

Crops Marketing and Management Update

Grains and Forage Center of Excellence

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Vol. 2020 (1)

January 27, 2020

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Topic 1. January WASDE Incorporates Final 2019 Corn and Soybean Production Estimates

The January *Crop Production – Annual Summary* provides the final estimates of the 2019 corn and soybean crops. The market analysts surveyed before report release expected the 2019 corn and soybean crops to shrink from the November projections because of the impacts of the late-planted, late-harvested, and inclement weather during the growing season.

The 2019 corn crop is projected at 13.69 billion bushels, which is a 30-million-bushel increase from the November projections and 197-million-bushels above the market's expectation. The 2019 U.S. corn crop is 648 million bushels less than the 2018 corn crop (Table 1).

USDA did adjust the old-crop corn supply and demand estimates based on the stocks survey also released on January 10, 2020. USDA reduced the size of the 2018 corn crop by 79 million bushels by lowering planted and harvested acreage from 2018. USDA also lowered 2018 feed and residual use by 186 million bushels based on the stocks survey. The net impact on 2018 ending stocks was to increase ending stocks to 2.2 billion bushels (Table 1).

The larger carry-in and larger 2019 corn crop have increased 2019 corn supplies to 15.9 billion bushels. At this point, the 2019 corn supply is 547-million bushels less than the 2018 corn supply (Table 1).

	2016-17	2017-18	2018-19 Estimated	2019-20 Projected	Change from 18-19
Planted Area (million)	94.0	90.2	88.9	89.7	+0.8
Harvested Area (million)	86.7	82.7	81.3	81.5	+0.2
Yield (bushels/acre)	174.6	176.6	176.4	168.0	-8.4
----- Million Bushels -----					
Beginning Stocks	1,737	2,293	2,140	2,221	+81
Production	15,148	14,609	14,340	13,692	-648
Imports	<u>57</u>	<u>36</u>	<u>28</u>	<u>50</u>	+22
Total Supply	16,942	16,939	16,509	15,962	-547
Feed and Residual	5,472	5,304	5,432	5,525	+93
Food, Seed & Industrial	6,883	7,056	6,791	6,770	-21
Ethanol and by-products	5,432	5,605	5,376	5,375	-1
Exports	<u>2,293</u>	<u>2,438</u>	<u>2,065</u>	<u>1,775</u>	-290
Total Use	14,649	14,799	14,288	14,070	-218
Ending Stocks	2,293	2,140	2,221	1,892	-329
Stocks/Use	15.7%	14.5%	15.5%	13.4%	-2.1%
Days of Stocks	57	53	57	49	-8
U.S. Marketing-Year Average Price (\$/bu)	\$3.36	\$3.36	\$3.61	\$3.85	+\$0.24

Source: January 2020 WASDE - USDA: WAOB.

The market now focuses on corn demand, and USDA also increased 2019 total use by 155 million bushels from the December report. Increased feed/residual use more than offsets the lower projected industrial use and export demand.

The net impact on 2019-20 ending stocks is an 18 million-bushel reduction in projected ending stocks from the last report. If realized, 2019 ending stocks are projected to decline by 329 million bushels from the 2018 crop. The stocks-to-use ratio is currently projected at 13.4%. As this ratio decreases, the fundamentals are projected to support a higher U.S. marketing year average (MYA) farm price of \$3.85/bushel (Table 1). History suggests the Kentucky MYA corn price will be \$0.35 to \$0.45 above the U.S. MYA farm price.

Analysts expected the January report to reduce the 2019 soybean crop by 31 million bushels from the November report. USDA surprised the market by increasing the size of the 2019 soybean crop by 8 million bushels from the November report.

	2016-17	2017-18	2018-19 Estimated	2019-20 Projected	Change from 18-19
Planted Area (million)	83.4	90.2	89.2	76.1	-13.1
Harvested Area (million)	82.7	89.5	87.6	75.0	-12.6
Yield (bushels/acre)	52	49.3	50.6	47.4	-3.2
----- Million Bushels -----					
Beginning Stocks	197	302	438	909	+471
Production	4,296	4,412	4,428	3,558	-870
Imports	<u>22</u>	<u>22</u>	<u>14</u>	<u>15</u>	+1
Total Supply	4,515	4,735	4,880	4,482	-398
Crushings	1,901	2,055	2,092	2,105	+13
Exports	2,174	2,129	1,748	1,775	+27
Seed	105	104	89	96	+7
Residual	<u>34</u>	<u>9</u>	<u>43</u>	<u>32</u>	-11
Total Use	4,213	4,297	3,971	4,008	+37
Ending Stocks	302	438	909	475	-434
Stocks/Use	7.2%	10.2%	22.9%	11.9%	-11.0%
Days of Stocks	26	37	84	43	-40.3
U.S. Marketing-Year Average Price (\$/bu)	\$9.47	\$9.33	\$8.48	\$9.00	+\$0.52

Source: January 2020 WASDE - USDA: WAOB.

Compared to 2018, soybean production is projected to be 870 million bushels lower. The large carry-in partially offsets this production loss with 2019 supply projected to be 397 million bushels less than last year (Table 2).

Soybean use is projected to be slightly above last year's use with crushing and exports projected to be 13 and 27 million bushels larger than in 2018. The export project will be scrutinized, given the trade uncertainty, and the market waiting on China to act on the Phase One trade agreement.

USDA projects 2019 ending stocks at 475 million bushels, which would almost be a 50% reduction in stocks from 2018. The 2019 stocks-to-use ratio is projected at 11.9%, which is projected to support a U.S. MYA price of \$9.00/bushel (Table 2).

USDA made minor adjustments to the 2019-20 wheat balance sheet in the January report. The report made no adjustments to the 2019 supply projections. USDA reduced the seed use by 1 million bushels but increased feed use by 10 million bushels from the previous month. The net impact is a 9 million bushel reduction in ending stocks from the previous month.

	2016-17	2017-18	2018-19 Estimated	2019-20 Projected	Change from 18-19
Planted Acres (million)	50.1	46.1	47.8	45.2	-2.6
Harvested Acres (million)	43.9	37.6	39.6	37.2	-2.4
Yield (bushels/acre)	52.7	46.4	47.6	51.7	+4.1
	----- Million Bushels -----				
Beginning Stocks	976	1,181	1,099	1,080	-19
Production	2,309	1,741	1,885	1,920	+35
Imports	118	157	135	105	-30
Total Supply	3,402	3,079	3,119	3,105	-14
Food	949	964	955	955	+0
Seed	61	63	59	60	+1
Feed and Residual	156	51	90	150	+60
Exports	1,055	901	936	975	+39
Total Use	2,222	1,980	2,039	2,140	+101
Ending Stocks	1,181	1,099	1,080	965	-115
Stocks/Use	53.2%	55.5%	53.0%	45.1%	-7.9%
Days of Stocks	194	203	193	165	-29
U.S. Marketing-Year Average Price (\$/bu)	\$3.89	\$4.72	\$5.16	\$4.55	-\$0.61

Source: January 2020 WASDE - USDA WAOB.

USDA currently projects 2019 wheat stocks at 965 million bushels. If realized, wheat stocks will be 115 million bushels less than 2018 ending stocks and will be the smallest level of wheat stocks since the 2014-15 marketing year.

However, the United States has sufficient wheat stocks to withstand a minor production loss for the 2020 wheat crop. The 165-day wheat supply available at the end of the 2019 marketing year will provide a cushion.

The U.S. MYA price is projected lower at \$4.55/bushel, which is a \$0.61/bushel reduction from the 2018-19 U.S. MYA farm price.

Topic 2. 2020 Projected Profitability and Break-Even Analysis: Western Kentucky Corn vs. Soybean

As managers think about 2020, a starting point in preparing marketing and risk management plans is to compare the profitability of corn and soybeans and determine the price needed to cover the budgeted costs. The projected costs of producing corn, soybeans, and second-year corn and soybeans are shown in Table 4.

