



Evaluating the ARC-IC Program Election in the 2014 Farm Bill

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Under the Agricultural Act of 2014, all producers operating on a farm must unanimously agree on the program choice between the agriculture risk coverage program (ARC) or the price loss coverage program (PLC). The election deadline for this decision is March 31, 2015. The ARC program contains two coverage options- county (CO) or individual coverage (IC). Similar to the payment yield update decision (which is a farm owner decision), program election among ARC-CO and PLC can be made on covered commodity-by-covered commodity basis. In the likelihood that the producers on a farm select the ARC-IC (individual) coverage option, the ARC-IC decision applies to all covered commodities that are produced on the farm; i.e. it functions as a whole-farm revenue program.

The ARC-IC program concept is comparable to whole-farm insurance, where payments are calculated based on the revenue from all crops across the entire farm on a proportionate share. Rates are calculated based on all FSA farms enrolled in ARC-IC. Under ARC-IC, the actual crop revenue for a producer on a farm for a crop year is based on the producer's share of all covered commodities planted on all farms for which the ARC-IC option has been selected. Actual crop revenue is obtained by multiplying the total production of the covered commodity by the higher of the national marketing year average (MYA) price or the national average loan rate for a marketing assistance loan in effect for a crop year. The sum of the amounts is determined for all covered commodities. The quotient (proportion) is then obtained by dividing the summed amount by the total planted acres of all covered commodities by farm serial number.

ARC-IC benchmark revenue is based on the producer's share determined for each planted covered commodity for each of the most recent five crop years. The product obtained by multiplying the yield per planted acre for the covered commodity on the farm by the national MYA price. For each covered commodity, the five-year Olympic average of revenue is calculated. For each of the 2014 through 2018 crop years, the sum of all the amounts for all covered commodities on the farm are adjusted to reflect the ratio between the total number of acres planted on such farms to a covered commodity and the total acres of all covered commodities planted on such farms. Similar to ARC-CO, payments are triggered whenever the actual revenue falls below the revenue guarantee (but capped at 10% of the benchmark revenue). A major difference to ARC-IC is that payments are made on 65% of the farm's total base acres for all covered commodities planted on the farm.

In the example that follows, a program evaluation for an Avoyelles parish farm that produces wheat and grain sorghum is presented. Underlying assumptions are made regarding the planting ratio of the base acreage on the farm, historical individual farm-level yields, and MYA price outlook for 2014. A comparison is then presented for the ARC-IC coverage option as well as the ARC-CO and PLC options. In this representative farm situation, the farm consists of 120 base acres- with an allocated 70 acres to wheat and the remaining 50 acres allocated to grain sorghum base. For the 2014 crop year the producer

chooses to plant the farm's 120 base acres in the following crop-mix: 80 acres of wheat and 40 acres of grain sorghum.

A distinguishing factor of this example is that the individual farm yields are set a 20% below the parish average, as reported by USDA NASS over the 2009 to 2013 time period. For this particular farm (designated by its farm serial number), the individual farm yields for the covered commodities planted are presented in the following tables. Data on MYA price and the determinants of farm revenue are also included on an annual basis.

Table 1. Individual farm production history for wheat, 2009-2013.

	2009	2010	2011	2012	2013
Farm Yield (bu/ac)	41.0	27.0	48.0	32.0	42.0
MYA Price (bu)	\$4.71	\$5.37	\$6.81	\$7.55	\$6.89
Farm Revenue (\$/ac)	\$225.30	\$198.00	\$326.88	\$271.80	\$289.38

Table 2. Individual farm production history for grain sorghum, 2009-2013.

	2009	2010	2011	2012	2013
Farm Yield (bu/ac)	70.0	78.0	76.0	80.0	87.0
MYA Price (bu)	\$3.22	\$5.02	\$5.99	\$6.33	\$4.28
Farm Revenue (\$/ac)	\$284.40	\$391.56	\$455.24	\$506.40	\$372.36

From Table 1, farm revenue calculations have two basic ARC program mechanics such as the parish transition yield (T-yield) for wheat at 36.0 bushels and the wheat reference price of \$5.50 per bushel that are embedded into the final revenue determination. Table 2 uses the same set of operational mechanics, except that the parish T-yield for grain sorghum is 72.0 bushels and the reference price is \$3.95 per bushel. In years where the farm yield for the particular covered commodity is below the T-yield, the T-yield is inserted in the benchmark revenue calculation. Likewise, when the MYA price is less than the reference price, the reference price serves as the price threshold in that year. Both 'stopgaps' are used for the benchmark revenue calculation only.

