

# Iowa Farm Outlook

Department of Economics  
Ames, Iowa

September 2019

Econ. Info. 2113

## Beef Packing Utilization-to-Capacity and Fed Cattle Prices

Low cattle prices are usually related to price determination factors, more so than price discovery factors. Low prices result from supplies that are large relative to current beef demand conditions. Variation in week-to-week or daily prices across pens of cattle, both above and below the market price level, result from many factors directly affecting price discovery, of which market information could be one of many contributing causes.

Price determination is the interaction of the broad forces of supply and demand that determine the market price level. On the supply and demand balance, the signal is currently positive. Through July 2019 (the most current data available), commercial beef production was up 1.1% compared to the first seven months of 2018, yet Iowa-Minnesota negotiated fed cattle prices (USDA AMS LM\_CT185 report) have also been higher by 1.1% or \$1.39/cwt. Through July, all fresh retail beef prices were 9 cents per pound or 1.5% higher compared to the same period last year. This indicates that consumers have been willing to pay more for beef even though there is more beef available.

Beef exports have been relatively strong too. Through July 2019, beef plus beef variety meat exports were down 1.6% from a year ago in volume but were only down fractionally from last year's record value pace. Export volume was up 1.1% year-over-year in July while value was still only slightly lower.

August fed cattle prices were \$1.92/cwt higher than last August but almost \$3/cwt lower than the average in July. In addition, October 2019 live cattle futures declined from an average of \$108.62/cwt in July to \$102.80/cwt in August. Deferred futures contracts have also seen similar declines. One could argue that the decline in fed cattle prices in August was more related to price discovery than price determination.

Price discovery is the process of buyers and sellers arriving at a transaction price for a given quality and quantity of a product at a given time and place. Price discovery involves several interrelated concepts, among them market structure (number, size, location, and competitiveness of buyers and sellers); market behavior (buyer procurement and pricing methods); market information and price reporting (amount, timeliness, and reliability of information); and futures markets and risk management alternatives.

So, the number of packers bidding on cattle and individual packing plants or firms affect fed cattle prices. This is relevant in today's cattle market as the Tyson Foods' Holcomb, Kansas, beef packing facility fire on August 9<sup>th</sup> has thrown an entirely new wrench into the market. According to Cattle Buyers Weekly, a publication that has maintained a detailed database of cattle slaughter plants and capacity for many years, the Tyson plant can harvest about 6,000 head of cattle per day. All the cattle harvested in this facility are fed cattle, i.e., steer and heifer slaughter. This represents about 5% to 6% of the nation's fed cattle packing capacity.

Given the number of beef packing plants that have been shuttered or scaled down back in the 2000's and early 2010's and the herd expansion that has occurred there is no longer the amount of cushion (excess capacity) with respect to shackle space. And with operational capacity being smaller than physical capacity, being further constrained by the tight labor situation, a packing plant going off-line has had a major impact. The magnitude of impact was particularly exacerbated by the size and location of this packing plant being in a major cattle feeding region.

Why is the degree to which cattle slaughter (processing) capacity is being utilized a determinant of fed cattle price movement? Beef packing facilities desire to operate at a level in which the number of cattle equals the

operating capacity of the facility. When the facility is underutilized, then the business incurs higher fixed costs per unit. Importantly, packers may also have beef contracts to fulfill. The result, there is an incentive to pay higher prices for cattle to secure a quantity level that will not cause the utilization level to drop further. The higher price incentivizes more cattle production (pounds short-term and more head longer-term).

