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Weekly Farm Economics: Yields Below Which ARC-CO Will Make Payments

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This article shows break-even county yields below which Agricultural Risk Coverage at the County Level (ARC-CO) will make payments in 2019. Break-even yields are calculated at USDA's January estimates of Market Year Average (MYA) prices: $3.85 per bushel for corn, $8.40 per bushel for soybeans, and $5.50 per bushel for wheat. For corn, 2019 county yields likely will exceed break-even levels in most Illinois counties, meaning that most Illinois counties will not receive an ARC-CO payment in 2019. More counties could generate soybean ARC-CO payments. ARC-CO will generate 2019 payments for wheat, but PLC payments will exceed ARC-CO payments in most cases.

Break-Even Yield Calculations

ARC-CO will make payments when county revenue is below a county guarantee. The county guarantee equals:

.86 x benchmark yield x benchmark price.

For 2019, the benchmark yield equals the Olympic average of county yields that are trend-adjusted for the years from 2013 to 2017. Figure 1 shows the Olympic average yield for corn grown in McLean County, Illinois. Figure 1 comes from the *2018 Farm Bill What If Tool* (https://farmdoc.illinois.edu/2018-farm-bill), a Microsoft Excel spreadsheet available for download from the *farmdoc* website. The Olympic average for McLean County is 224.8 bushels per acre. The benchmark price is $3.70 per bushel (details on benchmark price calculation are provided in the *2018 Farm Bill What If Tool*). Given the benchmark yield and benchmark price, ARC-CO will make a payment for corn when McLean county revenue is below the guarantee of $862.05 per acre (.86 x 224.8 x 3.70).

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Figure 1. Calculation of Benchmark Yield for Corn in McLean County from 2018 Farm Bill

Year	County Yield[1]	80% of T-yield	Higher of Actual or 80% of T-yield[2]	Number of Years to Trend	Trend Yield Adjustment[4]	Trend Adjusted ARC-CO Yield[5]
	Bu/acre	Bu/acre	Bu/acre		Bu/acre	Bu/acre
2013	196.3	142.4	196.3	6	12.1	208.5
2014	231.2	142.4	231.2	5	10.1	241.3
2015	189.3	142.4	189.3	4	8.1	197.4
2016	227.9	142.4	227.9	3	6.1	233.9
2017	227.9	147.2	227.9	2	4.0	231.9
	Trend Adjustment[3]		2.02		**2019 Benchmark Yield[7]**	**224.8**

[1] Crop yields are from data provided by Risk Management Agency

[2] The higher of county yield or 80% of T-yield

[3] In most cases, trend yield adjustments are the same as used for calculation Trend-Adjusted APH yields for crop insurance.

[4] The trend adjustment times the number of years to trend.

[5] Equals higher of actual yield or 80% of trend yield.

[6] Olympic average of trend adjusted ARC-CO yields. An Olympic average eliminates the high and low values, and then averages the remaining values.

For additional information on ARC-CO see the following article on farmdocDaily:
farmdocDaily, September 17, 2019

County revenue equals the Market Year Average (MYA) price times county yield. At this point, neither the MYA price nor county yield for 2019 are known with certainty. However, USDA currently projects the 2019 MYA price at $3.85 per bushel (see *farmdoc daily*, January 14, 2020). The actual MYA price can vary from this estimate (see *farmdoc daily*, January 14, 2020 for more detail), but 2019 MYA prices are coming into clearer focus.

For a given MYA price, a break-even ARC-CO yield equals:

(.86 x benchmark yield x benchmark price) / Projected MYA price

For corn in McLean County, the break-even yield is 186 bushels per acre (186 = (.86 x 224.8 x 3.70) / 3.85).

Break-even yields were calculated for corn, soybeans, and wheat for all counties where Farm Service Agency (FSA) provided complete yield information for 2019. This information can be downloaded from the linked Break_Even_ARC-CO_Yields_Jan2020 spreadsheet. In developing these estimates, January 2019 MYA prices are used:

- $3.85 per bushel for corn,
- $9.00 per bushel for soybeans, and
- $3.55 per bushel for wheat.

Remaining tables in this article report break-even yields for corn, soybeans, and wheat in Illinois counties.

Corn

For McLean County, the break-even yield is 186 bushels per acre (see Table 1). McLean County has an "all" yield series, not distinguishing between irrigated and non-irrigated production. Many Illinois counties have irrigated and non-irrigated production. For example, Tazewell county has a 188 bushel per acre break-even yield for irrigated production. For non-irrigated production, the break-even yield is 189 bushels per acre. In Table 1, non-irrigated break-even yields are listed in the "all" column.