The budgets use current harvest-time cash forward contract bids as the sales price on January 24, 2020. The yields are the Olympic Average yields reported by the Kentucky Farm Business Management (KFBM) for the Ohio Valley region. Similarly, total variable costs reflect input costs for typical Ohio Valley grain farms as communicated by KFBM specialists.

Table 4 compares the returns for rotation corn, second-year corn assuming a 6% yield drag, rotation soybeans, and second-year soybeans assuming a 2.5% yield drag. Corn has the largest return over total budgeted costs. The market is currently not bidding for second-year corn or second-year soybeans at a price that compensates for increased production costs and the yield drag.

Given the assumptions for costs and yields, the price needed to cover total budgeted rotation corn and rotation soybean costs is \$3.67 and \$9.02 per bushel, respectively (Table 4). Managers should perform sensitivity analysis on this break-even price by changing the yield and other costs to better understand the prices needed from the market to be profitable in 2020.

	<u>Rotation Corn</u>	<u>2nd Year Corn 94%</u>	<u>Rotation Beans</u>	<u>2nd Year Beans</u>
Harvest Forward Contract Price	\$3.80	\$3.80	\$9.15	\$9.15
Yield	<u>185.0</u>	<u>174.1</u>	<u>55.0</u>	<u>53.6</u>
Revenue	\$704	\$662	\$503	\$491
Total Variable Costs (TVC)	<u>\$426</u>	<u>\$444</u>	<u>\$264</u>	<u>\$284</u>
Return over TVC	<u>\$278</u>	<u>\$218</u>	<u>\$239</u>	<u>\$207</u>
Rent	<u>\$185</u>	<u>\$185</u>	<u>\$185</u>	<u>\$185</u>
Return over TVC+Rent	\$93	\$33	\$54	\$22
Overhead	<u>\$68</u>	<u>\$68</u>	<u>\$47</u>	<u>\$47</u>
Return over Budgeted Costs	\$25	-\$35	\$7	-\$25
Break-Even Price over Budgeted Costs	\$3.67	\$4.00	\$9.02	\$9.62
Break-Even Yields over Budgeted Costs	178.5	183.2	54.2	56.4

A question I receive in Extension meetings at this time of the year is, "What price do I need from soybeans to be as profitable with corn (or vice versa)?" This question is easy to answer and can be calculated easily using the budgets in Table 4.

Table 5. Break-Even Price, which makes Rotation Soybeans and Second-Year Soybeans as Profitable as Rotation Corn in Western Kentucky in 2020.					Table 6. Break-Even Yields, which makes Rotation Soybeans and Second-Year Soybeans as Profitable as Rotation Corn for Western Kentucky in 2020.				
If the Corn Price is:		Break-Even Price for Same Return			If the Corn Yield is:		Break-Even Yield for Same Return		
Price Corn	2nd Year Corn 94%	Rotation Soybeans	2nd Year Soybeans	Yield Corn	2nd Year Corn 94%	Rotation Soybeans	2nd Year Soybeans		
\$3.55	\$3.87	\$8.61	\$9.21	170	175	51	53		
\$3.65	\$3.98	\$8.95	\$9.55	175	180	53	55		
\$3.75	\$4.09	\$9.29	\$9.90	180	185	55	57		
\$3.85	\$4.19	\$9.62	\$10.24	185	190	57	59		
\$3.95	\$4.30	\$9.96	\$10.59	190	195	59	61		
\$4.05	\$4.41	\$10.30	\$10.93	195	200	61	63		
\$4.15	\$4.51	\$10.63	\$11.28	200	205	63	65		
\$4.25	\$4.62	\$10.97	\$11.62	205	210	65	67		
\$4.35	\$4.72	\$11.30	\$11.97	210	215	67	69		
\$4.45	\$4.83	\$11.64	\$12.31	215	220	69	72		
\$4.55	\$4.94	\$11.98	\$12.66	220	225	71	74		

Assuming the costs and yields from Table 4, the prices that make rotation soybeans and second-year soybeans, as profitable as rotation corn and second-year corn are shown in Table 5. If rotation corn is sold at \$3.95 per bushel, then rotation soybeans are as profitable as rotation corn at a price of \$9.96 per bushel, while second-year soybeans need a price of \$10.59 per bushel for the same profitability. If rotation corn is sold at \$4.15 per bushel, then soybeans sold at \$10.63 would have the same profitability (Table 5). The soybean market needs confirmation of improved exports to China to provide the potential of higher prices.

Table 6 uses the prices and costs from Table 4 to calculate the break-even yields that makes soybeans as profitable as corn. If rotation corn yields are typically 190 bushels per acre, then rotation soybeans and second-year soybeans must yield 59 and 61 bushels, respectively, to be as profitable as rotation corn. Similarly, soybeans must yield 63 and 65 bushels to be as profitable as 200-bushel corn (Table 6).

This analysis is to motivate managers to use their own cost information for the 2020 crops along with their knowledge of typical yields to understand which crop enterprise may be more profitable. Regardless of the 2020 crop-mix, managers should monitor the markets for pricing opportunities, which may occur before the seed leaves the bag.

Topic 3. 2019 Corn, Soybean and Wheat Basis vs. Previous Years

Figure 1, Figure 2, and Figure 3 show the monthly average corn, soybean, and wheat spot basis, respectively, for twelve Western Kentucky markets. For each figure, the red line is the basis for the 2016 crop. The green line is the 2017 basis, while the black line represents the 2018 basis. The blue triangles represent the 2019 basis.

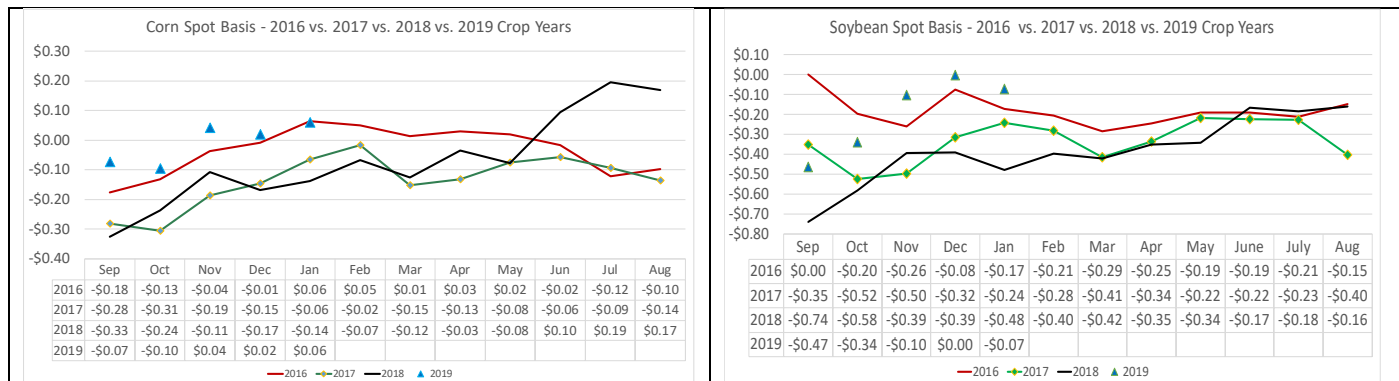
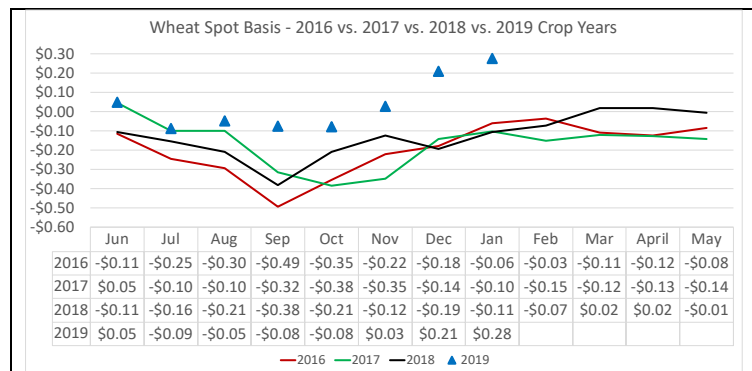


