

PURDUE AGRICULTURAL ECONOMICS REPORT

YOUR SOURCE FOR IN-DEPTH AGRICULTURAL
NEWS STRAIGHT FROM THE EXPERTS.

2017 AGRICULTURAL OUTLOOK

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EDITOR'S WELCOME NOTE

Welcome to our 2017 Agricultural Outlook. It's a new year that will bring opportunities and challenges for agricultural industries. While no one can accurately predict the future, it is our mission to help you understand the major economic drivers of the agricultural economy in 2017. That begins with a new administration in D.C., which is expected to immediately pass an economic stimulus package to accelerate economic growth. That should have some positive impacts for U.S. agriculture but what about the strength of the U.S. dollar, and expectations for higher interest rates and higher inflation?

Speaking of the new administration, there was more anti-trade rhetoric this election season than has been around for a long time. Trade is a foundation of the U.S. agricultural economy. Are we moving into a more protectionist era and shifting away from globalization?

Farm incomes are depressed and the theme of the 2017 outlook is for a continuation of low farm incomes from both crop production as well as the animal industries. In these articles we give you a commodity-by-commodity evaluation. How long will this downturn last? What does it mean to the financial position of the Ag sector? It's all right here for you to read.

- Chris Hurt, Editor and Professor of Agricultural Economics

TRUMP'S ELECTION CHANGES THE GENERAL ECONOMY OUTLOOK

LARRY DEBOER, PROFESSOR OF AGRICULTURAL ECONOMICS



The unexpected Election Day outcome changed the outlook for the U.S. economy. The day before the election, the outlook was for more of the same: real GDP growth near 2%, inflation less than 2%, an unemployment rate falling a bit below 5%, and very gradual increases in interest rates. That meant not much was going to change from 2014, 2015 or 2016.

Once the realization that it would be a Trump administration set in, the outlook changed. The stock market has set new record highs, Treasury bond interest rates have increased, inflationary expectations have increased, and the value of the dollar has risen to 13-year highs.

The economy is near capacity, with the unemployment rate at 4.6% in November. It will be harder for businesses to find new employees if they want to expand. That means that output growth is limited by the growth in the labor force. The labor force is growing slowly, only 0.9% over the past year, because baby boomers are retiring in large numbers. Output also depends on productivity, which is output per employee. That is influenced by the quantity of machinery and quality of technology that workers use. Productivity has actually been falling over the past year, down 0.3%. That's unlikely to continue, but modest labor force growth plus modest productivity growth means that the economy's capacity to increase production of goods and services is limited too.

With the election, Federal fiscal policy could be unbound after six years of stalemate between the White House and Congress. Federal fiscal policy will likely become more stimulative to a higher rate of economic growth. There will likely be an income tax cut that will add to consumer and business spending, and perhaps increases in defense and infrastructure spending creating more jobs. Pressure from baby boom retirements and health care costs will keep entitlement costs rising. Substantial changes in Obamacare and Medicare may be a few years off but are now anticipated. All this means increased federal budget deficits. Federal borrowing will increase and push up interest rates.

Consumer spending increased by 2.7% above inflation over the past year. There are many reasons to think that consumers will keep spending. Falling unemployment means job prospects keep improving. Wages have begun to rise. Home values and stock prices are up. Add a tax cut, and we can expect consumer spending to rise 3.3% next year.

Investment in housing construction grew 1.5% above inflation over the past year, a slower pace than over the past few years. However, housing is still in short supply. Rising housing prices will encourage construction, and still-low mortgage rates should support demand. I am looking for a 5% increase next year.

Other components of spending will show less growth. Investment in business buildings and equipment is falling, by 1.4% over the past year. Since business interest rates are very low, this decline must mean that businesses have low expectations for returns to expansion. Policy uncertainty over the next year might inhibit investment too. Trade growth has stagnated, falling as a share of total output, though exports grew 2% while imports grew 0.6% this past year, so trade was a small net addition to spending. A rising value of the dollar and slow growth abroad probably will hold down export growth. Trade restrictions could inhibit imports.

Add it up, and spending is likely to rise by 2.3% over the next year. Can an economy at capacity, with a slowly growing labor force and slowly growing productivity, raise production to meet that new demand?

In the short run the answer is probably yes. Real GDP is likely to increase by about 2.3%. The short supply of labor will raise wages, and some labor market indicators show several million people who could join the labor force with such encouragement. Faster labor force growth means that unemployment may not change very much in 2017. It should remain around 4.5% by next December.

What about inflation? Added spending beyond capacity would encourage businesses to raise prices. Higher costs would do the same. OPEC oil producers intend to restrict supply, which should increase gasoline prices. The headline inflation rate has been 1.6% over the past year. With added demand, limited supply and higher gasoline prices inflation should run near 2.3% over the next year.

Falling unemployment and higher inflation should embolden the Federal Reserve to raise their policy interest rate more frequently. We may see a quarter-point increase every three months, which would mean a one-point hike over the next year. The 3-month Treasury interest rate could rise from 0.5% now to 1.4% by next December and the ten-year Treasury rate may rise from 2.4% to 2.7%.

Will the Trump administration really increase tariffs? Congress may resist. But markets have already anticipated lower demand for the Mexican peso. Its value has fallen and the dollar's value has risen by about 10% since the election, which makes U.S. exports to Mexico more expensive. That may cost U.S. jobs in exporting industries like agriculture. If tariffs are imposed, some manufacturing activity may shift back to the U.S., though ever-increasing automation may limit the number of added jobs. Tariffs also would increase the prices that consumers pay, adding to inflation.

Our 2017 story is one of tax cuts and rising government spending in an economy near capacity. Output and inflation will rise, countered by higher interest rates and a higher exchange value of the dollar. Unless, of course, policy doesn't change. Then we'll see slower growth,

lower inflation, fewer interest rate hikes and slower increases in the dollar than in this forecast.

What President Trump does will be important, but remember there is still a lot of uncertainty about what the new administration will actually do.

