal Reserve chairman:** The President-elect will select a conservative nominee to the Supreme Court, and during his first term he may have additional opportunities to add to the court's conservative balance. Additionally, he will be able to appoint a new Federal Reserve Chairman in January 2018 and possibly could appoint as many as four Federal Reserve governors during his first term.

Not all of these Republican priorities will necessarily be enacted into law. The President proposes, while the Congress disposes. Although the Republicans control both houses of Congress, there are deep fissures within the party. Republicans also lack the two-thirds majority necessary in the Senate to overcome filibusters and other delaying tactics on the part of opponents. Changing the Senate's two-thirds voting requirement (the "nuclear option") could be risky because it would mean that only three Republican senators would need to cross the aisle

with a unified Democratic bloc to provide an opposing majority. The greatest uncertainty to the president's agenda will be the willingness of Congress to permit a significant increase in projected budget deficits and the national debt.

Over the next four years, as these measures get discussed, debated, and enacted (or not), economists, strategists, and analysts will be kept busy trying to discern what impact they will have on U.S. economic growth. Following President-elect Trump's win, stock markets and foreign exchange markets have all expressed their optimistic regard for the Republicans' agenda. Nonetheless, it is premature to hazard any firm projections about how much the Republicans' agenda will impact U.S. economic growth going forward. At this point, no one knows which measures will get enacted, when they'll be implemented, or what the actual legislation will look like. Plus, it's unclear whether their net impact will be positive or negative on economic growth. A trade war between the U.S. and its key trading partners, for instance, would likely prove to be damaging to the economic performances of all concerned.

For now, we're sticking with our baseline projection that U.S. economic growth will remain in the range of 2 to 2.5 percent during 2017. With the unemployment rate currently below 5 percent (widely viewed as the "full employment" level) and productivity growth at a subpar 0.5 to 1.0 percent, U.S. economic growth doesn't appear to have much room for upside potential.

U.S. Agricultural Markets

Outsized crop harvests and increased supplies of animal protein and dairy products continue to dominate the agricultural landscape. While each commodity has unique characteristics, they all face a common challenge with respect to a widening imbalance between demand and supply and the attendant price pressures. U.S. domestic demand remains robust, but global markets face significant challenges and uncertainties. In particular, the U.S.'s major trading partners are waiting to see whether the new Administration will follow through on its campaign promises to walk away from existing

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and new free trade agreements while also imposing new duties, tariffs, and quotas on goods being imported into the U.S. Plus, with the U.S. dollar having risen 5 percent since November 9 when the results of the presidential election were announced, the strong U.S. dollar will continue to impair the U.S.'s global competitiveness.

Net farm income is projected to total \$67 billion in 2016, down 17 percent from a year ago and 46 percent below the record high level in 2013. In the coming year, however, farm income is likely to stabilize as input costs come into better alignment with the sharp drop in commodity prices over the past few years. Moderate declines in land values in the Corn Belt and Upper Midwest are likely to continue, but balance sheets and working capital will remain strong by historical standards.

Grains, Oilseeds and Ethanol

Farmers set a new record in 2016 by hauling in the biggest fall crop in U.S. history. Despite flooding in key growing regions of the Midwest, fall harvest came to a successful conclusion with minimal transportation issues. The return of robust export business also defied expectations as the U.S. benefited from weather-induced supply disruptions in South America and Europe that sent export business back to the U.S., resulting in the swiftest export pace on record. Leading the charge on exports were soybeans, thanks to the resilience of ever-growing Chinese demand.

However, the sheer abundance of grain and oilseed supplies in the U.S. and around the world, coupled with the strengthening U.S. dollar, continue to burden the marketplace. USDA foresees the largest stockpile of grains and oilseeds in the U.S. since 1987. For grain end-users, the supply abundance is a blessing with ethanol producers running their facilities at a record pace and livestock and poultry producers expanding

their herds and flocks. In the weeks and months ahead, growers and traders will focus increasingly on weather in South America where Brazilian and Argentine farmers are slated to produce record crops on expanded acreage.

Corn

U.S. corn growers harvested a bin-busting 15.2 billion bushels this fall, based on USDA's latest estimates. Forecasts for hot and dry La Niña conditions earlier this year fell far short of the reality and gave way to a near-perfect growing season. Ample rainfall resulted in a record yield of 175.3 bushels per acre (bu/acre), beating the previous record of 171.0 bu/acre set in 2014.

Early concerns of potential transportation shortages resulting from the record harvest also failed to materialize with the U.S. rail system having sufficient capacity to move the crop amid significantly lower coal and crude oil shipments. Storage shortages throughout the Midwest and the Plains regions are widespread with much of this year's crop held in bunker storage or piled on the ground, raising concerns of increased shrink or spoilage.

Despite the strong U.S. dollar, corn's export program remained stout through the fourth quarter as world buyers shifted purchases to the U.S. after Brazilian corn farmers struggled with hot and dry conditions earlier in the season that sharply reduced yield and production. U.S. corn exports for the current marketing year are expected to total 2.2 billion bushels – the largest in nine years.

Domestically, low corn prices continue to expand the demand base across the livestock and ethanol sectors. USDA's projection for 5.7 billion bushels of feed and residual usage will be the biggest in 11 years, while corn used for ethanol is seen at a record 5.3 billion bushels.

While corn growers are hopeful of a significant price recovery bolstered by the hastened export pace and growing demand base in the U.S., the story of supply overabundance persists. Basis across the country remains at multi-year lows, and the futures market is encouraging commercial hedgers to store rather than deliver grain.

Abroad, corn production is expected to expand further with major exporters Brazil, Argentina and Ukraine

enjoying cheaper currencies that incentivize increased production. Brazil in particular is expected to see an expansion of the short-season "safrinha" corn crop that is double-cropped following soybean harvest during the U.S. winter/spring. Since the U.S. presidential election, the value of the Brazilian currency has dropped roughly 5 percent against the U.S. dollar. This is expected to spur further expansion in Brazil's crop acreage, should the Real's weakness against the U.S. dollar persist. USDA forecasts Brazil's corn crop in 2017 to grow to 3.4 billion bushels, improving by nearly 10 percent over this year's short crop if normal growing conditions prevail.

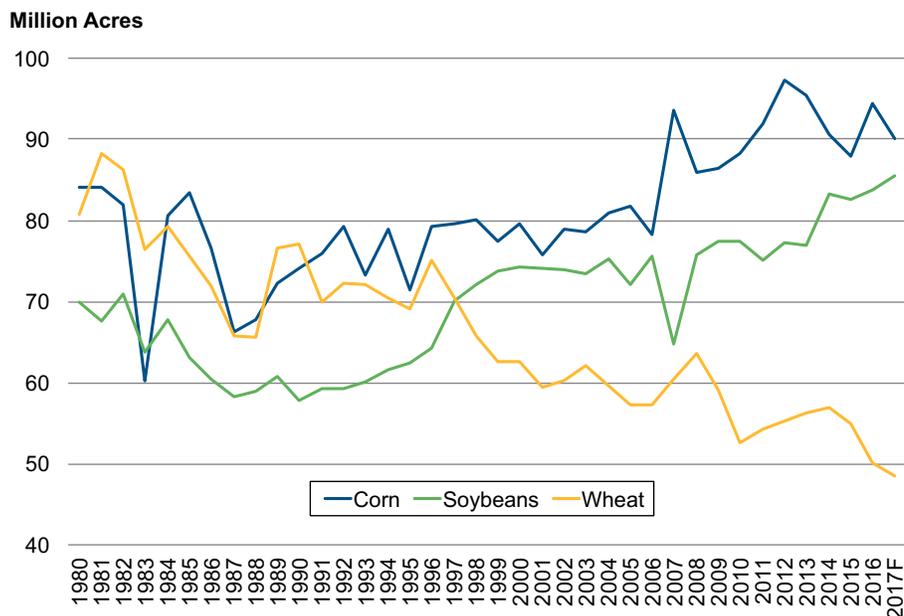
Looking ahead to the 2017 U.S. corn crop, USDA is already anticipating a significant reduction of corn seedings due to low corn prices compared to stronger soybean prices. In its latest baseline projections, the USDA called for corn acreage to fall to 90.0 million acres, down 4.5 million from 2016. (See *Exhibit 1*.) Of note is USDA's less-than-optimistic view of demand growth for U.S. corn for the 2017-18 marketing year with ending stocks tightening only slightly to 2.3 billion bushels, down 103 million bushels year-over-year (YoY), with an average national corn price unchanged at \$3.30/bushel. Barring a significant weather event that would sharply reduce production in major corn-producing countries, supplies outside the U.S. are expected to continue growing in the years ahead, thereby increasing competition with U.S. corn exports.

Oilseeds

China remains the leading character in soybean's story of resilient exports in the face of a strong U.S. dollar and rising global competition. The world's most populous country and second-biggest economy continues to grow into its role as the top soybean importer and chief export destination for U.S. soybeans as China's hog herd continues to expand. Additionally, China's reduced imports of dried distillers grains (DDGs) have also bolstered their need for soybean meal.

Thanks to relentless Chinese demand, the U.S. is well on its way to achieving a record soybean export pace of 2.05 billion bushels. More than three-quarters of all U.S. soybean exports this year are going to China. The record

Exhibit 1: U.S. Planted Acreage



Source: USDA-NASS.

U.S. crop and increased availability in rail and river barge freight have made it possible to meet China's near-insatiable demand.

The record shipping pace of soybeans in the last quarter has been matched with a record soybean crush pace as U.S. soybean processors fill growing feed demand from the livestock sector. The USDA anticipates that domestic crush will reach a record 1.930 billion bushels for the current marketing year.

Boosting hopes for further increases in domestic demand for soybeans in 2017 was the EPA's decision in November to raise the blending requirement for advanced biofuels (consisting mostly of biodiesel), which will contribute to further growth in soybean demand. With soybean oil comprising roughly 25 percent of biodiesel production, USDA now predicts that 6.2 billion pounds of soybean oil will be processed into biodiesel in the 2016-17 marketing year, up 9.3 percent YoY.

Shorter crops of competing global vegoils have bolstered the demand profile for U.S. soybeans in the last quarter. In Indonesia and Malaysia, palm oil prices have held at 4-year highs following El Niño-induced

drought conditions in early 2016. However, slower exports are causing Malaysian palm oil reserves to build, and more favorable growing conditions are expected with La Niña. This could portend a decline in world vegoil prices for 2017. The record Canadian canola crop is also adding support to the global balance of vegoils.

With the short-term tightness in world vegoils and robust export demand for soybeans, U.S. farmers are expected to respond with record soybean acreage in 2017. USDA's baseline projection in December pegged U.S. soybean acreage next year at 85.5 million acres, up 1.8 million YoY. New-crop soybean futures have been offering producers an opportunity

to lock in modest profits for the coming year, while corn futures remain depressed. November 2017 soybeans are currently priced well over \$10/bushel, which compares to December 2017 corn that has held stubbornly below \$4/bushel. Agricultural economists at the University of Illinois in Urbana-Champaign estimate that at those prices, soybeans would generate a profit of about \$80/acre more than corn for Central Illinois producers.