Figure 1. Western Kentucky Corn Spot Market Basis Appreciation from September to August for the 2016 to 2019 Crop Years.
Basis Calculated on January 24, 2019

Figure 2. Western Kentucky Soybean Spot Market Basis Appreciation from September to August for the 2016 to 2019 Crop Years.
Basis Calculated on January 24, 2019

The corn basis is \$0.06/bushel above the March corn contract, which is a \$0.20/bushel increase from the 2018 basis in January. Last year, the corn basis appreciated from October to February by \$0.17/bushel, which was \$0.12/bushel less than the amount of appreciation in the basis for the 2017 corn crop from harvest to February. The current corn basis appreciation for the 2019 corn crop is \$0.16/bushel (Figure 1).

The average soybean basis, as of January 24, 2019, was -\$0.07/bushel under the March 2020 soybean contract. The basis is \$0.41 per bushel narrower than the 2018 basis in January (Figure 2). Last year, the basis appreciated \$0.18/bushel from October to February, but the 2017 crop's basis appreciated \$0.24/bushel from harvest to February. For the 2019 crop, the appreciation from October is \$0.27 (Figure 2).



The average wheat spot basis has been strengthening since January 2019. The average basis for the 2018 crop (black line) has been narrower than the 2017 crop since March 2018 and is much stronger than the basis for the 2016 wheat crop.

The 2019 wheat basis is +\$0.28/bushel above the March futures contract. The 2019-wheat basis is still narrower than the basis for 2018, 2017, and 2016 crops in January. Managers using HTA contracts for 2020 wheat should monitor the basis for opportunities to fix the basis at stronger levels than previous crop year's basis.

Figure 3. Western Kentucky Wheat Spot Market Basis Appreciation from June to May for the 2016 to 2019 Crop Years.
Basis Calculated on January 24, 2019

Topic 4. 2019 Projected Return to Storage for Corn and Soybeans

Table 7 provides projected returns to on-farm and commercial corn storage from harvest to the following June. The return to on-farm storage is calculated as the deferred price less the harvest price less the monthly opportunity cost less the on-farm storage fee. The harvest price for corn is projected at \$3.63 per bushel. The annual interest rate is 5%, which gives a monthly interest cost of \$0.015/bushel for corn. The corn futures complex closing prices on January 24, 2019, and the five-year average monthly spot basis are used to forecast the most-likely deferred cash prices. The maximum monthly basis is the optimistic basis, and the minimum basis is the pessimistic basis. On-farm storage is charged \$0.127 per bushel, and the return to on-farm storage is the return to the farm's drying and storage system.

The projected return to on-farm corn storage, assuming the optimistic basis, is +\$0.17/bushel in January 2020. The combination of an optimistic basis appreciation and carry in the futures market provides even larger projected returns to on-farm storage into spring 2020, with a potential return of \$0.28/bushel in May 2020 (Table 7).

Harvest Cash Price	\$3.63					
	JAN	FEB	MAR	APR	MAY	JUNE
On-Farm Storage Cost (\$/bu)	\$0.17	\$0.19	\$0.20	\$0.22	\$0.23	\$0.25
Commercial Storage (\$/bu)	\$0.25	\$0.31	\$0.38	\$0.44	\$0.51	\$0.57
Most Likely Spot Price Forecast (\$/bu)	\$3.86	\$3.89	\$3.91	\$3.94	\$3.99	\$4.03
Conservative Spot Forecast (\$/bu)	\$3.74	\$3.81	\$3.78	\$3.80	\$3.90	\$3.92
Optimistic Spot Forecast (\$/bu)	\$3.97	\$3.95	\$4.02	\$4.05	\$4.14	\$4.12
Returns to On-Farm Storage	+\$0.06	+\$0.08	+\$0.08	+\$0.10	+\$0.13	+\$0.15
Conservative	-\$0.06	-\$0.01	-\$0.05	-\$0.05	+\$0.04	+\$0.05
Optimistic	+\$0.17	+\$0.13	+\$0.19	+\$0.21	+\$0.28	+\$0.25
Returns to Commercial Storage	-\$0.01	-\$0.04	-\$0.09	-\$0.12	-\$0.14	-\$0.17
Conservative	-\$0.14	-\$0.13	-\$0.22	-\$0.27	-\$0.23	-\$0.28
Optimistic	+\$0.10	+\$0.01	+\$0.02	-\$0.01	+\$0.01	-\$0.07

Harvest Cash Price	\$8.83					
	JAN	FEB	MAR	APR	MAY	JUNE
On-Farm Storage Cost (\$/bu)	\$0.24	\$0.27	\$0.31	\$0.35	\$0.38	\$0.42
Commercial Storage (\$/bu)	\$0.41	\$0.50	\$0.53	\$0.57	\$0.61	\$0.64
Most Likely Spot Price Forecast (\$/bu)	\$8.90	\$8.90	\$8.95	\$8.98	\$9.15	\$9.21
Conservative Spot Forecast (\$/bu)	\$8.54	\$8.62	\$8.73	\$8.80	\$8.95	\$9.07
Optimistic Spot Forecast (\$/bu)	\$9.20	\$9.23	\$9.31	\$9.31	\$9.54	\$9.53
Returns to On-Farm Storage	-\$0.16	-\$0.20	-\$0.19	-\$0.19	-\$0.06	-\$0.04
Conservative	-\$0.52	-\$0.48	-\$0.40	-\$0.37	-\$0.26	-\$0.18
Optimistic	+\$0.14	+\$0.13	+\$0.17	+\$0.13	+\$0.32	+\$0.28
Returns to Commercial Storage	-\$0.34	-\$0.43	-\$0.41	-\$0.42	-\$0.28	-\$0.26
Conservative	-\$0.70	-\$0.70	-\$0.63	-\$0.59	-\$0.48	-\$0.40
Optimistic	-\$0.04	-\$0.09	-\$0.05	-\$0.09	+\$0.10	+\$0.06

Projected on January 24, 2020.

Projected on January 24, 2020.

The return to commercial corn storage is the deferred price less the harvest price, interest costs, and commercial storage fees. Commercial storage is assumed at \$0.20/bushel from harvest to January 31, with an additional \$0.05/bushel per month starting in February. The projected commercial storage return is +\$0.10/bushel in January, assuming the optimistic basis and the current carry in the futures market. Commercial storage returns decline when the additional monthly charge begins in January (Table 7).

The projected on-farm and commercial storage returns for soybeans are presented in Table 8. The harvest price for soybeans is projected at \$8.83 per bushel, with a monthly interest cost of \$0.037/bushel. The five-year average monthly spot basis is used to forecast the most-likely deferred cash prices. The maximum monthly basis is the optimistic basis, and the minimum basis is the pessimistic basis. On-farm storage is charged \$0.127 per bushel, and the return to on-farm storage is the return to the farm's storage system.

Assuming the most likely basis and the current carry in the soybean futures market, the return to on-farm storage is -\$0.16/bushel in January 2020 (Table 8). Soybean basis has been wider than average for the 2017 and 2018 crops, so the conservative basis suggests a return to on-farm storage of -\$0.52/bushel in January. The optimistic returns might be too optimistic given recent basis appreciation and market fundamentals.