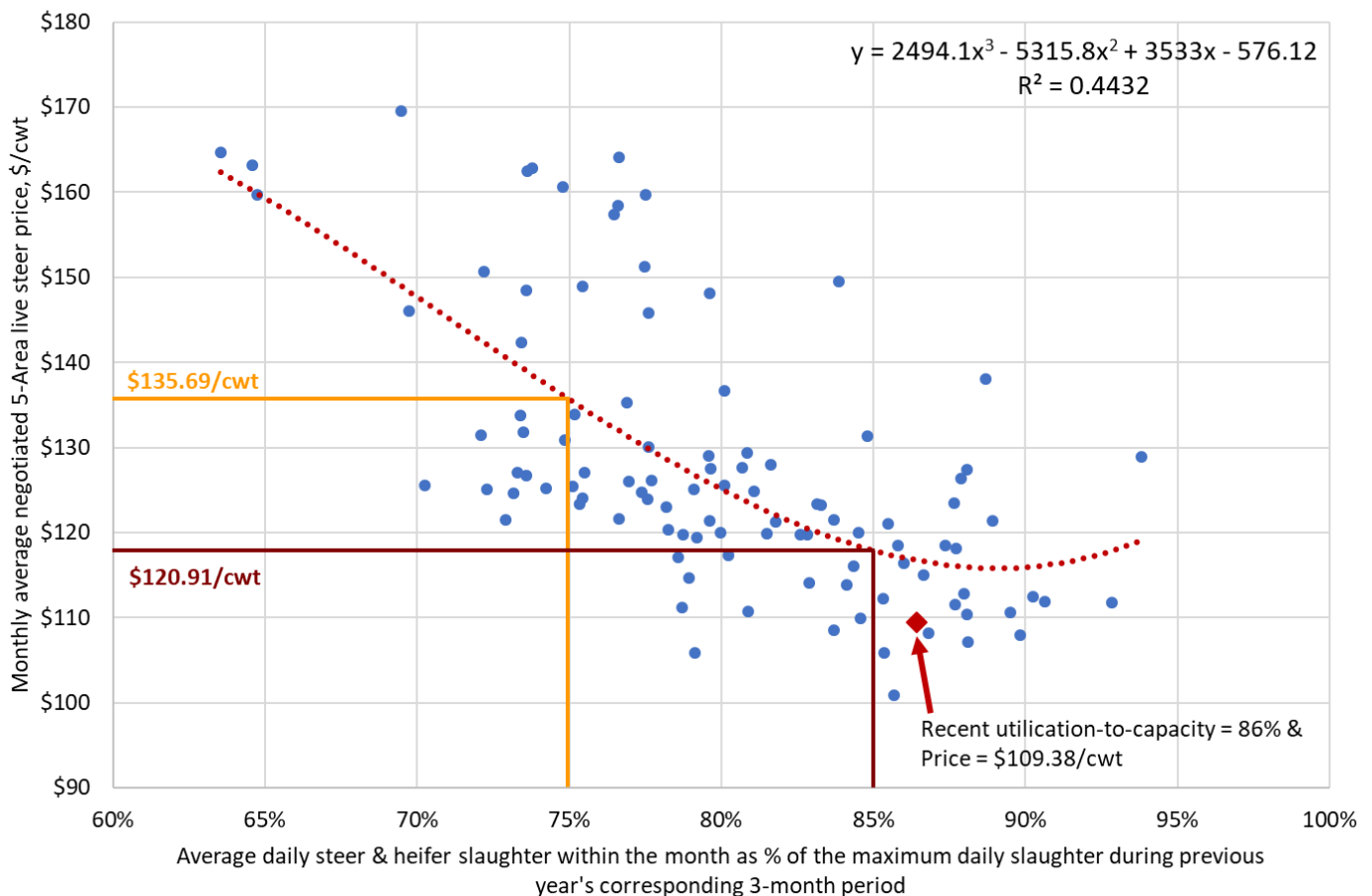
On the flip side, quantities that push utilization above a normal capacity level leads a packer to offer lower prices. Packers pay overtime, supplies in cold storage build up and cattle prices are depressed. If this is a long-term thing, the price of beef has to be lowered to incentivize more beef consumption. Anything that pushes packer costs higher eventually hurts producers (if the cost increase is from overutilization) or consumers (if the cost increase is from underutilization).

Figure 1 is the fitted relationship between beef packing capacity-utilization and fed cattle price. The values are for the average across the entire fed cattle industry, i.e., U.S. capacity and 5-Area prices. Here, I am using the utilization-to-capacity measure that I have found to be the best fit:

$$\frac{\text{current month's daily average steer \& heifer slaughter}}{\text{max (month's daily max (steer \& heifer slaughter during the quarter of the prior year))}}$$

where, for example, the utilization-capacity ratio for August 2019 is the daily average steer & heifer slaughter in August 2019 divided by the maximum month's daily maximum between the three months of June, July, and August 2018. So that if June 2018 had the highest level of daily slaughter compared to July or August 2018, then the ratio the August 2019 daily steer & heifer slaughter divided by the June 2018 daily steer & heifer slaughter is used. This is an imperfect measure, i.e., we do not know the true U.S. fed cattle fed cattle slaughter capacity, but it serves as a barometer which can accurately capture trends and deviations from trend.

**Figure 1. Monthly Relationship Between Beef Packing Plant Utilization-to-Capacity vs. Negotiated 5-Area Fed Cattle Price, Jan 2011 thru Aug 2019**