South American soybean producers are also heeding the call of higher soybean prices with Brazil and Argentina both expected to produce record soybean crops. Early planting this winter likely will result in an early harvest with Brazilian soybeans coming to market as early as January. Unfilled U.S. soybean export sales could be switched when the Brazilian harvest commences. As of mid-December, 237 million bushels of soybean export sales to unknown destinations were still on the books. Weather could turn for the worse in parts of South America as concerns about dry conditions in Argentina are building. La Niña is being blamed for the warm and dry conditions, but the adverse weather is expected to fade along with La Niña in early 2017.

Wheat

The wheat market continues to struggle with massive worldwide supply abundance and an increasingly competitive global export market. In Canada, farmers harvested the third largest wheat crop on record. In the Southern Hemisphere, wheat harvest is now in full force with the combined Australian and Argentine harvests also reaching a new record, helping to push the world wheat crop to an all-time high. (See Exhibit 2.)

Despite the global expansion of wheat stocks, the U.S. wheat export program saw new life in the closing months of 2016. Shipments of hard red winter (HRW) wheat and hard red spring (HRS) wheat have improved as global demand for higher-protein milling wheat grows in a world market flooded with low-protein wheat. But the rejuvenated shipping pace was a hard win for the U.S. Prices dredged new lows to attract demand amidst a fiercely competitive market and a strengthening U.S. dollar. HRS and HRW wheat have led the export race while low-protein soft red winter (SRW) exports continue to struggle.

The improvement in exports, however, hasn't been enough to make a major dent in U.S. wheat stocks. The

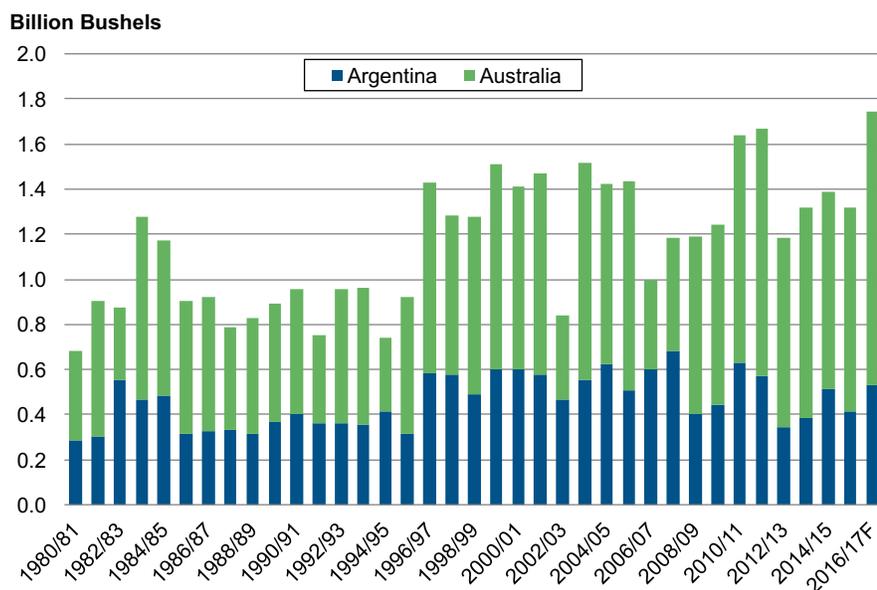
USDA projects a nearly 26 percent increase in U.S. wheat exports over last year, yet inventories will still swell to the largest level since 1987. Now, with record harvests coming to market in the Southern Hemisphere, competition for market share in key Asian export markets will intensify in the weeks and months ahead, bringing into question the sustainability of the U.S.'s renewed export pace.

Domestically, the burdensome stockpile of U.S. wheat has driven cash prices to their lowest levels in decades, with some elevators in the Plains pricing wheat at 85-90 percent of the price of cash corn. Livestock operators, though, have been slow to include wheat in feed rations for fear of impairing animal performance. Ample sources of cheap feed grains like corn and grain sorghum have also discouraged end-users from aggressively including wheat in feed rations.

With wheat languishing at stubbornly low prices, U.S. farmers were discouraged from seeding wheat during the fall. Winter wheat acreage is widely expected to fall significantly YoY, as acres shift to competing crops like soybeans, corn, sorghum, cotton and canola. A potential increase in winter-kill following sudden drops to below-freezing temperatures and poor fall establishment across the Central and Southern Plains brought on by the return of drought in key wheat-producing regions could also lead to increased rates of abandonment and graze-out with cattle operations in the spring. The U.S. Drought Monitor shows nearly 60 percent of the High Plains region as abnormally dry. Kansas, the top wheat-producing state, was 52 percent abnormally dry with 10 percent in severe drought. Some regions of the plains have not seen rain in two months.

Not all news is bad for wheat, however. In December, India scrapped its 10 percent import duty on wheat after drought depleted its inventories over the past two years. India continues to purchase wheat from the U.S., but

Exhibit 2: Southern Hemisphere Wheat Crop



Source: USDA-NASS.

Australia and the Black Sea region stand to benefit most as they take advantage of their closer proximity.

The burdensome global supply story, though, remains the key defining feature for wheat. Growing conditions in the winter wheat producing regions of the U.S. and the Black Sea region will be the two key features to monitor closely in the months ahead.

Ethanol & Biofuels

In November, the Environmental Protection Agency (EPA) surprised the biofuel industry with its final ruling on the Renewable Fuel Standard (RFS) for 2017-18 blending levels. The agency set the total renewable fuel mandate at 19.28 billion gallons of ethanol and other biofuels – well above the previously proposed volume of 18.8 billion gallons but also beyond the so-called 10 percent “blend wall.” EPA’s ruling for 2017 is forecast to push total renewable fuel usage to 10.7 percent of total transportation fuel, a net increase of 1.2 billion gallons over 2016 use. The increase, while welcomed by the biofuels industry, is still far below the 24 billion gallons originally legislated by Congress.

The EPA raised the implied conventional ethanol mandate for 2017 to 15.0 billion gallons, an increase of 500 million gallons that would translate into roughly 170 million more bushels of corn. The biodiesel mandate was increased to 2.0 billion gallons, a 100-million-gallon boost that will translate to 250 million more pounds of vegoils, chiefly soybean oil. Cheap corn, rising consumer fuel usage, and rising energy prices have combined to push biofuel processor margins to very comfortable levels. The higher biofuel mandates point to a promising outlook for 2017.

Some concern has surfaced in the biofuels industry over President-elect Trump’s decision to select Oklahoma Attorney General Scott Pruitt to lead the EPA. Pruitt has been a harsh critic of the RFS in the past, raising questions about whether Pruitt will adhere to his former statements or Trump’s campaign promise of RFS support. The price of Renewable Identification Numbers (RINs) plunged to 80 cents/RIN, down from its high of \$1.03/RIN, on the announcement of his appointment. Heightened uncertainty also surrounds the future of

the \$1/gal biodiesel blenders’ credit, which expires on January 1, 2017.

Meanwhile, biofuel demand continues to expand both in the U.S. and abroad. Ethanol’s expanding export program has helped underpin the widening margins that producers are currently enjoying, and portends further growth in 2017 amid low corn prices and rising gasoline use. Recent purchases from China have been key to lifting exports. The Chinese government, though, has announced that it plans to double domestic ethanol production to 1.34 billion gallons by 2020 and increase consumption by 12 to 15 percent.

China’s plan to increase ethanol production and consumption is part of a broader effort to accomplish two goals: whittle down its enormous corn inventories and improve air quality in major population centers. If China does meet its objectives, the increased ethanol production would consume about 125 million bushels of corn – a fraction of the more than 4 billion bushels that USDA figures China has in stocks. Private estimates put China’s corn stocks at more than 8 billion bushels.

Recent increases in Brazilian sugar prices have also supported U.S. ethanol exports by incentivizing Brazilian refiners to process cane into sugar rather than ethanol. Brazilian mills have dedicated about 53 percent of their production capacity to producing ethanol at the end of 2016, down from 67 percent last year. Falling sugar prices, though, will likely shift some production back to ethanol in 2017.

Farm Supply

Ag retailers continue to struggle in a weakening farm economy. Persistently low commodity prices are forcing farmers and ranchers to cut costs wherever possible, and those cutbacks translate into reduced purchases of inputs. In December, USDA estimated 2016 net farm income at \$67 billion, down 17 percent YoY. Farm production expenses dropped 2.6 percent in 2016, according to USDA, which was welcome news for growers, but also resulted in tighter profit margins for suppliers and retailers. Total farm expenditures on fertilizer and lime are estimated to have fallen 15 percent

YoY while seed costs are estimated to have declined 1.2 percent. Pesticide expenses, though, increased about 3 percent as farmers struggle with mounting problems with herbicide-resistant weeds.

Declining profitability in the farm sector accelerated merger and acquisition activity (M&A) across the industry's entire supply chain. Fertilizer, seed, chemical and ag retailer companies continue to evaluate M&A opportunities in an effort to cut costs, achieve economies of scale, and gain efficiencies. Acreage shifts from input-intensive corn to input-light soybeans will add further stress to the sector in 2017.

Crop Nutrients

Fertilizer prices continued their long-term descent in the final quarter of 2016 under the pressure of weak commodity prices and global oversupply of fertilizers. Following a bounce during fall fertilizer-application season, the combination of excess supply and a strengthening U.S. dollar plunged prices to new multi-year lows. Corn Belt spot fertilizer prices in the U.S. are down across the board with urea down 8.3 percent

YoY to \$275/ton, DAP prices down 23.6 percent on the year, and potash prices 19.4 percent lower at \$250/ton. (See Exhibit 3.)

The steady downward price trends added stress to the ag retail community. According to the 2016 CropLife 100 Ag Retailers Survey, the fertilizer sector has experienced four straight years of declining revenues, with fertilizer accounting for 45 percent of an ag retailer's total crop input sales.

Retailers anticipate further weakness into 2017 as demand for key nutrients, i.e., nitrogen (N), phosphorus (P), and potassium (K), is expected to lighten as farmers move acres out of corn and into soybeans. (As a legume, soybeans produce their own nitrogen.)

Most analysts estimate that fertilizer prices either have bottomed or soon will. Fertilizer manufacturers are trimming production or mothballing plants to cut financial losses. However, new nitrogen production capacity will soon come online in the U.S. and weigh on prices. Overseas, China has found significant potassium deposits that will curtail its import demand and keep world supplies of potash at elevated levels.