The five-year Olympic average farm revenue is calculated across each planted covered commodity's annual earning (dollars per acre). For instance, the five-year Olympic revenue measure for wheat would require removing the crop years 2011 and 2010; since 2011 was the highest earning year and 2010 was the lowest annual revenue measure. The resulting calculation produces an average across the remaining three crop years of 2009, 2012, and 2013. The five-year Olympic average for wheat on this farm is \$262.23 per acre. Applying this same methodology to grain sorghum produced on this farm, the five-year Olympic average revenue is \$406.39 per acre.

Actual farm revenue for 2014 requires that two additional assumptions be made. First, the final 2014 MYA price for wheat and grain sorghum is assumed to be \$5.88 and \$3.80 per bushel, respectively. The individual farm yield for wheat is anticipated to be 40 bushels per acre and 80 bushel per acre for grain sorghum. Recall from our earlier statement the producer plants 80 acres of the 120 base acre to wheat and the remaining 40 base acres to grain sorghum as this proportion of plantings to total base acres will be an important determinant to the ARC-IC benchmark guarantee for 2014. Farm revenue that is generated from wheat's share of production (over the 80 planted base acres) is \$18,816. Farm revenue generated from grain sorghum's share of production (over the 40 planted acres) is \$12,160. Combined, the anticipated actual revenue for the 2014 crop year is expected to total \$30,976.

Another unique feature of the ARC-IC program is that the benchmark revenue figure is a weighted average of all planted covered commodities on the farm's base acres for the crop year. The weighted planted ratio for wheat is expressed as 66.67% (80/120). The remaining 40 of the 120 acres planted to grain sorghum is expressed as 33.33%. Recall, that the benchmark revenue for wheat was \$262.23 and \$406.39 per acre for grain sorghum. Applying these weights of their planting proportions, equates to measures of a \$174.82 wheat and a \$135.46 grain sorghum share. When summed, their weighted total revenue is \$310.28. Applying the ARC-IC guarantee of 86% to this benchmark, a \$266.84 farm revenue guarantee is obtained.

The next component in the ARC-IC payment determination is to calculate the actual farm revenue across all covered commodities produced relative to both the producer's and the crops' share of total planted base acres. Farm revenue that the wheat crop generated was \$18,816 while the grain sorghum crop generated \$12,160. Since wheat was planted on 80 of the base acres (66.67%), the revenue produced per acre was \$156.80. In a similar calculation, grain sorghum produced on 40 acres (33.33%) yielded a revenue per acre of \$101.33. In combination, this wheat and grain sorghum farm has a weighted actual revenue per are of \$258.13 in 2014.

The ARC-IC revenue guarantee is \$266.84, which is greater than the \$258.13 in actual revenue for the 2014 crop year; so an ARC-IC payment is made in the amount of the difference, equal to \$8.71. This is often referred to as a revenue loss for the farm in a particular crop year. Yet another unique aspect of the ARC-IC program is that payment is made to 65% of the total base acres (planted) on a farm. 65% of the 120 total planted base acres results in a payment acreage amount of 78.0 acres. Therefore, the ARC-IC payment to the farm totals \$679.18 for the 2014 crop year under these assumptions. Figure 1 provides the mathematical computations necessary for determine the benefits of the ARC-IC program relative to this farm example.

Figure 1. ARC-IC program payment calculations for an Avoyelles parish wheat and grain sorghum farm.

