

# ***Updated Analysis:*** **Exporting Corn and Soybeans through U.S. Red Meat**

Study produced by World Perspectives, Inc. on behalf of the  
U.S. Meat Export Federation



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# Table of Contents

Executive Summary..... 2

About this Study ..... 4

Growth in U.S. Meat Exports ..... 4

Measuring Feed Demand ..... 6

Value of Meat Exports to Corn and Soybeans ..... 7

The Impact of Red Meat Exports on the Price of Corn and Soybeans..... 9

Red Meat Exports Impact on DDGS and Ethanol ..... 11

Economic Impact of 2018 Meat Exports ..... 12

Long Term Market Impact of Meat Exports..... 12

Conclusion: Importance of Maintaining Market Access ..... 14

## Executive Summary

In October 2016 the [U.S. Meat Export Federation](#) (USMEF), with support from the National Corn Growers Association, commissioned [World Perspectives, Inc.](#) (WPI) to quantify the impact of U.S. beef and pork exports on domestic corn use and value, based on 2015 year-end data. WPI produced a study entitled *The Intersection of U.S. Meat Exports and Domestic Corn Use* which looked at the 2015 corn use by meat exports and quantified the projected long term impact from USDA's baseline 2016-2025 projections.

Given the robust and record-setting growth in red meat exports since 2016, coupled with the various trade uncertainties that developed in the second half of 2018, USMEF engaged WPI to update the original study. That update was completed and released on 1 December 2018 based on year-to-date data with WPI's forecasts and trend-line estimates for year-end totals of beef and pork exports. As the final 2018 data compiled and reported by USDA has been completed, and the new 2019 to 2028 USDA baseline projection has been published, this latest update finalizes the analysis of red meat exports' impact on corn in 2018 as well adding an analysis of the impact that pork exports have on the domestic use and value of soybeans.

Finally, the report includes a projection of domestic feed use impacts based on both the long term 10-year baseline projections for meat exports, as well as a special analysis on the critical importance of the proposed U.S.-Japan Free Trade Agreement (FTA).

This report finds that:

- ❖ Through the 2016 to 2018 period, red meat exports exceeded what was forecast in USDA's 2016 baseline by 1.396 billion
- ❖ Beef exports were at record levels in 2018, and pork exports set new highs in 2016 and 2017, and came within a half a percent of record volume in 2018.
- ❖ In 2018, exports accounted for 14.5 percent of total U.S. beef production and 25.7 percent of U.S. total pork production, and accounted for:
  - 459.7 million bushels of corn utilization – with a market value of \$1.62 billion at the year-average market price
  - 2 million tons of DDGS use – with a market value of \$291 million at the year-average market price
  - 2 million tons of soybean meal disappearance, which is the equivalent of 84.2 million bushels of soybeans – with a market value of \$783 million at the year-average market price
- ❖ Since 2015, meat exports represent the fastest growing category of corn and soybean meal use.

- ❖ Over that period, one in every four bushels of added feed demand for corn was due to beef and pork exports and one in every 10 tons of added feed demand for soybean meal use was due to pork exports.
- ❖ Beef and pork exports are an increasingly important driver of value to U.S. farmers; in 2018, meat exports contributed \$0.39 per bushel to the price of corn, and \$0.85 per bushel to the price of soybeans.
- ❖ Without red meat exports, corn growers would have lost \$5.7 billion in 2018 and soybean farmers would have lost \$3.9 billion in 2018.
- ❖ Over the next 10 years, meat exports are forecast to generate a projected \$30.8 billion in cumulative annual market value to corn and soybeans based on USDA's long-term forecast for crop prices.
- ❖ Maintaining global market access for U.S. beef and pork is critical to this growth and to the continued value that meat exports bring to corn and soybeans.

## About this Study

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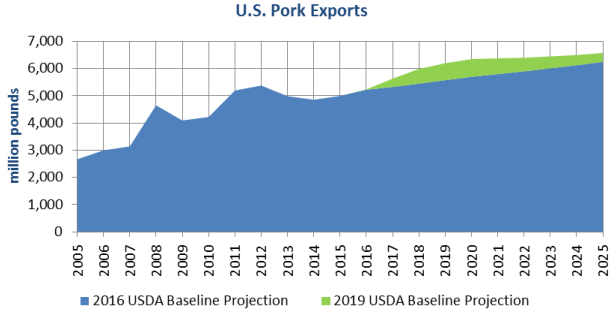
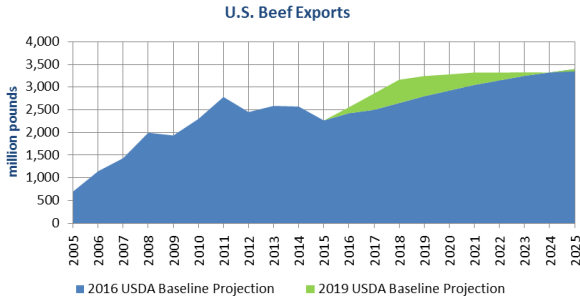
Given the robust and record-setting growth in red meat exports since 2016, coupled with the various trade uncertainties that developed in the second half of 2018, USMEF engaged WPI to update the original study. That update was completed and released on 1 December 2018 based on year-to-date data with WPI's forecasts and trend-line estimates for year-end totals of beef and pork exports. As the final 2018 data compiled and reported by USDA has been completed, and the new 2019 to 2028 USDA baseline projection has been published, this latest update finalizes the analysis of red meat exports' impact on corn in 2018, as well as adding an analysis of the impact that pork exports have on the domestic use and value of soybeans.