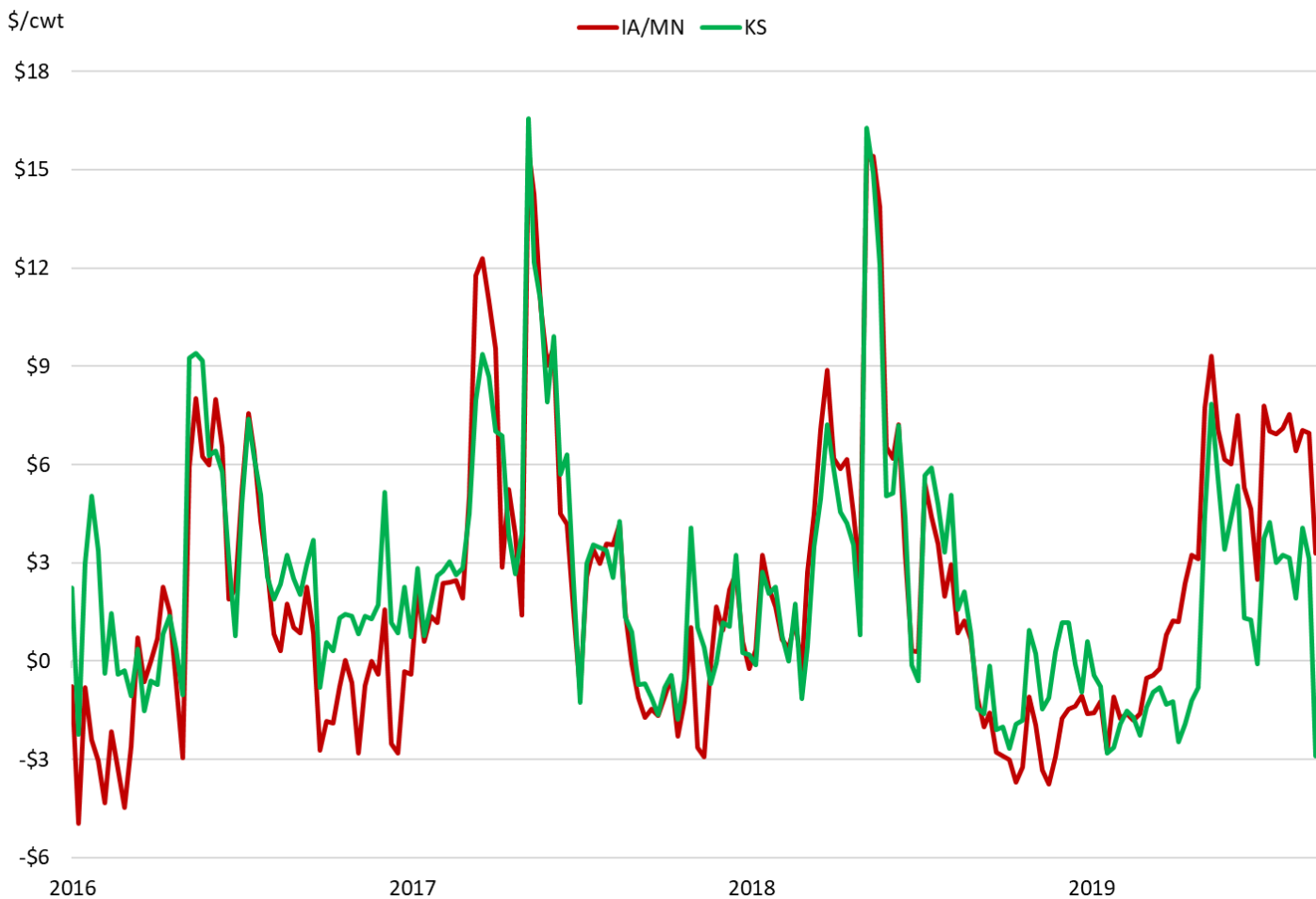
Data source: USDA-AMS. Calculations by Lee Schulz.

The fitted line in figure 1 shows the fact that at a lower industry average utilization-to-capacity level the price of fed cattle is higher and at higher industry average utilization-to-capacity level prices the price of fed cattle is lower. The August 2019 level of utilization-to-capacity is 86% versus a fed cattle price of \$109.38/cwt. Clearly, this most recent point is below the computed trend-line in the data. At 86% utilization-to-capacity the predicted price from this simple model suggests a price of \$117.08/cwt.

Because many other factors impact the cattle market, one should be careful in associating too much causality between the utilization-to-capacity value and the level of fed cattle prices. The significance of the plant fire and the market’s reaction to it is likely being further amplified by the growing supply of finished cattle both nationwide and in Kansas. U.S. cattle on feed total in feedlots with 1,000 or more head capacity was record large for August 1 data at 11.11 million head, 19,000 head more than a year ago. Cattle on feed in Kansas as of August 1 stood at 2.34 million head, which was also an August record and represented 21.1% of the U.S. total.

While we tend to look at slaughter capacity on a national basis and judge that against cattle numbers, because that is the data we have readily available, any sound analysis concerning changes in that capacity and impact on prices might be best done on a more granular level. Local cash markets may have a different supply and demand situation than the broader market, i.e., futures market, which subsequently influences the cash price received resulting in the basis value (cash – futures). Basis values can vary widely from state to state.

**Figure 2. Fed Cattle Basis (Cash - Futures)**



Data source: USDA-AMS and CME Group.

Figure 2 depicts weekly negotiated fed cattle basis for Iowa-Minnesota and Kansas since 2016. For the month of August, the 2016-2018 average basis for Iowa-Minnesota was \$1.36/cwt and for Kansas \$2.09/cwt, i.e., in both Iowa-Minnesota and Kansas cash prices are greater than futures on average in the month of August. In 2019, August basis values were \$6.25/cwt and \$1.87/cwt, respectively. The observed August basis level this

year for Kansas was only slightly lower than expected based on historical averages while for Iowa-Minnesota fed cattle basis was almost five times the expected or recent average for basis. Local fed cattle markets are still reflecting the strong beef demand situation however the Kansas market is reflecting a situation where supply is closer to packing capacity than it once was.

