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Input Costs and Net Returns Trends for Arkansas Field Crops, 2000-2017

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Relative prices among inputs are determinants of potential profitability for field crop production. Input price increases for inputs with extensive application levels in a crop will decrease profits relatively more for that crop than for crops with less extensive application levels of identical inputs. Input costs per unit of crop output is a useful measure for gauging profitability potential in relation to expected commodity prices. This report presents estimates of costs per acre for typical Arkansas methods of crop production, as well as trends in input prices and net returns for field crops.

Input Costs for 2017 Field Crop Production

Input prices applied to field rates of usage determine production costs. Crop enterprise budgets developed by the University of Arkansas Cooperative Extension Service include estimated costs per acre for field crops (University of Arkansas System 2017). Budget costs represent the most generalized production practices for three irrigation scenarios: 1) surface, 2) center pivot, and 3) non-irrigated. For this report, aggregated 2017 production functions are developed for field crops as weighted averages of crop enterprise budgets. Weighted average crop enterprise budgets are presented in Table 1. Input prices were updated in March 2017 so that costs are representative of the spring 2017 planting period. Irrigation energy costs are weighted by irrigation type, as well as diesel or electric power source (USDA-NASS 2015a; USDA-NASS 2015b). Rice weights are percentages of seed type planted based on information from Extension specialists.

Value of cottonseed sold as a by-product is assumed equal to all post-harvest costs. Thus, post-harvest costs are excluded from operating costs for cotton. Cotton has the greatest operating costs in Table 1 of $549.43/acre. With post-harvest costs excluded for cotton, rice has the second greatest operating costs of $516.90/acre. Wheat has the lowest operating costs of $219.99/acre.

Fixed costs are greatest for cotton with $175.26/acre and lowest for wheat with $51.43/acre. Adding fixed costs and operating costs leads to cotton having the greatest total production costs of $724.69/acre. Rice total costs of $624.33/acre in Table 1 include building levees, but costs do not include any other activities related to land forming. Costs for land rent are not included in Table 1.

Operating costs in Table 1 consists of production inputs, repairs and other fees, and post-harvest expenses. Table 2 summarizes total costs with the three categories for operating costs. Production inputs include seeds, fertilizers, chemicals, custom applications, diesel fuel, electricity, supplies, surveying levees, and labor. Cotton has the greatest costs of production inputs with $549.43/acre. Production inputs are lowest for wheat with $203.50/acre.

Expected yields for 2017 are calculated as trend line Arkansas yields (USDA-NASS 2017). Dividing total costs by expected yields results in total costs per yield unit in Table 2. For example, corn prices received above $3.25/bu. represent revenue greater than total production costs, excluding land costs.

Table 1. Weighted Average Crop Enterprise Budgets, per Acre, Arkansas Field Crops, 2017

Expense	Cotton	Corn	Soybean	Rice	Sorghum	Wheat
Seed, Includes All Fees	123.50	111.84	72.60	81.51	19.30	32.00
Nitrogen	32.17	74.61	0.00	49.50	32.49	37.92
Phosphate (P2O5)	11.62	24.46	16.30	16.30	24.46	8.15
Potash (K2O)	13.78	21.75	14.50	14.50	21.75	9.67
Other Nutrients	8.56	23.38	0.00	8.83	0.00	4.27
Herbicide	109.85	51.56	85.37	46.88	48.15	26.70
Insecticide	78.69	0.00	18.75	3.75	11.91	0.00
Other Chemicals	24.14	0.00	14.88	15.00	0.00	14.33
Custom Chemical & Fertilizer Applications	11.91	5.95	14.00	45.36	3.01	28.00
Diesel Fuel, Pre-Post Harvest	10.93	7.05	7.41	8.07	6.40	5.36
Repairs and Maintenance, Pre-Post Harvest	11.62	7.49	8.31	6.57	6.41	5.40
Diesel Fuel, Harvest	10.75	5.70	3.70	6.65	4.75	4.75
Repairs and Maintenance, Harvest	18.10	9.98	5.49	11.88	7.10	7.10
Irrigation Energy Cost	20.99	24.48	17.98	55.36	8.84	0.00
Irrigation System Repairs & Maintenance	3.09	3.61	2.65	5.59	1.30	0.00
Supplies (ex. polypipe, other)	2.57	2.57	2.21	0.00	1.30	0.00
Other Inputs, Levee Gates	0.00	0.00	0.00	0.70	0.00	0.00
Labor, Field Activities	23.45	11.36	9.65	12.51	9.39	7.81
Scouting/Consultant Fee	10.00	6.00	7.00	8.00	6.00	0.00
Boll Weevil Eradication Fee	4.00	0.00	0.00	0.00	0.00	0.00
Crop Insurance	8.41	13.00	7.21	10.00	13.00	7.85
Interest, Annual Rate for 6 Months	11.30	8.50	6.47	8.55	4.74	4.19
Cotton: Hauling, Ginning; Grain: Drying	116.80	34.81	0.00	67.20	0.00	0.00
Cotton: Warehousing; Other: Hauling	46.72	45.80	12.85	31.92	23.00	15.90
Promotions, Boards, Classing	11.39	1.83	2.26	2.27	0.92	0.59
Operating Costs[1,2]	**549.43**	**495.75**	**329.59**	**516.90**	**254.20**	**219.99**
Pre-Harvest and Harvest Machinery	146.75	72.17	64.17	73.74	63.03	48.98
Irrigation Equipment	21.17	24.10	18.14	30.01	9.22	0.00
Miscellaneous Overhead[3]	7.34	3.61	3.21	3.69	3.15	2.45
Fixed Costs	**175.26**	**99.88**	**85.52**	**107.43**	**75.40**	**51.43**
Total Costs[4]	**724.69**	**595.63**	**415.11**	**624.33**	**329.61**	**271.42**

[1]Value of cottonseed sold assumed equal to cotton post-harvest expenses.
[2]Cottonseed value deducted from cotton post-harvest expenses.
[3]Estimated as percentage of pre-harvest and harvest machinery.
[4]Does not include land cost.