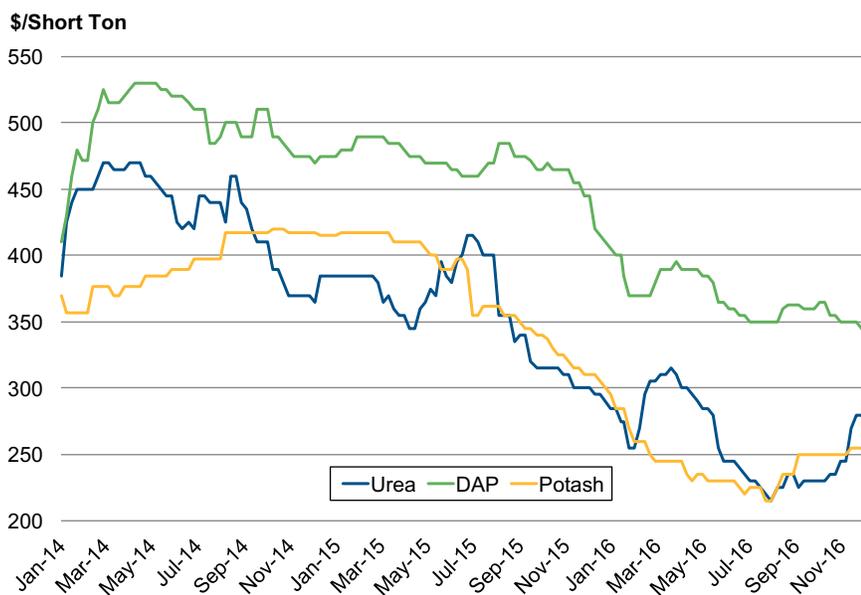
As long as the global fertilizer picture remains bearish, retailers will keep inventories light as they attempt to minimize exposure to price risk. Farmers are also reluctant to pre-book fertilizer needs as they expect prices to be cheaper in the months ahead.

Seed & Crop Protection

While M&A remains the dominant theme in the seed and crop protection sector, there is still considerable uncertainty about what the industry will look like in months to come. The proposed Dow-DuPont, Bayer-Monsanto and ChemChina-Syngenta deals all still face further scrutiny by government agencies.

Thus far, no serious roadblocks to the major mergers have developed. The Dow-DuPont merger is expected to be

Exhibit 3: U.S. Corn Belt Fertilizer Prices



Source: Bloomberg.

completed in the first quarter of 2017, but new products from the merger are not expected to be released for the upcoming crop season. On December 13, Monsanto's shareholders approved the merger with Bayer, and the deal is expected to close by the end of 2017. Bayer in turn issued statements aimed at shareholders and regulators regarding its plan to continue product development and innovation. Antitrust regulators in the EU, though, are expected to announce their decision on March 29, 2017, on whether to approve the ChemChina-Syngenta merger. Lenders also raised concerns about the sizable debt load that ChemChina will shoulder as a result of the purchase. In response, the Chinese state-owned company is seeking to raise roughly \$25 billion in equity commitments from investors.

In the U.S., attention is already turning to the acreage breakout for the 2017 crop. Soybeans are widely expected to gain several million acres from corn and wheat. Growers will be enticed to switch by the dual benefits of soybeans' lower input costs and better prices. Despite multiple years of weak crop prices, growers have been reluctant to downgrade on seed quality. Up until this point, their goal has been to maximize yield. Should financial stress intensify across the farm sector in 2017, that goal would likely change as farmers begin to prioritize cost efficiency over yield potential.

Monsanto's new dicamba formulation for in-crop use on their new dicamba-tolerant line of soybean and cotton seed gained EPA's approval in November for the 2017 growing season. State approvals, however, are pending. Lawsuits and the shooting death of a farmer in Arkansas in disputes related to spray drift from illegal applications of dicamba-based herbicide could motivate states to restrict the technology's availability and use. Dicamba, which is highly volatile and can drift across field borders and damage neighboring crops, is restricted in federal and state law to pre-plant and post-harvest applications. Going forward, ag retailers will be closely watching for state approval of Monsanto's low-volatility Xtendimax formulation with VaporGrip Technology, and will be keen on avoiding potential legal issues that could arise from spray drift via custom applications.

“A much improved export situation is helping to alleviate an otherwise burdensome surge in domestic meat availability.”

Animal Protein

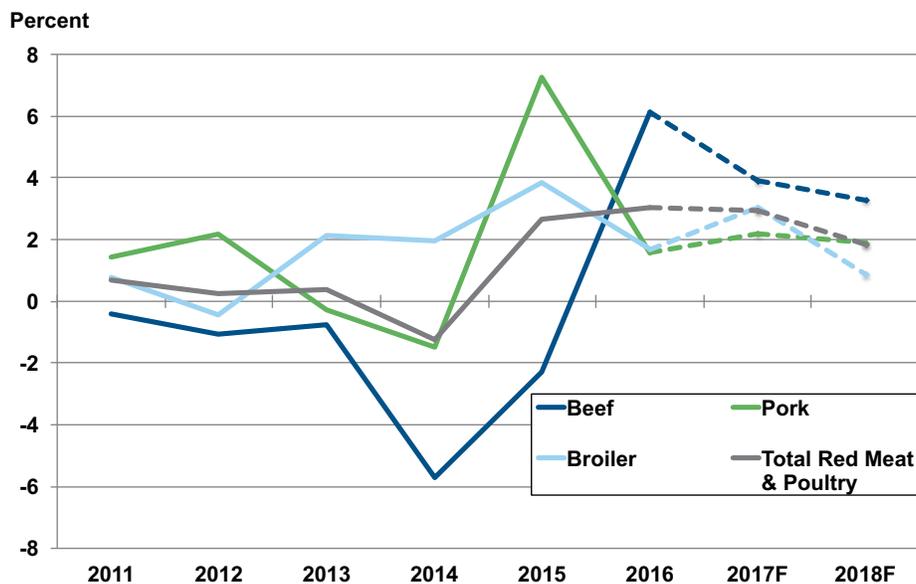
Total red meat and poultry output in the U.S. is on pace to grow nearly 4 percent in 2016 and another 3 percent in 2017. (See Exhibit 4.) Persistent low input prices for feed and energy are fueling the growth. Plus, a much improved export situation is helping to alleviate an otherwise burdensome surge in domestic meat availability. However, U.S. consumers are still faced with increased per capita supplies of beef, pork and chicken, along with lower prices across the meat complex. Increased featuring activity is expected to ratchet down retail prices throughout 2017 as competition heats up in the meat case.

Demand growth will continue to be a key focus in the face of expanding supplies. For producers, supply side price pressures will make risk management imperative for success. Increased slaughter levels and near full processing capacity utilization promise to be major factors in 2017 as slaughter hours are increased and new capacity comes online. Moving into 2017, concerns also exist regarding the domestic labor situation, control of animal disease outbreaks, the strengthening U.S. dollar, and uncertainty regarding relationships with key export destination countries.

Beef

Beef prices retreated 40 to 50 percent in the fall of 2016 from the cyclical highs posted in the fall of 2014. The dramatic correction occurred much faster than the industry anticipated, and its expectations for herd expansion have been scaled back. The industry remains in expansion mode, but the pace of rebuilding is slowing. Reduced profitability at the cow-calf level and regional drought conditions are impacting producer

Exhibit 4: Annual U.S. Meat Production Growth



Sources: USDA, Livestock Marketing Information Center.

decisions related to calf marketings, heifer retention, and culling rates.

Estimated cow-calf producer returns are currently near breakeven, on average. High return producers are still marginally profitable, while low return producers are in the red. At this point in the cattle cycle, cow-calf returns are expected to fluctuate near breakeven for the next two years. The faster than normal decline in profitability will prevent cow numbers from expanding as much as analysts had thought just a few months ago. Fewer heifers retained today will limit the calf crop in 2019.

Increased drought conditions, especially in the Southeast, have sent more calves to market and slightly shifted cow inventory numbers to the Central Plains where adequate pasture conditions exist.

Cow slaughter is up 13 percent YoY and more heifers are entering the fed cattle mix. Both of these figures are higher than a year ago, but still remain lower than the historical five-year average. These metrics are supportive of a slower pace of expansion moving forward.

The larger calf crop in 2015 contributed to overall increases in feedyard placements for much of 2016.

However, in September and October of 2016, unfavorable economic conditions caused placements to dip below year ago levels. Producers were reluctant to accept low calf and feeder cattle prices, and feeders were less willing to continue placing negative margin cattle on feed. Given the increased inventory of feeder cattle outside of feedyards, placements should rebound and post YoY increases in late 2016 and throughout 2017. As a result, a temporary tightening of market-ready fed cattle supplies in the first couple months of 2017 are expected to be supportive of prices in the short term. However, the long

term outlook is defined by downward price pressure in the face of growing supplies until 2019. Under this assumption, price rallies may present small windows of opportunity for hedging decisions.

Beef is leading the overall meat and poultry production increases with year-to-date (YTD) growth of 5.7 percent above a year ago. The growth in beef output is expected to taper off to 3-4 percent in 2017. YTD average weights are on par with last year, making an increase in slaughter numbers the sole contributor to the surge in output. Weights in the second half of 2016 are trending lower than a year ago. The inventory of cattle on feed 120 days or more also continues to drift lower. As cattle are being pulled forward, feedyard inventory currentness continues to improve dramatically compared to a year ago.

Aggressive marketings, improved currentness, and a favorable feed cost outlook are all contributing to an improved margin outlook for the cattle feeding sector in 2017. Feeding breakevens continue to drift lower, also reducing the amount of capital required to finish cattle. An abundance of global wheat stocks is spurring competition among feed grains, benefiting cattle feeders. Producers who are considering ration changes will

consider local market conditions and grain availability at on-farm facilities.

Looking forward to the second half of 2017, cattle feeding margins are expected to be positive based on more normal price spreads and persistently low feed costs. Demand remains a wildcard and will play a larger role in determining price expectations moving forward. As always, the development and proper execution of a sound risk management plan will be paramount to the success of cattle feeders in the face of declining prices.

Packer margins were record high in 2016. Adequate demand pull-through, both domestically and in the global market, has lifted slaughter levels. The beef packing industry is at full capacity, based on a 40 hour workweek, and is expected to continue to operate at full capacity for the next two years. Increased Saturday slaughter hours contributed importantly to the greater availability of market-ready cattle in the second half of 2016. Packing capacity expansion will be a key discussion throughout 2017 to accommodate growing cattle numbers. Recent profitability will likely spur additional capacity or renovations of existing facilities to take advantage of high-margin, value-added processing opportunities.

Retail beef prices have begun to retreat, but at a much slower pace than cattle values. The ratios of beef prices to pork and chicken prices have also begun to retreat. At the retail level, more affordable beef will continue to pressure competing meat values as competition for the consumer dollars heats up. The cutout is expected to face price pressure throughout 2017, further increasing the competition among beef, pork, and chicken. Rib prices have been a bright spot amidst recent price declines. A seasonal holiday rally in rib prices was much better than anticipated while all other cuts underperformed. In 2017, trim prices will face tremendous pressures from growing output of lower priced pork and poultry.

The net trade balance for beef improved greatly during 2016. Export demand gained momentum in late 2016 and is expected to extend into 2017. Beef exports were up 9 percent YTD through October 2016, with annual forecasts calling for a 10 percent increase. At the same

“*At the retail level, more affordable beef will continue to pressure competing meat values as competition for the consumer dollars heats up.*”

time, beef imports are projected to decline 12 percent in 2016. The bulk of this decline is reduced lean beef shipments from Australia and New Zealand. Both countries are coming off the heels of drought-induced liquidations and are currently in aggressive expansion mode as moisture returns. Current slaughter levels in Australia are down nearly 35 percent from a year ago, limiting the beef available for export, not only to the U.S. but to other key destinations as well.