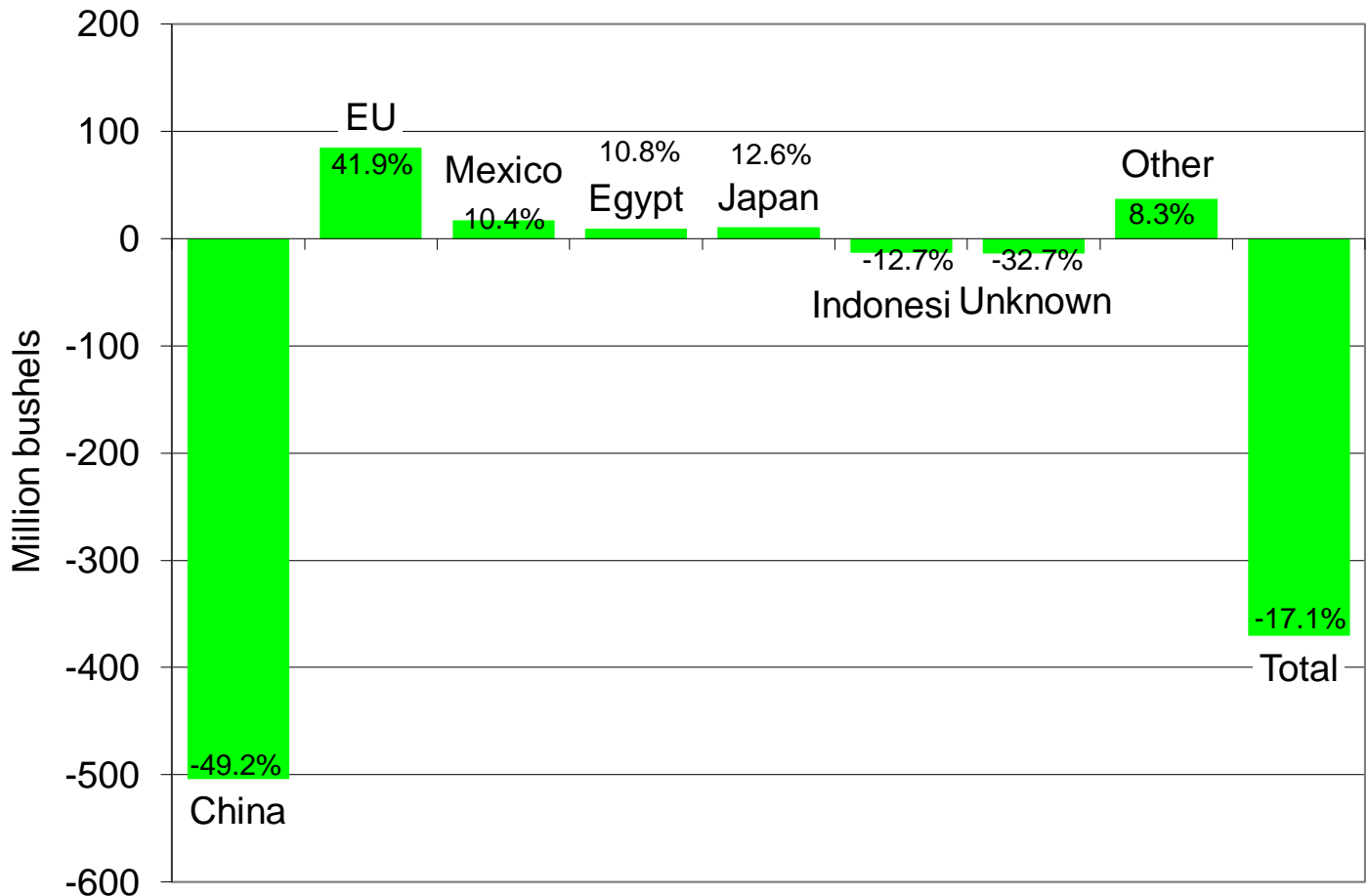
When demand is strong or expanding and when supplies relative to packing capacity are small or declining, price discovery problems are generally not a major concern. In contrast, one of these conditions has temporarily changed. Beef demand is strong, but fed cattle supplies are large and expanding and packing plant capacity has constrained for the time being. This has been one factor leading to lower fed cattle prices and has heightened price discovery concerns. But this situation should be relatively short-lived as the packing plant damaged by fire expects to be back on-line in a couple of months.

*Lee Schulz*

### Export Challenges

As the calendar turns over to September, thoughts usually shift to football and crop harvests. With Iowa State and Iowa both ranked, there is a lot of positive anticipation for football, whereas the upcoming harvest season has more negative expectations attached to it. The variability of the crops as we approach harvest holds over from the sporadic planting and delayed emergence of the crops. A few fields will be ready to harvest at the usual time, more fields will need a couple more weeks to reach maturity, and other fields may not get there unless the first frost is also behind schedule. In a year with later planting, it helps to have the usual weather events delayed throughout the year as well. But while many focus on the upcoming harvest, we should also be watching the prospects for crop usage over the marketing year. And specifically, the challenge will be to maintain international demand for our crops.