Table 2. Summary of Weighted Average Crop Enterprise Budgets, per Acre, 2017

Expense Category	Cotton	Corn	Soybean	Rice	Sorghum	Wheat
Production Inputs	482.91	364.73	277.35	364.93	191.74	178.96
Repairs & Other Fees	66.52	48.58	37.12	50.59	38.54	24.54
Total Production Expenses	**549.43**	**413.31**	**314.48**	**415.51**	**230.28**	**203.50**
Post-Harvest Expenses[1]	0.00	82.44	15.11	101.39	23.92	16.49
Total Operating Expenses[2]	**549.43**	**495.75**	**329.59**	**516.90**	**254.20**	**219.99**
Fixed Costs	175.26	99.88	85.52	107.43	75.40	51.43
Total Costs[3]	**724.69**	**595.63**	**415.11**	**624.33**	**329.61**	**271.42**
Unit Cost[4,5]	0.62	3.25	8.72	3.72	3.58	4.31

[1]Value of cottonseed sold assumed equal to cotton post-harvest expenses.
[2]Cottonseed value deducted from cotton post-harvest expenses.
[3]Does not include land cost.
[4]Total costs per lb. for cotton, all other are total cost per bu.
[5]Trend line yield is applied.

Production inputs are presented by input type in Table 3. Chemicals are the greatest cost for cotton and soybeans. For cotton, chemicals are 44% of production input costs. Chemicals are 43% of production input costs for soybeans. Fertilizers are the greatest production input costs for corn (40%), rice (24%), sorghum (41%), and wheat (34%). Seed cost for cotton is $123.50/acre which is 26% of production inputs. Seed cost for corn is $111.84 which is 31% of production inputs. Seed cost for soybean production is 26% of production inputs and 22% for rice. Diesel and electricity costs are greatest for rice due to energy requirements for irrigation. The capital intensive nature of crop production is indicated by the relatively low labor cost for all crops in Table 3.

Table 3. Production Input Costs Details, Percent of Total Production Inputs, per Acre, 2017

Input	Cotton	Corn	Soybean	Rice	Sorghum	Wheat
Seed	123.50	111.84	72.60	81.51	19.30	32.00
Percent	26	31	26	22	10	18
Fertilizers	66.12	144.20	30.80	89.14	78.69	60.01
Percent	14	40	11	24	41	34
Chemicals	212.68	51.56	119.00	65.63	60.06	41.03
Percent	44	14	43	18	31	23
Diesel & Electricity	42.67	37.24	29.09	70.08	19.99	10.11
Percent	9	10	10	19	10	6
Labor, Field Activities	23.45	11.36	9.65	12.51	9.39	7.81
Percent	5	3	3	3	5	4
Custom Work, Supplies, Other	14.49	8.53	16.21	46.06	4.31	28.00
Percent	3	2	6	13	2	16
Total Production Inputs[1]	**482.91**	**364.73**	**277.35**	**364.93**	**191.74**	**178.96**
Percent[1]	**100**	**100**	**100**	**100**	**100**	**100**

[1]Totals may not sum due to rounding.

Net Returns Projections for 2017 Field Crop Production

Crop enterprise budgets developed by the University of Arkansas Cooperative Extension Service include estimated costs per acre for field crops (University of Arkansas System 2017.) Input prices applied to field rates of usage determine production costs. Budget costs represent the most generalized production practices for three irrigation scenarios: 1) surface, 2) center pivot, and 3) non-irrigated. For this report, aggregated 2017 production functions are developed for field crops as weighted averages of crop enterprise budgets. Irrigation energy costs are weighted by irrigation type, as well as diesel or electric power source. Rice weights are percentages of seed type planted based on information from Extension specialists. Table 4 presents average net returns with state average 2017 trend line yields and expected commodity prices received determined by USDA forecasts for 2017 price and historical differences between annual U.S. prices and Arkansas prices (USDA-WASDE 2017; USDA-NASS 2017).

Table 4. Weighted Average Net Returns, per Acre, Arkansas Field Crops, 2017

Revenue and Expenses	Cotton	Corn	Soybean	Rice	Sorghum	Wheat
Average Yield[1]: Cotton (lbs.), Other (bu.)	1,168	183	47.6	168	92	59
Price Received[2]	0.670	3.70	9.50	4.95	3.20	4.25
Sell Seed[3]	174.91					
Operating Costs[4]	549.43	495.75	329.59	516.90	254.20	219.99
Returns to Operating Costs	**233.13**	**182.09**	**122.61**	**314.70**	**40.20**	**30.33**
Fixed Costs	175.26	99.88	85.52	107.43	75.40	51.43
Total Costs[5]	724.69	595.63	415.11	624.33	329.61	271.42
Net Returns to Land & Management	**57.87**	**82.21**	**37.09**	**207.27**	**-35.21**	**-21.09**

[1]2017 yield is trend line yield.
[2]Price based on U.S. forecast and historical Arkansas difference; Cotton price is for lint only.
[3]Value of cottonseed sold assumed equal to cotton post-harvest expenses.
[4]Cottonseed value deducted from cotton post-harvest expenses.
[5]Does not include land cost.