The return to commercial soybean storage is the deferred price less the harvest price, interest costs, and commercial storage fees. Commercial storage is assumed at \$0.30/bushel from harvest to January 31, with an additional \$0.05/bushel per month starting in February. The projections in Table 8 suggest a -\$0.34/bushel return to commercial storage in January 2020 for the most likely basis assumption (Table 8).

Topic 5. Post-Harvest 2019 Corn and Soybean Risk Management Opportunities

Managers storing corn and soybeans to February 2020 may want to consider if the futures or options markets are providing opportunities to protect prices at profitable levels.

Table 9 compares the potential of using hedging, forward contracts, or put options to lock in a return over total economic costs, family living, and on-farm storage. Those farms that produced more than 190-bushel corn in 2019 may be able to lock-in a profit above total budgeted costs. Farms with lower expected yields do not have profitable risk management opportunities at current prices to cover all budgeted costs (Table 9).

Storage Hedge: Feb 2020	Corn			
	170	180	190	200
Yield				
TVC+Rent+Overhead+Family Living (\$/acre)	\$714	\$714	\$714	\$714
TVC+Rent+Overhead+Family Living (\$/bu)	\$4.20	\$3.97	\$3.76	\$3.57
TVC+Rent+OH+Family+\$0.21 storage (\$/bu)	\$4.41	\$4.18	\$3.97	\$3.78
Hedge @ \$3.87+\$0.05 basis = \$3.92	-\$0.49	-\$0.25	-\$0.05	+\$0.14
Forward Contract at \$4.01	-\$0.40	-\$0.17	+\$0.04	+\$0.23
Put: \$3.85 strike @\$0.05 = \$3.85 floor	-\$0.56	-\$0.33	-\$0.12	+\$0.07
Strategies Evaluated on:	January 24, 2020			

Storage Hedge: Feb 2020	Soybeans			
	40	50	60	70
Yield				
TVC+Rent+Overhead+Family Living (\$/acre)	\$532	\$532	\$532	\$532
TVC+Rent+Overhead+Family Living (\$/bu)	\$13.30	\$10.64	\$8.87	\$7.60
TVC+Rent+OH+Family+\$0.27 storage (\$/bu)	\$13.57	\$10.96	\$9.19	\$7.92
Hedge @ \$9.02 + \$0.00 basis = \$9.02	-\$4.55	-\$1.94	-\$0.17	+\$1.10
Forward Contract at \$9.11	-\$4.46	-\$1.85	-\$0.08	+\$1.19
Put: \$9.00 strike @\$0.094 = \$8.91 floor	-\$4.66	-\$2.05	-\$0.28	+\$0.99
Strategies Evaluated on:	January 24, 2020			

Table 10 presents risk management alternatives for storing soybeans from harvest to February 2020. The example varies the harvested yield to illustrate how the break-even price over inputs, rent, overhead, family living, and storage changes with yield.

The example illustrates that a yield greater than 60-bushels is needed to lock in a profit using forward contracts. Table 10 also demonstrates that farmers harvesting lower yields will be challenged to find profitability at current prices and the assumed costs.

Topic 6. Projected Corn, Soybean, and Wheat Futures Trading Ranges to July 2020

Figures 4–6 provide the projected futures price trading range by futures contract month, based on the contracts' volatility for the previous 21-day period for corn, soybeans, and wheat. The green lines represent the range that describes the 68% probability of the projected trading range with the red line representing a 95% likelihood of the expected trading range. Notice how these projections fan out for the contracts that will expire later in 2020. That is because there is more time until the contract's expiration; thus, there is a wider potential trading range for these deferred futures contracts.

Figure 4. Corn Futures Closing Price 68% Probability (Green) and 95% Probability (Red) Trading Range.

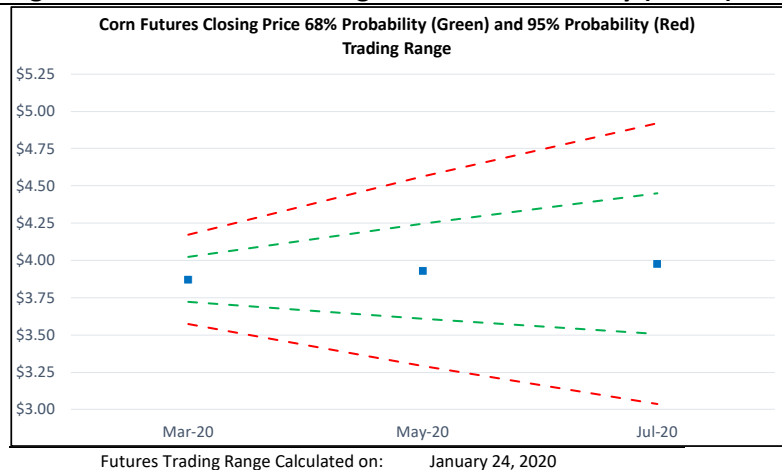


Figure 4 provides the probabilistic trading range for the corn futures contracts from March 2020 to July 2020. There is a 68% probability that the March 2020 corn contract will trade between \$3.72 and \$4.02 and a 95% probability that the March 2020 corn contract will trade between \$3.57 and \$4.17. Managers considering storing corn into late spring 2020 should monitor the July 2020 contract, which has a 68% probability of trading between \$3.51 and \$4.45 per bushel. The July 2020 corn contract has a 95% probability of trading between \$3.04 and \$4.92 per bushel, which reflects the volatility in the corn futures contracts for the deferred months (Figure 4).

Trading range calculated on January 24, 2020, using the average volatility of the previous 21-day period. The 68% probability range is the closing futures price on January 24, 2020, plus and minus one standard deviation. The 95% probability range is the closing price plus and minus two standard deviations.

Figure 5. Soybean Futures Closing Price 68% Probability (Green) and 95% Probability (Red) Trading Range.

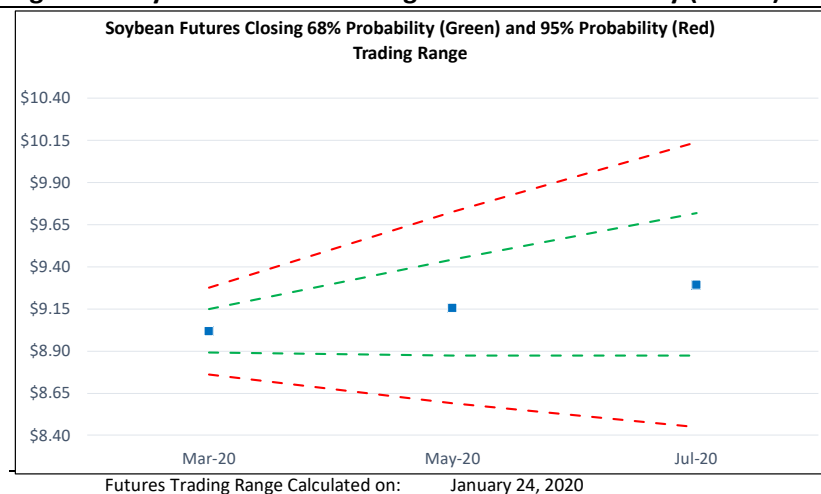


Figure 5 provides the probabilistic trading range for soybean futures contracts from January 2020 to July 2020. Managers planning to store soybeans into the new-year should monitor the March 2020 soybean contract. The March 2020 contract has a 68% probability of trading between \$8.89 and \$9.15 per bushel. The July 2020 soybean contract has a 68% probability of trading between \$8.87 and \$9.15 per bushel (Figure 5).

Trading range calculated on January 24, 2020, using the average volatility of the previous 21-day period. The 68% probability range is the closing futures price on January 24, 2020, plus and minus one standard deviation. The 95% probability range is the closing price plus and minus two standard deviations.

Figure 6. Wheat Futures Closing Price 68% Probability (Green) and 95% Probability (Red) Trading Range.