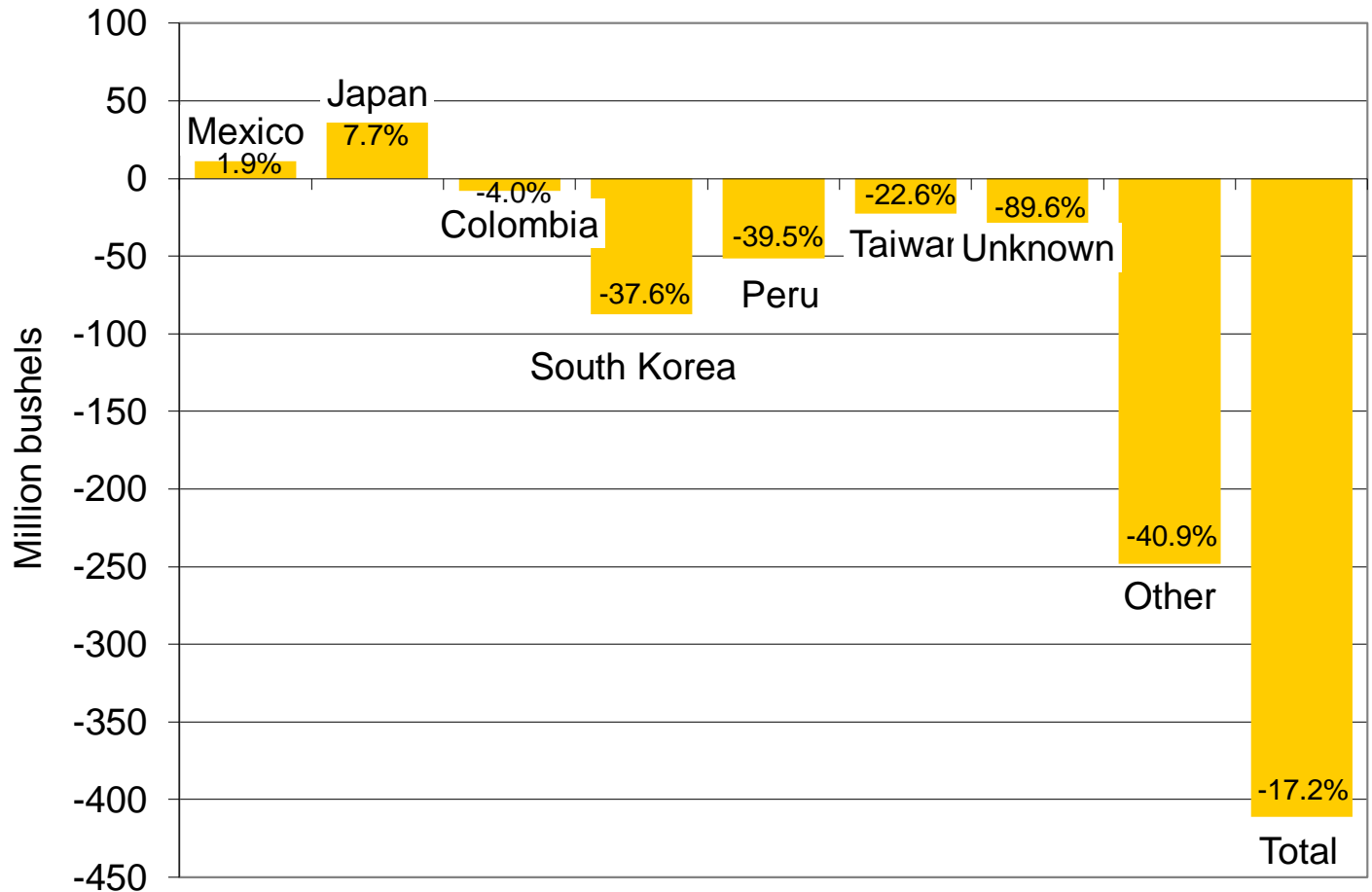
**Figure 1. Soybean export shifts. Source: USDA-FAS.**



The combination of large global supplies and ever shifting trade policies have put a significant dent in export sales for U.S. corn and soybeans. While soybeans have received most of the attention, due to the ongoing trade battle with China, corn has also seen a pullback in international demand over the past year. Producers of both crops are hoping for a reversal of fortunes for the coming marketing year. As we close out the 2018/19 marketing year, soybean export sales have struggled to gain traction. The initial hit in the U.S.-China trade war put a 500 million bushel hole in the export market. Through all of the waves of positive rumors and negative results on the U.S.-China trade negotiations, the Chinese soybean import gap remained fairly steady at 500 million bushels, where it still stands today. For a while, increases in sales to other counties and regions reduced the overall decline to 300 million bushels. But recently, those sales to other countries have tailed off and the overall export gap is growing once again. The most recent weekly export sales report showed a 380 million bushel drop in soybean export sales compared to last year. Despite the trade war, China remains our largest export market, taking nearly 30% of our exports. The European Union is next at 16%. While we did see more soybean sales to the European Union, Mexico, Egypt, and Japan, they were not nearly enough to offset the halving of the Chinese market. With China threatening to stop U.S. agricultural purchases, the challenge will be to continue to build alternative soybean markets, and the quicker the better.