Net returns to land and management in 2017 are projected greatest for rice with $207.27 per acre. Corn has the second greatest net returns with $82.21 per acre. Soybean projected net returns are $37.09 per acre. Cotton net returns of $57.87 per acre are for lint only and do not include cottonseed rebate value potentially greater than post-harvest expenses.

Table 4 is weighted net returns for surface irrigation, pivot irrigation, and non-irrigated production and excludes land costs. Most acreage in Arkansas field crop production is rented on the basis of cash rent per acre or share rent as a percentage of revenue. Rental arrangements vary widely and are influenced by productivity that is determined by yield potential. Yields for irrigated acreage represented in crop enterprise budgets are greater than state average yields and correspond to land that is typically rented for a 25% share rental rate. Table 5 presents costs and returns for Arkansas surface irrigated acreage with a 25% share rent. Price of cotton in Table 5 includes a $0.05/lb. premium for value of cottonseed. As a comparison to results in Table 2 for state average corn cost per bushel without land cost that is $3.25/bu., Table 5 indicates that cost for irrigated corn production including land is $3.82/bu.

Table 5. 2017 Net Returns Projection, per Acre, Surface Irrigation

Receipts	Cotton	Corn	Sorghum	Soybean	Rice	Hybrid Rice
Yield (cotton-lb, other-bu)	1,200	210	115	60	170	190
[1]Price ($/yield unit)	0.72	3.70	3.20	9.50	4.95	4.95
Grower Share, %	75%	75%	75%	75%	75%	75%
Crop Revenue	**648.00**	**582.75**	**276.00**	**427.50**	**631.13**	**705.38**
[2]Gin Rebate/Bale						
Operating Expenses						
Input Costs	478.52	368.99	210.05	278.23	331.31	408.63
Other Operating Expenses	89.50	58.93	49.75	47.13	60.48	62.10
Total Out-of-Pocket Expenses	568.02	427.92	259.80	325.36	391.79	470.73
Post-harvest Expenses	180.00	94.50	29.90	19.05	102.60	114.67
[3]Net Operating Expenses	**568.02**	**522.42**	**289.70**	**344.41**	**494.39**	**585.40**
Cash Land Rent	0.00	0.00	0.00	0.00	0.00	0.00
[4]Returns to Operating Expenses	**79.98**	**60.33**	**-13.70**	**83.09**	**136.74**	**119.98**
Fixed Costs	162.21	84.80	72.07	77.19	94.07	94.07
[5]Total Specified Expenses	**730.23**	**607.22**	**361.77**	**421.60**	**588.46**	**679.47**
[4]Returns to Specified Expenses	**-82.23**	**-24.47**	**-85.77**	**5.90**	**42.67**	**25.91**
Operating Expenses/yield unit	0.47	2.49	2.52	5.74	2.91	3.08
Total Expenses[5]/yield unit	0.61	2.89	3.15	7.03	3.46	3.58
Land Expense/acre	216.00	194.25	92.00	142.50	210.38	235.13
Land Expense/yield unit	0.18	0.93	0.80	2.38	1.24	1.24
Total Cost/yield unit, including land	0.79	3.82	3.95	9.40	4.70	4.81

[1]Cotton: includes value of cottonseed, net of post-harvest expenses

[2]Gin rebate is set equal to post-harvest expenses.

[3]Gin rebate deducted from post-harvest expenses.

[4]Share rent and cash land rent are deducted from crop revenue.

[5]Does not include management or other expenses and fees not associated with production.

Trend in Costs and Returns for 2000-2017

Historical trends in Arkansas costs of production are estimated by applying annual costs of production reported for regions most closely associated with Arkansas production characteristics (USDA-ERS 2017). These annual costs account for input price changes, as well as changes in production technology. Annual Arkansas yields and prices received are reported by the National Agricultural Statistics Service (USDA-NASS 2017). Trends in costs of production and returns are presented in Figure 1 through Figure 12.