Table 1. Break-Even Corn Yields Below Which ARC-CO Will Trigger Payments in 2019 Given a MYA Price of $3.85

County	Irr [1]	All [2]	County	Irr [1]	All [2]	County	Irr [1]	All [2]
	bu/acre	bu/acre		bu/acre	bu/acre		bu/acre	bu/acre
Adams	163	158	Hardin		101	Morgan	179	177
Alexander		133	Henderson	172	179	Moultrie		182
Bond		141	Henry	178	178	Ogle		177
Boone		167	Iroquois	154	162	Peoria	186	182
Brown		161	Jackson		142	Perry		120
Bureau	183	183	Jasper		140	Piatt		191
Calhoun		140	Jefferson		122	Pike	183	154
Carroll	177	187	Jersey		162	Pope		131
Cass	183	175	Jo Daviess		161	Pulaski		147
Champaign	174	181	Johnson		124	Putnam		174
Christian		182	Kane		168	Randolph		121
Clark	167	156	Kankakee	163	159	Richland		127
Clay		127	Kendall		172	Rock Island	182	177
Clinton		137	Knox		185	St. Clair		143
Coles		171	Lake		134	Saline		155
Cook		118	LaSalle		184	Sangamon		187
Crawford	170	140	Lawrence	172	132	Schuyler	181	159
Cumberland		155	Lee	172	174	Scott	175	166
DeKalb		173	Livingston		176	Shelby		158
De Witt		182	Logan	191	187	Stark		189
Douglas		177	McDonough		179	Stephenson		169
DuPage		145	McHenry	176	154	Tazewell	188	189
Edgar		166	McLean		186	Union		130
Edwards		134	Macon		184	Vermilion	157	169
Effingham		148	Macoupin		163	Wabash	158	144
Fayette		144	Madison		151	Warren		188
Ford	178	169	Marion		128	Washington		131
Franklin		133	Marshall	189	184	Wayne	158	123
Fulton		171	Mason	178	171	White	170	148
Gallatin	168	161	Massac	136	140	Whiteside	180	174
Greene	179	163	Menard	184	180	Will		149
Grundy		179	Mercer	174	180	Williamson		136
Hamilton		143	Monroe	158	132	Winnebago		161
Hancock	179	175	Montgomery		161	Woodford		185

[1] Irrigated yield.

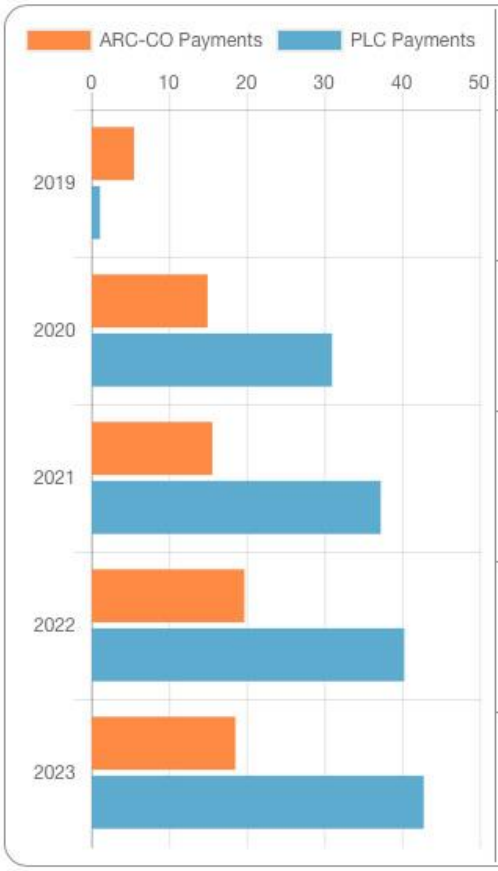
[2] This yield is the non-irrigated yield if there is a irrigated yield or "all" yield if no irrigated yield.

For corn, the projected MYA price of $3.85 is well above the $3.70 effective reference price that triggers Price Loss Coverage (PLC) payments. As a result, there is very little chance of PLC payments. Given historical changes, there is an 11 percent chance of PLC payments in 2019 (see *farmdoc daily*, January 14, 2020).

While planted late, 2019 corn yields for planted corn were relatively good, and for most counties will likely exceed the break-even levels shown in Table 1. However, there will be a minority of counties that have county yields below the break-even levels, most likely in the northern and southern parts of Illinois where wet weather and late planting were more severe. County yields used by FSA in calculating ARC-CO payments will be based on planted acres. Counties with a great deal of failed acres could have lower yields.