Agriculture Risk Coverage Program with the Individual Coverage Option (ARC-IC)													
Location: Avoyelles Parish, LA													
(1) Existing covered commodity base acres on the farm (by FSN)													
Crops	Base Acres												
Wheat	70.0												
Grain Sorghum	50.0												
TOTAL	120.0												
(2) The current plantings for the 2014 crop year on the farm													
Crops	Plant Acres												
Wheat	80.0												
Grain Sorghum	40.0												
TOTAL	120.0												
(3) Calculate the benchmark revenue for the wheat crop on the farm in 2014 (will include the 2009-2013 yield history of the individual farm)													
Year	2009	2010	2011	2012	2013								
Ind. Farm Yield	41	27	48	32	42								
T-Yield for Parish	36.0	36.0	36.0	36.0	36.0	T-Yields for wheat in Avoyelles Parish is							
MYA Price	\$4.71	\$5.37	\$6.81	\$7.55	\$6.89	Reference price for wheat is							
Farm Revenue	\$225.50	\$198.00	\$326.88	\$271.80	\$289.38								
5-yr Olympic Avg*	\$262.23					*Note this is a 5-yr Olympic average of farm revenue not MYA and yield levels (as with ARC-CO).							
(4) Calculate the benchmark revenue for the grain sorghum crop on the farm in 2014 (will include the 2009-2013 yield history of the individual farm)													
Year	2009	2010	2011	2012	2013								
Ind. Farm Yield	70	78	76	80	87								
T-Yield for Parish	72.0	72.0	72.0	72.0	72.0	T-Yields for grain sorghum in Avoyelles Parish is							
MYA Price	\$3.22	\$5.02	\$5.99	\$6.33	\$4.28	Reference price for grain sorghum is							
Farm Revenue	\$284.40	\$391.56	\$455.24	\$506.40	\$372.36								
5-yr Olympic Avg*	\$406.39					*Note this is a 5-yr Olympic average of farm revenue not MYA and yield levels (as with ARC-CO).							
(5) Calculate the actual farm revenue for the 2014 crop year relative to the planting ratio for wheat (from step 1)													
Year	2014												
MYA Price	\$5.88												
Ind. Farm Yield	40												
Acres Planted	80.0												
Wheat Revenue	\$18,816.00												
(6) Calculate the actual farm revenue for the 2014 crop year relative to the planting ratio for grain sorghum (from step 1)													
Year	2014												
MYA Price	\$3.80												
Ind. Farm Yield	80												
Acres Planted	40.0												
Sorghum Revenue	\$12,160.00												
(7) Calculate actual farm revenue across all planted covered commodities in 2014													
Farm Revenue													
(8) Determine the weighted share of the benchmark revenues													
Crop	Benchmark Revenue	Weighted Planted Ratio	Weighted Benchmark	ARC-IC Guarantee									
Wheat	\$262.23	66.67%	\$174.82	\$150.34									
Grain Sorghum	\$406.39	33.33%	\$135.46	\$116.50									
Total			\$310.28	\$266.84									
(9) Determine the actual farm revenue across the entire farming operation													
Crops	Farm Revenue	Producer's Share of Crop	Producer's Share of Revenue	Production Acres	Weighted Planted Ratio	Producer Revenue per ac							
Wheat	\$18,816.00	100%	\$18,816.00	80.0	66.67%	\$156.80							
Grain Sorghum	\$12,160.00	100%	\$12,160.00	40.0	33.33%	\$101.33							
TOTAL	\$30,976.00		\$30,976.00	120.0		\$258.13							
(10) Calculate the ARC-IC Payment													
MAX ARC-IC Payment Cap	\$31.03												
ARC-IC Guarantee	\$266.84												
Actual Revenue	\$258.13												
Does the ARC-IC guarantee exceed the farm's actual revenue in 2014?	YES												
Revenue Loss	\$8.71												
Total Planted Base Acres	120.0												
65% of Total Base Acres	78.0												
Producer's Share	100%												
ARC-IC Payment to Farm	\$679.18												
Comparison of ARC-IC to ARC-CO and PLC options for the 2014 crop under assumptions													
Crops	ARC-IC	ARC-CO*	PLC Pymt Yield**	PLC*									
Wheat	--	\$0.00	37.44	\$0.00									
Grain Sorghum	--	\$2,115.54	70.92	\$452.12									
Total	\$679.18	\$2,115.54		\$452.12									
*ARC-CO and PLC are paid on 85% of the base acres, respectively													
**Note the inclusion of the 2008 farm yield for wheat													
**Note the inclusion of the 2008 farm yield for sorghum													
Avoyelles Parish ARC-CO for Wheat (2014 only)													
Year	Parish Yld/plt ac	MYA Price	Price for Benchmark Rev	Actual Revenue	Benchmark Revenue	Payment Factor	ARC Guarantee	Maximum ARC Pymt Allowed	Does Guarantee Exceed Actual?	ARC Pymt Difference	ARC Pymt Rate	ARC Pymt Factor	ARC Pymt per Base Acre
2009	52	\$4.71	\$5.50	\$244.92									
2010	34	\$5.37	\$5.37	\$182.58									
2011	60	\$6.81	\$6.81	\$408.60									
2012	40	\$7.55	\$7.55	\$302.00									
2013	53	\$6.89	\$6.89	\$365.17									
2014	60	\$5.88	\$5.88	\$352.80	\$309.33	86%	\$266.03	\$30.93	No	\$0.00	-\$86.77	85%	\$0.00
Avoyelles Parish ARC-CO for Grain Sorghum (2014 only)													
Year	Parish Yld/plt ac	MYA Price	Price for Benchmark Rev	Actual Revenue	Benchmark Revenue	Payment Factor	ARC Guarantee	Maximum ARC Pymt Allowed	Does Guarantee Exceed Actual?	ARC Pymt Difference	ARC Pymt Rate	ARC Pymt Factor	ARC Pymt per Base Acre
2009	87	\$3.22	\$3.95	\$280.14									
2010	98	\$5.02	\$5.02	\$491.96									
2011	95	\$5.99	\$5.99	\$569.05									
2012	100	\$6.33	\$6.33	\$633.00									
2013	109	\$4.28	\$4.28	\$466.52									
2014	98	\$3.80	\$3.80	\$372.40	\$497.77	86%	\$428.09	\$49.78	Yes	\$55.69	\$49.78	85%	\$42.31