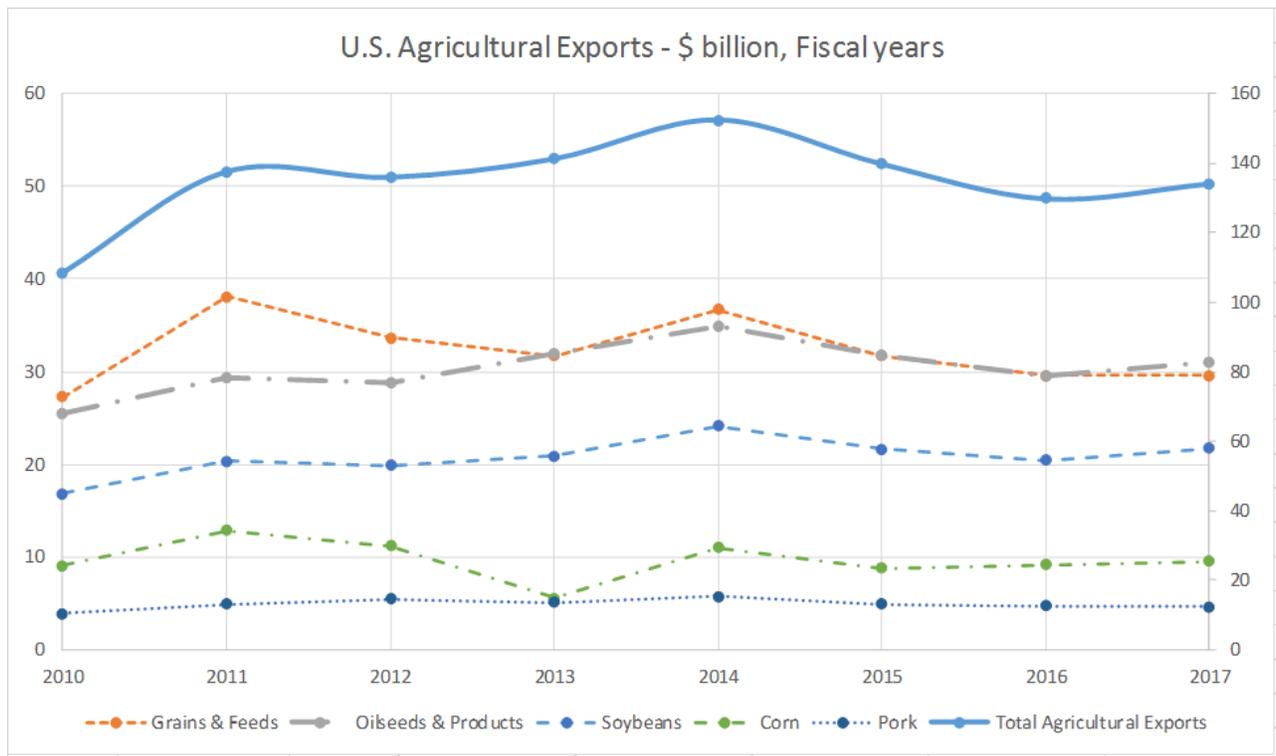
WEAK AG TRADE OUTLOOK FOR 2017

PHILIP ABBOTT, PROFESSOR OF AGRICULTURAL ECONOMICS



First, a look at the numbers. After setting records in fiscal years 2013 and then 2014, reaching \$152.3 billion, U.S. agricultural exports fell to \$139.7 billion in 2015. They are estimated to fall further, to \$129.7 billion in fiscal 2016 and are projected to recover somewhat to \$134 billion in 2017 according to USDA's latest (November 2016) trade outlook.

Grain and feed exports led the downward movement by falling \$4.7 billion from 2014 to 2015, declined by another \$2.0 billion to 2016, and are projected to remain flat at \$29.6 billion in 2017. Oilseed exports fell \$3.2 billion from 2014 to 2015, fell by \$1.2 billion from 2015 to 2016, and are projected to recover by only \$1.5 billion in 2017, reaching \$31 billion. Livestock, dairy and poultry exports fell \$3.7 billion in 2016, and are projected to increase \$0.9 billion in 2017. Pork exports have remained



relatively flat since 2014 at about \$4.7 billion. (ERS, 2016t).

These reductions are largely attributable to lower commodity prices. In 2016 soybean export prices were down 19.5% in 2015 and 12% in 2016; corn was down 14.1% in 2015 and 4.8% in 2016; and pork was down 9.8% in 2015 and 6.9% in 2016. USDA's 2017 forecasts see a 3% recovery in soybean prices, but further declines in corn and pork prices at around 5%. (FAS, 2016g).

The low commodity prices plus shortfalls in grain and oilseed production in South America have led to unexpected improvements in export volume (WAOB 2016). Corn export volume for 2016 is up 9.4%, but is expected to fall back by 5.1% in 2017. Soybean export volume is up 7% in 2016 and another 3% is projected for 2017. Weekly export sales reports show increases over past sales trends in the second half of the 2015/16 crop year that are continuing into the current crop year, corresponding with the southern hemisphere shortfall (FAS, 2016e). The declines of Brazilian corn production by 21% and Argentine oilseed production of 7.5%, contributed significantly to this outcome. Production and export volumes in South America are expected to recover in 2017 (FAS, 2016p).

Two factors contributing to low export values are weak global macroeconomic performance and the extremely strong dollar. Since 2014 the dollar has appreciated 25% relative to the Euro, 32% relative to the British pound, and 45% relative to the Brazilian real. USDA estimates that its real exchange rate index, which accounts for inflation here and abroad, appreciated 12% since 2014, 2.6% in 2016, and will appreciate an additional 2.1% in 2017. A strong exchange rate has historically contributed to low commodity prices, as U.S. exports are more expensive for their trading partners and competitors.

Both USDA and the IMF (2016) have predicted slow global economic growth in 2016 followed by modest recovery in 2017. While U.S. weak macroeconomic performance (1.6% GDP growth for 2016) has been one of the surprises leading to reductions in projections from one report to the next, very recent optimism calls for somewhat faster growth in 2017. The IMF estimate for

2017 U.S. GDP growth is 2.2%. Brazil and Russia are expected to emerge from recessions, China remains at over 6% growth, but the Euro area is expected to slow to just 1.5% growth.

One factor that potentially contributes to a better agricultural trade outlook, though not for the immediate future, is the successful completion of trade agreements. Historically, U.S. agriculture has benefited substantially from exports, and in particular from reforms in trade agreements like NAFTA and the URAA of WTO.

The U.S. concluded negotiations for the Trans Pacific Partnership (TPP) in October 2015 but ratification is now extremely doubtful. Not surprisingly, many agricultural interest groups have come out strongly in support of TPP. But president-elect Trump has indicated he will withdraw from TPP on his first day in office. The USDA noted in its outlook that "A change in the U.S. trade relationship with China and Mexico is of particular concern for agricultural competitiveness. Together, these two countries were the destination for an average of almost one-third of total U.S. agricultural exports from 2013-2015. China alone was the destination for roughly 60% of U.S. soybean exports, on average, during this period."

Negative perceptions of trade agreements and globalization are not limited to the U.S. and its election outcome. Brexit, the U.K. vote to leave the European Union, also reflects inward, protectionist sentiment that is also found elsewhere now. In addition to potential negative effects on trade, Brexit is credited with GDP slowdown in both Britain and the EU. These come at a time when the IMF in its recent outlook had already highlighted a global trade slowdown (IMF 2016). Trade volume worldwide is expected to increase only 1.3% in 2016. Trade value will decline given low commodity prices generally. While trade growth is expected to recover somewhat in 2017, the more rapid growth of global trade than GDP growth appears to be a relic of the past.

Weak export demand was one key to recent agricultural price and value declines. Global economic weakness and a strong dollar mean agricultural trade will not turn

around quickly nor dramatically. In spite of lower prices and good crops this year, agricultural exports are likely to remain weak, showing only marginal improvement for the coming year. This weakness is likely to be reflected in prices and farm income, as well.

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LOWER GROCERY STORE FOOD PRICES: GOOD FOR CONSUMERS AND BAD FOR FARMERS

KEN FOSTER, PROFESSOR OF AGRICULTURAL ECONOMICS AND DEPARTMENT HEAD



In the most recent (November 2016) report on food prices by the U.S. Department of Commerce, monthly year over previous year average retail grocery store prices for food consumed “at home” were down for the eleventh straight month. This is the longest such streak of declines since 1959-60 and tells a dramatic story of agricultural supply response.

It was less than a decade ago that many were expressing dire food security concerns as food prices rose strongly on demand from biofuel production and food demand in other parts of the world. Farmers and other participants in the food and agricultural industry responded with increased supply and now, after several good grain harvests in the U.S, agricultural commodity prices have fallen dramatically. Thus, the most important reason for lower grocery store prices this year are lower farm

prices. Abundant harvests over the past three years have reduced the prices farmers receive.

In addition, lower prices for feed items like corn and soybean meal have increased animal production and lowered animal product prices from beef to milk. Food consumers are the benefactors this year. Record U.S. yields for corn, soybeans, and wheat in 2016 should keep grocery store food price increases at modest levels into 2017 with perhaps continued declines in the near term.

Lower farm prices filter through the supply chain in the form of lower grain-based food products. Retail food products in the Cereals and Bakery Products category, for example, were down 1.2% in October 2016 versus the same month the previous year. The year to date average decline in prices of those items has been 0.5% suggesting that the record 2016 corn, wheat, and soybean yields have already impacted retail prices.