Finally, the report includes a projection of domestic feed use impacts based on both the long-term 10-year baseline projections for meat exports, as well as a special analysis on the critical importance of the proposed U.S.-Japan FTA..

## Growth in U.S. Meat Exports

Since 2015, exports of both beef and pork have grown dramatically; in 2018 beef exports set a new record of 1.352 million metric tons, breaking the previous high mark from 2011 by 5 percent. Pork exports set a historic high in 2017 at 2.45 million metric tons, 6 percent above the previous record established in 2016. For the first half of 2018, pork exports were well on pace to set another record – which would have been the third year in a row – until U.S. pork was targeted for retaliatory tariffs by Mexico and China. Despite a drop in exports in the second half of 2018, the year-end export volume came within half of a percent of 2017's record amount.

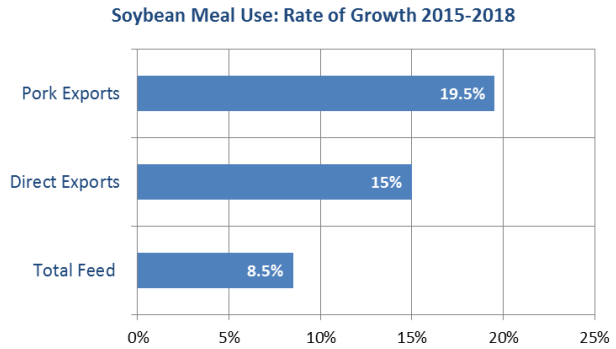
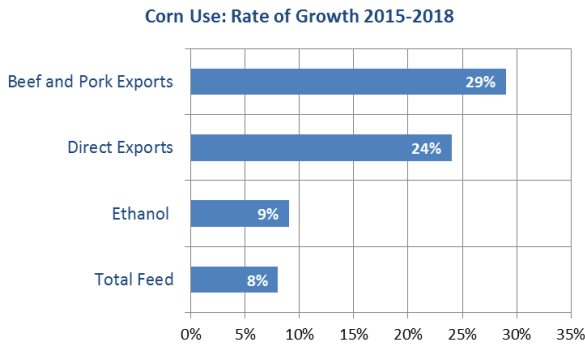
Compared to 2015's export totals, cumulative beef and pork shipments have grown 18.5 percent. Over the past three years, beef exports have grown 8.2 percent and pork exports 4.6 percent in annual, year over year average growth. **Through the 2016 to 2018 period, red meat exports exceeded what was forecast by the USDA's 2016 through 2025 long term baseline outlook by 1.396 billion pounds.** The latest USDA baseline projection pegs cumulative red meat exports to total 63 billion pounds over the next 7 years. That is an additional growth rate of 7.6 percent compared to the original 2016 baseline growth forecast.



Source: USDA, USMEF, WPI

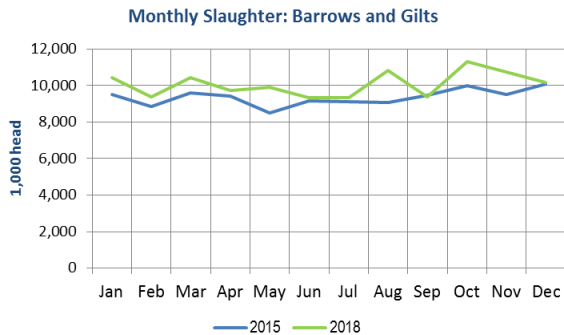
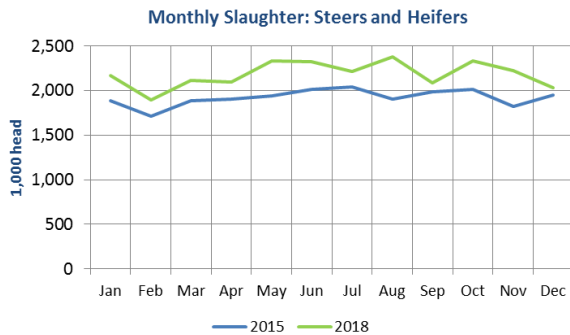
In 2018, the global market accounted for 14.6 percent of total U.S. beef production; similarly 25.7 percent of U.S. pork production was exported. Of course, exports of beef and pork also provide a strong and growing demand for feed. This makes the red meat-derived **indirect exports of corn, DDGS and soybean meal** an increasingly important driver of value to U.S. farmers.