As part of any risk management strategy, producers should compare their farm to any potential ARC-CO program for wheat and ARC-CO for grain sorghum at the count-level, as well as the PLC program for considering their farm's payment yields. By holding the 2014 final MYA grain prices constant (\$5.88 per bushel for wheat and \$3.80 per bushel for sorghum) in this next section of the report, a comparison of farm program alternatives can be made across this 120 acre wheat and sorghum farm.

ARC-CO and PLC program information for wheat and sorghum produced in Avoyelles parish can be obtained by accessing the LSU Agricultural Center's Department of Agricultural Economic and Agribusiness website. Historical production data for Avoyelles parish from 2009 through 2013 is presented for wheat and grain sorghum in Tables 3 and 4 for the purposes of ARC-CO program payment determination. Note that parish yield and MYA price levels are estimates for this illustration.

Table 3. Historical wheat production in Avoyelles parish, 2009-2013.

Year	Parish Yield (bu/ac)	MYA Price (bu)	Actual Revenue in for Parish (\$/ac)	Benchmark Revenue for Parish (\$/ac)	ARC-CO Guarantee (\$/ac)
2009	52	\$4.71	\$244.92	--	--
2010	34	\$5.37	\$182.58	--	--
2011	60	\$6.81	\$408.60	--	--
2012	40	\$7.55	\$302.00	--	--
2013	53	\$6.89	\$365.17	--	--
2014*	60*	\$5.88*	\$352.80*	\$309.33	\$266.03

Table 4. Historical grain sorghum production in Avoyelles parish, 2009-2013.

Year	Parish Yield (bu/ac)	MYA Price (bu)	Actual Revenue in for Parish (\$/ac)	Benchmark Revenue for Parish (\$/ac)	ARC-CO Guarantee (\$/ac)
2009	87	\$3.22	\$280.14	--	--
2010	98	\$5.02	\$491.96	--	--
2011	95	\$5.99	\$569.05	--	--
2012	100	\$6.33	\$633.00	--	--
2013	109	\$4.28	\$466.52	--	--
2014*	98*	\$3.80*	\$372.40*	\$497.77	\$428.09

The ARC-CO payment is \$0.00 in 2014 for wheat in Avoyelles parish as the actual parish revenue of \$352.80 is greater than the \$266.03 ARC-CO revenue guarantee. However, the parish revenue for grain sorghum (\$372.40) is less than the ARC-CO revenue guarantee of \$428.09. Since this amount of \$55.69 exceeds 10% of the benchmark payment limit, the maximum allowable ARC-CO program payment for 2014 would be \$49.78. The payment acres under the ARC-CO program is equal to 85% of the covered commodity's base acres. In this example the farm has 50 base acres of grain sorghum. Therefore, total ARC-CO grain sorghum payment to the farm is \$2,115.54. This is in stark contrast to the total amount of planted base (65%) under the guidelines for the ARC-IC option.