With increased availability of beef in the U.S. to export, producers have gained market share in countries where shipments from Australia have declined.

Overseas demand for U.S. beef continues to gain momentum in key export destinations. Highlights include YTD volume increases of 21 percent to Japan, 20 percent to Taiwan, and 8 percent to Mexico. Lower U.S. prices are increasing competitiveness in the global beef trade and helping to offset a strengthening U.S. dollar. The recent announcement by China to resume imports from the U.S. is a positive development for export demand in the future. However, trade negotiations continue to be monitored and an unknown timeline remains to gain full access and begin product shipments.

Pork

U.S. pork production is on pace to expand 1.6 percent in 2016. Concerns about exceeding packing capacity seasonally in late 2016 caused producers to pull forward marketings dramatically beginning in late summer and continuing through the fall. Consequently, average carcass weights are down 0.5 percent YTD, partially offsetting a 2 percent increase in the number of head slaughtered. Forecasts are currently calling for a 2 percent increase in pork output in 2017, driven by the

lowest breakeven costs since 2010 and demand to fill new packing capacity expected to come online.

Hog producers have been marginally profitable in 2016, despite volatility in pricing associated with concerns about exceeding packing capacity. Proper risk management and opportunistic hedging activity early in the year shielded many producers from the price decline in the fall of 2016. As the industry remained ultra-current with market hog supplies and the concern regarding packing capacity diminished in mid-December, a rally in future prices dramatically changed the producer outlook for 2017. Futures prices in December created positive margin pricing opportunities for at least the first half of 2017. Technological advancements in hog production facilities are expected to increase production efficiency metrics such as pigs per litter, further adding to margin opportunities for producers in 2017.

The year 2016 will likely turn out to be the second most profitable year for pork processors, behind 2014. Recent profitability is attracting capital and is also the driving force behind processing capacity expansion plans through 2018. The additional capacity will incentivize

producers to expand output to record levels in 2017. Packers are also likely to compete for hog numbers as the extra capacity comes online. Producers are likely to be the beneficiary of this competition in the form of lean hog price support. Overall meat supplies are expected to pressure the cutout, resulting in a potential margin squeeze for hog processors.

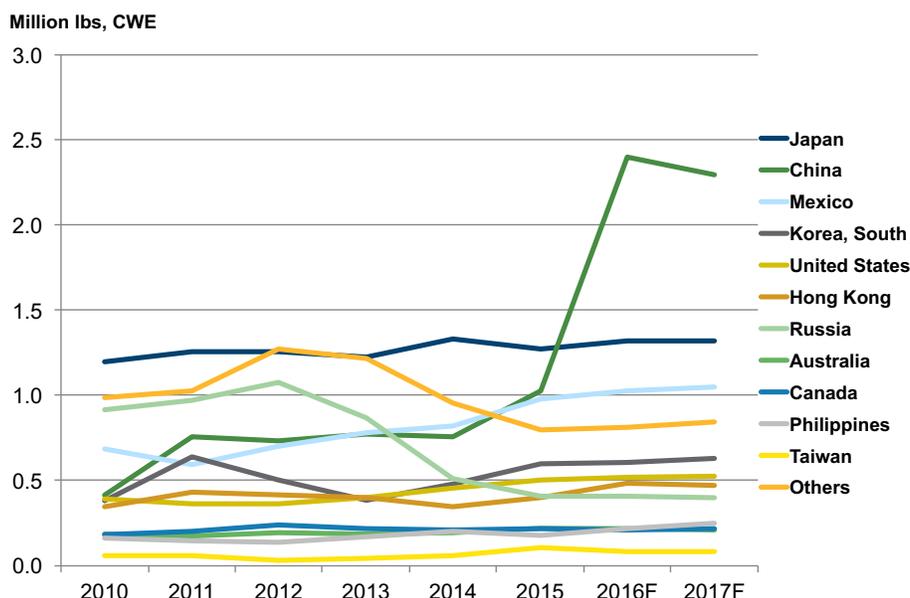
Longer term, five new or renovated pork packing plants are expected to come online beginning in 2017. These state-of-the-art facilities will ease capacity constraints, raise the industry standard for efficiencies, and likely put pressure on dated facilities throughout the Midwest. A combination of production growth and a shuttering of existing, less efficient plants will contribute to optimal utilization of these new plants.

U.S. pork exports continue to build momentum, posting double digit increases YoY in October and up 6 percent YTD. In the final months of 2016 Mexico emerged as the bright spot for U.S. pork sales. Despite a significant devaluation of the peso, shipments to Mexico increased 9 percent and are closing in on the record pace set in 2015. Japan remains the number one value market for U.S. pork, but the export volume YTD to Japan is behind the previous year's pace by 7 percent.

China's pork imports surged in 2016 and have catapulted the country into the world's number one importer. (See Exhibit 5.) The EU has been the biggest beneficiary of the surging Chinese pork buying in 2016, accounting for roughly 70 percent of China's imports. China still accounts for a small share of U.S. pork exports, but U.S. exporters are benefitting from China's increasing appetite. U.S. shipments to China are up 66 percent in 2016.

Going forward, diversifying export destinations will be key to growing U.S. pork export volume.

Exhibit 5: Annual Pork Imports



Sources: USDA-FAS, PSD.

An encouraging increase of 10 percent in the “other countries” category in 2016 is a positive step toward that goal. Improving overall export volume in step with expected production increases will be paramount to the profitability outlook for the U.S. hog sector, as the new processing capacity comes on-line.

Poultry

While the U.S. broiler industry was largely unaffected by the 2015 outbreak of Highly Pathogenic Avian Influenza (HPAI), recent outbreaks across the globe are again elevating concern. Increased prevalence of the virus is showing up across Europe, Asia, and Africa. As migratory patterns direct the flow of wild birds into North America during the winter of 2016/17, the U.S. is on heightened alert for another potential outbreak. Recent enhancements to testing and biosecurity protocols are anticipated to be tried in the spring of 2017. Another outbreak has the potential to shake up global trade flows of poultry products in 2017. Barring any HPAI outbreaks domestically, the U.S. is in a position to benefit in the export market from the current outbreaks in other countries. Potential foreign supply shortages and/or trade restrictions would provide an opportunity for the U.S. to fill any potential supply gaps.

“*Lower priced beef and pork on the market will pressure wholesale chicken values.*”

Broiler production is on track to expand 1.7 percent in 2016, and another 2-3 percent in 2017. The 2016 increase was primarily driven by higher average bird weights. Lately, however, the monthly gains in bird weights have been trending downward due to the growth in antibiotic-free production and the prevalence of “woody breast” which has led to slower growing breeds of broilers. In contrast, the production increases in 2017 should primarily be driven by a pickup in the number of head slaughtered. YTD chick placements are up

1 percent YoY, with larger increases occurring in the second half of 2016.

Consistent with previous forecasts, the outlook for small bird production remains the brightest, while big bird and tray-pack production systems edge closer to breakeven levels. Depending on the product mix for each integrator, the margin outlook is much lower than in recent history. Persistently low feed costs continue to fuel growth, but at much narrower profitability levels.

Lower priced beef and pork on the market will pressure wholesale chicken values. However, the outlook is mixed at the cut level. Wings continue to hold tremendous value and that strength is likely to remain well into 2017. Breast meat is expected to underperform, facing stiff competition from pork loins and ground beef. Tenders remain supported by loyal foodservice menu applications. Leg quarters have rebounded from dismal levels of around 20 cents per pound during the heights of HPAI-related trade restrictions and are now hovering around 35 cents. Leg quarter dependence on export markets elevates demand and price uncertainty, but current forecasts point to steady values of 25 to 30 cents.

U.S. broiler exports remain the wildcard in the industry’s outlook, especially in the face of recent global HPAI outbreaks. Exports are on pace to increase 4 percent in 2016, and are projected to advance another 4-5 percent in 2017, though export growth will need to accelerate in order to keep domestic supplies in check. If the 2017 increase in exports materializes, domestic per capita supply should increase a modest 1.4 percent next year. However, if exports were to trail expectations or HPAI returns to the U.S., the domestic pork supply would balloon. Any export disruptions would compress integrator margins and potentially ratchet back plans for future production increases.

Dairy Situation and Outlook

Healthy domestic demand throughout most of the year has been further bolstered by solid holiday buying. This has helped to counter some of the downward pressure on prices that stemmed from expansion in output and mounting inventories. But as the holidays wind down,

and as New Year's resolutions kick in, there tends to be a seasonal slowdown in demand. Luckily, as the domestic market begins to cool, the global markets should begin to turn their attention back to the U.S.

Domestic milk production has been strong and should continue to grow, driven by a positive margin outlook and ample replacement heifers in the pipeline. The most recently released production numbers indicate an increase of 2.5 percent over the previous year in October – stronger growth than many had expected, despite a slight decline in cow numbers. Over the coming months, herd numbers should begin to increase once again and the trend of a steadily growing milk supply will continue.

Dairy product prices in other areas of the world have been climbing as milk production in most other major exporting regions has slowed. As prices converge, the U.S. will once again become price-competitive in the global dairy product markets. (See Exhibit 6.) Imports into the U.S. have already started to slow down, and export orders are gaining momentum. U.S. dairy product exports should

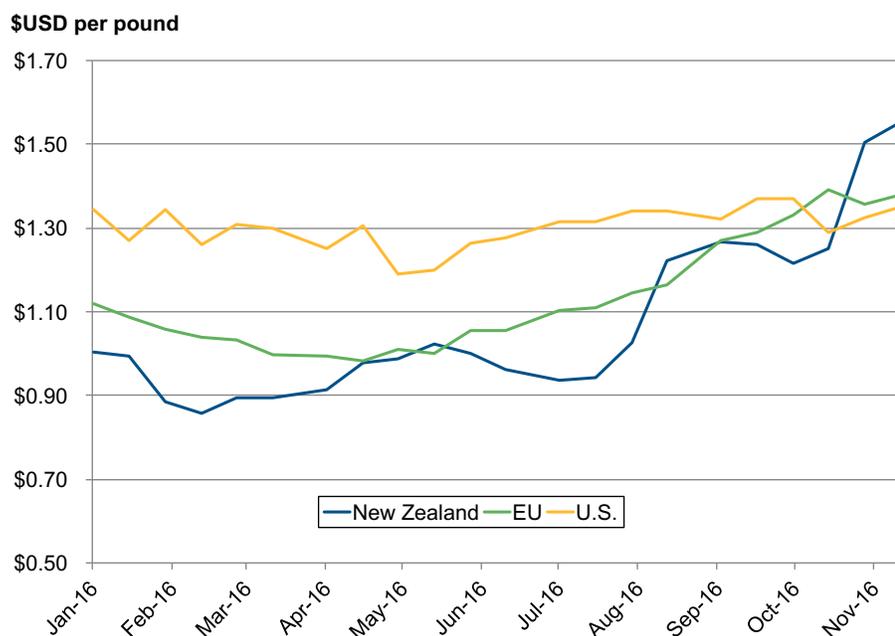
pick up speed in the first quarter of 2017, which will provide support for domestic prices. With milk production expected to continue to grow in the U.S., exports will be critical to avoid building up stocks in warehouses.