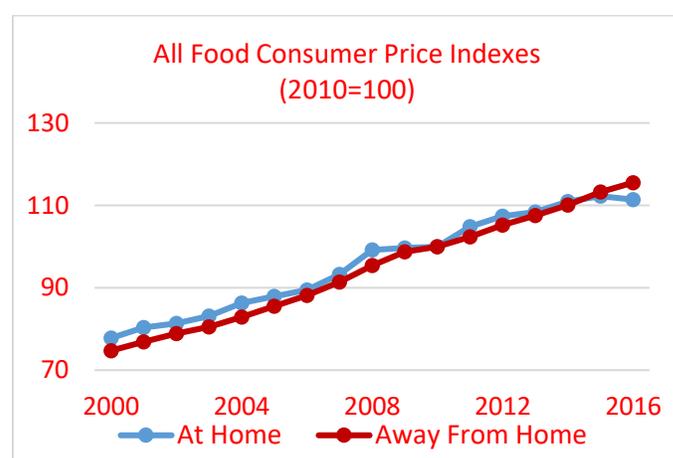
The story is even more dramatic when looking at the category of meat, poultry, fish, and eggs. Those prices are down almost 5% so far in 2016 with beef and pork leading the way with 6% and 4% declines so far this year, respectively. Likewise, dairy product retail prices are down 2.5% so far this year compared to last. These animal-derived food proteins are partial substitutes for each other and thus a relatively large supply of one weighs down the prices of others. When there are relatively high supplies, such as now, then prices tumble to clear markets for these perishable products.

For the year to date, through October, only fruit and vegetable prices have increased on average since last year (about 1.4%) and even those are softening this fall with average prices for that category down 0.7% and 0.8% for September and October 2016 versus the previous year.

While grocery store prices are down, we also purchase food at fast food outlets and restaurants, a category called “away from home.” Prices in that category of food purchases have risen 2.6% with steady increases in each month this year versus the corresponding month in 2015. This suggests that while the commodity, or the farm portion, of food prices are declining, the cost of delivering marketing services is increasing as

unemployment in the labor market rapidly declines. There is no reason to expect that this trend will change and is likely to continue into 2017.

All food costs, a combination of at home and away from home, will rise by only .5% in 2016. In 2017, USDA expects the increase to be 1.5% to 2.5%. The figure shows the trend in “at home” and “away from home” prices. Clearly, the level of prices has been steadily rising until this year for at home purchases. In the longer term, this overall upward trend is likely to continue as food marketing costs like labor, packaging, utilities, and transportation continue to rise.



ANOTHER DIFFICULT YEAR FOR BEEF CATTLE PRODUCERS

JAMES MINTERT, PROFESSOR AND DIRECTOR OF THE CENTER FOR COMMERCIAL AGRICULTURE

Cattle prices fell harder, and faster, during 2016 than most beef industry participants expected. The peak in slaughter cattle prices during this cattle cycle occurred in 2014 when slaughter weight steers in the Southern Plains averaged \$154 per cwt. and prices remained above or near that level through much of 2015, before dropping precipitously during the fall of 2015. At the beginning of 2016 weekly average prices for slaughter steers in the Southern Plains were 22% lower than a year earlier. Prices for slaughter steers remained below a year earlier throughout 2016 and dipped below \$100 per cwt. in mid-October before recovering to about \$114 per cwt. in

early December. For the year, slaughter steer prices in the Southern Plains averaged about \$120 per cwt. in 2016, nearly 20% lower than in 2015, when they averaged \$148 per cwt.

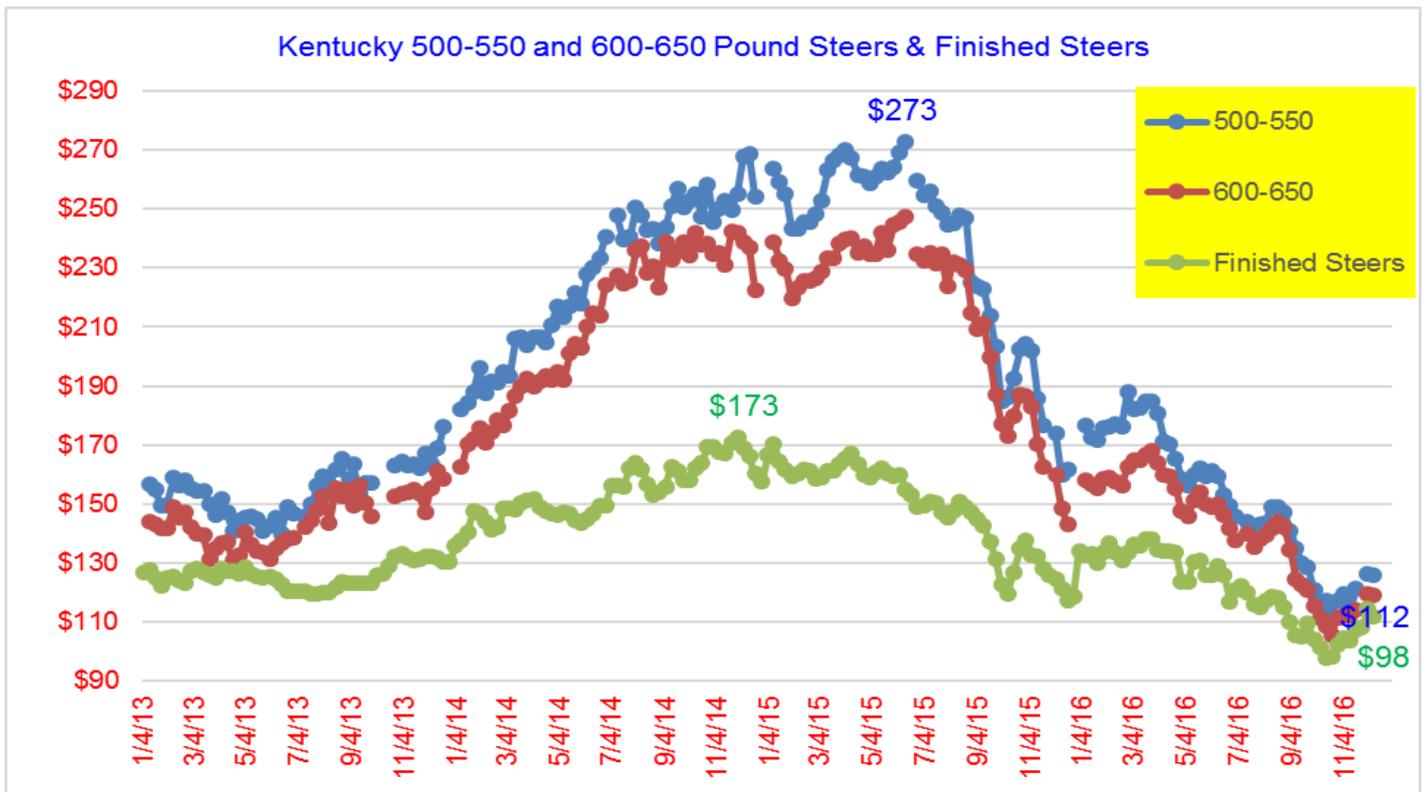
Weaker than expected slaughter cattle prices meant most cattle feeding programs were unprofitable again during 2016. Iowa State Extension’s estimates of Corn Belt cattle feeding returns indicate that a program of routinely placing 750-pound steers on feed each month and then marketing approximately 150 days later yielded an average loss during 2016 of over \$100 per head. The largest losses for this simulated feeding program took

place early in the year, exceeding \$300 per head in January, before briefly moving into the black in late spring. Losses began anew in the summer, and by October estimated losses were once again over \$200 per head. The accumulated losses of 2015 and 2016 have placed a tremendous amount of stress on cattle feeders as equity built up in prior years has vanished.