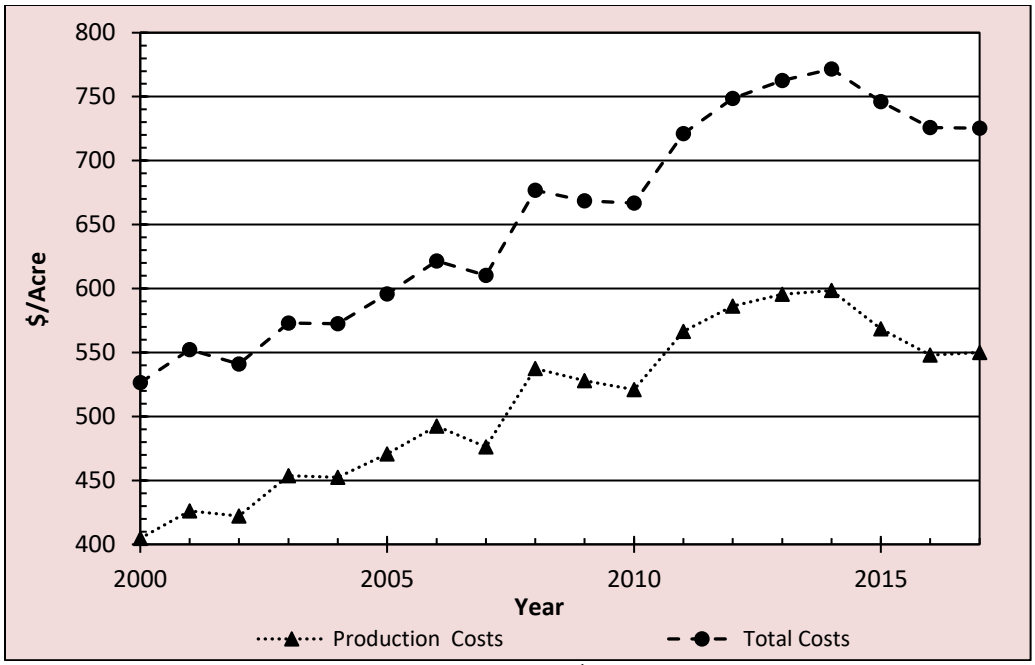

Figure 1. Arkansas Cotton Costs, 2000-2017[1]
[1]2017 yield for post-harvest costs is trend line forecast

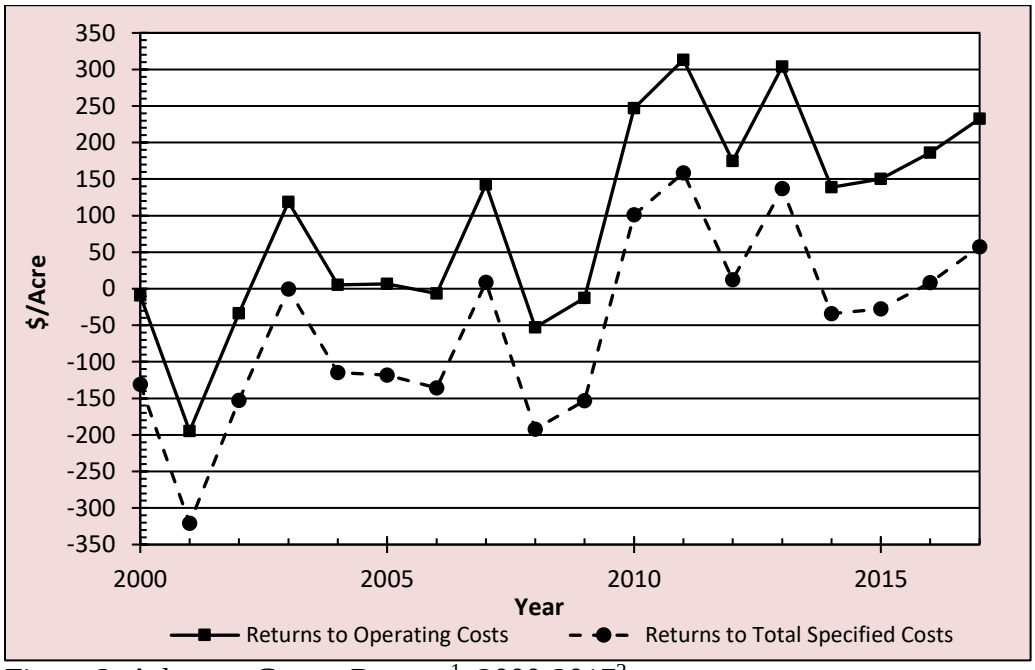

Figure 2. Arkansas Cotton Returns[1], 2000-2017[2]
[1]Market receipts for lint only
[2]2017 yield is trend line forecast

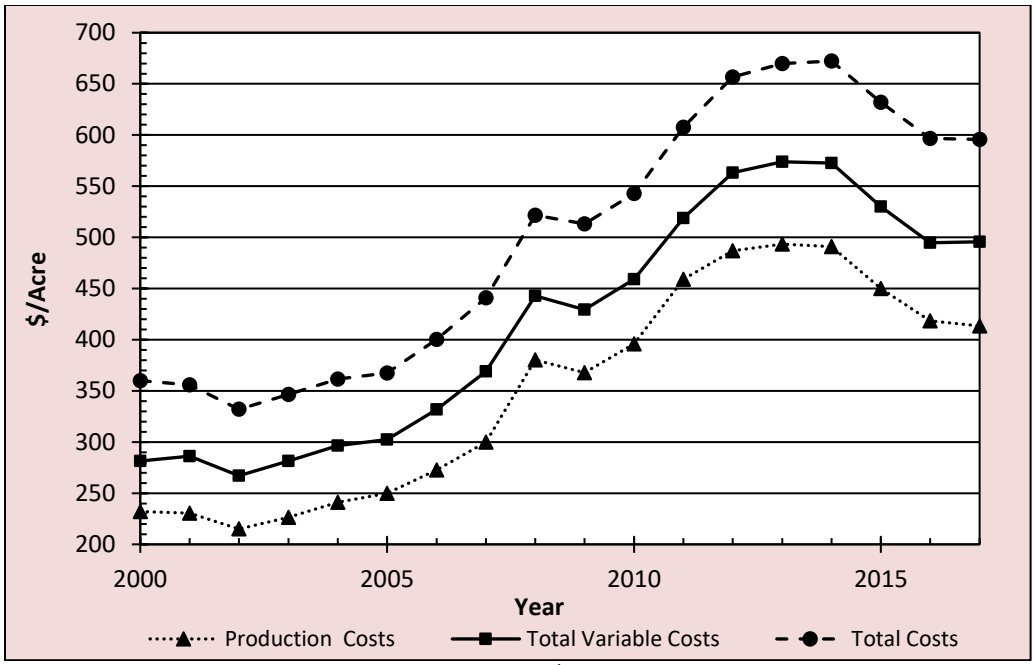

Figure 3. Arkansas Corn Costs, 2000-2017[1]
[1]2017 yield for post-harvest costs is trend line forecast