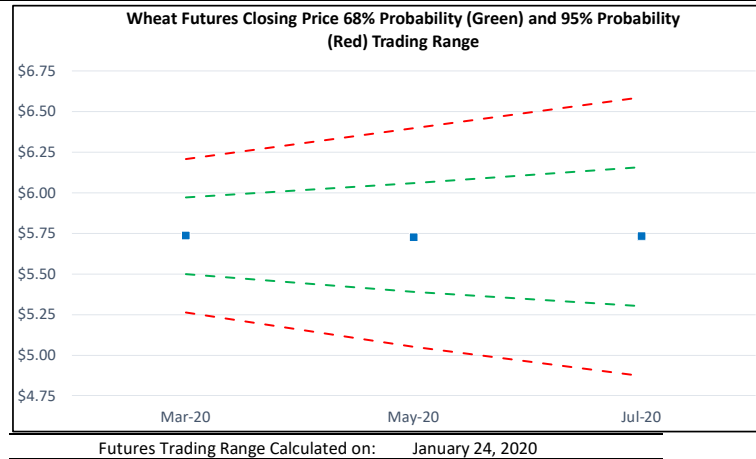


Figure 6 provides the probabilistic trading range for the wheat futures contract from March 2020 to July 2020 contracts. The March 2020 contract has a 68% chance of trading between \$5.50 and \$5.97/bushel. The July 2020 Futures contract has a 68% probability of trading between \$5.30 and \$6.16 per bushel and should be considered as a tool to manage price risk for producers growing wheat for 2020 (Figure 6).

Trading range calculated on January 24, 2020, using the average volatility of the previous 21-day period. The 68% probability range is the closing futures price on January 24, 2020, plus and minus one standard deviation. The 95% probability range is the closing price plus and minus two standard deviations.

Topic 7. Pre-Harvest 2020 Corn, Soybean, Wheat and Double-Crop Soybean Risk Management Opportunities

Tables 11-14 analyze the effectiveness of using hedging with futures, forward contracts, and put options in protecting revenue that covers total input costs, cash rent, overhead, and family living for corn, soybeans, and double-crop soybeans in 2020. Managers should monitor the futures market for opportunities because sometimes the best pricing opportunities occur several weeks before planting. These examples are provided to help raise awareness of risk management opportunities available now for managers planning their 2020 production. I am using the same costs as 2019 because I do not anticipate input costs or rental rates to decline significantly from 2019.

Table 11 presents risk management alternatives for Western Kentucky corn production for 2020. Several yield projections are provided to show what yield is needed to find profitable pricing opportunities. Three risk management alternatives are compared. The first marketing alternative is to hedge with commodity futures, or HTA contracts, that would lock in an expected cash price at \$3.68/bushel assuming a -\$0.30/bushel harvest-time basis. The second alternative is to lock in a cash price through a forward contract at \$3.76/bushel. The third alternative is to establish a price floor at \$3.44/bushel by buying a put option with a \$4.00 strike price that costs \$0.26 (Table 11).

Table 11. Risk Management Alternatives for 2020 Western Kentucky Corn for Various Yield Objectives.

	150	160	170	180	190	200
Yield	150	160	170	180	190	200
TVC+Rent+Overhead+Family Living (\$/acre)	\$714	\$714	\$714	\$714	\$714	\$714
TVC+Rent+Overhead+Family Living (\$/bu)	\$4.76	\$4.46	\$4.20	\$3.97	\$3.76	\$3.57
Hedge @ \$3.98+ -\$0.30 basis = \$3.68	-\$1.08	-\$0.78	-\$0.52	-\$0.28	-\$0.08	+\$0.11
Forward Contract at \$3.76	-\$1.00	-\$0.71	-\$0.44	-\$0.21	-\$0.00	+\$0.19
Put: \$4.00 strike @\$0.263 = \$3.44 floor	-\$1.32	-\$1.03	-\$0.76	-\$0.53	-\$0.32	-\$0.13
Strategies Evaluated on:	January 24, 2020					

Table 11 demonstrates that risk management opportunities only exist to lock in a profit above total economic costs and family living if yields exceed 190-bushels. If demand increases and continues into the 2020 marketing year, the December 2020 corn futures contract may increase to a price level that provides profitable risk management opportunities for lower expected yields.

Table 12 illustrates the risk management potential for full-season soybeans in 2020. Current prices are providing an opportunity to lock in a return over total economic costs plus family living for yields of 70 bushels/acre or greater.

The November 2020 contract has ebbed and flowed higher and lower since September 2019. On September 6, 2019, the November 2020 contract closed at \$9.25 ½ and then rallied to \$9.74 ¼ on October 24, 2019. The contract declined to \$9.25 ½ on December 3, 2019, before rallying again to \$9.80 ¾ on January 2, 2020. It then traded lower to \$9.38 ¾ on January 24, 2020. Two opportunities to hedge above \$9.70/bushel have passed so far this year.

Yield	<u>45</u>	<u>50</u>	<u>55</u>	<u>60</u>	<u>65</u>
TVC+Rent+Overhead+Family Living (\$/acre)	\$532	\$532	\$532	\$532	\$532
TVC+Rent+Overhead+Family Living (\$/bu)	\$11.82	\$10.64	\$9.67	\$8.87	\$8.18
Hedge @ \$9.39 + -\$0.40 basis = \$8.99	-\$2.83	-\$1.65	-\$0.69	+\$0.12	+\$0.80
Forward Contract at \$9.08	-\$2.75	-\$1.57	-\$0.60	+\$0.21	+\$0.89
Put: \$9.40 strike @\$0.45 = \$8.55 floor	-\$3.27	-\$2.09	-\$1.12	-\$0.32	+\$0.37
Strategies Evaluated on:	January 24, 2020				

Yield	<u>80</u>	<u>85</u>	<u>90</u>	<u>95</u>	<u>100</u>
TVC+50% Rent+Overhead+Family Living (\$/acre)	\$470	\$470	\$470	\$470	\$470
TVC+50% Rent+Overhead+Family Living (\$/bu)	\$5.88	\$5.53	\$5.22	\$4.95	\$4.70
Hedge @ \$5.73 + \$0.15 basis = \$5.88	+\$0.01	+\$0.35	+\$0.66	+\$0.93	+\$1.18
Forward Contract at \$6.04	+\$0.17	+\$0.51	+\$0.82	+\$1.09	+\$1.34
Put: \$5.70 strike @\$0.312 = \$5.54 floor	-\$0.34	+\$0.01	+\$0.32	+\$0.59	+\$0.84
Strategies Evaluated on:	January 24, 2020				

Table 13 illustrates the risk management potential for wheat in 2020. The costs in Table 13 assume that rent and family living expenses are split evenly between wheat and double-crop soybeans. Current prices are providing an opportunity to lock in a return over total economic costs plus family living for yields of 85 bushels/acre or larger. Some managers have been able to harvest yields of 90 bushels or better, which suggests an opportunity may exist to manage risk by using cash forward contracts and to lock in a better return.

Yield	<u>35</u>	<u>40</u>	<u>45</u>	<u>50</u>	<u>55</u>
TVC+Rent+Overhead+Family Living (\$/acre)	\$380	\$380	\$380	\$380	\$380
TVC+Rent+Overhead+Family Living (\$/bu)	\$10.86	\$9.50	\$8.44	\$7.60	\$6.91
Hedge @ \$9.3875+ -\$0.40 basis = \$8.99	-\$1.87	-\$0.51	+\$0.54	+\$1.39	+\$2.08
Forward Contract at \$9.08	-\$1.78	-\$0.43	+\$0.63	+\$1.48	+\$2.17
Put: \$9.40 strike @\$0.45 = \$8.55 floor	-\$2.31	-\$0.95	+\$0.11	+\$0.95	+\$1.64
Strategies Evaluated on:	January 24, 2020				

The market is providing an opportunity to protect double-crop soybean risk for those that typically harvest 45-bushel double-crop soybeans or better. The November 2020 soybean futures could rally further if China follows through with their Phase 1 commitment to increase imports of agricultural goods (Table 14).1

Topic 8. When is a Good Time to Consider Hedging Corn and Soybeans?