Lower prices for feeder cattle and calves reduced prices needed by cattle feeders to breakeven when selling slaughter weight steers and heifers, but not by enough to make feeding cattle profitable during most of 2016. This despite the fact that prices for 700-800 pound feeder steers in Kentucky averaged \$151 per cwt. during the first quarter of 2016, more than \$50 per cwt. (26%) lower than a year earlier. Similarly, prices for 500-600 pound steer calves in Kentucky averaged \$183 per cwt. during January-March 2016, \$80 per cwt. (30%) lower than during 2015's first quarter. For the year, Kentucky feeder weight steers averaged about \$137 per cwt. in 2016, down 32% compared to the prior year, while prices for 500-600 pound Kentucky steer calves averaged near \$153 per cwt., 36% lower than in 2015.

Larger supplies of slaughter cattle and increasing beef production helped push prices lower during 2016, although the price decline was larger than expected based on the supply increase alone. Cattle slaughter totaled about 30.4 million head in 2016 and beef production exceeded 25 billion pounds, both of which were nearly 6% greater than in 2015. Although beef imports were smaller, and exports larger, than in 2015, estimated per capita beef supplies at retail were still nearly 3% larger than in 2015. Per capita supplies of other meats also increased modestly and consumers were faced with a retail meat supply of nearly 214 pounds per capita in 2016, up from 211 pounds in 2015.

Total meat supplies have rebounded sharply since bottoming out in 2014 at 201 pounds per capita and are expected to increase again in 2017, possibly reaching 217 pounds per capita. This brings total meat supplies a step closer to the record large supply levels that consumers faced roughly a decade ago when per capita red meat and poultry supplies hit 222 pounds per capita. The increase in domestic meat supplies means that prices for retail beef prices and cattle prices will both be under pressure again in 2017.



What's ahead in 2017? Beef producers started expanding their herds during 2014 and continued to expand in 2015 and 2016. The expansion means that cattle slaughter and beef production during 2017 will both increase compared to 2016, but the increase is expected to be smaller than what took place in 2016, perhaps ranging between 3% and 4%. Still, the increase in supplies is expected to push prices for slaughter steers in the Southern Plains lower with an annual average near \$110 per cwt. likely.

Another decline in slaughter cattle prices means downward pressure on calves and feeder cattle is likely.

After averaging near \$153 per cwt. in 2016, prices for 500-600 pound steers in Kentucky could average in the \$120's in 2017. Calf prices at this level are below the breakeven price on many cow-calf operations, which could bring herd expansion to a halt in 2017. Recent cattle slaughter data supports this idea as female slaughter has been rising relative to steer slaughter, which indicates the interest in expansion is waning.

The visual shows the extraordinary rise and fall of Kentucky steer calves and finished cattle prices in the past four years.

MILK PRICES EXPECTED TO INCREASE WITH STABLE FEED COSTS

MICHAEL SCHUTZ, PROFESSOR OF ANIMAL SCIENCES

NICOLE WIDMAR, ASSOCIATE PROFESSOR OF AGRICULTURAL ECONOMICS

Some improvement in milk production returns may be on the way. In the latest update, USDA has reduced its forecast for national cow numbers in 2017, resulting in slightly reduced forecast from earlier estimates for milk production. The USDA is projecting the 2017 national milk cowherd at 9.37 million head (up 40,000 cows) and milk-per-cow at 23,160 pounds (up 395 pounds). This would be a production increase of about 2% over 2016 production.

Global financial markets and economic, as well as political situations around the World have continued to be less favorable for US markets. This is true across the livestock sector. Numerous factors are impacting dairy trade, including (but not limited to) the strong US dollar undermining export opportunities for most US agricultural products, the slowing of the Chinese economy, general political and economic pandemonium occurring in the Middle East and North Africa, removal of milk quotas in the European Union, and the Russian embargo on imports from the European Union following their annexation of Crimea. Recent election results and their impact on possible renegotiation of trade deals leave export forecasts uncertain.

Despite these uncertainties milk exports on a milk-fat basis are expected to rise by over 2% and imports are expected to be down as well next year.

Looking to the domestic market, USDA Agricultural Marketing Service reported average national wholesale prices for cheese, nonfat dry milk, whey, and butter moving in various directions during the November to December time period. Block cheddar cheese price rose through much of November to \$1.95 per lb. but has now declined \$1.76. Butter price too has softened from \$2.23 to \$2.11 per pound, but both cheese and butter prices are historically quite strong. On the other hand, nonfat dry milk price increased from \$0.84 to \$1.01 per pound. Stocks for cheese have remained high relative to recent years; however, butter and nonfat dry milk have matched reports for recent years. Stocks of dry whey have declined substantially since May.

The December USDA all-milk price forecast for 2016 is currently \$16.10 per cwt. Their 2017 forecast is for the all-milk price to rise to an annual average between \$16.85 and \$17.65 (\$17.25 is the mid-point of their range).

The Chicago Mercantile Exchange Class III futures have shown considerable gains in the past 2 months and are

trading near \$16.75 for early 2017 with increases during the summer months to \$17.50. These prices would

correspond to an all-milk price around \$17.80 to \$18.60, respectively.

HOG PRODUCTION LOSSES CONTINUE

CHRIS HURT, PROFESSOR OF AGRICULTURAL ECONOMICS



For 2016 live hog prices are going to average about \$46 per live hundredweight which is down from around \$50 in 2015. They are expected to be higher in 2017, around \$47.

Hog prices in the final quarter of 2016 will average about \$37 per hundredweight representing the lowest fourth quarter price since 2002. Prices have been depressed since the third quarter of 2016 and have dropped more sharply than expected.

Pork production in 2016 was about 2% greater than the year before, but with exports up over 3% and imports down, the actual amount of pork available to consumers was actually down. This would have suggested stronger prices, not weaker.

The culprit appears to be a shortage of processing capacity in the last quarter of 2016. It is generally thought that 2.5 million head per week is near federal inspection capacity. In four of the past seven weeks, the number of head processed at federal inspected plants has been above 2.5 million head.

When there is a shortage of capacity in any industry there tends to be high returns to those who own that capacity. That seems to be the case this fall as the farm-to-wholesale margin is at record high levels. Looking at the most recent data, the farm-to-wholesale margin for January through October has averaged 68 cents per retail pound this year compared to 56 cents per retail pound for the same period in 2015, (USDA).

If all of this higher margin were bid into the farm level price it would increase live hog prices by \$5 to \$7 per live hundredweight.

After averaging about \$37 for the final quarter of 2016, prices are expected to improve to about \$43 for the first quarter of 2017 with head counts that are a little smaller. Then, seasonally smaller supplies in the second and third quarter could support live hog prices in the low \$50s.

Two new processing plants are expected to come on-line by the fall of 2017 and these should relieve the capacity shortage and allow hog prices to be higher a year from now, even though hog supplies will be higher. Current forecast are for live hog prices to average about \$44 in the fourth quarter of 2017.

With current costs estimated at \$49, this means large losses for the current quarter of about \$34 per head. First quarter 2017 losses would drop to \$18 per head. Small profits of about \$5 a head are expected for the spring and summer, but returning to losses of around \$16 in the final quarter.

My estimates of annual losses of about \$11 per head in 2016 are expected to drop to \$6 a head in 2017. More packer capacity will help hog prices in 2017. In addition, retail pork prices are expected to continue to drop and provide stronger domestic usage, and pork exports are expected to grow in 2017 as well.

Nevertheless, these positive factors will not be enough to bring the industry back to the breakeven level. Therefore, the industry will need to consider a reduction in the breeding herd in the last half of 2017 in order to boost prices back closer to breakevens in 2018.

HIGH GRAIN YIELDS CONTRIBUTE TO LOW PRICES

CHRIS HURT, PROFESSOR OF AGRICULTURAL ECONOMICS



High yields were an important part of the story for the grain sector in 2016. Corn, soybeans and wheat all had record national yields and corn and soybeans had their third consecutive year of favorable production.

In the last three years, U.S. production has outpaced usage for corn, soybeans, and wheat. This means that end of year inventory levels have steadily increased. In fact, the stocks-to-use percentage for wheat is expected to be at the highest level in 30 years. Corn and soybean stocks-to-use percentages are the highest in a decade.