But soybeans is not the only crop to experience a 17% drop in export sales, corn export sales have also dropped that much, with much less fanfare. While the soybean export story is all about one country, the corn export story is a cross-section of many countries. Our two largest corn markets, Mexico and Japan, have provided a slight boost in their corn purchases. But most everywhere else has pulled back on U.S. corn significantly. South Korea and Peru had been stronger customers for U.S. corn over the past few years, but sales this year are down at least 37% for both countries. The steepest cuts are showing up with our smaller volume customers, represented by the “Other” category in the graph. “Other” shows the combined sales to countries not listed in the chart, so it’s the rest of the world category. Currently, our top 6 markets for U.S. corn take up 82% of our

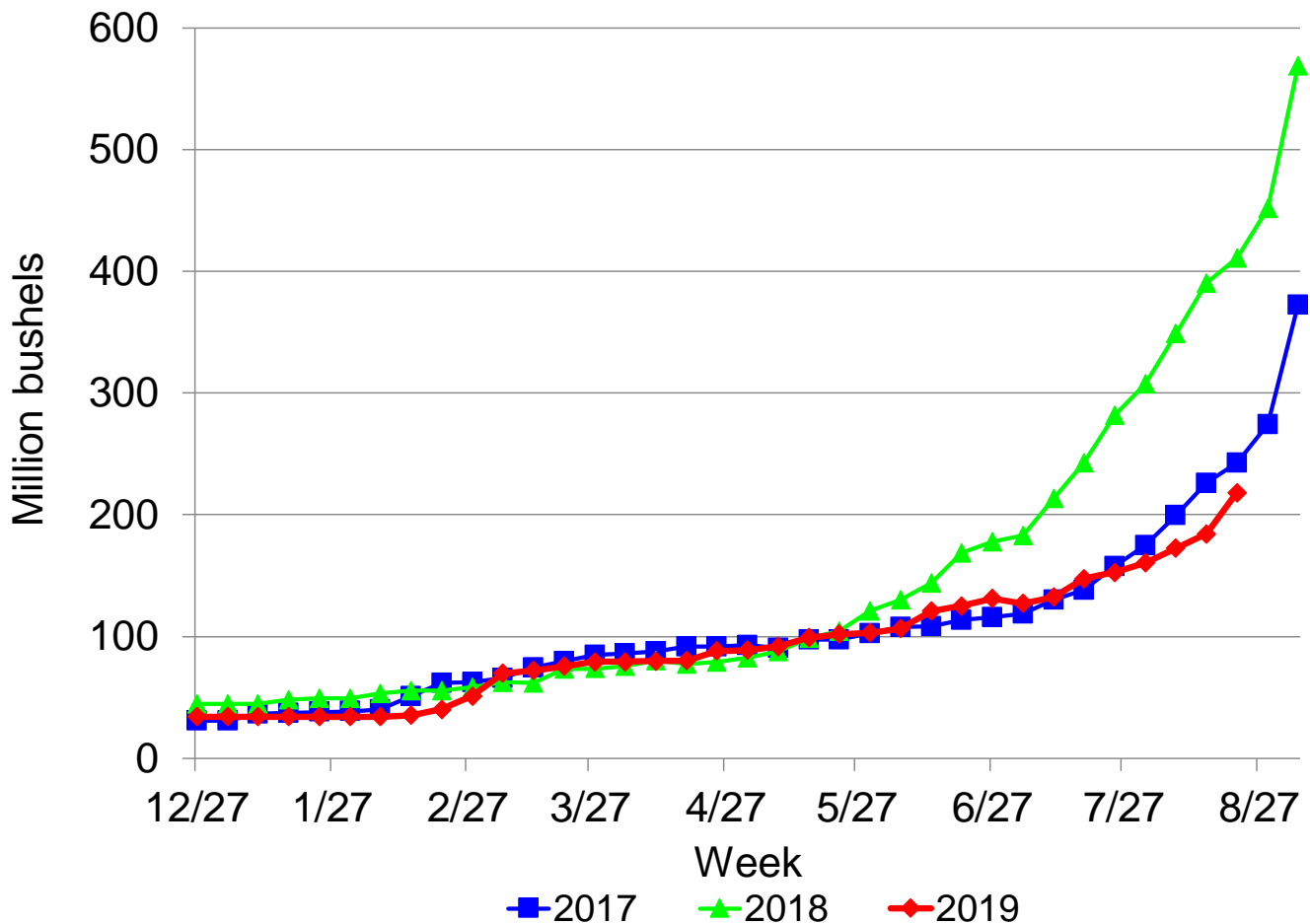
**Figure 2. Corn export shifts. Source: USDA-FAS.**



export sales. “Other” captures 18%, but that’s down 40% from last year. In fact, 30 of the 50 international markets I track for corn reduced corn purchases this year. The largest declines occurred in the European Union (they moved from our 7<sup>th</sup> largest market to our 42<sup>nd</sup> largest) and Vietnam (dropped from 8<sup>th</sup> to 26<sup>th</sup>). The fall in corn export sales seems to be more correlated with concerns about the global economy, as the loss in sales shows up nearly in every continent (Asia, Europe, South America, and Africa).