The *Gardner ARC/PLC Payment Calculator* (https://fd-tools.ncsa.illinois.edu) estimates the probabilities of payments for 2019 for most, major-producing counties. For McLean County, as well as all U.S. counties, the chance of a 2019 PLC payment for corn is 13% (see Figure 1). By happenstance, the chance of a 2019 ARC-CO payment for corn in McLean County also is 13%. Some combination of lower county yields than expected or lower MYA prices could result in an ARC-CO payment for corn in McClean County.

Figure 2. Output from the Gardner ARC/PLC Payment Calculator for Corn in McClean County in January 2020



Expected Payment ($)	Likelihood of Payment (avg)	Payment Distributions	MYA Price ($)	Expected Yield (bushel/acre)
$5.51 $1.13	13% 13%		$3.85	210.7
$14.98 $31.01	33% 53%		$3.71	212.7
$15.59 $37.28	33% 56%		$3.65	214.8
$19.72 $40.31	39% 58%		$3.62	216.8
$18.56 $42.82	38% 60%		$3.60	218.8

Model data last updated: January 12, 2020

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More complete information will become available on February 20th after NASS releases estimates of county yields. NASS county yield estimates will not be the same as the yields used by FSA in calculating ARC-CO payments. However, NASS yields likely will be very close to FSA county yields, allowing more accurate assessments of the probability of ARC-CO making payments.

Once the February NASS estimates are released, probabilities in the Gardner ARC/PLC Payment Calculator will be updated. If the NASS county yield estimates are well above the break-even estimates shown in Table 1, the likelihood of ARC-CO payments will decrease. If above the break-even level, the McLean County estimate for ARC-CO payment for corn would go from 13% to a likelihood near 0%. On the other hand, those probabilities will move closer to 100% if the 2019 NASS county yields are below the

break-even yields shown in Table 1. Our expectations are that most counties will have NASS corn yields well above break-even levels.

Soybeans

Break-even yields for soybeans are shown in Table 2. The $9.00 estimate of 2019 MYA price is well above the $8.40 effective reference price, suggesting that there is a very low likelihood of a 2019 PLC payment. The Gardner ARC/PLC Payment Calculator estimates the chance of a 2019 payment at 4%.

Table 2. Break-Even Soybean Yields Below Which ARC-CO Will Trigger Payments in 2019 Given a MYA Price of $9.00

County	Irr [1]	All [2]	County	Irr [1]	All [2]	County	Irr [1]	All [2]
	bu/acre	bu/acre		bu/acre	bu/acre		bu/acre	bu/acre
Adams	53	51	Hardin		34	Morgan	60	59
Alexander	47	42	Henderson	53	55	Moultrie	64	65
Bond		51	Henry	58	58	Ogle	56	58
Boone		55	Iroquois	56	53	Peoria	61	58
Brown	53	51	Jackson		44	Perry		42
Bureau	59	60	Jasper		52	Piatt	65	66
Calhoun		45	Jefferson		41	Pike	55	50
Carroll	58	59	Jersey		55	Pope		40
Cass	57	56	Jo Daviess		55	Pulaski		46
Champaign	63	62	Johnson		40	Putnam		56
Christian	63	63	Kane		55	Randolph		42
Clark	54	53	Kankakee	53	51	Richland		47
Clay		44	Kendall		55	Rock Island	53	55
Clinton		49	Knox	58	59	St. Clair		48
Coles	59	61	Lake		43	Saline		49
Cook		39	LaSalle	58	58	Sangamon	63	63
Crawford	47	51	Lawrence	52	47	Schuyler	59	53
Cumberland	56	54	Lee	58	57	Scott	60	54
DeKalb	56	59	Livingston	58	57	Shelby	56	57
De Witt	63	62	Logan	59	61	Stark	61	59
Douglas	62	62	McDonough	59	58	Stephenson	58	56
DuPage		45	McHenry	56	51	Tazewell	58	59
Edgar	62	60	McLean	63	62	Union		44
Edwards		48	Macon	64	64	Vermilion	61	60
Effingham		54	Macoupin		57	Wabash	48	50
Fayette		50	Madison		52	Warren	61	59
Ford	59	57	Marion		46	Washington		43
Franklin		43	Marshall	58	59	Wayne	57	44
Fulton	55	55	Mason	54	52	White	50	45
Gallatin	55	49	Massac	50	41	Whiteside	59	55
Greene	53	56	Menard	59	59	Will	50	49
Grundy	56	55	Mercer	54	56	Williamson		40
Hamilton		45	Monroe	49	43	Winnebago		51
Hancock	57	56	Montgomery		56	Woodford	61	60

[1] Irrigated yield.