Abundant inventories of grains and soybeans mean low prices. Wheat prices for the 2016 crop are expected to be at \$3.70 per bushel, the lowest level since the 2005 crop. Corn and soybean prices for the 2016 crop are expected to be at the lowest level since the 2006 crops. All three are reflecting decade-low prices. Unfortunately, costs of production have not nearly dropped back to the levels they were a decade ago, so margins for the 2016 crops will be narrow or even negative for many producers.

Corn prices received by Indiana farmers are expected to average \$3.45 a bushel. This is down from \$3.85 a bushel for the 2015 crop. The visual provides a hypothetical seasonal price pattern if Indiana prices follow a typical pattern of the past 10 years (without the 2012 crop) and average \$3.45. That has January prices around \$3.50 and reaching \$3.70 to \$3.80 in the spring or early summer.

If this were to be the price pattern, then storage into the late spring would be favorable for corn in commercial storage and especially on-farm storage. The goal is to acquire as much of the return to storage as possible. Keep in mind that these prices are averages for the state and they assume that current information does not change. Of course location has an impact on price levels, and new information can have an impact as well. As an

example, a weather concern in South America's major corn production region might provide opportunities for cash prices to rise closer to \$4 or higher.

Corn acreage is expected to drop in 2017 as returns to soybeans are expected to be more favorable. Thus for the 2017 corn crop, the average price received by Indiana farmers is expected to be about \$3.75 a bushel. Small additional price increases are currently expected for the 2018 and 2019 crops.

2016 crop ARC-County payments in Indiana are currently expected to be about \$40 per corn base acre before sequestration. These would be payable in October 2017. The exact payments cannot be calculated until October 2017, so payment levels remain uncertain. In addition, my estimate is for the entire state (on average) so individual counties could be sharply different. At this point 2017 and 2018 ARC-County corn payments are expected to be zero. If there were payments from these crops, they would be made in October 2018 and 2019.

The soybean situation is different from corn and is providing stronger prices as compared to corn. The primary reason is the reduced production in South America at the end of their growing season last spring when production fell about 220 million bushels short of expectations. Many of those bushels were destined for the export market, and world buyers instead came to the U.S. for those soybeans this past summer. USDA revised the U.S. exports of soybeans upward by about 200 million bushels after May 2016. The pace of soybean exports has been robust this fall and the primary reason prices have been able to be above \$10 per bushel.

Cash soybean prices in Indiana were at the higher \$8 per bushel level prior to the unfavorable weather in South America. This causes us to ask the question, "If South

America returns to normal production next spring will that turn soybean prices downward toward \$9?

USDA's current forecast is for 2017 South American production to increase by 253 million bushels, restoring them to normal production. If this happens, our rapid pace of exports this fall would slow sharply in the second half of the marketing year from March to August 2017. The implications for price are that cash bean prices would be stronger in the early part of the marketing year, like this fall and early winter.

South America now produces around 50% more soybeans than the U.S. so weather there is critical to U.S. prices this winter and through the first half of 2017. Brazil has had favorable weather with rain currently in the forecast. Argentina on the other hand has been dry with near-term forecast to stay dry. Weather uncertainty will likely support March futures in a range from \$9.75 to \$10.75 through February 2017. South American weather remains a potential wild card, as always.

If South America has normal or above yields, U.S. soybean prices could weaken into the spring and summer. U.S. acreage is expected to expand 3% to 5% for 2017 that will also provide potential downward pressure. Futures markets could drop back below \$9.50 a bushel.

The current strategy favors pricing more beans this fall and winter than normal. Cash prices at \$10 or higher should be considered. New crop cash bean prices at \$10 or higher also look like an attractive level to start some pricing.

2016, 2017 and 2018 crop ARC-County payments from the FSA office are expected to be zero. If there were payments, they would be paid in October of 2017, 2018 and 2019.

More bean acres will likely keep 2017 crop beans at an average price around \$9.50, but further acreage buildup in 2018 and 2019 could drop soybean prices back closer to \$9 a bushel. Market prices in the next few years will be in the process of adjusting acreage to cause increases in corn and wheat prices but at the expense of more soybean acres and lower bean prices.



2017 INDIANA CROP COST AND EXPECTED RETURNS

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CRAIG DOBBINS, PROFESSOR OF AGRICULTURAL ECONOMICS



The 2017 *Purdue Crop Cost and Return Guide*, which is available free by downloading from the Center for Commercial Agriculture website, available at this address

<http://www.agecon.purdue.edu/commercialag/resources/farmmgmt/index.html>, gives estimated costs for planting, growing and harvesting a variety of crops, as well as

Table 1. 2017 Purdue Crop Budget for Average Productivity Soil.

	Continuous Corn	Rotation Corn	Rotation Soybeans	Wheat	Double-Crop Soybeans
Expected Yield per Acre	160	170	52	75	36
Harvest Price	\$3.70	\$3.70	\$9.50	\$4.30	\$9.50
Market Revenue per Acre	\$592	\$629	\$494	\$323	\$342
Less Variable Costs per Acre					
Fertilizer	123	111	40	61	29
Seed	121	121	72	44	83
Pesticides	56	56	47	15	44
Dryer Fuel	32	25	0	0	5
Machinery Fuel	16	16	10	10	7
Machinery Repairs	22	22	18	18	15
Hauling	16	17	5	8	4
Interest	12	12	7	5	6
Insurance and Misc.	38	38	34	9	9
Total Variable Costs	\$436	\$418	\$233	\$170	\$202
Contribution Margin per Acre	\$156	\$211	\$261	\$153	\$140

See ID-166-W for more detail, October 2016 Estimates.

estimated contribution margins and earnings. The guide is updated frequently as grain futures prices change and the costs of inputs, such as seed, fertilizer, pesticides and fuel, fluctuate. This paper discusses estimates made in October 2016.

The guide presents cost and return information for low, average, and high productivity soils. The discussion in this article will focus on the estimates for average productivity soil only. Table 1 presents crop budget information for continuous corn, rotation corn, rotation soybeans, wheat, and double-crop soybeans for average productivity soil. Double-crop soybeans are typically planted after wheat so it is typical to combine the contribution margin for these two crops when comparing to continuous corn, rotation corn, and rotation soybeans. It is important to note that crop yields have been modified in this year's guide. The current yield estimates reflect trend yields for Indiana for each crop. The contribution margin, obtained by subtracting total variable cost from market revenue, ranges from \$156 per acre for continuous corn to \$293 per acre for wheat plus double-crop soybeans. The contribution margins for rotation corn and rotation soybeans on average productivity soil are \$211 and \$261 per acre,

respectively. It is important to note that the contribution margin is used to cover overhead costs such as machinery costs, family and hired labor, and land rent. Failure to cover these overhead costs typically puts downward pressure on cash rents.

From 2010 to 2013, the contribution margin for rotation corn was higher than the contribution margin for rotation soybeans. The average difference in the contribution margin was approximately \$50 per acre during this period. However,

since 2014, the average difference in the contribution margin has been an advantage to soybeans of about \$80 per acre. The higher contribution margin for rotation soybeans in 2017 versus rotation corn as shown in Table 1, is expected to encourage some shifting of acres from corn to soybeans.