After building during much of the year, record butter inventories have mostly been drawn down by holiday sales. Meanwhile, strong demand for cream exports to Canada and Mexico has helped curb butter production recently. What appeared at one point to be a burdensome national inventory is now much more manageable. If exports pick up as expected, butter markets could be positioned for a good start to 2017. International butter prices are currently about \$2 per pound.

Milk powder exports have been showing some signs of gradual improvement, though the weight of EU intervention stocks remains a source of uncertainty to the market. A total of about 355,000 metric tons of skim milk powder (SMP) was pulled off the market as a price support measure, and now the EU has begun to test the market by offering about 6 percent of that product back for sale. Most bids to buy the powder in the initial sale were rejected by the European Commission for being too far below current market prices. The SMP being offered is over a year old, and with Oceania and the EU struggling with declining milk production, the U.S. will have an advantage in terms of fresh powder supply.

Futures markets are reflecting a sense of optimism leading into 2017. Every class III milk (used for making cheese) futures contract through 2017 is currently trading above \$17 per hundredweight despite the actual announced class III milk price not having hit the \$17 per hundredweight mark since 2014. The average price since January 2015 has been only \$15.24. This situation is creating opportunities for producers to lock in favorable margins through the year. It is

Exhibit 6: International Whole Milk Powder Prices



Sources: GDT, USDA.

also, however, causing stress for milk buyers who could be facing input costs well above what they had grown accustomed to over the last couple of years.

The U.S. dairy industry has benefited from strong domestic production at a time when output in the other major exporting regions of the world has slowed. If domestic demand holds firm and exports pick up, 2017 has the potential to be an improvement over the previous two years. However, as the level of milk production continues to climb, any disruption to demand could have a magnified impact to the downside.

Specialty Crops

Update on California

California's 2017 water year is off to a good start with heavy rains in parts of the state. The Northern Sierras have had the wettest fall in over 30 years, with double the average precipitation in the first two months of the water year. Historically, the Northern Sierras have received above average fall precipitation a total of 11 years, and in each of those years the region ended the water year with above-average precipitation. This relief has not been shared in southern California, though, which remains very dry.

At the end of November, the California Department of Water Resources (DWR) announced that its initial 2017 water delivery allocations will be 20 percent of contracted amounts for the 29 water agencies that receive water from the State Water Project (SWP). The DWR typically issues a conservative initial allocation shortly after the start of the new water year, while the final allocation is issued at the end of California's wet season in May. California's rainy season runs from December to April, and the state typically receives 90 percent of its precipitation during this five-month period.

While the allocated percentage might increase or decrease depending on the amount of rain and snow the state receives during the remainder of the rainy season, the DWR's initial allocation is heartening as it is a definite improvement over the preceding three years when initial allocations amounted to only 5 or 10 percent. The initial allocation estimate is based on current storage levels,

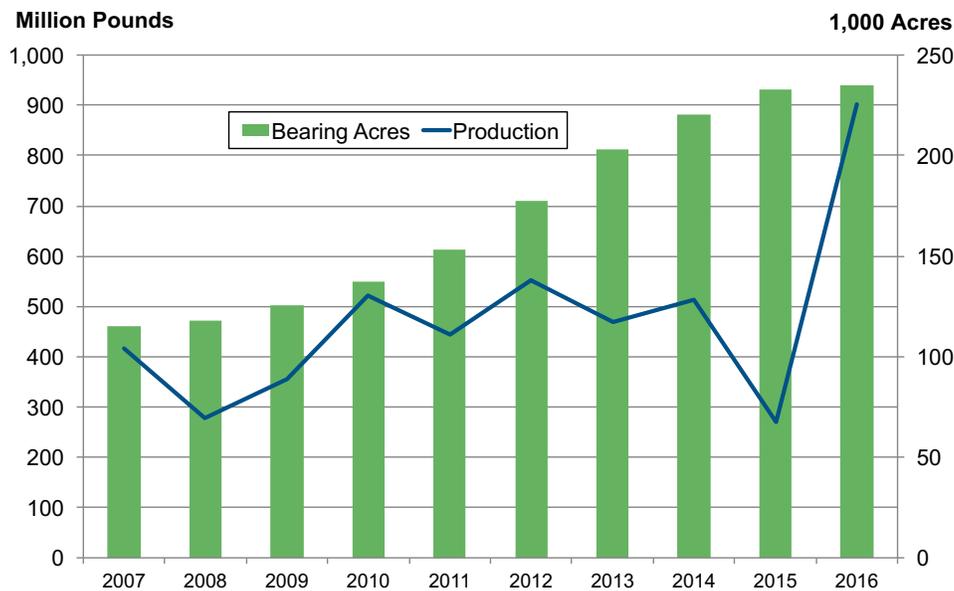
“California's 2017 water year is off to a good start with heavy rains in parts of the state. This relief has not been shared in southern California, though, which remains very dry.”

regulatory restrictions and expected streamflows. The storms that swept through California during the first few weeks of the new water year have had a positive impact on the initial announcement.

With the strong start to the rainy season, the U.S. drought monitor reports that as of mid-December, only three-quarters of California is now in some form of drought and 12 percent of the state is no longer dry. The last time the numbers looked this good was in April 2013 when 64 percent of the state was in varying states of drought. The current drought outlook is a huge improvement considering that as recently as a year ago, 97 percent of the state was experiencing drought conditions. The wet start to the season is certainly very promising, but anything can happen over the remainder of the season. Even if California were to have a wet year, it is unlikely that it will be sufficient to break the five-year drought.

In September 2016, the State Water Board promulgated a draft proposal to update environmental flow requirements in the San Joaquin River (SJR) and its tributaries: the Stanislaus, Tuolumne and Merced Rivers. The proposal, which would lead to the first update of the policy in 20 years, calls for increasing the allocation of the February-to-June unimpaired flow on the three SJR tributaries to between 30 and 50 percent in order to improve the habitat for fish and wildlife. Historical median flows during these critical months in native fish life stages in the Merced, Tuolumne and Stanislaus Rivers are 26, 21 and 40 percent of unimpaired flow, respectively. With this new proposal, the SWB aims to implement a flexible approach to the amount and timing of flows as long as fish and wildlife protection goals are met.

Exhibit 7: California Pistachio Production and Bearing Acreage



Source: Administrative Committee for Pistachios.

The SJR Watershed does not generate enough water, however, to meet existing human demands and support a healthy ecosystem concurrently, with the result that increasing instream flow requirements to protect fish and wildlife is expected to result in a 7-23 percent reduction in surface water availability for human use. The impact of such a move would have the greatest impact on agriculture. Consequently, the new proposal has many in the agricultural community up in arms as it will not only affect the economies of agricultural communities within the SJR Watershed, but will also likely increase the dependence on groundwater as surface water supplies decline. Comments on the proposed amendments were due in November and public hearings were also held in that month. The State Water Board will take up the proposed amendments at a public meeting in early 2017.

In other water policy news, President Obama signed into law a water projects authorization bill in late December called the Infrastructure Improvements for the Nation Act. For California, the provisions of the new bill are directed at changing the amount of water pumped to farms and cities in the San Joaquin Valley and Southern California and will guarantee that Sacramento Valley farmers receive all of their allocated water. It also

expands the current water transfer timeframe from July-September to April-November so as to ensure that farmers have sufficient water during the spring planting period. In addition, the bill allows for the streamlining of dam construction approval and provides funding for a variety of California water projects, including desalination and water recycling projects.

While this new bill might be good news for many water-challenged farmers, members of California's salmon industry and environmentalists are decidedly displeased with it. Many fear that the increased diversion of water to farmers will harm fishing

industries and further threaten endangered species by depleting rivers that are critical to salmon reproduction. However, according to proponents of the bill, the new provisions should not have a negative impact on the Delta, as it is only aimed at capturing exceptional flows and diverting them for use in the Central Valley and southern California.

Tree Nuts

The 2016/17 marketing year has gotten off to a promising start for California's major tree nut industries. As 2016 draws to a close, good crop receipts and steady shipments mean that market conditions are looking much better than they did a year ago.

Pistachios

2015 was an "off-year" for pistachios in California, delivering a paltry crop of only 275 million pounds. Given their alternate-bearing nature, it followed that 2016 would be an "on-year" in terms of production. Coming in at 902 million pounds, the 2016 crop has exceeded all expectations and is almost double the previous record crop of 555 million pounds in 2012. (See Exhibit 7.) With pistachio acreage more than doubling since 2008, it was only a matter of time before the pistachio crop

reached record levels. Of the 300,000 acres of pistachios currently in California, 235,000 acres are bearing.

Apart from being an “on-year”, several other factors contributed to the size of the 2016 crop: (1) the pistachio trees were very well rested after the tiny 2015 crop; (2) much-improved rainfall last winter meant that growers had more water at their disposal during the 2016 production season, and (3) the trees got enough chilling hours this year thus ensuring adequate pollination.

Shipments YTD are up considerably from a year ago. October saw a new shipment record of 74 million pounds and the November and December shipments should also be high. Demand is strong, especially from China and Hong Kong, thereby allaying some of the concerns about finding buyers for the big 2016 crop. Demand is being bolstered by the fact that (1) Iran had a small crop this year, thereby allowing the U.S. to regain some of the market share lost to Iran over the previous two seasons when it had huge crops; and (2) pistachio prices are down 15-25 percent over previous highs. With the current momentum, conditions are in place for shipments to maintain their momentum during the remainder of the marketing year.

Almonds

All indications are that the 2016 almond crop will come in just shy of 2.1 billion pounds. Bearing acreage in 2016 is 900,000 acres – a slight increase over the previous year’s bearing acreage of 890,000 acres. Almond plantings continue to increase. According to the USDA’s almond acreage survey, 108,000 acres of almonds were planted from June 2015 to May 2016. Just over 71 percent of those acres constituted new almond orchards. In the previous year, 96,000 acres of almond orchards were established, 75 percent of which were new orchards. Almond acreage and crops will therefore continue to trend upwards.

Though larger than the 2015 crop of 1.89 billion pounds, the fact that the 2016 crop is in line with the USDA-NASS forecast has helped maintain the impetus in the market as buyers continue to make solid commitments. With the current almond price range less than half of the peak pricing, prices remain attractive to buyers,

prompting a 28 percent increase in November YTD commitments YoY from 429.5 million pounds in 2015 to 550 million pounds in the current marketing year. Demand for almonds remains strong as evidenced by the solid growth in both domestic and export shipments. The combination of firm demand and reasonable prices means that total shipments were up 39 percent YoY at the end of November. This prodigious start to the 2016/17 marketing year bodes well for the remainder of the year. Almond prices are expected to remain firm, especially since the Spanish almond crop is much smaller than last year’s crop.