[2] This yield is the non-irrigated yield if there is a irrigated yield or "all" yield if no irrigated yield.

Many counties could have 2019 soybean yields below the break-even levels shown in Table 2. For McLean County, the break-even yield for non-irrigated soybean production is per acre. From 2013 to 2017, county yields in McLean County have been close to 62 bushels per acre. Actual yields were 57.9 bushels per acre in 2013, 64.8 in 2014, 64.7 in 2015, 66.8 in 2016, 67.5 in 2017, and 70.2 in 2018. From 2013 to 2018, yields have been below the 62 bushels per acre break-even in one year. Currently, the

Gardner ARC/PLC Payment Calculator estimates the probability of payment at 30%. Like corn, more information will become available after the release of county yields. Estimates in the Gardner Payment Calculator will be revised at that point.

Wheat

Table 3 shows break-even wheat yields calculated at a $4.55 MYA price. This $4.55 price is well below the $5.50 effective reference price, suggesting a near certainty of PLC payments.

Table 3. Break-Even Wheat Yields Below Which ARC-CO Will Trigger Payments in 2019 Given a MYA Price of $4.55

County	Irr [1]	All [2]	County	Irr [1]	All [2]	County	Irr [1]	All [2]
	bu/acre	bu/acre		bu/acre	bu/acre		bu/acre	bu/acre
Adams		62	Hardin		72	Morgan		70
Alexander		52	Henderson		56	Moultrie		77
Bond		73	Henry		70	Ogle		84
Boone		79	Iroquois		71	Peoria		61
Brown		57	Jackson		79	Perry		70
Bureau		67	Jasper		72	Piatt		69
Calhoun		58	Jefferson		71	Pike		67
Carroll		81	Jersey		73	Pope		62
Cass		70	Jo Daviess		71	Pulaski		75
Champaign		80	Johnson		61	Putnam		70
Christian		76	Kane		80	Randolph		80
Clark		72	Kankakee		79	Richland		77
Clay		76	Kendall		66	Rock Island		69
Clinton		78	Knox		72	St. Clair		82
Coles		76	Lake		65	Saline		75
Cook		74	LaSalle		76	Sangamon		75
Crawford	70	70	Lawrence	78	74	Schuyler		48
Cumberland		74	Lee		68	Scott		64
DeKalb		82	Livingston		68	Shelby		72
De Witt		69	Logan		78	Stark		74
Douglas		76	McDonough		51	Stephenson		79
DuPage		76	McHenry		74	Tazewell		70
Edgar		82	McLean		76	Union		61
Edwards		71	Macon		62	Vermilion		80
Effingham		73	Macoupin		66	Wabash		71
Fayette		71	Madison		75	Warren		63
Ford		73	Marion		74	Washington		78
Franklin		79	Marshall		63	Wayne		74
Fulton		56	Mason	75	65	White		83
Gallatin	76	76	Massac		63	Whiteside		67
Greene		64	Menard		81	Will		77
Grundy		66	Mercer		61	Williamson		69
Hamilton		80	Monroe		74	Winnebago		71
Hancock		65	Montgomery		71	Woodford		70

[1] Irrigated yield.

[2] This yield is the non-irrigated yield if there is a irrigated yield or "all" yield if no irrigated yield.

Many counties also will generate ARC-CO payments. NASS has already released county yields for wheat. Table 4 compares the 2019 NASS yield to the break-even yields. Break-even yields in Table 1 either are for “all” wheat production, representing all irrigated or non-irrigated wheat production, or “non-irrigated” wheat production. Note that many counties have 2019 NASS yields below break-even yields, suggesting that ARC-CO will make payments for wheat in those counties. Still, PLC likely will make higher

payments than ARC-CO for wheat. The PLC wheat yield on a farm will matter in these cases. We suggest placing the farm's PLC yield in the Gardner ARC/PLC payment calculator to estimate that payment.

Table 4. Comparison of 2019 Break-Even Yields for Wheat to 2019 County Yields Released by NASS