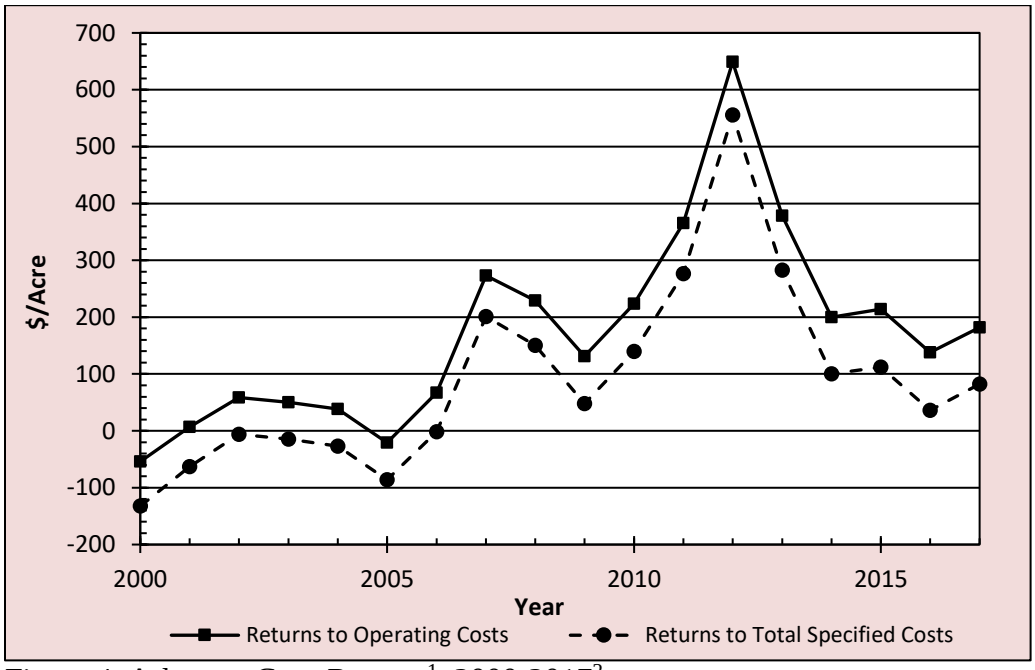

Figure 4. Arkansas Corn Returns[1], 2000-2017[2]
[1]Market receipts only
[2]2017 yield is trend line forecast

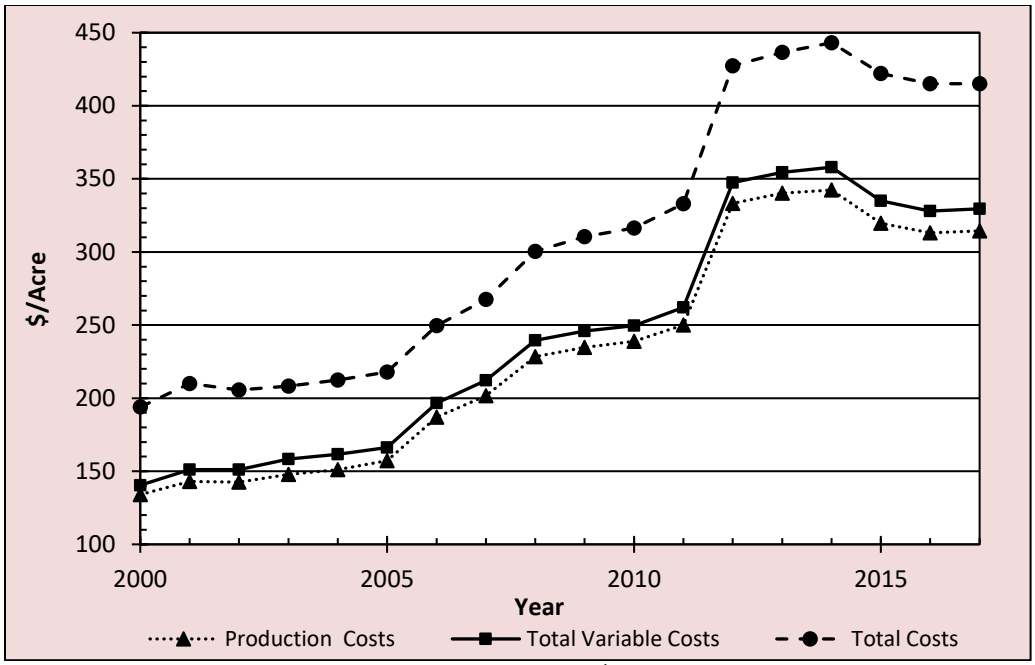

Figure 5. Arkansas Soybean Costs, 2000-2017[1]
[1]2017 yield for post-harvest costs is trend line forecast