Walnuts

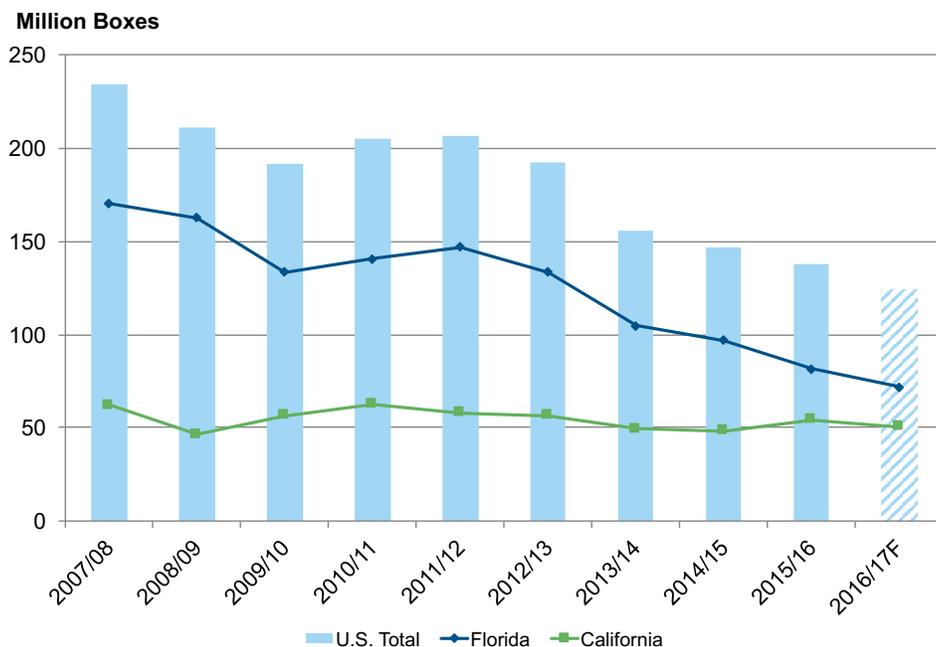
The 2016 California walnut crop appears to be converging to the USDA’s forecast of 670,000 tons. Due to an increase in both bearing acres – 315,000 in 2016 vs 300,000 in 2015 – and yield per bearing acre, the 2016 crop is 11 percent larger than a year ago. Plus, the overall quality of the 2016 crop is excellent, resulting in one of the best color years in a long time.

As in the case of almonds and pistachios, walnut shipments, too, are up this year following a price correction that was more severe than what the other nut crops experienced. At 180,829 inshell equivalent tons, the YTD shipments in October 2016 represent a 40 percent increase over those of a year ago. A welcome consequence of the strong demand for good, quality U.S. walnuts is that prices are also starting to increase. Industry insiders remain positive about the demand and pricing outlook for walnuts for the remainder of the season.

Citrus

The harvest of the 2016/17 citrus crop is underway in California and Florida. While a smaller crop is expected in both of these production areas, growers in Florida are buoyed by the high quality of the grapefruit, navel oranges and easy-peeler varieties that have been harvested so far this season. At 72 million boxes, the projected Florida all-orange crop is 12 percent smaller than the previous year’s crop of 81.6 million boxes. The non-Valencia orange crop is expected to remain unchanged from last year at 36 million boxes, but a 9.5 million box contraction in the Valencia orange harvest is

Exhibit 8: U.S. All-Orange Production



Source: USDA-NASS.

the reason for the reduction in Florida's all-orange crop. (See Exhibit 8.)

Although the projected 2016/17 Florida citrus crop will be the smallest crop in 53 years, the bactericides that were applied earlier in the season seem to be having a positive effect on the crop. Fruit sizes are still below the minimum (sizing of the last 10 seasons), but fruit drop does appear to be lower and the Brix (i.e., sugar content) and taste of the fruit are good. Packouts are higher – especially on the grapefruit side – and pricing, too, is holding up well with prices on par with those of last season.

The forecast for the California 2016/17 all-orange crop is 50.5 million boxes, which is 7 percent below last season's crop of 54.2 million boxes. The U.S. 2016/17 grapefruit crop is expected to be down by 1 million boxes on the 2015/16 crop – 18.3 million boxes vs 19.4 million boxes – as citrus greening in Florida continues to impact grapefruit volumes too.

December orange juice (OJ) futures (Jan 2017) are trading at \$2.02, down from the November record high of \$2.26. OJ futures are trending down, yet are

expected to remain high on the back of production declines in Florida and Brazil mainly due to citrus greening.

Other Crops

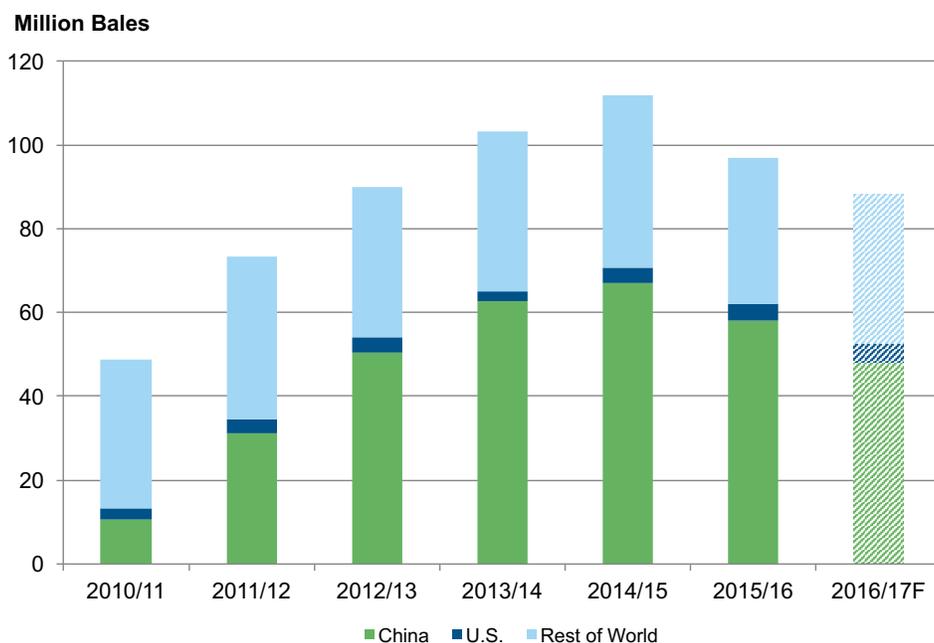
Cotton

Cotton supplies in the U.S. and abroad remain large. Expanded acreage and excellent yields, especially in Texas, boosted the 2016 U.S. crop output by 28 percent to 16.5 million bales. Cotton acreage rebounded in 2016 as alternative crops were less favorable, and beneficial rainfall in most of the cotton growing regions reduced abandonment rates to a 6-year low. Ample supplies and

suppressed prices will modestly boost U.S. domestic cotton demand again in 2016/17. However, U.S. ending stocks are projected to increase as the larger cotton crop will more than offset the increased demand, keeping a ceiling on prices in the mid-to-upper \$0.60/lb range. Despite large supplies, the situation should improve modestly for many cotton producers in 2016/17 as a result of better yields and a slowdown in production cost increases. Most growers will generate positive returns for the first time since 2012.

China still drives the global market direction. China's government has imposed tight cotton import controls in an attempt to shrink its domestic stockpiles. Those inventories are slowly shrinking, but estimates indicate that China will still account for more than half of the world's stocks at the end of the marketing year. (See Exhibit 9.) Chinese mills will draw on those reserves throughout the year, but in so doing, will curtail its imports of cotton and yarn. It is anticipated that China will resume sales from its reserve to foreign buyers again in March 2017.

Exhibit 9: Cotton Ending Stocks 2010/11 – 2016/17



Note: 1 Bale = 480 lbs
Sources: USDA ERS, WAOB.

Led by production increases in the U.S., Pakistan and India, world production in 2016/17 is forecast to rise 8 percent. Chinese production is expected to be slightly lower due to smaller plantings.

Global use and trade are expected to remain essentially unchanged YoY as cotton continues to face price competition from synthetic fibers. However, cotton consumption is set to continue growing in countries like Turkey, Bangladesh and Vietnam. And despite flat global trade, the larger U.S. crop will make U.S. cotton much more competitive on the world market and boost U.S. exports to the highest level in four years. Australia's share of global exports is also set to increase in 2016/17 as much-needed rainfall in Australia has resulted in a considerably larger crop forecast. However, the combination of sluggish global use and good harvests in key regions will keep pressure on prices throughout the year.

Rice

Despite lower than expected yields in Arkansas and Missouri, the 2016/17 U.S. rice crop will be up 22

percent over last year's crop. At a projected 234.8 million cwt, it will be the second largest crop on record. The huge increase in output is a result of larger plantings in all U.S. rice-growing states and bumper harvests in California and Texas. The combination of increased supplies and lower domestic use and exports YoY will result in a 29 percent increase in ending stocks from a year earlier, pushing ending stocks to their highest level in 31 years.

Global growing conditions were also much-improved in 2016/17, leading to record worldwide production. Although global consumption is also expected to be at an all-time high – a result of

population growth – production will exceed consumption. Consequently, global ending stocks will edge up to levels not seen since 2001/02. Inventory build is set to continue in some nations, but the Thai government may offload more state reserves early in 2017. Driven by good demand from African and Asian buyers, global trade is forecast to improve slightly in 2017.

With expectations for bumper U.S. and world rice crops, U.S. and international rice prices will trend downward. The projection for the U.S. all-rice 2016/17 season-average farm price (SAFP) is \$9.90-\$10.90/cwt vs last year's price of \$12.10/cwt. The estimates of the U.S. long-grain and California medium- and short-grain 2016/17 SAFP are \$9.20-\$10.20/cwt and \$13.00-\$14.00/cwt, respectively. In contrast, these two rice classes fetched \$11.10/cwt and \$18.30/cwt last season.

Sugar

The U.S. sugar industry continues to grapple with a short supply of raw sugar. A months-long dispute has intensified between U.S. and Mexican sugar interests over whether Mexico is violating policy by shipping too

much refined sugar to the U.S. and not enough raw sugar. U.S. sugar refiners have been most impacted by Mexico's exports and thus have heavily petitioned the U.S. Department of Commerce to investigate the situation and rule against Mexico.

On November 29, the Department of Commerce issued a preliminary ruling that supported the claims of the U.S. sugar industry. The ruling also stated that the Agency will further investigate the Mexican government and sugar mills before issuing a final ruling. The Commerce Department now has until April to provide a final ruling and determine what the U.S. response will be. Negotiations are ongoing, but uncertainty surrounding the outcome is accentuated by the upcoming change of Administration in January.

In the meantime, U.S. sugar prices have continued to climb as processors struggle to obtain enough raw sugar to keep plants running. Processor margins, in turn, have compressed as a result of low throughput.

The sugar industry also remains squarely in the middle of the GMO debate. For much of 2016, there were two U.S. sugar markets: one for GMO beet sugar and another for non-GMO cane sugar. Several large food manufacturers are choosing to buy only cane sugar in order to market their products as non-GMO. This has boosted premiums for cane and created excess supplies of cheaper beet sugar. Beet sugar production also increased by 5 percent in 2016, while cane production climbed by only 2 percent. Total U.S. supply of sugar is estimated to remain unchanged from 2015 to 2016.