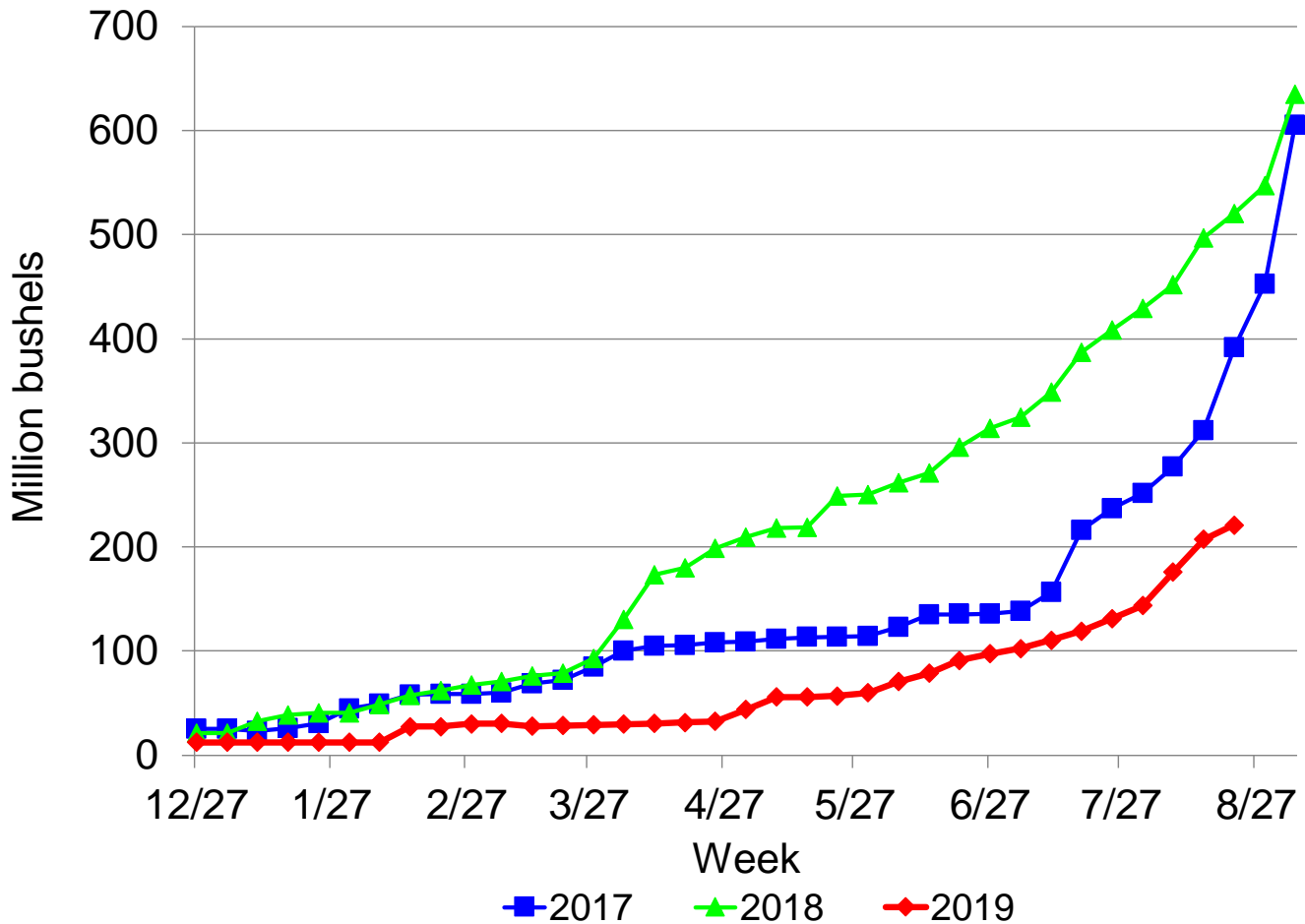
And that drag on export sales is extending into the upcoming crop year. Advance export sales for corn are roughly half of what they were last year. The current pace is more reminiscent of the 2017 marketing year than the 2018 marketing year. Mexico represents over half of the advance sales. But the other countries in our top six have been very sluggish to purchase U.S. corn ahead of harvest. Combined, Colombia, South Korea, Peru, and Taiwan represent only 2% of our advance corn sales. We will need a sizable turn-around from these countries to meet export projections.