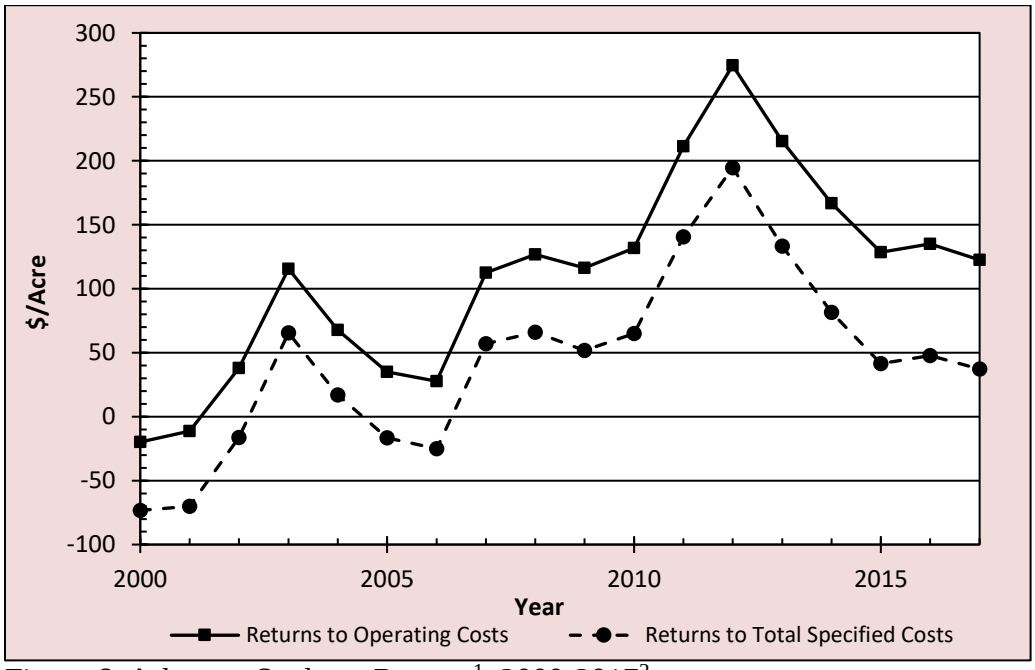

Figure 6. Arkansas Soybean Returns[1], 2000-2017[2]
[1]Market receipts only
[2]2017 yield is trend line forecast

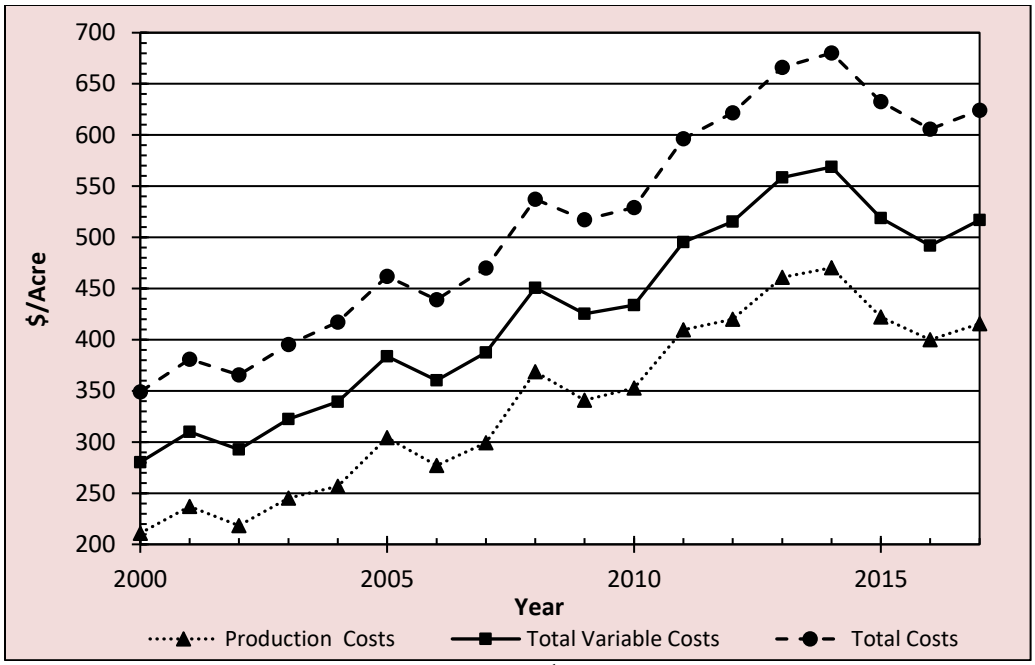

Figure 7. Arkansas Rice Costs, 2000-2017[1]
[1]2017 yield for post-harvest costs is trend line forecast