In fact, since 2015, **indirect exports represent the fastest growing category of corn and soybean meal use**. Over the period, one in every four bushels of added feed demand for corn was due to beef and pork exports and one in every 10 tons of added feed demand for soybean meal use was due to pork exports.



Source: WPI, USDA

Strong global demand for U.S. beef and pork has been the driver of domestic production of hogs and fed cattle. In 2018, fed cattle slaughter was 13.6 percent greater than in 2015, and barrow and gilt slaughter grew 8 percent larger than in 2015. All of this has increased the domestic use of corn and soybeans.



Source: USDA, WPI

## Measuring Feed Demand

As the USDA's Feed Outlook report has noted, "...there is no survey or other direct measurement available for the volume..." of feedstuffs fed to livestock. Moreover, feed rations are highly variable – they can vary by region, with price or availability of substitutable ingredients; by type and location of operation, etc. However, some basic formulas can be developed to estimate the amount of feed used in U.S. red meat production, and thus to calculate indirect exports of corn and soybean meal.

WPI's research has **quantified the average feed demand of domestic cattle and hog production and then estimated the proportion of that demand that can be attributed to exports of pork and beef.** The estimates in this study are based on 2018 averages in cattle placements, days on feed, and slaughter weights for cattle and hogs.

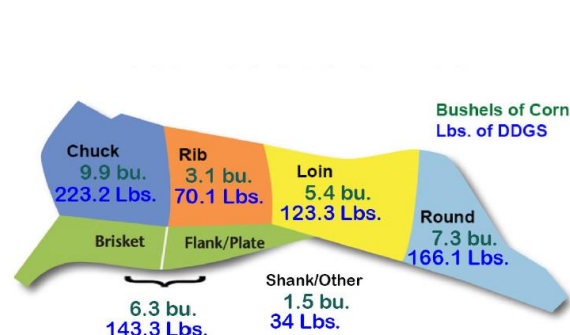
Compared to 2015, corn and DDGS use per head of fed cattle slaughtered in 2018 was down on lighter live weights, but increased slaughter volumes more than offset that reduction. For barrows and gilts, corn, DDGS and soybean meal use per slaughtered head remained steady between the two years.

Below for illustration is a breakdown of the feed use by primal cut in the beef and pork cutout.

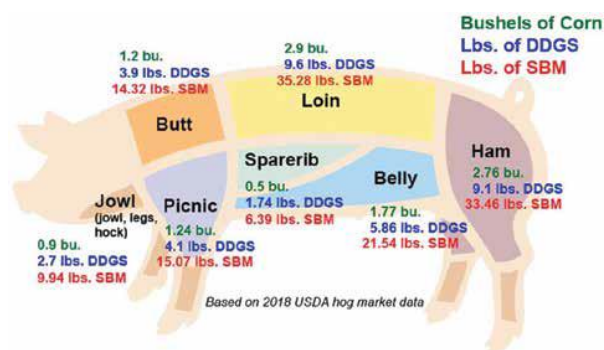
Feed Use Cutout for Beef		
Primal	Corn <i>in bu.</i>	DDGS <i>in lbs</i>
Round	7.3	166.1
Chuck	9.9	223.2
Loin	5.4	123.3
Rib	3.1	70.1
Flank/Plate/Brisket	6.3	143.3
Shank	1.5	34

Source: WPI

Feed Use Cutout for Pork			
Primal	Corn <i>in bu</i>	DDGS <i>in bu</i>	Soybean Meal <i>in lbs</i>
Butt	1.2	3.9	14.32
Picnic	1.24	4.1	15.07
Loin	2.9	9.6	35.28
Spare Rib	0.5	1.74	6.39
Belly	1.77	5.86	21.54
Ham	2.76	9.1	33.46
Jowl, Hock	0.9	2.7	9.94