Figure 1 illustrates the trends in fertilizer, seed, pesticide, and cash rent costs for rotation corn on average productivity soil from 2007 to 2017. Fertilizer cost peaked in 2013 at \$176 per acre. In 2017, fertilizer cost

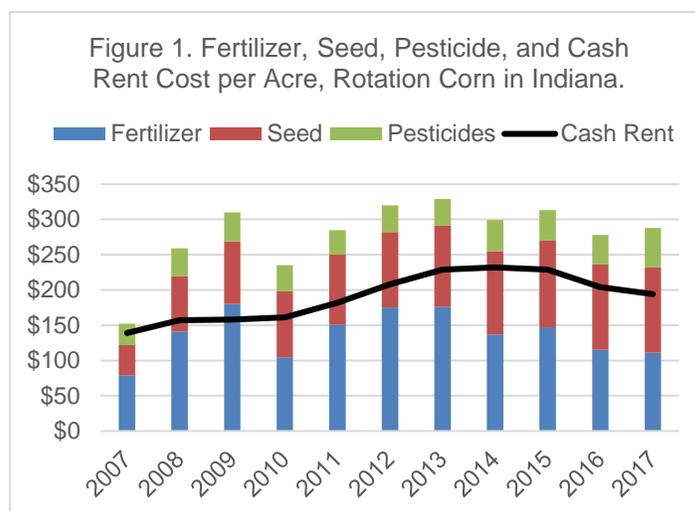
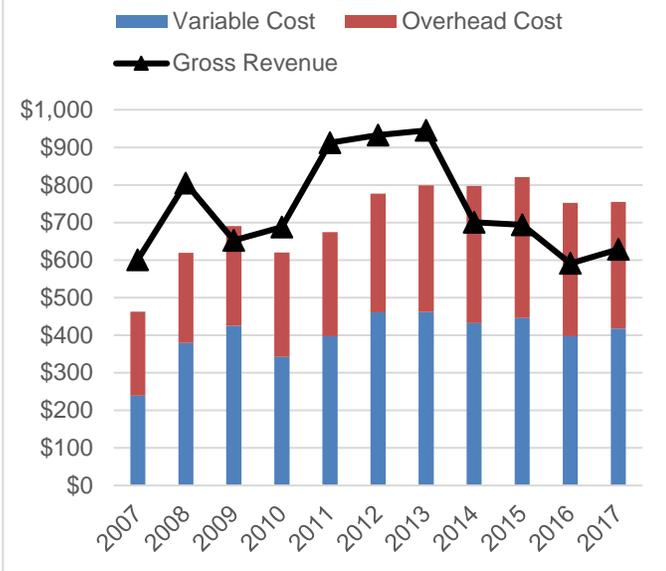


Figure 2. Variable Cost, Overhead Cost, and Gross Revenue per Acre, Rotation Corn in Indiana.



per acre is projected to be \$111 per acre. Cash rent per acre peaked in 2014 at \$232 per acre at \$194 per acre, 2017 projected cash rent is approximately \$40 per acre lower than it was at the peak in 2014. Pesticide cost per acre in 2017 are expected to be higher than in 2013 and 2014, this is partially due to resistant weed problems.

Gross revenue (market revenue plus government payments), variable cost, and fixed cost per acre for rotation corn on average productivity soil is illustrated in Figure 2. Variable cost per acre peaked in 2013 at \$462 per acre, and is projected to be \$418 per acre in 2017. Fixed cost (overhead cost) per acre peaked in 2015 at \$375, and is projected to be \$337 per acre in 2017.

The breakeven price needed to cover variable and fixed costs varied from \$4.89 to \$4.98 per bushel from 2013 to 2015. In 2016, the breakeven price declined to \$4.56 per bushel. The projected breakeven price for 2017 is \$4.44 per bushel. Gross revenue for

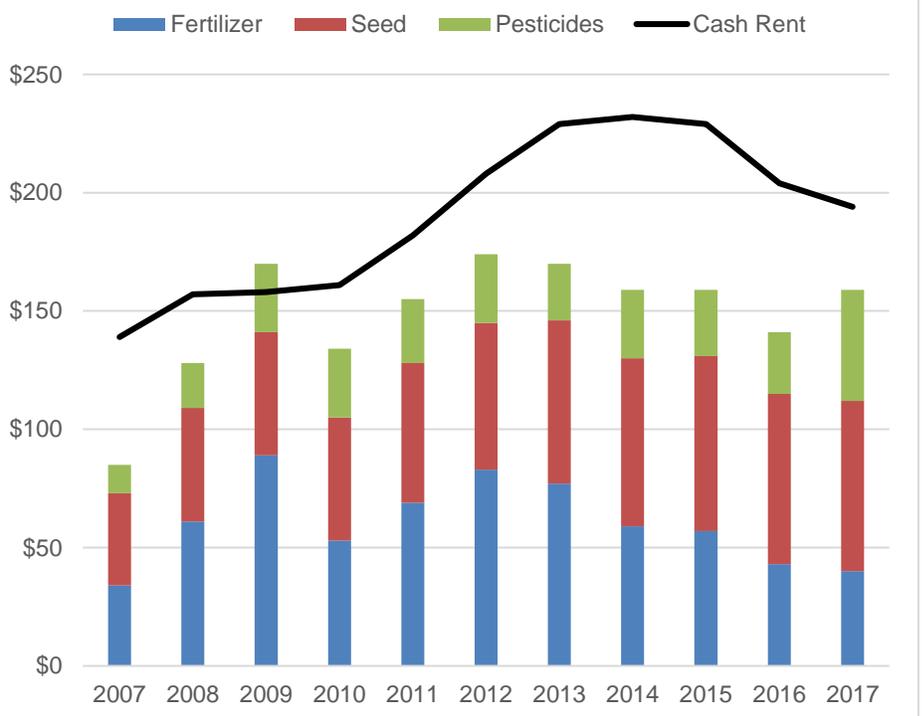
rotation corn has declined from \$945 per acre in 2013 to \$629 per acre in 2017. The expected loss per acre for rotation corn in 2017 is \$126 per acre.

Figure 3 illustrates the trends in fertilizer, seed, pesticide, and cash rent costs for rotation soybeans from 2007 to 2017. Fertilizer cost and cash rent have declined since their peaks in 2013 and 2014. Resistant weed problems have put upward pressure on pesticide cost for rotation soybeans.

Gross revenue (market revenue plus government payments), variable cost, and fixed cost per acre for rotation soybeans on average productivity land is illustrated in Figure 4. Variable cost per acre peaked in 2013 at \$239 per acre, dropped to \$201 in 2016, and is projected to be \$233 per acre in 2017. Like corn, fixed cost per acre peaked in 2015 at \$375, and is projected to be \$337 per acre in 2017.

The breakeven price needed to cover variable and fixed costs declined from \$11.94 per bushel in 2015 to \$10.96 in 2017. Gross revenue for rotation soybeans has declined from \$670 per acre in 2013 to \$494 per acre in

Figure 3. Fertilizer, Seed, Pesticide, and Cash Rent Cost per Acre, Rotation Soybeans in Indiana.

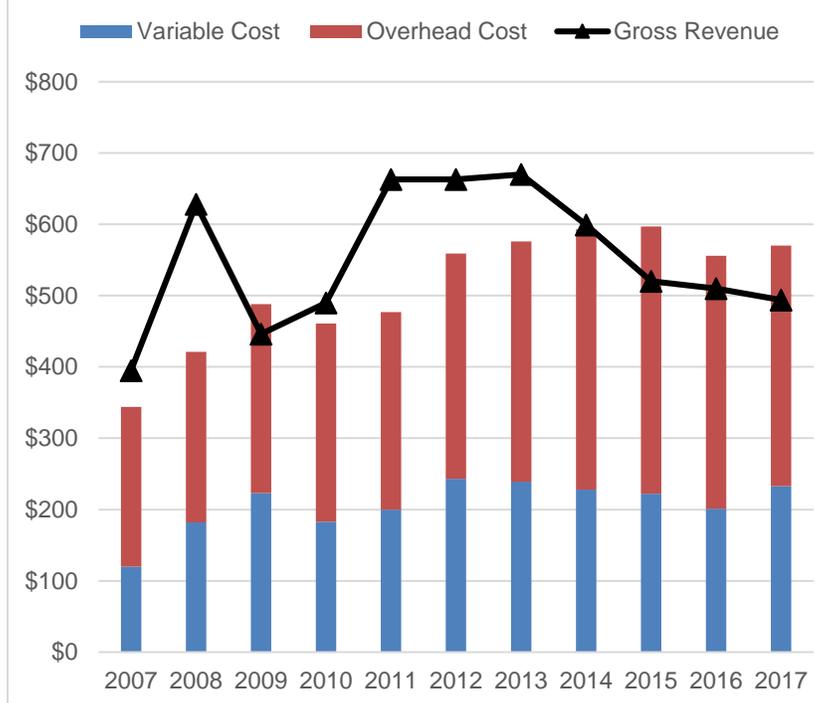


2017. The expected loss in 2017 for rotation soybeans is \$76 per acre.

The breakeven prices for rotation corn and rotation soybeans discussed above were for average productivity land. For high productivity land, the breakeven prices for rotation corn and rotation soybeans are expected to be \$4.01 and \$10.06 per bushel, respectively. Unless prices rise above \$4.00 per bushel for corn and \$10.00 per bushel for soybeans, expected earnings per acre will be negative for all three land qualities.