County	Break-Even Yield[1]	2019 NASS Yield[2]		County	Break-Even Yield[1]	2019 NASS Yield[2]		County	Break-Even Yield[1]	2019 NASS Yield[2]	
	bu/acre	bu/acre			bu/acre	bu/acre			bu/acre	bu/acre	
Adams	62			Hardin	72			Morgan	70		
Alexander	52	54		Henderson	56			Moultrie	77	71	*
Bond	73			Henry	70	62	*	Ogle	84	82	*
Boone	79			Iroquois	71			Peoria	61	59	*
Brown	57			Jackson	79			Perry	70		
Bureau	67	61	*	Jasper	72			Piatt	69	59	*
Calhoun	58	57	*	Jefferson	71	58	*	Pike	67	82	
Carroll	81	76	*	Jersey	73	72	*	Pope	62		
Cass	70	54	*	Jo Daviess	71	58	*	Pulaski	75	62	*
Champaign	80	74	*	Johnson	61			Putnam	70		
Christian	76	71	*	Kane	80	57	*	Randolph	80	76	*
Clark	72	74		Kankakee	79			Richland	77	64	*
Clay	76	71	*	Kendall	66	78		Rock Island	69		
Clinton	78	65	*	Knox	72	71	*	St. Clair	82	69	*
Coles	76			Lake	65	47	*	Saline	75		
Cook	74			LaSalle	76			Sangamon	75		
Crawford	70	63	*	Lawrence	74	70	*	Schuyler	48	65	
Cumberland	74			Lee	68	62	*	Scott	64		
DeKalb	82	57	*	Livingston	68	76		Shelby	72	65	*
De Witt	69			Logan	78			Stark	74		
Douglas	76			McDonough	51			Stephenson	79	86	
DuPage	76			McHenry	74			Tazewell	70	67	*
Edgar	82	71	*	McLean	76	76		Union	61	69	
Edwards	71	63	*	Macon	62	59	*	Vermilion	80		
Effingham	73	70	*	Macoupin	66			Wabash	71		
Fayette	71	64	*	Madison	75	74	*	Warren	63		
Ford	73			Marion	74	59	*	Washington	78	69	*
Franklin	79	66	*	Marshall	63			Wayne	74		
Fulton	56			Mason	65	64	*	White	83		
Gallatin	76	82		Massac	63	57	*	Whiteside	67		
Greene	64	75		Menard	81	82		Will	77		
Grundy	66			Mercer	61			Williamson	69		
Hamilton	80	69	*	Monroe	74	65	*	Winnebago	71	77	
Hancock	65	47	*	Montgomery	71			Woodford	70	63	*

[1] This is either the "All" or Non-irrigated break-even yield (see Table 3). County yields below this will trigger an ARC-CO payment given a $4.55 MYA price in 2019.

[2] This is the county yield reported by National Agricultural Statistical Service. It is not the same yield FSA will use in calculating ARC-CO payments but should be close.

* Indicates that 2019 NASS county yield is below break-even yield.

Summary

At this point, we expect the following:

- Corn: ARC-CO will not make 2019 payments for corn in most counties. However, there will be some counties in which ARC-CO will make payments, most likely in areas of late planting.

- Soybeans: ARC-CO could make payments in some counties. We expect more counties to trigger soybean ARC-CO payments than corn ARC-CO payments.

- Wheat: ARC-CO will make payments in many counties. However, PLC likely will make larger payments, particularly for those cases in which PLC yields are close to 50 bushels per acre for wheat.

NASS will release corn and soybean yields in February. Those released yields can be compared to break-even levels reported here. Results in the Gardner ARC/PLC Payment Calculator will be revised on release of NASS yields.

At this point, our advice remains the same as before (see *farmdoc daily*, January 22, 2020). We suggest that farmers evaluate ARC-IC for their individual Farm Service Agency (FSA) farms. This evaluation can be done using the *2018 Farm Bill What If Tool*. If ARC-IC is not expected to make payments, the following will likely hold:

- Corn: We would not expect PLC ARC-CO to make payments in 2019 (see *farmdoc daily*, January 22, 2020). ARC-CO could make payments in a limited number of counties in 2019, but those counties likely will be limited to areas with very late planting. For 2020, PLC likely has a higher chance of payment and higher expected payments, given current price levels.

- Soybeans: PLC is not expected to make payments in 2019. There is a chance that ARC-CO will make payments in 2019 for more counties. For 2020, the likelihood and expected level of payments are about the same between ARC-CO and PLC.

- Wheat: There is a near certainty of PLC payments in 2019 and a very high chance of payments in 2020. ARC-CO will make payments in many counties in 2019, but those payments likely will be lower than PLC payments. The level of a PLC yield on a farm will matter in this determination.

Signing up FSA farms for ARC/PLC at this point seems appropriate as the March 15th deadline for making those elections is approaching. There is the possibility of long wait times as the March 15th deadline approaches. After making elections, we suggest running the Gardner ARC/PLC payment calculator in late February. Elections can be changed up to the March 15th deadline.

More information on 2018 Farm Bill decisions is available in the *farmdoc* Farm Bill Toolbox (https://farmdoc.illinois.edu/2018-farm-bill).

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