Based on 2018 USDA cattle market data

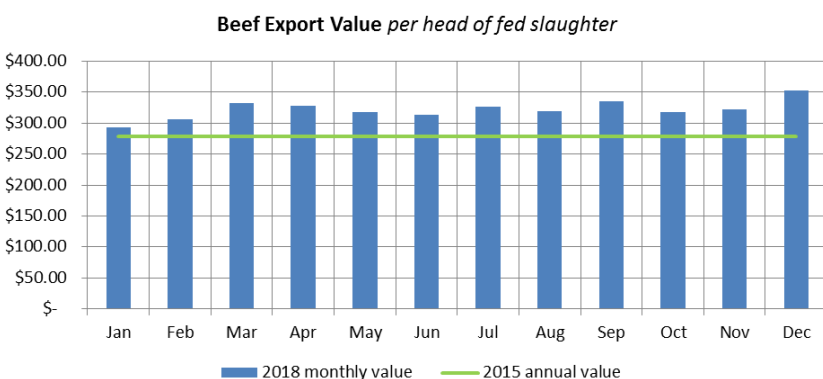


Based on 2018 USDA hog market data

## Value of Meat Exports to Corn and Soybeans

Meat exports add value not only by increasing the quantity demanded of beef and pork - and the soybean meal, corn and DDGS used to feed those cattle and hogs - but also by increasing the market value of hogs and cattle. **Export markets add extra value to the carcass by providing a demand for cuts that are undervalued in the U.S.** These cuts include beef short plate, short ribs, chuck short ribs, and chuck and round cuts as well as pork hams, butts, picnics, and loins. Further marginal value is added by the export of variety meats.

From 2015 to 2018, the per head value to cattle generated by beef exports increased more than 16 percent; and for hogs, it increased by more than 6 percent.



In 2015, beef exports generated a value of **\$277.87** per head of fed slaughtered;

... in 2018 that value generated by exports was **\$323.14** per head slaughtered.

Source: USMEF, WPI

Pork exports in 2015, generated a value of **\$48.31** per head of hog slaughtered;

... the value generated by exports in 2018 was **\$51.37** per head slaughtered.

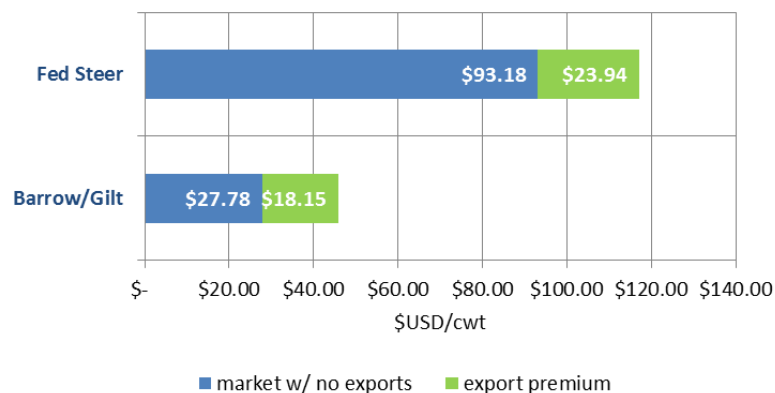


Source: USMEF, WPI

The marginal value earned from global markets is an **export premium**. Based on the 2018 average market prices and the above per head values, the export premium for fed steers was \$23.94/cwt and for barrows and gilts it was \$18.15/cwt.



### 2018 Market Price Breakdown



Source: USDA, WPI

A positive export premium directly factors into the economics of feed demand and livestock finishers' capacity to cover feed costs, which helps not only the feeder, but ultimately the corn and soybean farmer too.

2018 Budget for Finishing One Steer Calf			Breakeven Feed Cost/head
750 lb. feeder calf	1 head	\$1,162.50	With export premium: \$285.06
Interest at 9%	5.5 months	\$41.85	W/O export premium: <b>(\$38.13)</b>
Non-feed variable costs	5.5 months	\$77.71	
Fixed costs		\$14.00	
Total non-feed costs		\$1,296.06	

Source: WPI, USDA, Iowa State University Extension

2018 Budget for Finishing One Feeder Pig			Breakeven Feed Cost/head
10-12 lb. feeder pig	1 head	\$45.00	With export premium: \$48.07
Interest at 8%	5 months	\$1.51	W/O export premium: <b>(\$3.29)</b>
Non-feed variable costs	5 months	\$24.12	
Fixed costs		\$11.28	
Total non-feed costs		\$81.91	