If the PLC program were selected, the 2014 MYA price assumption for wheat of \$5.88 per bushel is greater than the \$5.50 reference price, resulting in no PLC payment being issued. In the case of grain

sorghum, the 2014 MYA price assumption of \$3.80 per bushel is less than the \$3.95 reference price, hence a PLC payment would be triggered. The PLC payment rate is \$0.15 multiplied by an assumed updated payment yield of 70.92 bushels. Therefore, the payment rate over 85% of the grain sorghum base acres (50 acres) on the farm is equal to \$452.12.

Table 5 presents a summary and program comparison of the design features of each Title I program of the 2014 farm bill. Key differences exist between these three farm programs from both an operational and eligibility standpoint.

Table 5. Program comparison of PLC, ARC-CO, and ARC-IC farm program options.

Design Feature	PLC	ARC-CO	ARC-IC
Decision Framework	One-time irrevocable decision for the 2014 through 2018 crop years.		
Enrollment	Covered commodity-by-covered commodity on individual FSA farm	Covered commodity-by-covered commodity on individual FSA farm	Whole-farm program across all planted covered commodities on an individual FSA farm
Payment Acres	Payments made on 85% of base acres	Payments made on 85% of base acres	Payments made on 65% of base acres
Payment Trigger	Statutory set reference prices (in effect for the duration of the farm bill)	5-year Olympic moving average revenue guarantee (set at 86% of benchmark revenue)	5-year Olympic moving average revenue guarantee (set at 86% of benchmark revenue)
Payment Made When	The U.S. MYA price is less than the reference price for the covered commodity	The actual revenue is less than the ARC revenue guarantee for the covered commodity	The actual farm revenue is less than all farm ARC revenue guarantee (a whole farm program as the payment entity)
Payment Yield	May retain current FSA farm CC yield or Update to 90% of farm average planted acre yield for 2008-2012 crops	Does not pertain to ARC-CO program	Does not pertain to the ARC-IC program
Payment Range	Reference price minus the loan rate	10% cap (maximum) of program crop revenue benchmark	10% cap (maximum) of whole farm revenue benchmark across all planted crops
Payment Limit	Aggregate \$125,000 per legal entity (\$250,000 for person and spouse)		
SCO Option Availability	SCO is available for purchase through a crop insurance agent to buy county-level insurance to cover yield or revenue loss between 86% and coverage of individual policy	Participation in ARC-CO prohibits purchase of a SCO endorsement insurance policy	Participation in ARC-IC prohibits purchase of a SCO endorsement insurance policy

Adapted from the following sources:

(a) Purdue Agricultural Economics Report. Features of New Commodity Programs. April 2014. (b) Zulauf, C. 2014 Crop Safety Net Decision: Key Considerations. University of Illinois. February 12, 2014.

In conclusion, this report attempts to compare the program alternative for a representative farm in which that individual farm's yield(s) deviate from the county level. In this production scenario, the farm has experienced lower yields when compared to those of the county by approximately 20%. The question was

posed as to whether or not the ARC-IC program would be an attractive alternative to the ARC-CO selection for this wheat and grain sorghum farm in Avoyelles parish, given that ARC-CO benchmark revenue for the parish is greater than what the ARC-IC benchmark across both crops would be. In this specific case, results from the model indicate that the ARC-CO program produces a greater payment across a larger portion of the individual bases (85% of individual base acres-decoupled from planting-compared to 65% of total planted base acres) on the farm. Further research into the ARC-IC program could be performed as to model the trend deviations of an individual farm as compared to the county yield trend and the effect on ARC-IC program payment.

Note: Information presented in this report is intended for educational purposes. No endorsement is made for one farm program or insurance product over another. The LSU Agricultural Center's Department of Agricultural Economics and Agribusiness farm bill webpage can be accessed through:

http://www.lsuagcenter.com/en/our_offices/departments/Ag_Economics_Agribusiness/extension_outreach/2014-Farm-Bill-Information/



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