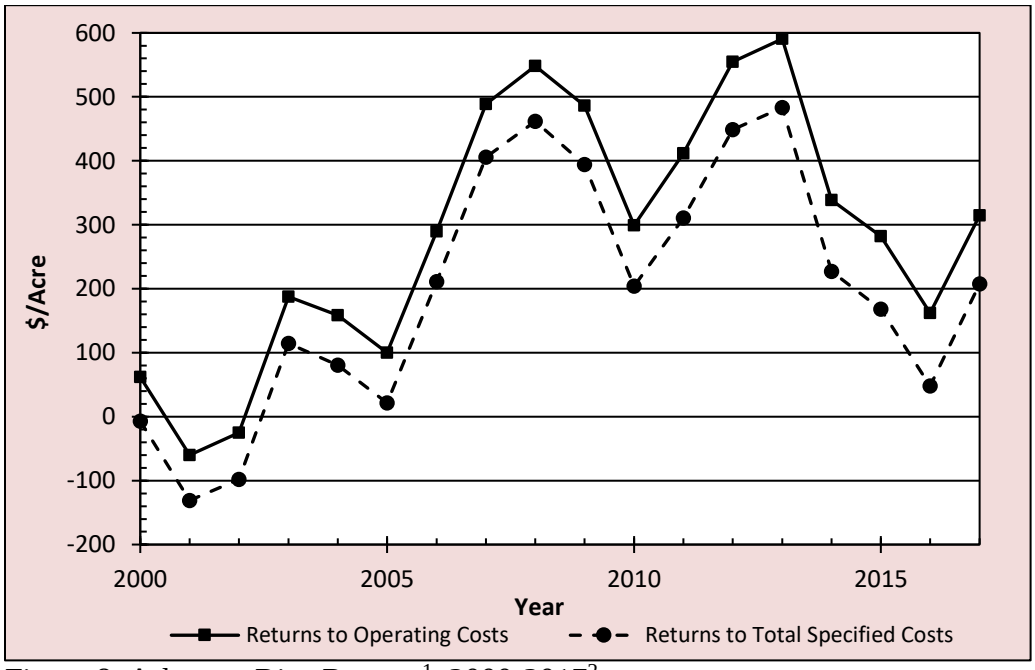

Figure 8. Arkansas Rice Returns[1], 2000-2017[2]
[1]Market receipts only
[2]2017 yield is trend line forecast

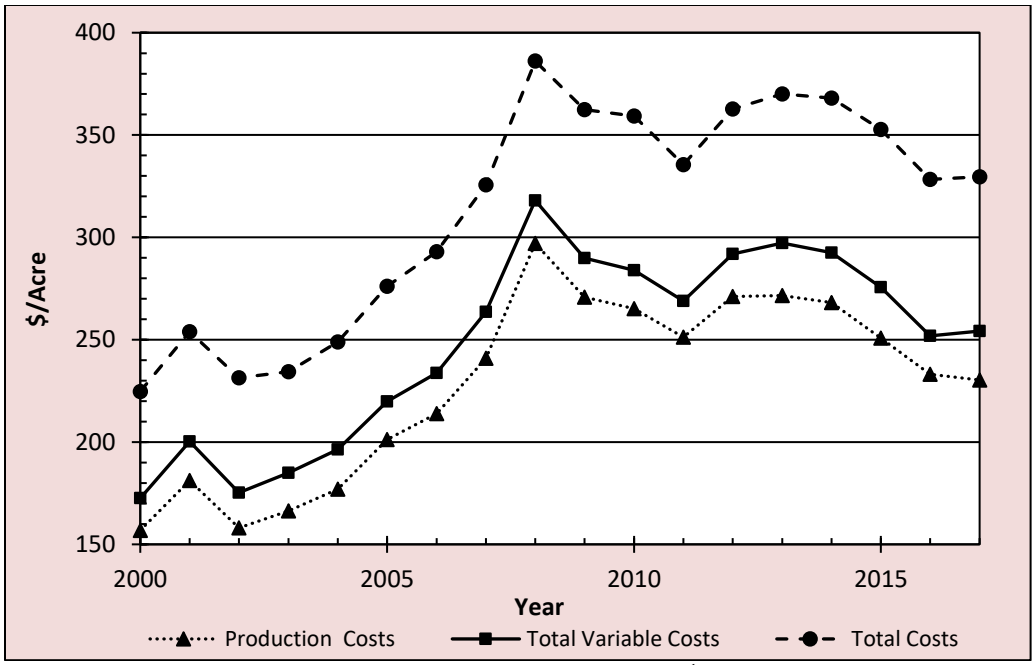

Figure 9. Arkansas Grain Sorghum Costs, 2000-2017[1]
[1]2017 yield for post-harvest costs is trend line forecast

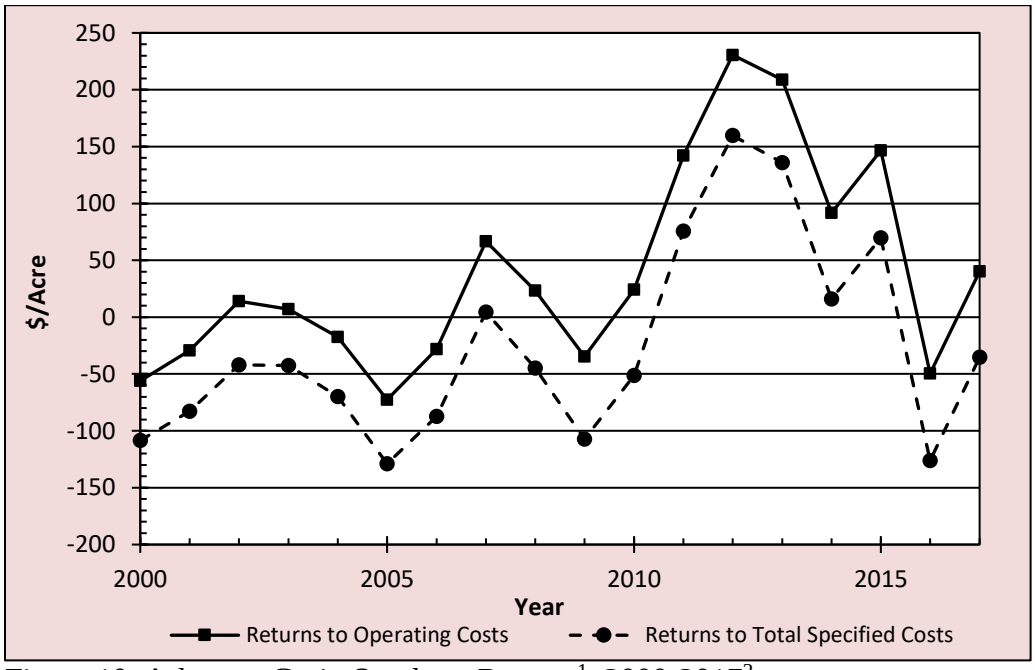

Figure 10. Arkansas Grain Sorghum Returns[1], 2000-2017[2]
[1]Market receipts only
[2]2017 yield is trend line forecast