Source: WPI, USDA, Iowa State Extension

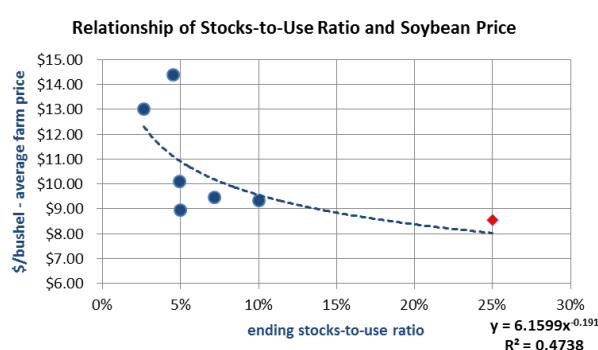
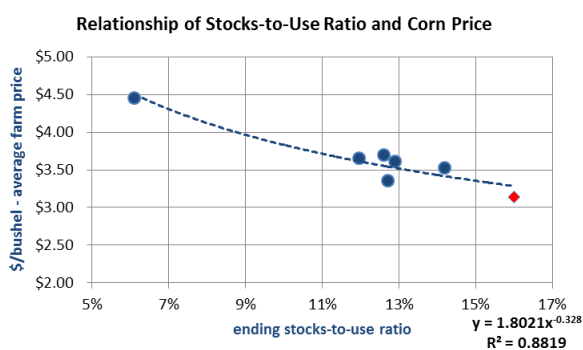
## The Impact of Red Meat Exports on the Price of Corn and Soybeans

Demand for feed generated by meat exports adds to the price of corn and soybeans. While red meat exports comprise about 3 percent of total corn use, and 4 percent of soybean meal, markets price commodities based on marginal demand – i.e. the use and value of the next bushel of corn or beans. Therefore, the demand for corn and soybean meal driven by beef and pork exports has a significant price impact.

While the price relationship between supply and demand is complex and dynamic; the following calculation applies a model to estimate how indirect exports through beef and pork impact corn and soybean prices in a given year. This model is based on “snapshots” of the marketplace, using end-of-the-year averages for corn and soybean meal converted to soybeans, while making red meat exports a variable. The following parameters are utilized:

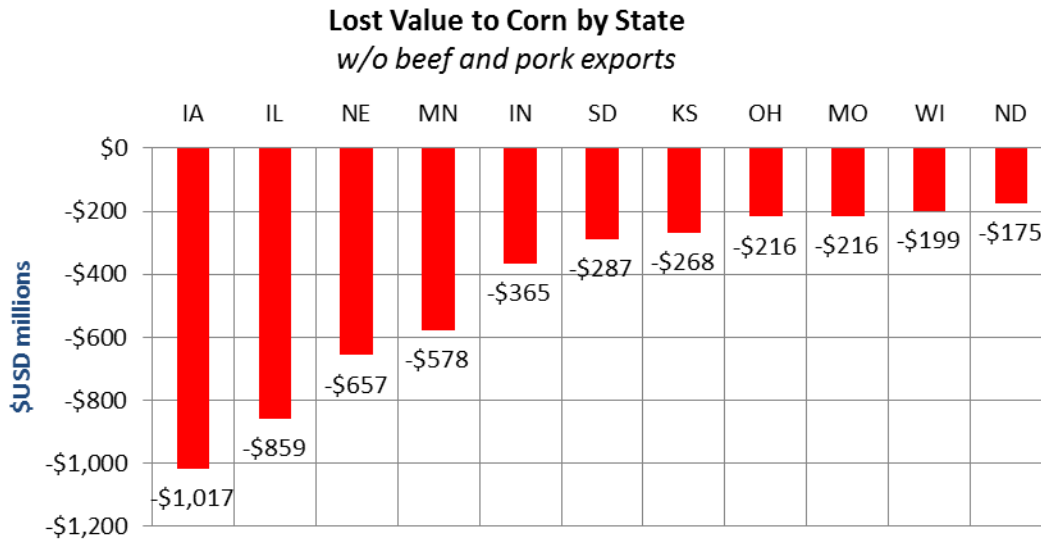
1. Hold other domestic demands constant (industrial, ethanol, non-pork and beef feed demand).
2. Hold supply constant.
3. Assume that there were no beef or pork exports and subtract meat exports' feed consumption from total domestic use (converting soybean meal into the bushel equivalent of soybeans)
4. Reallocate the amount of corn and soybeans:
  - a) Assume that half of the corn not utilized by meat exports is exported directly; and add the other half to the year-end stocks-to-use ratio
  - b) Assume one-quarter of the soybean bushel equivalent is exported directly; and add three-quarters of the amount to the year-end stocks-to-use ratio

The charts below show a regression of the annual average price of corn and soybeans and their relationship to the year ending stocks-to-use ratio. Based on the relationship between prices and stocks-to-use, and calculating a change in the stocks-to-use by applying the above formula assuming the impact of no red meat exports, **it can be estimated that beef and pork exports in 2018 contributed about \$0.39 to an average corn price of \$3.53/bushel.** That value breaks down to approximately \$0.11 per bushel from beef and \$0.28 per bushel from pork. Similarly, it is estimated that **pork exports contributed about \$0.85 per bushel to an average soybean price of \$9.30/bushel.**