In summary, margins are expected to be tight again in 2017. This increases the importance of carefully scrutinizing input and crop decisions. Producers are encouraged to create crop budgets and in general improve their record keeping. Low crop margins will adversely impact a farm's liquidity position and financial performance.

Figure 4. Variable Cost, Overhead Cost, and Gross Revenue per Acre, Rotation Soybeans in Indiana.



FARMLAND VALUES FACE THIRD YEAR OF DECLINE

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Average Indiana farmland values reached a peak of \$8,129 per acres late in 2013. The 2016 Purdue farmland value survey indicated average farmland values had declined to \$7,041 per acre in mid-2017; a decline of 13.4%. The primary force behind the farmland value decline has been the decline in crop production profitability. In 2013, the Purdue Crop Guide indicated a contribution margin of \$483 for corn and \$431 for soybeans or \$457 for a corn soybean rotation. The contribution margin represents the amount of revenue remaining to pay the overhead or fixed costs of unpaid owner labor, machinery and facilities and farmland.

As Indiana farmers move into 2017, grain prices remain at low levels. While there have been some downward

adjustments in the cost of inputs, input prices have been slow to reflect the lower product price environment. With the abundant corn harvest of 2016, without some type of supply disruption in 2017, there seems to be little reason to expect significantly higher 2017 corn price.

Given the strong export demand for soybeans, the soybean price has not experienced the same price decline that has occurred in corn. The 2017 Purdue Crop Guide indicates the contribution margin for corn is projected to be \$211 per acre while the contribution margin is \$261 per acre, or \$236 per acre. Over the four years from 2013-2016, the contribution margin has declined 50%. If this lower contribution margin is allocated to unpaid labor, machinery and facilities, and land in the same

proportions as 2013, these payments would be 50% less. Capital asset pricing theory indicates that if the amount of long-term income generated by a capital asset is reduced by 50% then the assets price will decline by 50%, if other factors stay the same.

While the margin from crop production is strongly negative, there are several other factors that influence farmland values. Most of these factors are positive. First, long run interest rates continue to be at historically low levels. Increases in interest rates have been expected for a number of years, but they have not occurred, at least not yet. The supply of land being brought to market continues to be in balance with the demand. Both sales and purchases have declined.

One of the important dynamics of the farmland market in the 1980s was the excess supply of farmland on the market. Farmland is still viewed as a good investment for those looking to diversify their portfolios. Inflation expectations also remain low. Low expectations about future inflation contributes to low long-term interest

rates. Finally, there are still buyers in a strong cash position, but fewer are likely to be farmers. On the negative side, the current farm policy is not as supportive of farmland values as prior policies. There are currently no expected policy support payments associated with the 2017 crops for corn or soybeans. Prior policies would likely be providing significant support payments in this price environment rather than none.

Current low grain prices continue to set a negative tone for farmland values. While there are several positive forces in the farmland market, these positive factors are overridden by low farm commodity prices and narrow contribution margins. Producers continue to look for ways to lower the per bushel direct and fixed costs of producing corn and soybeans. Futures prices indicate a rise in the price of corn for 2018 and 2019, but a decline in the price of soybeans. With the continued tight margin situation, farmland value declines are expected to continue. For 2017, it seems likely that farmland values may decline another 5% to 10%.

CASH RENTS TO DROP IN 2017

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In the farmland market, the adjustment in market value can be a slow process because the value of farmland is not only influenced by current conditions but also by expected future conditions. Initially a sharp downturn in the profitability of crop production may be viewed as a temporary event. While evidence is collected on the likelihood that the future will be a lower profit environment, values hold steady. As buyers adjust their expectations about future profitability, farmland values will begin to decline.

Table 1. 2015 & 2016 Purdue Crop Guide budgeted net return for 3,000-acre farm and 2017 forecast.

	2015	2016	2017
Contribution Margin	\$250	\$220	\$236
Operator Labor	\$45	\$44	\$41
Machinery Overhead	\$94	\$98	\$98
Cash Rent	\$229	\$204	\$184 - 194
Net Return	(\$118)	(\$126)	(\$87 - 97)

As with Indiana farmland values, current and expected future profitability in grain production is an important force in the farmland rental market. However, if the cash rent being paid by the operator is too high, this situation can quickly erode the working capital position of the business. As a result, it is important that operators are able to make adjustments in production costs, including cash rent, in a reasonable period.

The [Purdue Crop Guide](#) contribution margin, the margin remaining to pay overhead costs of operator labor, machinery, and cash rent from a corn and soybean rotation, for 2015, 2016, and 2017 are estimated to be \$250, \$220 and \$236 per acre, respectively. Cash rents from the Purdue Farmland Value Survey for average farmland during 2015, and 2016 were \$229, and \$204 per acre. Subtracting the cash rent from the contribution margin in 2015 and 2016 leaves \$21 and \$16 per acre to pay for operator labor and machinery overhead. The Purdue Crop Guide estimates operator labor expense to be \$45 per acre in 2015 and \$44 per acre in 2016. Machinery overhead for a 3,000-acre farm was estimated to be \$94 in 2015 and \$98 in 2016. Subtracting these expenses from the contribution margin results in a negative net return of \$118 in 2015 and \$126 in 2016. These budgets indicate that there is not enough income to cover total production and overhead costs.

These losses have motivated operators to attempt to lower the cost of producing crops. Declines in the price

of fertilizer and fuel prices have helped. Reducing the use of seed traits, lowering seeding rates, cutting back on fertilizer rates, reducing the application of crop protection products, reducing family living expenses and working to reduce cash rents are all things being tried to lower the per bushel cost of corn and soybean production.

These losses also indicate more work needs to be done to lower total production costs. It is expected that on average cash rents in 2017 are likely to decline by 5% to 10%. If these cost and return projections become reality, the 2017 net return loss will be \$39 - \$49 per acre less. It would also be the second year of a 5% or larger reduction in cash rent; the first time since the 1980s to have cash rent reductions this large in consecutive years.

The budget numbers presented do not represent a specific farm. In the current environment it is important to know what numbers represent your situation in order to establish an equitable cash rent. In the current economic environment, contribution margins (revenues minus direct costs) are small. If cash rent is less than the contribution margin, the difference that remains helps to pay overhead costs. The loss minimization strategy would be to continue farming the farm. On the other hand, if the cash rent is more than the contribution margin, there is no positive contribution associated with renting the land. In this case, the loss minimization strategy is to stop renting the farm.