A question that I am asked during Extension meetings is, "When is a good time to hedge corn and soybeans?" The best time to use either price risk management tool should be based on your marketing plan and the price needed to pay production costs, cash rent, principal and interest payments, family living expenses, and any other expenses that are paid from the farm business. Managers should also understand the seasonality of commodity futures and forward contract bids to know the months that tend to provide pricing opportunities. As managers begin to form their 2020 risk management plan, it is helpful to understand the seasonality of the December corn and November soybean futures contracts for the last five crops to identify when better future prices tend to occur.

Figure 7. December Corn Futures Contract Distribution of Price by Thirds by Month for the 2015 to 2019 Crops.

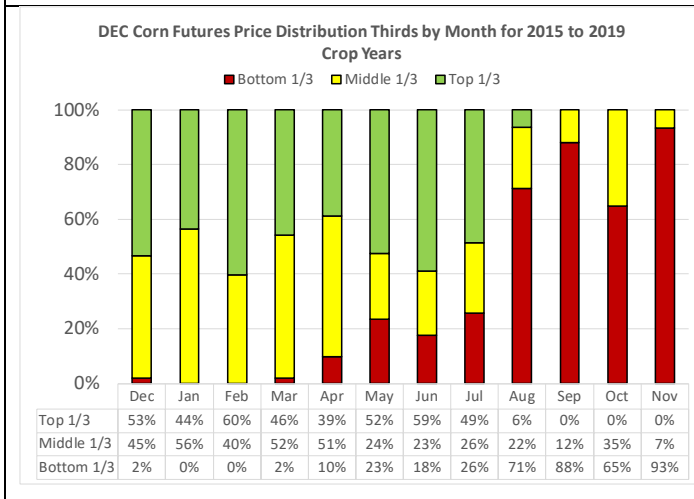


Figure 8. November Soybean Futures Contract Distribution of Price by Thirds by Month for the 2015 to 2019 Crops.

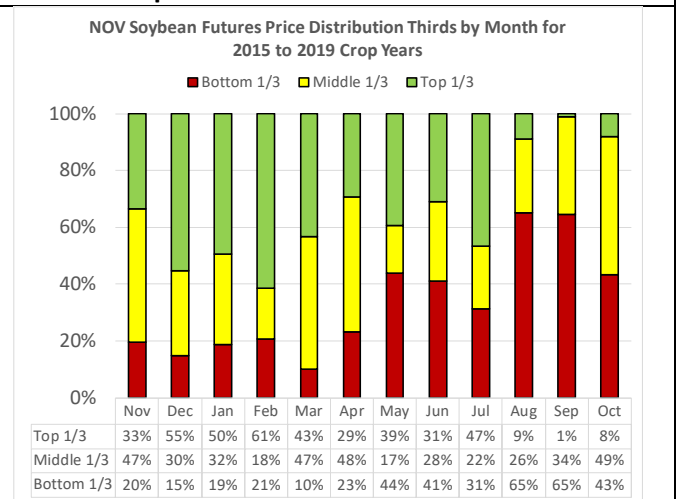


Figure 7 and Figure 8 show the distribution of closing prices each month in the year's top-third (green), middle-third (yellow), and bottom-third (red) ranking for corn and soybeans, respectively, for the 2015 to 2019 crop years. The analysis uses daily futures prices from December the previous year to November of the harvest year for corn and from November to October for soybeans. For each year, the number of days the futures price closed in the year's top-third, middle-third, or bottom-third is calculated for each month.

The green colored bars in Figures 7 and 8 represent the percentage of the days where the futures price closed in the year's top-third price range. For corn, it should not be surprising to see that the top-third prices for the 2015 to 2019 crops were most likely to occur from December to May (Figure 7). A combination of South American weather risk, bidding for the planted area in the United States, and planting-time weather risk kept the futures price trading in the top-third.

There is value in knowing when not to implement a hedge. The red columns in Figure 7 show that once the market knows the size of the corn crop, opportunities to price in the top-third price range declines. Figure 7 shows why managers should avoid selling at harvest unprotected, as they are more likely to receive the low-third price for the year. The futures contract did not close in the top-third range from September to November for the 2015 to 2019 crops.

February tends to be the month when the November soybean contract trades in the top-third of the market (Figure 8). The soybean market tends to offer more opportunities to hedge in the top-third in from December to May than later in the growing season. However, July has offered hedging opportunities because of growing season weather. However, the opportunities to market in the top-third declines after July as production risk is removed.

Topic 9. Combining Crop Insurance and Forward Contracts to Reduce Revenue Risk: Preliminary Game Plans for 2020 Corn, Soybeans, and Wheat

This topic evaluates the potential risk protection provided by combining crop insurance with forward contracts to manage revenue risk for corn (Figure 9), full-season soybeans (Figure 10), wheat (Figure 11), and double-crop soybeans (Figure 12). The analysis uses the corn and soybean costs from Table 4 in Topic 2 (above). The examples assume managers only consider the cash costs with farming. For instance, managers plan on covering 100% of inputs, and 100% of cash overhead costs. The Kentucky Farm Business Management reports indicate the average grain farm owns 25% of their land base, so these examples assume that managers only pay cash rent on 75% of the land farmed. Any grain not sold through the forward contract is assumed to be stored and sold after capturing a \$0.25/bushel price appreciation.

The RP crop insurance projected price is assumed to be \$4.03 per bushel and coverage at the 75% level. The marketing plan is to forward contract 50% of expected production (assuming the expected yield of 185-bushels) at a

price of \$4.00 per bushel. At a harvested yield of 185-bushel (Figure 9 – green line), the return over budgeted costs is a minimum of \$94/acre at a DEC 20 futures price of \$3.22/bushel (\$2.92/bushel cash). If there is a 10% yield loss (Figure 9 – blue line), the maximum loss is \$57/acre at the DEC 20 futures price of \$3.63/bushel (\$3.33/bushel cash). The lines form a “v-shape” which reflects crop insurance indemnities paid from lower prices or yields. The gold-line reflects a 20% yield loss with the lowest return at \$21/acre at a DEC 20 futures price of \$4.03/bushel (\$3.73/bushel cash) (Figure 9). Because these examples ignore the economic costs that contribute family living costs or other debt payments, a 20% yield loss would create liquidity problems and likely reduce working capital or increase debt.

The return over total budgeted soybean costs for full-season soybeans is shown in Figure 10. The cost assumptions for the corn examples are applied for full-season soybeans. The risk management plan is to purchase RP insurance at the 65% coverage level at a projected price of \$9.36/bushel. The marketing plan is to forward contract 50% of expected production (assuming an expected yield of 55 bushels) at a cash price of \$9.20 per bushel. Assuming a -\$0.40/bushel basis, the November 2019 futures price would be \$9.60/bushel to fulfill this marketing objective.

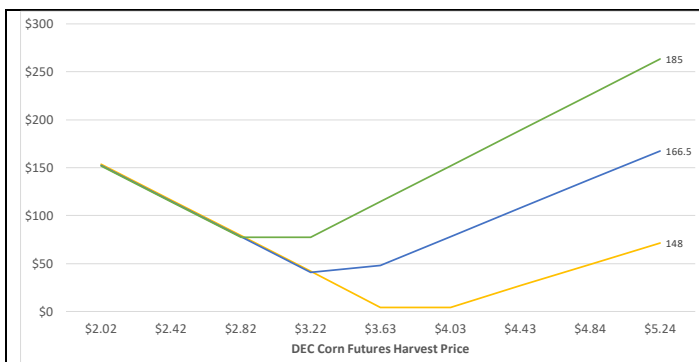


Figure 9. Return over Total Inputs, Land, and Overhead Costs for 2019 Western Kentucky Corn.