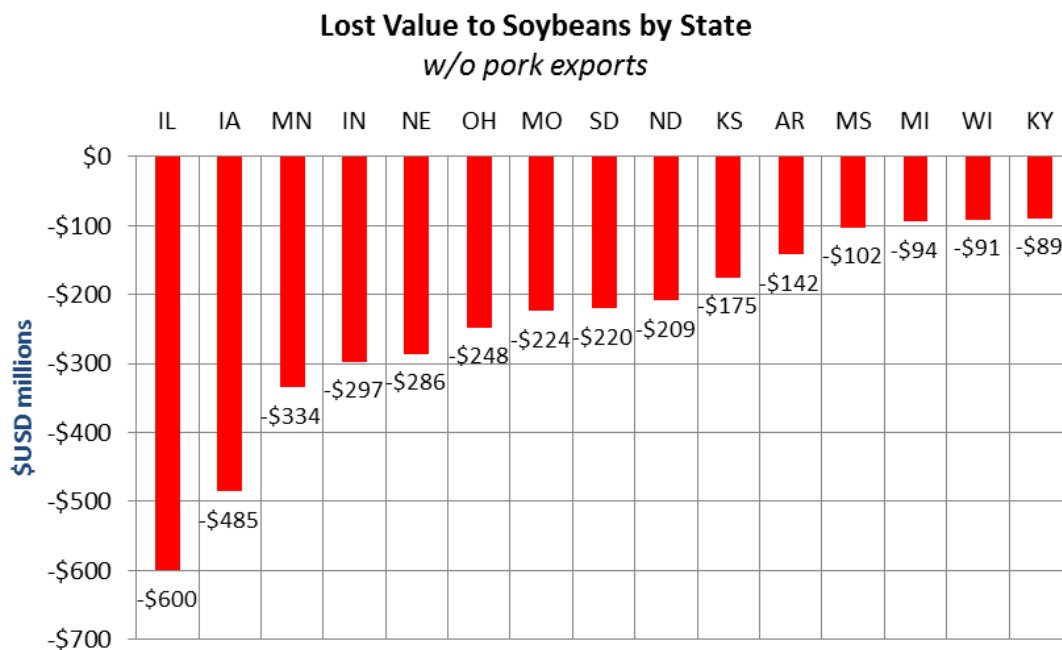
Source: WPI based on USDA WASDE data

Based on the above calculation of red meat exports on corn price, **corn growers would have lost about \$5.7 billion in value in 2018 were there no beef and pork exports.** Below is a breakdown of those projected losses by state.



Source: WPI, USDA

Similarly based on the above calculation of red meat exports on soybean price, **soybean growers would have lost about \$3.9 billion in value in 2018 were there no pork exports.** Below is a breakdown of those projected losses by state.



Source: WPI, USDA

## Red Meat Exports Impact on DDGS and Ethanol

Beef and pork exports also have a direct impact on the utilization and value of DDGS. Overall, the value of DDGS sold for feed to livestock in 2018 represented more than 24 percent of the value of ethanol per bushel of corn.

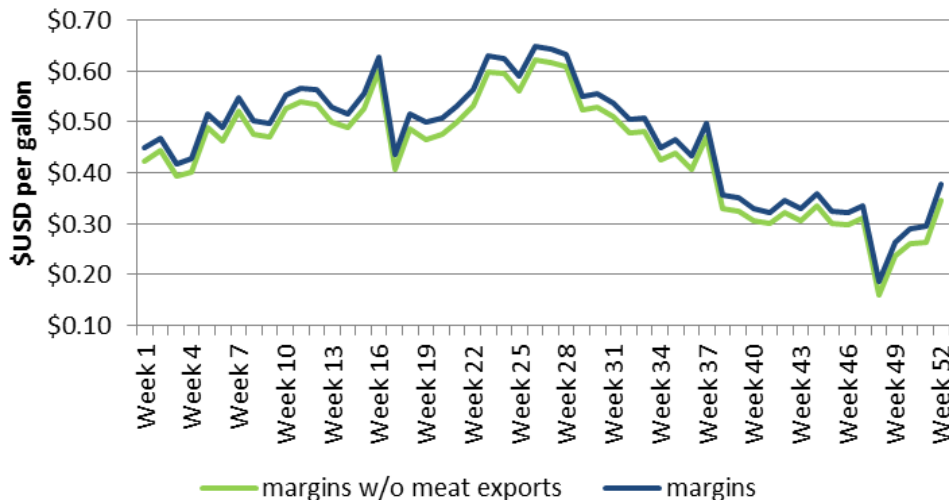
Inputs for ethanol		
Corn \$/bu	\$3.40	
Natural Gas \$/MMBtu	\$4.07	
Output of Ethanol Mill per bu of corn	w/ DDGS	w/o DDGS
Ethanol	\$3.69	\$3.69
DDGS	\$1.25	-
Distillers oil	\$0.15	\$0.15
Gross Margin	\$1.10	-\$0.04

FOB Iowa ethanol plant, weekly input costs and margins 2018.