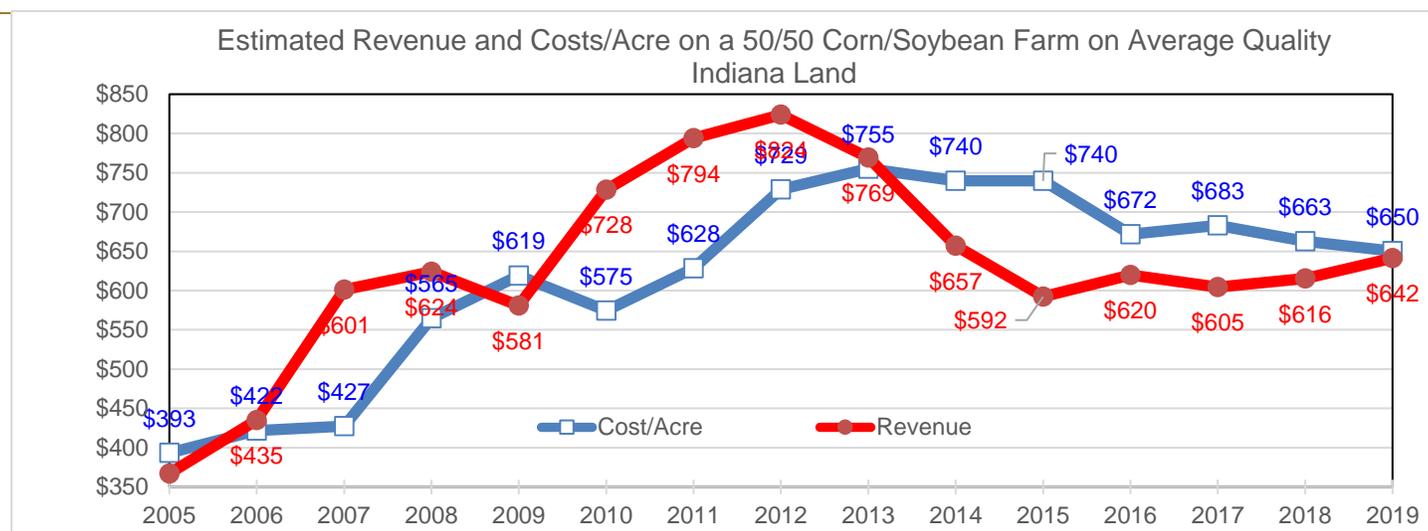
FINANCIAL OUTLOOK CONTINUES TO WEAKEN

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U.S. net farm income is projected to drop approximately 17% in 2016 according to USDA. Incomes are expected to be lower for both crop and livestock farmers in 2016 compared to 2015. Farm asset values in the U.S. are projected to fall approximately 2% in 2016, and farm debt

is projected to increase approximately 5%. The drop in farm income and corresponding increase in farm debt will put additional pressure on working capital. Surveys from the Federal Reserve Banks indicate that land values in the



Corn Belt continue to show softer values, and debt servicing challenges are increasing.

Let's now turn to prospects for farm income and the financial challenges for Indiana crop producers for the upcoming year. Using the 2017 Purdue Crop Cost & Return Guide, the contribution margin for rotation corn and rotation soybeans on average productivity land is projected to be \$211 and \$261 per acre, respectively, in 2017. Government payments per acre for the 2017 crop year are projected to be zero. Government payments for the 2016 crop year, which will be paid in the fall of 2017, are likely to be considerably smaller than those for the 2015 crop year, and are a very sensitive to changes in crop prices during the next few months. The payments for the 2016 crop year will also be impacted by 2016 county crop yields.

The contribution margin is used to cover machinery ownership costs, operator and hired labor, and cash rent and land ownership costs. These costs are often referred to as overhead costs or fixed costs. For average productivity land, overhead costs for 2017 are projected to be \$333 per acre. After subtracting overhead costs from the contribution margins for corn and soybeans, the earnings per acre for a corn/soybean rotation in 2017 is projected to be a negative \$96 per acre. This is the fourth year in a row for which budgeted earnings per acre were projected to be negative. Though actual earnings have differed from budgeted earnings for the last three years, actual earnings were negative in each year since 2014.

Low earnings will put pressure on working capital. A commonly used benchmark for the working capital to value of farm production is 35% or higher. The median value for Illinois FBFM farms was 52% in 2014, dropping to 45% in 2015. Even if the working capital to value of farm production declined another 7 percentage points in 2016, the average farm will still be above the 35% benchmark. However, Illinois FBFM farms in the lower quartile had an average value of just 9% in 2015. These farms will have very little maneuvering room to deal with low earnings in 2016 and again in 2017.

What about the longer term – when will this downturn end and farmers' incomes improve. No one knows for sure, but three studies at Purdue provide some useful insight. The first looks at the farm safety net and its effectiveness in buffering crop farmers from the downturn – the farm commodity program through FSA and crop insurance.

The majority of Midwest corn and soybean farmers chose the Agricultural Revenue Coverage – County Option (ARC-CO) farm program option that in essence provides a payment per base acre of corn and soybeans that depends on the level of yields and prices. The crop insurance program provides an indemnity payment to farmers if prices and/or yields decline, depending on the program and coverage level chosen. The most common program choice is revenue protection (RP) which buffers gross revenue from price and/or yield reductions – coverage level choices range from 50% to 85% of market revenue.

When the crop insurance and farm programs were initiated, it was anticipated that they would provide an effective safety net for farmers who might encounter significant price and/or yield reductions due to changing market conditions or weather/disease events. But crop insurance indemnities adjust to market conditions over time. If prices systematically decline, the potential indemnity also declines. Farm program payments under the ARC-CO program are capped, and the level of support declines as market prices increase.

Budgeting analysis using price forecasts from FAPRI, and trend yields from WASDE for a 50/50 corn/soybean rotation on a White County case farm indicate that ARC-CO payments and crop insurance implements are projected to be zero or less than \$10 per acre for even a low price scenario in 2017 and 2018. Given that government program payments account for almost 20% of the expected net farm income in 2016, these numbers suggest that the government safety net is not going to be a very effective buffer from the downturn in the longer run.

The second study uses budgeted data to project expected cost and returns per acre for a 50/50 corn/soybean rotation on average quality land in Indiana. A summary of this analysis is presented in the figure. The base assumptions for costs, prices and yields for these estimates come from Purdue University budgets for past years; and projections of trend yields, prices as reflected in futures markets and a 5% per year reduction in costs for future years. The bottom line of this analysis is that crop costs are expected to exceed revenues in 2017 and 2018, and then crop farmers have the potential to see costs and revenues back in balance by 2019. But notice a very important take-way – positive incomes in the longer run will primarily result from cost reductions rather than yield or price increases based on these current projections.

A third study looks at the financial vulnerability of farmers using a broader set of financial measurements than income. The focus of this study was to assess the financial performance of illustrative Midwest grain farms with different size, tenure status, and capital structures over a three-year period under the shocks of volatile

crop prices, fertilizer prices, farmland values and cash rent.

These “stress test” results suggest that the financial vulnerability and resiliency of Midwest grain farms to price, cost, yield and asset value shocks are, not surprisingly, dependent on their size, tenure and leverage positions. Farms with modest size (i.e. 550 acres) and a large proportion of their land rented are very vulnerable irrespective of their leverage positions unless they have significant income from off-farm sources. These same modest size farms are more financially resilient if they have a higher proportion of their acreage that is owned rather than rented.

Larger size farms (2500 acres) with modest leverage (25% debt-to-asset ratio) that combine rental and ownership of the land they operate have relatively strong financial performance and limited vulnerability to price, cost, yield and asset value shocks. In addition, these farms can increase their leverage positions significantly (from 25% to 50% in this study) with only modest deterioration in their financial performance and a slight increase in their vulnerability.

These results suggest that farmers are resilient to price, cost, yield and asset value shocks because of the current low use of debt in the industry (currently a 13% debt-to-asset ratio for the farming sector) does not adequately recognize the financial vulnerability of many typical family farms to those shocks. Not nearly as many farmers are expected to face bankruptcy compared to the 1980s bust, but many will still face cash flow and debt servicing problems and will need to make major adjustments to reduce their costs or extend their loan repayment terms.

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