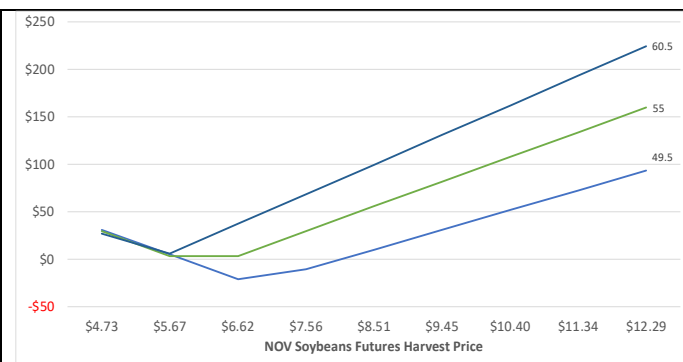


Figure 10. Return over Total Inputs, Land, and Overhead Costs for 2019 Western Kentucky Full Season Soybeans.

For the planned yield of 55 bushels/acre (Figure 10 -- green line), the minimum return over budgeted costs is positive at a futures price of \$6.55/bushel (\$6.15/bushel cash). If the yield is 60.5 bushels (10% higher), the minimum return is at a \$5.62/bushel futures price (\$5.22/bushel cash). If yields are 10% lower at 49.5 bushels/acre (Figure 10 – light blue), then returns are negative for a future price of \$7.49/bushel.

The risk management plan for wheat presented in Figure 11 assumes RP crop insurance was purchased at the 75% coverage level at the projected price of \$4.86/bushel. The returns over budgeted costs in Figure 11 assume a return for the wheat / double-crop soybean enterprise assuming a double-crop soybean yield of 50-bushels. The cost assumptions include covering the cash overhead costs and cash rent on the land base that is rented. Because wheat prices have strengthened recently, the plan is to forward contract 65% of expected production at \$5.95/bushel. The rest is stored for an expected storage gain of \$0.35/bushel.

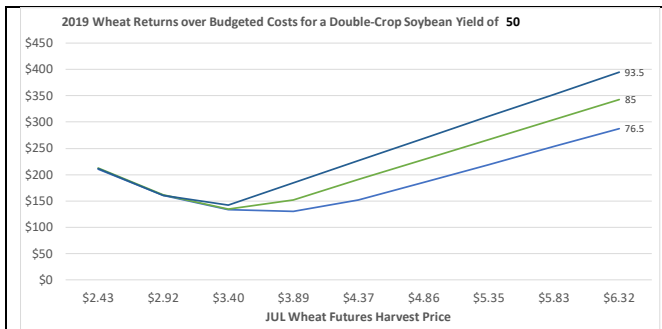


Figure 11. Return over Total Inputs, Land, and Overhead Costs for 2019 Western Kentucky Wheat-DC Soybeans for a Double-Crop Soybean Yield of 50 bushels/acre.

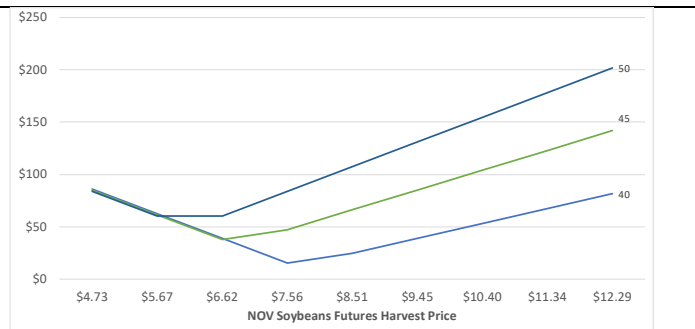


Figure 12. Return over Total Inputs, Land, and Overhead Costs for 2019 Western Kentucky Double-Crop Soybeans.

The graph of the wheat enterprise returns over budgeted costs also includes the revenue from the double-crop soybeans at a yield of 50 bushels/acre. Double-crop soybean revenues are included in the graph to demonstrate how soybean revenue reinforces wheat profitability. For the planned yield of 85-bushels or larger, the wheat/double-crop soybeans enterprise is profitable with the minimum return of \$135/acre at a JUL 20 wheat price of \$3.40/bushel. Even with a 10% yield loss for wheat (76.5 bushels/acre), the enterprise is profitable with the minimum return over total costs of \$130/acre at a \$3.89 JUL 20 price (Figure 11)

Figure 12 shows the full-season soybean risk management plan applied to the double-crop soybean enterprise. The double-crop soybean plan assumes the same RP coverage level as full-season soybeans and the same percentage forward contracted at the same price as full-season soybeans. Because of the lower cost structure, locking in a large percentage of expected production at \$9.20/bushel in the spot market buoys the wheat enterprise. Figure 12 is shown to remind managers of the importance of locking in favorable margins when they exist.

The purpose of this article is to demonstrate how risk management tools can be combined to protect revenue. Unfortunately, there is not a silver bullet cure to provide 100 percent risk protection. Managers should calculate how much working capital is available and gauge how much risk can be absorbed by the farm business. The risk that cannot be absorbed by the farm business should be passed to the insurance market and price risk tools.

Also, remember the seasonality of the corn and soybean market and consider that sometimes better pricing opportunities have occurred in February with the potential of another chance due to production risk from May to July. I encourage you not to pass up a good opportunity now in hopes of something better in the future, especially if liquidity is a problem with your farm business.

Topic 10. July Wheat Trading Days Frequency for the 2016 to 2020 Crop Years

The July 2020 wheat futures contract has been on a roller coaster ride. On July 1, 2019, the contract closed at \$5.44 ¼ and then rallied to \$5.53 on July 12, 2019. The contract then traded lower to \$4.69 ½ on September 3, 2019, before rallying again to \$5.44 on October 18, 2019. Over the following weeks, the contract traded higher to \$5.80 ½ on January 21, 2020, and closed at \$5.73 on January 24, 2020.

One purpose of this newsletter is to help managers identify good marketing and risk management opportunities. Figure 13 demonstrates the frequency of the July contract closing at a price of \$5.65 per bushel or higher by month for the 2016 to 2020 crops as of January 24, 2020.

The challenge managers face when the futures market rallies is deciding when to place a hedge. Some managers fear that they will "miss the boat" of potentially higher prices. Having a perspective of how high the July wheat contract has traded and when these highs have occurred may provide some clarity for this decision.

Figure 13. Frequency of the 2016 to 2020 JUL Wheat Futures Contracts Trading above \$5.50 per Bushel by Month as of January 24, 2020.