Infrastructure Industries

Power and Energy

President-elect Trump is reportedly considering a wide range of policy proposals that will directly affect the nation's power and energy industries. His long list of policy proposals includes vastly reducing environmental regulations, rolling back the Clean Power Plan (CPP), "taming" the EPA, ending "Obama's war on coal," expanding production of fossil fuels, providing federal assistance for struggling nuclear units, and expanding

“*The sugar industry also remains squarely in the middle of the GMO debate.*”

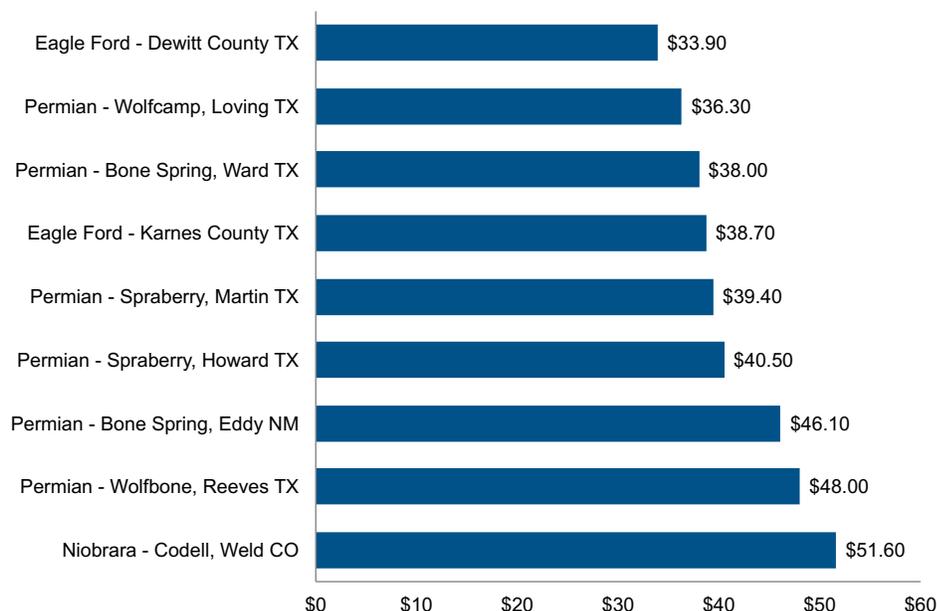
the country's energy infrastructure. Campaign promises are not always fulfilled. But President-elect Trump's rhetoric and recent political appointments suggest that many of the existing as well as proposed environmental and other regulations currently constricting the nation's power and energy industries will either be eliminated or go unenforced during the next four years.

On the campaign trail, President-elect Trump vowed to dismantle the Obama Administration's CPP. With many Republican legislators also strongly opposed to it, the CPP is likely to fade into oblivion during the next four years. It is currently under review by the D.C. Court of Appeals. Once a ruling is issued, the Trump Administration could wait for the case to die in the Supreme Court; or if it is upheld in the courts, it could send the CPP back to the EPA for a total re-write or simply refuse to enforce the regulation. Going forward, states are likely to play a larger role in setting and enforcing environmental regulations, potentially placing them in the position to self-regulate their own greenhouse gas emissions.

Less stringent environmental regulations and enforcement would likely end up lowering the cost to produce oil and gas in the U.S. Lower production costs in turn will bolster oil and gas output, in view of how dramatically the cost curve for U.S. shale has fallen. In 2012, an oil price of \$50 a barrel would have resulted in an additional 500,000 barrels a day; today, that price will support the production of 5 million barrels per day (MMb/d). According to Bloomberg, six of the lowest cost shale plays in the U.S. report breakeven costs below the 2016 WTI average of \$42.50 a barrel. (*See Exhibit 10.*)

The recent rally has boosted oil prices by 20 percent to the mid \$50s since November 30 when OPEC members agreed to reduce output, and it's already spurring U.S. production. Analysts assume that a price of \$60 a barrel

Exhibit 10: Lowest Cost Shale Plays in the U.S. (\$/barrel)



Source: Bloomberg.

would increase oil production from the lower 48 states from 6.5 MMB/d today to roughly 10 MMB/d by 2020. However, the ability for U.S. shale producers to respond quickly to price signals will place a ceiling on prices, which are likely to average closer to \$56 a barrel in 2017.

Natural gas production is projected to expand as much as 20 percent by 2020 due to reduced government regulations and increased drilling on federal leases. Demand for gas would also likely grow following a reduction of corporate taxes in those manufacturing industries that consume vast amounts of natural gas, such as petrochemical facilities. Growing demand could be supplied by new investments in pipelines and processing plants that are incentivized through favorable tax policy. Analysts expect the cost of producing natural gas to fall by ~\$0.10/MMBtu solely from restructuring the corporate tax rate.

Overall, going forward, energy analysts are anticipating that natural gas should experience positive demand growth, lower production costs, a modest increase in pipeline infrastructure, and slightly higher prices in the \$3.50-\$4.00/MMBtu range.

Any expansion of the U.S. natural gas industry, however, will occur at the expense of the coal industry. With energy demand nationwide having leveled off in recent years, any growth in gas production will likely be matched by an equal reduction in coal demand and production. Nor will dismantling the CPP succeed in improving the coal industry's prospects to any significant degree, owing to natural gas's significant price advantage over coal.

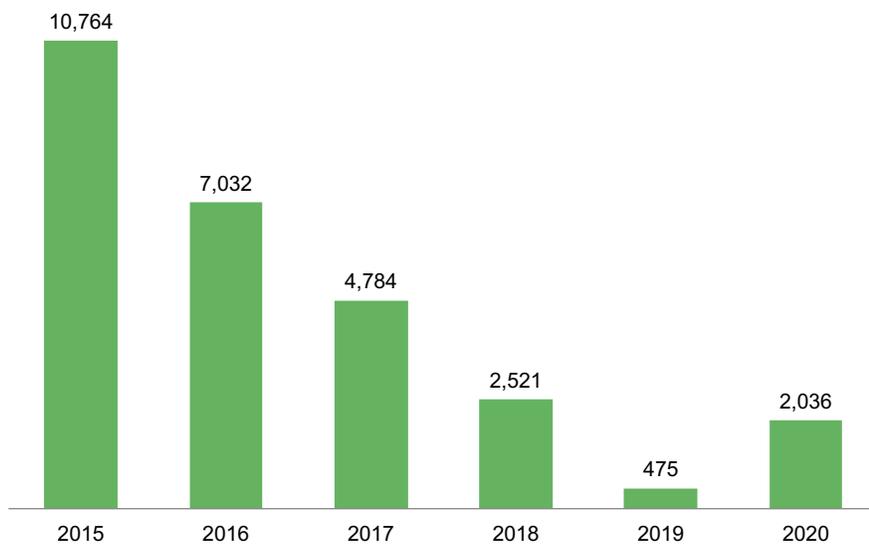
Coal demand in the U.S. has fallen more than 30 percent below what it was in 2008,

and 50 gigawatts, or 15 percent, of the nation's coal-fired capacity has been retired since 2009. Coal retirements will remain under pressure from low natural gas prices and could reach 80 gigawatts through 2030. (See Exhibit 11.) There will be virtually no new construction of coal-fired power plants moving forward. Instead, the electric utility industry will focus on sustaining the existing coal fleet, which could provide marginal growth in coal demand during periods of high electricity demand.

Going forward, coal demand could grow through expansion of coal export facilities. In that event, new ports would have to be built on the West Coast since virtually all of the global growth in coal demand is occurring in the Pacific Basin. However, state opposition to these export facilities remains implacable. Furthermore, those global coal suppliers that are located closer to demand centers in the Pacific Basin will benefit from a natural competitive advantage, limiting the upside for U.S. producers.

U.S. coal producers will benefit from less stringent environmental regulations, but robust demand growth is unlikely given competitive natural gas prices and coal producers' limited access to the regions of the world experiencing strong coal consumption growth. Therefore,

Exhibit 11: U.S. Coal Retirements 2015-2020 (MW)



Note: Values for 2017-2020 are forecasts
Source: EIA.

U.S. coal producers would be doing well just to maintain current historically low production levels, which are 27 percent below the average weekly production of 17 million tons in 2015.

Growth in renewable energy will remain positive but could experience a minor pull back until there is more clarity on proposed tax reform. The fear is that Republican lawmakers will withdraw the production and investment tax credits for wind and solar development as part of a broader effort to lower the corporate tax rate and eliminate “special interest carve-outs.” However, the tax credit extensions for both wind and solar were offered in return for lifting the crude oil export ban as part of the \$1.8 trillion spending and tax bill that was passed in December 2015; and there remains staunch Republican support within the Senate for renewable energy. Furthermore, renewable portfolio standards and net metering policies are run at the state level. Both of these state-sponsored policies will likely continue to enjoy success due to very strong public support and the downward trend in the cost of renewable energy.

Trump’s advisers are also searching for ways in which the U.S. government could help nuclear power generators, which currently are being forced out of the electricity

market by cheaper natural gas and renewable resources. Five of the country’s nuclear plants have closed in the past five years, according to Bloomberg, and more plants will likely be shut down as cheaper supplies from gas-fired plants, wind, and solar squeeze their profits.

Electric cooperatives and investor-owned utilities should benefit from less stringent environmental regulations that will result in lower capital expenditures since new pollution control equipment will have to be installed on fewer existing power generation units.

Despite benefitting from a potential reduction in capital expenditures,

electric coops and other utilities will face an inhospitable market that will continue to be defined by low energy prices due to cheap and abundant natural gas, increasingly competitive renewable energy, and sustained technological change. Moreover, policy makers cannot restore the strong historic relationship that was shared between GDP growth and energy demand, providing limited upside for the U.S. electric industry when, or if, the U.S. economy goes into overdrive.

Rural Water Systems

The most important issues facing the U.S. water industry today – replacing aging infrastructure, financing for capital improvements, public understanding of the value of water systems and water resources, and water supply availability – will not change when president-elect Trump enters the White House. However, along with the Trump Administration comes significant uncertainty about how the water industry’s most pressing issues will be addressed.

Improving the country’s infrastructure seems to be a top priority for the president-elect, but it remains unclear how water and wastewater will stack up against other types of infrastructure in competing for limited

resources. Furthermore, early indications suggest the new administration will focus its efforts on downsizing the EPA. For those businesses that are fighting environmental regulations, a weaker EPA could improve their bottom line. However, for water systems that rely on the EPA for regulation and oversight to protect their water resources and to facilitate much needed funding, a scaled back EPA could prove to be detrimental to water utilities and the communities they serve.

Recent surveys indicate that communities across the country need approximately \$660 billion in investments for drinking water, wastewater, and stormwater infrastructure over the next 20 years. The EPA plays a central role in supporting such water infrastructure development in large and small communities. In fact, the agency administers the Clean Water and Safe Drinking Water Revolving Fund programs, which to date have supported over \$151 billion in low-interest loans and other critical support for water infrastructure. In addition, the Water Infrastructure Finance and Innovation Act (WIFIA) of 2014 created a new federal loan and guarantee program at the EPA to accelerate investment in the nation's water infrastructure.