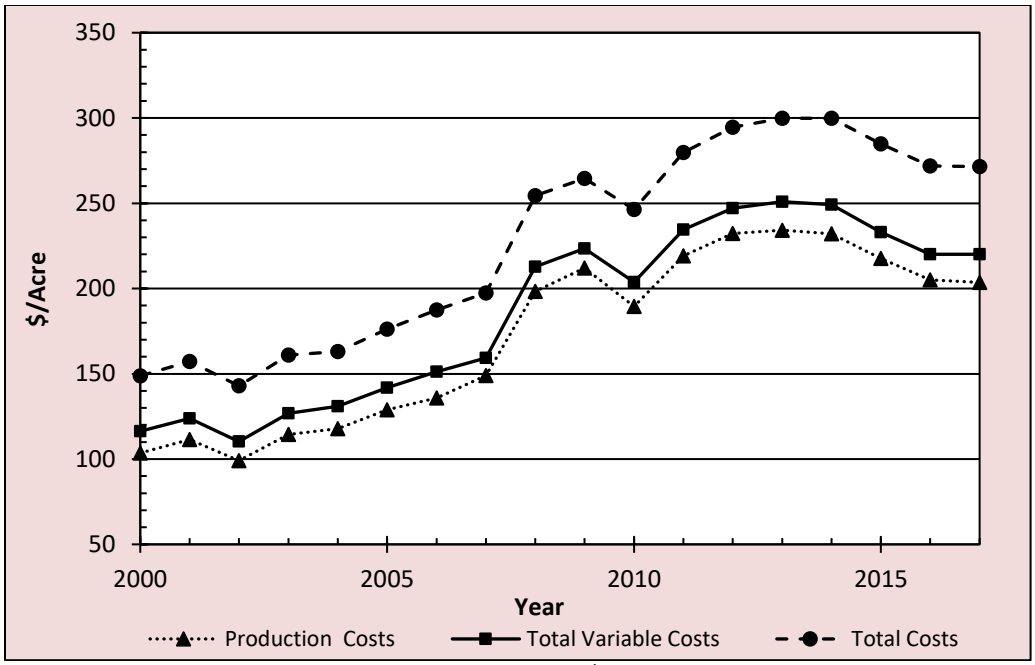

Figure 11. Arkansas Wheat Costs, 2000-2017[1]
[1]2017 yield for post-harvest costs is trend line forecast

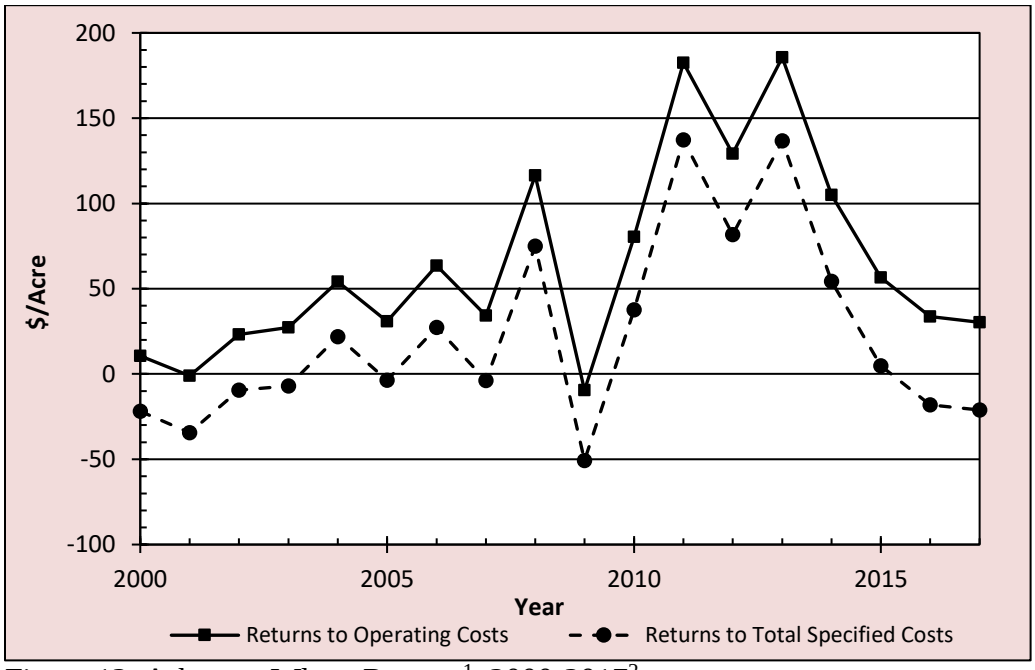

Figure 12. Arkansas Wheat Returns[1], 2000-2017[2]
[1]Market receipts only
[2]2017 yield is trend line forecast

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