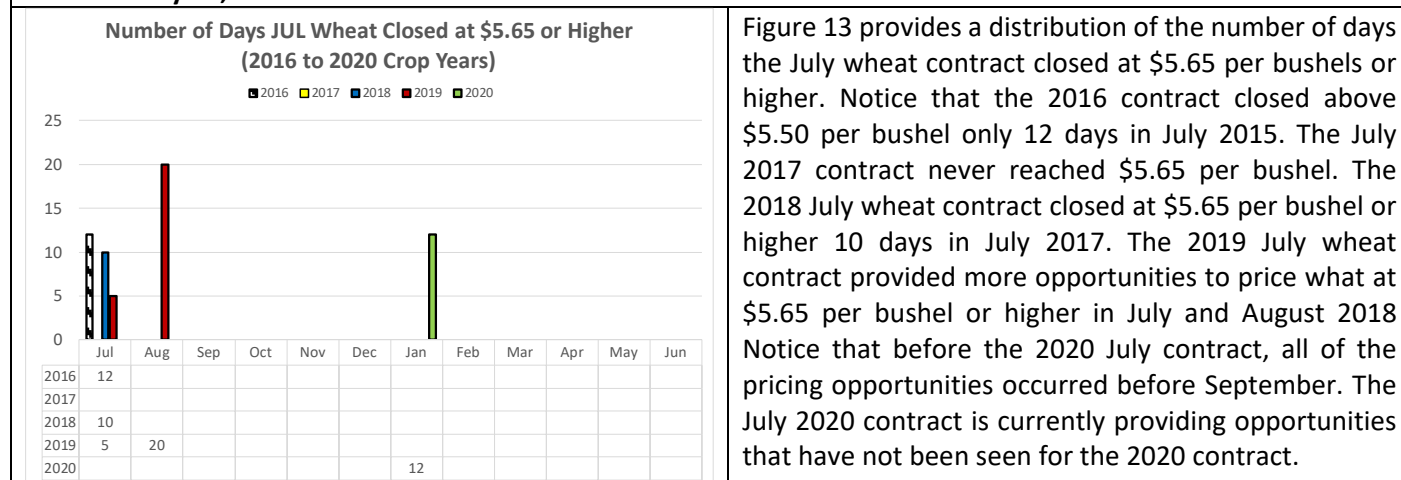


Figure 13 provides a distribution of the number of days the July wheat contract closed at \$5.65 per bushel or higher. Notice that the 2016 contract closed above \$5.50 per bushel only 12 days in July 2015. The July 2017 contract never reached \$5.65 per bushel. The 2018 July wheat contract closed at \$5.65 per bushel or higher 10 days in July 2017. The 2019 July wheat contract provided more opportunities to price what at \$5.65 per bushel or higher in July and August 2018. Notice that before the 2020 July contract, all of the pricing opportunities occurred before September. The July 2020 contract is currently providing opportunities that have not been seen for the 2020 contract.

Managers should know their costs and the price needed to profitable. The market is providing a rare opportunity to price wheat in January. Managers should consider on how removing price risk might help in the farm business profitability and liquidity management.

Topic 11. Beware of Typical Acreage and Normal Yields for 2020 Corn and Soybean Price Potential

This is the time of the year when market analysts try to project what 2020 corn and soybean planted area will be and then forecast ending stocks and the impact on the U.S. marketing year average price.

Over the last five crop years, the sum of planted corn and soybean area plus the prevented planted corn, and soybean area is 180 to 181 million acres. On average, 52% of the area is planted to corn and 48% to soybeans. The trend corn and soybean yields from the November 2019 preliminary *Agricultural Projections* are 178.5 and 50.5 bushels/acre, respectively.

The projections for the 2020 corn balance sheet is based on the January 2020 *WASDE* for the 2019-20 marketing year. If farmers plant the typical corn area and harvest a trend yield, then the 2020 corn crop could exceed 15.3 billion bushels. With carry-in and imports, total corn supply is projected at 17.2 billion bushels (Table 15).

Table 15. Potential 2020 Corn Balance Sheet for Varying Levels of Exports.			Table 15 assumes a slight increase in corn use from 2019 for the feed, FSI, and ethanol demand. The top-four export levels over the last fifteen years are shown in Table 15. If 2020 exports equal the record of 2.4 billion bushels, then an ending stocks of 2.2 billion bushels would support a \$3.70/bushel MYA price. This large year-over-year increase in exports is unlikely. If exports are at the 2.0 to 2.2 billion bushel level, ending stocks could increase to 2.4 to 2.6 billion bushels. The increased stocks would push prices lower to \$3.50 to \$3.60 per bushel.		
	Jan 20 WASDE 2019-20	2020-21 Corn Balance Sheet Assuming Typical Planted Area, Trend Yields, and Varying Total Use			
Planted Area (million)	89.7	94.5			
Harvested Area (million)	81.5	85.9			
Yield	168	178.5			
	----- Million Bushels -----				
Beginning Stocks	2,221	1,892			
Production	13,692	15,326			
Imports	50	50			
Total Supply	15,962	17,268	17,268	17,268	17,268
Feed	5,525	5,775			
FSI - Not Ethanol	1,395	1,400			
Ethanol	5,375	5,400			
Exports	1,775	1,980	2,065	2,293	2,438
Total Use	14,070	14,555	14,640	14,868	15,013
Ending Stocks	1,892	2,713	2,628	2,400	2,255
Stocks-to-Use Ratio	13.4%	18.6%	18.0%	16.1%	15.0%
Days of Stocks	49	68	66	59	55
U.S. MYA Farm Price	\$3.85	\$3.47	\$3.51	\$3.64	\$3.72

The take-away message is that corn stocks could increase significantly without a record level of corn exports. Corn profit margins are likely to be tight, or negative, for the 2020 crop.

A similar analysis is provided for the 2020 soybean balance sheet based on the January *WASDE* projections for the 2020 crop. If farmers plant 86.4 million acres and harvest a trend-yield of 50.5 bushels/acre, the 2020 soybean crop could exceed 4.2 billion bushels. With a carry-in of 475 million bushels and imports of 20 million bushels, the 2020 soybean supply could increase to 4.7 billion bushels (Table 16).

The top-four export quantities over the last fifteen years are shown in Table 16 to illustrate the exports needed to keep soybean stocks to swell from the larger crop. If soybean exports equal the record 2.17 billion bushels, then soybean stocks could potentially decline to 313 million bushels with stocks-to-use declining below 8% and to support a U.S. MYA price above \$10/bushel (Table 16). Just like the corn example, the large year-over-year increase in exports is unlikely. If 2020 exports are at the 1.9 billion bushel level, ending stocks could increase to 551 million bushels. At a 13.1% stocks-to-use ratio, the U.S. MYA price would decline to \$8.75 per bushel (Table 16).


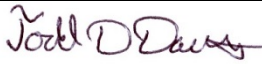

The take-away message of this article is that corn and soybean stocks are likely to increase for the 2020 marketing-year. The analysis assumes trend-yields; however, above-trend yields are possible, and the ending stocks projections could be understated. The projected U.S. MYA price would also be lower than shown in Table 15 and Table 16 if yields are above-trend.

Managers should consider using HTA or forward contracts to lock in favorable prices for bushels to be sold at harvest. A larger crop suggests the harvest-time basis will be wider in 2020 than for the 2019 crop. Managers using HTA contracts should monitor basis and lock in a current narrow basis before the seasonal widening into harvest.

Table 16. Potential 2020 Soybean Balance Sheet for Varying Levels of Exports.					
	Jan 2020 WASDE	2020-21 Soybean Balance Sheet Assuming Typical Planted Area, Trend Yields, and Varying Total Use			
Planted Area (million)	76.1	86.4			
Harvested Area (million)	75	85.4			
Yield	47.4	50.5			
	----- Million Bushels -----				
Beginning Stocks	909	475			
Production	3,558	4,277			
Imports	15	20			
Total Supply	4,482	4,772	4,772	4,772	4,772
Crushing	2,105	2,155			
Seed	96	100			
Residual	32	30			
Exports	1,775	1,843	1,936	2,129	2,174
Total Use	4,008	4,128	4,221	4,414	4,459
Ending Stocks	475	644	551	358	313
Stocks-to-Use Ratio	11.9%	15.6%	13.1%	8.1%	7.0%
Days of Stocks	43	57	48	30	26
U.S. MYA Farm Price	\$9.00	\$8.30	\$8.75	\$9.97	\$10.34

Topic 12. How Do I Get on the Email Distribution List to Receive this Newsletter?

The *Crops Marketing and Management Update* is published monthly, usually after the release of the USDA: WASDE report. You can find this issue and past issue on the U.K. Agricultural Economics Department's website at <http://www.uky.edu/Ag/AgEcon/extcmmu.php>. Email todd.davis@uky.edu to receive the newsletter by email.

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