The House and Senate agreed to \$20 million in WIFIA funding as part of a Continuing Resolution (CR) to keep the government funded through 2017. WIFIA is structured to work hand-in-hand with State Revolving Funds, giving states and prospective borrowers the opportunity to decide which program, or a combination of the two, is best able to support a given project. Furthermore, on December 6, 2016, the EPA Administrator approved guidelines for the program's administrative framework and established fees to reimburse the agency for the costs associated with administering the program. Significant progress has been made in laying the foundations for WIFIA, setting it up for easy implementation now that Congress has approved the funding, according to Joel Beauvis, Deputy Assistant Administrator for the Office of Water with the EPA.

Immediately following the passage of the CR, the Senate voted to pass the Water Infrastructure Improvements for our Nation Act (WIIN), which was then signed into law by the president on December 16, 2016. The law

authorizes vital water projects across the country to restore watersheds, improve waterways and flood control, improve drinking water infrastructure. It also includes resolutions that ensure robust support for the Clean Water and Safe Drinking Water State Revolving Funds, and ensures that appropriations for WIFIA are not taken from state revolving funds money.

Communications Industry

Changing of the guard

Deliberations within the Federal Communications Commission (FCC) began the fourth quarter at a feverish pace as it sought to continue to promote broadband deployment and adoption, and to resolve weighty issues surrounding Universal Service, privacy, low-income programs and wireless-related policy issues before the end of the year and the presumed sunset of Chairman Wheeler's tenure at the FCC. However, this rapid momentum came to an abrupt halt in late November, just one day before the FCC's scheduled open meeting, when Wheeler pulled several high-profile issues such as the mobility fund, roaming and business data services from the meeting agenda. This action was widely viewed as a response to pressure from Republican Congressional members to refrain from acting on any complex and/or controversial issues during the presidential transition, and was met with mixed reviews. Many industry players, especially the larger ones, welcomed the opportunity to deliberate outstanding issues under a Republican chairman who is expected to be more business-friendly than Wheeler (who favors pro-consumer and consensus-based policy). Others, including small and rural companies, expressed concerns that regulatory uncertainty will persist.

Republican Congressmen are looking forward to exercising greater influence over the direction of the FCC during the next four years. Republican commissioners will enjoy a 2-1 majority at the FCC as of January 2017. Democratic Commissioner Jessica Rosenworcel will depart by January 3 as the Senate declined to reconfirm her nomination for a second term. Chairman Wheeler recently announced that he will step down on January 20. Republican Commissioner Ajit Pai, who is on the

short-list of Chairman candidates and is expected to be named Interim Chairman, has vowed to “fire up the weed whacker and remove all those rules that are holding back investment, innovation, and job creation.”

High on the list of “weed-whacker” targets may be the privacy rules approved by the FCC during the fourth quarter and scheduled to take effect in March 2017. These pro-consumer rules require all telecommunications providers, including broadband and VoIP providers, to notify customers of the types of data collected, the purpose of the data collection, and all entities with which the company shares the data. Providers are obligated to obtain customer consent to use and share sensitive personal information, and to take reasonable measures to safeguard customer information against data breaches. Since the new rules modify existing requirements that voice providers have been following for several years, rural providers are familiar with many privacy protection measures and are well-positioned to carry out the enhanced rules. Others, including Internet-only service providers and VoIP companies, may find implementation to be costly and time consuming.

While much progress was made toward Universal Service Fund (USF) reform during the past few years, the new Republican-leaning FCC could choose either to make additional changes to the USF or to undo some or all of the reforms that have been put in place since 2011. In November, rate-of-return (ROR) carriers filed their decisions with the FCC to move forward under new model-based or modified legacy USF. Though many carriers were frustrated by a short decision window accompanied by the FCC’s slow-release of pertinent information, the model funding plan proved more popular than anticipated and created \$310 million in annual demand for a program with a \$150 million annual budget.

Though the FCC had stated that it could inject an additional \$50 million a year into the fund (likely diverting funds earmarked for tribal support), an annual deficit of \$110 million would remain. To address the substantial gap, the FCC is likely to retool the model to reduce carrier support and tighten up the eligibility requirements. While such additional support would eliminate the model

“While much progress was made toward Universal Service Fund (USF) reform during the past few years, the new Republican-leaning FCC could choose either to make additional changes to the USF or to undo some or all of the reforms that have been put in place since 2011.

fund deficit, it fails to address the close tie between the model and legacy budgets. The sizeable model budget shortfall essentially guarantees that the budget for non-model support would be lower than projected. Groups representing ROR carriers have already called for the FCC to make more funds available to ensure that the objective of the reforms will be realized – i.e., to place more controls on spending and deploy broadband throughout the country. Those groups also warned that the absence of critical USF support will raise end-user rates to unprecedented levels, contravening the intent of the USF to bring communications services to rural America that are comparable in performance and price to that of urban areas. ROR carriers are concerned that the funding shortfall could be viewed by the new, Republican-dominated FCC as a reason for reopening, re-addressing, and revising the USF reform package, creating renewed regulatory uncertainty for the carriers.

Commissioner Pai and his fellow Republican Commissioner Michael O’Rielly could also decide to move quickly to rescind the FCC’s net neutrality order that re-classified broadband as a telecommunications service and allowed for heavier regulatory oversight of broadband providers. Such action would be controversial and likely stir up consumer protection group opposition and high-profile media coverage. The Republican Commissioners have also been critical of Lifeline, business data services, municipal broadband and set-top box rules. Outside of

the Republican Commissioners' pet projects, the Trump administration is likely to encourage the FCC to apply a light-handed regulatory approach that will allow markets to dictate transactions and guide provider practices surrounding data security and privacy.

Consumer-driven upheaval

According to a recent study entitled, "Fit for Digital" [Fujitsu, 2016], business leaders across the globe recognize that digital disruption today is the most significant challenge they face. In that same study, 45 percent of all business leaders indicated that changes in customer behavior constitute the strongest external force leading to digital disruption. This finding holds especially true for communications providers as rapid adoption of new technologies and applications raise bandwidth requirements to new heights and heighten expectations for communications, technology and entertainment products and services.

“Business leaders across the globe recognize that digital disruption today is the most significant challenge they face.”

Video consumption continues to climb. An estimated 1.1 billion consumers now use their smartphones or other connected mobile devices to stream video content. Since 2010, viewership on mobile devices has increased 85 percent, and mobile viewership has increased by 200 hours a year since 2012. This increase works out to an additional 1.5 hours per week in video viewing, juxtaposed with a drop in fixed-screen viewing time of 2.5 hours per week. Going forward, the adoption of new video social media apps, 4K HD TV, and augmented reality devices are expected to perpetuate the surge in streaming video trends. Analysts foresee that video consumption will account for 82 percent of consumer data by 2020.

Telecom providers have responded by beefing up networks and upgrading to new technologies that allow for more bandwidth. Median broadband download speeds in the U.S. nearly quadrupled within four years, soaring from roughly 10 megabits per second (Mbps) in March 2011 to 39 Mbps in September 2015. Americans today receive fixed broadband speeds of 55.97 Mbps on average, and 19.27 Mbps on mobile networks. The industry's capital expenditures have been on the rise, with rural communications companies investing up to 22 percent of revenues since 2013. Those investments in broadband have paid off, as the median rural provider realized a six percent uptick in broadband revenues and a four percent increase in customer numbers in 2015.

While overall speeds are increasing nationwide, a recent study shows that the top legacy telephone companies deploy broadband disproportionately to higher-income areas within their service territories. While past studies have long showed a positive correlation between broadband adoption and household income, this is one of the first studies that has conclusively shown a pattern of "cherry-picking" among larger providers.

Legacy cable companies continue to report growth in the broadband market. The top cable companies added more than 2.4 million broadband subscribers in the first three quarters of 2016, while the top telco providers lost 475,000 broadband subscribers during the same period. The largest 14 broadband providers in the U.S. now serve 92.5 million subscribers, and the top cable companies own 62 percent of that market.

The pay TV market realized a net loss in the first three quarters of 2016 of 1.3 million subscribers, echoing the 2015 trend. Analysts estimate that overall subscribership will drop to 80 percent of U.S. households by the end of 2016, down from 87 percent in 2011. Roughly 14 percent of those households who had a pay TV subscription in the past year have cut the cord, and an increasing percentage of up and coming millennial households have never subscribed to pay TV and don't plan to do so. The pay TV model has seen thinning margins due to rising content costs; and most providers rely on scale to meet their return thresholds, while the

smaller ones view pay TV service as a way of improving customer retention rather than as a way of bolstering their margins.

Recently, in an effort to stem cord-cutting, pay TV providers have invested in more robust search platforms, expanded their feature-rich cloud-based DVR capabilities, added over-the-top (OTT) content integration, and begun to offer a wider price range of packages. Nonetheless, as many as 41 percent of current subscribers plan to cancel or pare down their pay TV subscription in 2017, and nearly 80 percent of households report interest in a-la-carte pay TV packages. Younger adults will be more difficult to gain and retain as pay TV subscribers, as this group is more likely to rely solely on OTT content for their entertainment.

The Internet of Things (IoT) market continues to grow. It is creating significant opportunities for broadband providers not only in providing a faster connection, but also in assisting subscribers with installation and maintenance of connected devices. A recent survey reported that fewer than one-third of consumers believe they are fully utilizing their connected devices, with 24 percent adding that they are likely unaware of some useful features on those devices. Analysts put the smart home market at \$130 billion by 2020, and estimate that broadband players are poised to earn up to 47 percent of that market. The study cautioned that providers entering the market must be prepared to compete effectively or partner with a smart home device company to realize success. Emerging augmented reality and artificial intelligence devices, anticipated to grow to a \$90 billion industry by 2020, will undoubtedly add additional complexity to the home network and more opportunity for the successful smart home service provider.

M&A activity surged across the industry during the second half of 2016, including such high-profile deals as AT&T/Time Warner, Level 3/CenturyLink, and Consolidated/FairPoint. The list of new M&A deals also included mid-to-small companies, including acquisitions among fiber network players and some consolidation and horizontal acquisitions among smaller and rural players. Buyers are looking for transactions to deliver scale, fiber assets, more customers, and in the case of horizontal acquisitions, new and complementary revenue sources. The M&A trend is expected to continue in the coming year, despite the short-term regulatory slowdown that will occur owing to the ongoing presidential transition.

A new trend involving divestitures has emerged during the past 12 months, with many tier-one and tier-two communications providers selling off their data center assets to pure-play data center operators. Analysts presume that these divestitures often incorporate strategic partnerships or resale agreements, as the sellers continue to offer managed hosting and other cloud-based services. ■

This quarterly update is prepared by the Knowledge Exchange Division and covers the key industries served by CoBank, including the agricultural markets and the rural infrastructure industries. Analysts at Plus One Strategic Communications LLC prepared the overview of the communications industry.

Trevor Amen

Economist, Animal Protein

Terry Barr

Senior Director, Knowledge Exchange

Tanner Ehmke

Senior Economist, Grains, Oilseeds, and Ethanol; and Farm Supply

Taylor Gunn

Lead Economist, Power, Energy, and Water

Daniel Kowalski

Director, Knowledge Exchange

Ben Laine

Senior Economist, Dairy Processing and Production

Christine Lensing

Senior Economist, Specialty Crops

Leonard Sahling

Manager, Knowledge Exchange

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Please send them to KEDRESEARCH@cobank.com.**

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