Source: USDA, WPI, Iowa State University

Beef and pork exports in 2018 represent about \$291 million in value to DDGS. Eliminating the demand for the more than 2 million tons of DDGS utilized by beef and pork exports from the 31 million ton total DDGS feed demand means somewhere between \$0.025 and \$0.03 per gallon gross margin for ethanol mills.

### WPI Estimated Gross Margins for Ethanol in 2018



Source: WPI, USDA, Iowa State University

## Economic Impact of 2018 Meat Exports

In 2018, U.S. beef and pork exports used:

- ❖ **459.7 million bushels of corn** – with a market value of **\$1.62 billion** at the year-average market price
- ❖ **2 million tons of DDGS** – with a market value of **\$291 million** at the year-average market price

Combined, meat exports accounted for a combined corn and DDGS total of 14.9 million tons of feed use, which represents **3.94 million acres of production** for corn and DDGS bushel-equivalent.

Pork exports in 2018 also used:

- ❖ **2 million tons of soybean meal**, which is the equivalent of **84.2 million bushels of soybeans** – with a market value of **\$783 million** at the year-average market price

The soybean meal use represents another **1.6 million acres of production** for soybeans.

To put the above figures in context, the chart below shows the growth in corn and soybean meal demand driven by meat exports calculated in this 2018 analysis compared to the findings of the original study based on 2015.

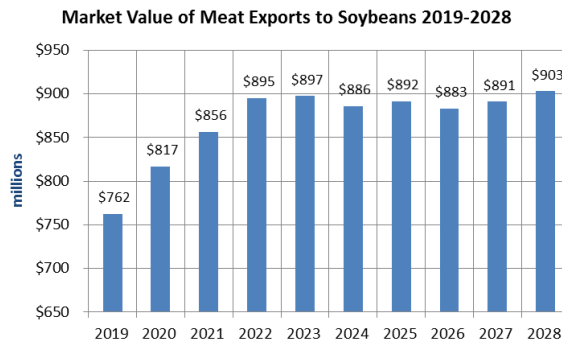
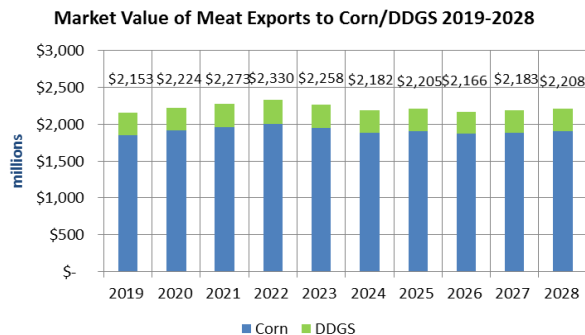
<b>Growth in Feed Use Feed from Meat Exports</b>			
<b>Category</b>	<b>2018</b>	<b>2015</b>	<b>Percent Change</b>
Total Feed Use	16.64 mln tons	13.4 mln tons	24%
Corn	460 mln bu	355 mln bu	29%
DDGS	2 mln tons	1.48 mln tons	35%
Soybean meal	2 mln tons	1.67 mln tons	19.5%
Acres (corn and soybean)	5.45 mln	4.56 mln	19%

Source: WPI, USDA

## Long Term Market Impact of Meat Exports

Over the baseline period 2019-2028, beef and pork exports are projected to result in the use of corn and DDGS with a combined cumulative **market value totaling \$22.2 billion**; \$19.1 billion for corn and \$3.1 billion for DDGS.

Pork exports use of soybean meal over the 2019-2028 period are projected to use the **soybean bushel equivalent of \$8.68 billion market value**. Moreover, from 2019 to 2028, soybean indirect exports through pork will be the fastest growing category of exports at a rate of 12 percent, compared to 8 percent for soybeans and 3 percent for soybean meal. In all, more than a third of the growth in exports of soybeans will come from pork exports.



Source: WPI, USDA

A state-by-state breakdown for the top corn and soybean producing states of the forecast market value generated by meat exports is detailed in the following two tables.