**Figure 3. Advance export sales for the 2019/20 corn crop. Source: USDA-FAS.**



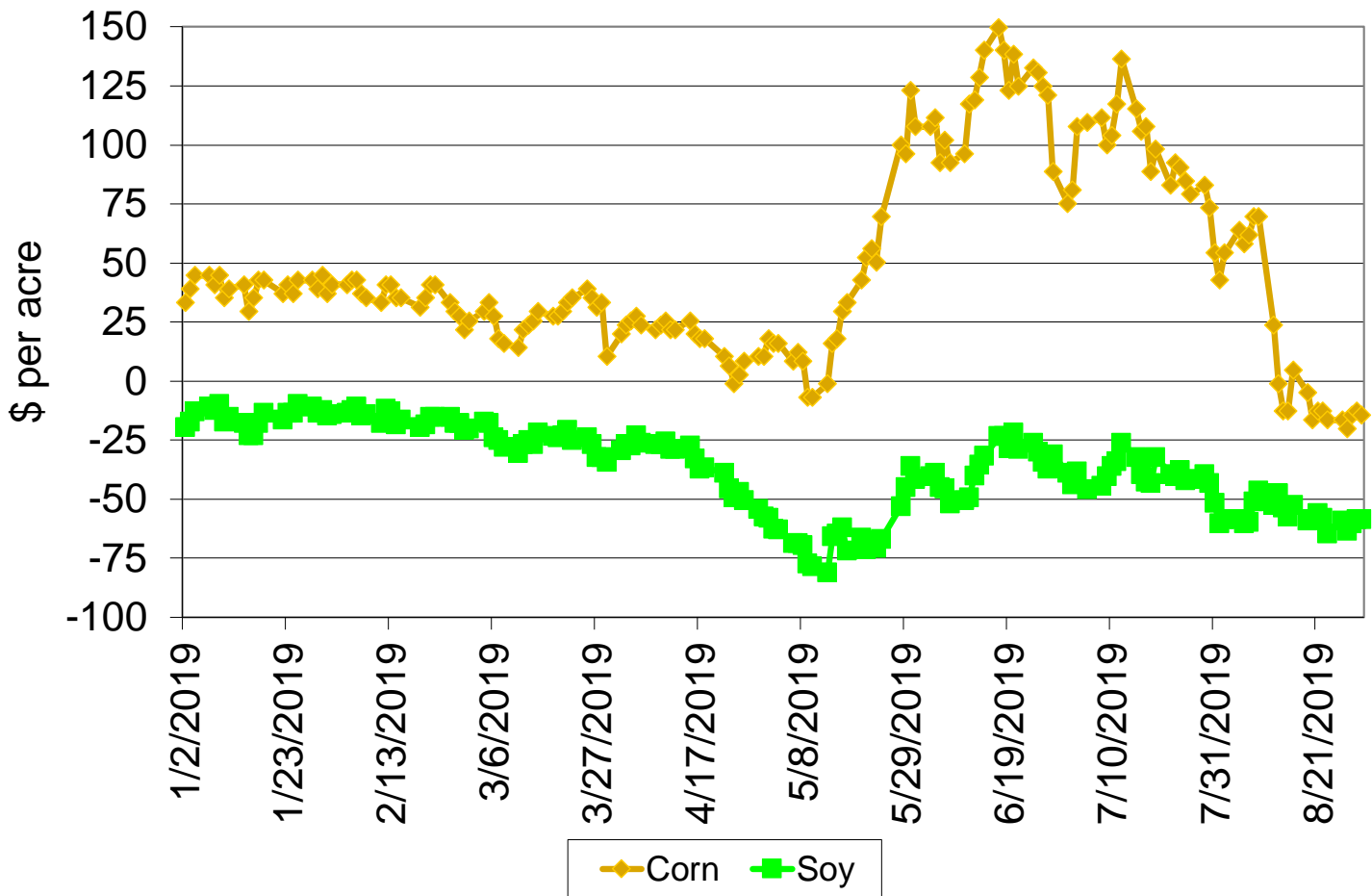
Looking at soybean advance export sales, China’s moves dominate the discussion. Last year, China represented 47% of soybean export sales. This year, that’s down to 29%. And the advance sales are down to 5%. Now some sales to China could be lurching in the sales to unknown destinations, which is nearly half of all advance sales thus far, but the loss of direct Chinese sales looms large for the soybean market. As with corn, Mexico has been the stalwart market, taking 19% of our advance sales. But the European Union has also backed off on purchases and we are not finding enough growth in other markets to offset the losses.

Figure 4. Advance export sales for the 2019/20 soybean crop. Source: USDA-FAS.



Between the trade problems and the unrealized expectations of a smaller projection of the crops by USDA, crop prices and margins have retreated over the past month. Given the current Iowa yield projections, both corn and soybeans have slipped below breakeven. For soybeans, the search for breakeven has been a long-run quest, as margins have been projected below zero for the entire year. But for corn, the projected loss of profitability is new. If crop yields do slide, prices should improve. Margin recovery will depend on the rate at which prices and yields move. Given recent history (the last few months), lower yields should generate better margins as well (i.e. prices will rise by a larger percentage than yields fall). But the export story above could put a damper on price recovery. Short crops create higher prices, but only if someone is ready and willing to buy. Advance export sales thus far indicate there seem to be fewer somebodies out there right now.

Figure 5. 2019/20 projected crop margins.



Chad Hart

Dr. Chad Hart  
 Associate Professor of Economics  
 Extension Crop Marketing Specialist  
 478F Heady Hall  
 Phone: (515) 294-9911  
 Fax: (515) 294-3838  
[chart@iastate.edu](mailto:chart@iastate.edu)  
[www2.econ.iastate.edu/faculty/hart/](http://www2.econ.iastate.edu/faculty/hart/)

Dr. Lee Schulz  
 Associate Professor of Economics  
 Extension Livestock Economist  
 478 Heady Hall  
 Phone: (515) 294-3356  
 Fax: (515) 294-3838  
[lschulz@iastate.edu](mailto:lschulz@iastate.edu)  
[www.econ.iastate.edu/people/faculty/schulz-lee](http://www.econ.iastate.edu/people/faculty/schulz-lee)

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Many materials can be made available in alternative formats for ADA clients. To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964.