<b>Forecast Market Value of Meat Exports to Corn and DDGS 2019-2028 by State</b> <i>in millions</i>			
<b>State</b>	<b>Corn</b>	<b>DDGS</b>	<b>Total</b>
Iowa	\$3,408	\$815	\$4,223
Illinois	\$2,879	\$347	\$3,226
Nebraska	\$2,202	\$437	\$2,639
Minnesota	\$1,936	\$245	\$2,181
Indiana	\$1,222	\$229	\$1,451
South Dakota	\$963	\$214	\$1,177
Kansas	\$898	\$96	\$994
Ohio	\$725	\$109	\$833
Missouri	\$723	\$50	\$772
Wisconsin	\$667	\$115	\$781
North Dakota	\$587	\$93	\$680
Kentucky	\$287	\$7	\$294

Source: WPI, USDA

Forecast Market Value of Pork Exports to Soybeans 2019-2028 by State in millions	
State	Soybeans
Illinois	\$1,198
Iowa	\$965
Minnesota	\$669
Indiana	\$591
Nebraska	\$568
Ohio	\$498
Missouri	\$443
South Dakota	\$436
North Dakota	\$420
Kansas	\$350
Arkansas	\$280
Mississippi	\$202
Michigan	\$187
Wisconsin	\$50
Kentucky	\$48

Source: WPI, USDA

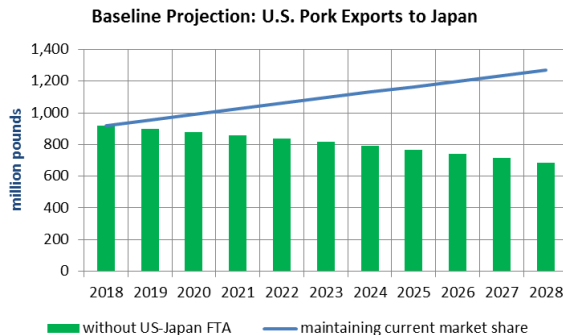
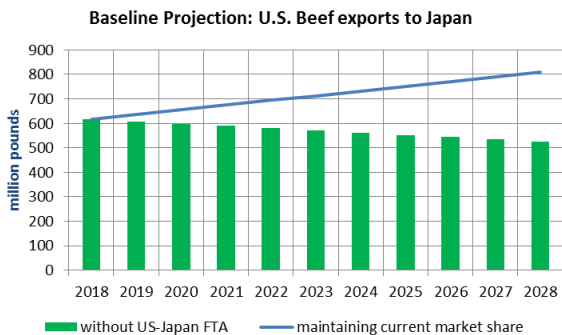
## Conclusion: Importance of Maintaining Market Access

Japan is the most important market for U.S. red meat exports: it ranks first in value for both beef and pork, and first in volume for beef and second in volume for pork. In 2018:

- ❖ U.S. beef comprised 48 percent of Japan's imports, up 7 percent in volume over 2017 and up 10 percent in value at **\$2 billion**
- ❖ U.S. pork comprised 31 percent of Japan's imports, up one percent in volume and value, totaling **\$1.66 billion**.

However, given Japan's membership in the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), as well as the existing Japan-EU Economic Partnership (EPA), U.S. meat exports are now at a tariff disadvantage to product from other exporting nations. The current **tariff disadvantage is between 7.1 and 11.9 percentage points for beef, and between 3.4 and 6.7 percentage points for pork**. That inequity will grow into the future as the CPTPP and EPA continue to phase down tariffs on beef and pork from other exporting countries. As of 1 April 2019, the tariffs under CPTPP and EPA are in the second phase of their scheduled reduction.

Without a U.S.-Japan free trade agreement (FTA) to restore equitable tariff rates and market access in Japan for U.S. beef and pork to that of competing exporters, the U.S. faces a significant loss in market share among beef and pork imports into Japan over the coming 10 years.



Source: USMEF, WPI

Under a scenario where meat exports from the U.S. are subject to an increasing tariff disadvantage over the next 10 years, the total **cumulative volume of beef could be reduced by 1.558 billion pounds** and the **cumulative volume of pork could be reduced by 3.143 billion pounds**.

This loss in market share could directly impact the demand for **more than 237 million bushels of corn** and **1.006 million tons of DDGS** and **1.05 million tons of soybean meal** (44.17 million bushel equivalent of soybeans). Based on the USDA’s forecast average 10-year baseline prices, this volume of potential lost feedstuffs utilization has a projected market value of between \$1 billion and \$1.5 billion.

Potential 2019-2028 Loss of Corn and DDGS from Tariff Disadvantage in Japan			
Feedstuff	Pork	Beef	TOTAL
Corn	172.8 mln bu	64.2 mln bu	237 mln bu
DDGS	282,867 tons	724,000 tons	1.006 mln tons
Soybean Meal	1.05 mln tons		1.05 mln tons

Source: USMEF, WPI, USDA