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Center-Pivot-Irrigated Corn Cost-Return Budget in Western Kansas

Department of Agricultural Economics — *www.agmanager.info*

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This budget provides cost and return estimates for center pivot irrigated corn in western Kansas. Separate budgets are used for southwest and northwest Kansas. Feed demand from the area's cattle feeding complex and developing hog industry make irrigated corn an important crop for the agricultural and overall economy of the western one-third of Kansas. Kansas ranked tenth in the nation in total corn harvested acreage (2.5 million acres) and eighth in total corn production (290 million bushels) in 2002.

The majority of irrigated corn production in Kansas is located in the western one-third of the state, averaging nearly 186 million bushels during the 2000 to 2002 period, or 51 percent of the state's total corn production during that period. Southwest Kansas is the predominant irrigated corn region in the state, averaging 131.4 million bushels from 735,300 harvested irrigated acres annually for the 3-year period. West central Kansas averaged 15.2 million bushels from 103,000 harvested irrigated acres, and northwest Kansas averaged 39.4 million bushels annually from 245,000 acres during this same period. South central Kansas is the other major irrigated corn producing area in the state, averaging 44 million bushels and 257,700 harvested acres per year during the 2000 to 2002 period.

In general, irrigated corn in southwest Kansas has higher evapotranspiration requirements and yield potential than in northwest Kansas. To represent these geographic differences, irrigation water amounts are higher in southwest than in northwest Kansas.

Income Per Acre

Crop production costs per unit and net returns are highly dependent on yields. The following estimated budgets include three different yield levels, which are intended to represent expected yields for land of varying quality for a given level of management. Producers can compare the profitability of crop enterprises on farmland tracts with varying yield potential by considering alternative expected yield scenarios. Land values and government payments have been adjusted for alternative yield levels in this budget. In customizing a budget to your farm, attention should be given to using land values representative of your farm's productive capacity and local farmland market conditions.

Price per bushel represents an expected harvest price in Scott City, Kan., accounting for government marketing loan price support levels. Corn producers in other regions of western Kansas should use an expected price that is representative for their location.

Crop insurance was not included as an input expense in the

Table 1A. *Production Inputs — Center-Pivot-Irrigated Corn – SW Kansas*

	Yield Level (bu)			
Item	170	205	240	
Seed, 1,000/a*	28	32	36	$2.24/1,000
Fertilizer:				
N (anhydrous)	230	277	324	$0.57/lb
N	0	0	0	$0.85/lb
P	73	88	103	$1.09/lb
K	0	0	0	$0.62/lb
Lime	0	0	0	$0.01/lb
Herbicide				
Bicep Lite II Magnum				
	1.5	1.5	1.5	$11.29/qt
Marksman	2.0	2.0	2.0	$4.26/pt
+ Aim	0.3	0.3	0.3	$6.73/oz
+ Adjuvants	1.0	1.0	1.0	$1.00/a
Insecticide / Fungicide				
Force 3G	5.4	5.4	5.4	$4.64/lb
Capture 2EC	0.08	0.08	0.08	$128.00/lb
Irrigation water, in	12	18	24	$5.80/in

** Bt seed*

Table 1B. *Production Inputs — Center-Pivot-Irrigated Corn – NW Kansas*

	Yield Level (bu)			
Item	160	200	240	
Seed, 1,000/a*	26	30	34	$2.24/1,000
Fertilizer:				
N (anhydrous)	216	270	324	$0.57/lb
N	0	0	0	$0.85/lb
P	68	86	103	$1.09/lb
K	0	0	0	$0.62/lb
Lime	0	0	0	$0.01/lb
Herbicide				
RT3	22.0	22.0	22.0	$0.40/oz
+ Bicep Lite II Magnum				
	1.5	1.5	1.5	$11.29/qt
RT3	22.0	22.0	22.0	$0.40/oz
+ Additives	1.0	1.0	1.0	$1.00/a
Insecticide / Fungicide				
Force 3G	5.4	5.4	5.4	$4.64/lb
Capture 2EC	0.08	0.08	0.08	$128.00/lb
Irrigation water, in	12	18	24	$5.80/in

** Bt seed*

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budgets because yields reflect an average of all years (good and bad). If crop insurance is included as an input expense, then an expected value for indemnity payments should be included in the returns section. Historically, crop insurance indemnity payments have typically exceeded premiums due to government subsidies.

Costs Per Acre

Production costs at the three production levels are shown on lines 1 through 13. Kansas Custom Rates for specific field operations are used to represent fuel and labor costs as well as machinery repair, depreciation, and interest expenses in these budgets. Tables 1A and 1B identify the typical seed, fertilizer, herbicide, insecticide, and irrigation water requirements (rate and cost/unit) for higher yield (southwest) and lower yield (northwest) environments, respectively. Herbicide requirements include both pre-crop and in-crop treatments. Tables 2A and 2B outline the machinery, irrigation equipment, and land resources used for center-pivot-irrigated corn. Each tillage, planting, and harvest operation is identified.

Table 2A. *Machinery and Land Resources — Center-Pivot-Irrigated Corn - SW Kansas*

	Yield Level (bu)			Custom
Item	170	205	240	Rate
Tillage/Planting/Chemical Applications:				
Chisel	1	1	1	$11.04/a
Disk	1	1	1	$9.07/a
Field cultivate	1	1	1	$8.29/a
Plant	1	1	1	$12.48/a
Anhydrous application	1	1	1	$9.68/a
Fertilizer application	0	0	0	$4.80/a
Herbicide application	2	2	2	$5.15/a
Insecticide / fungicide application	1	1	1	$5.14/a
Harvest				
Base charge	1	1	1	$25.33/a
Extra charge for yields exceeding	71	71	71	$0.188/bu
Hauling	170	205	240	$0.164/bu
Non-machinery labor	1.20	1.31	1.41	$13.00/hr
Irrigation labor	0.50	0.50	0.50	$13.00/hr
Land charge/rent	$42.40	$53.00	$63.60	
Interest on capital				8.0%
Irrigation Equipment	Investment, $/a		Years	Salvage value
Well, pump and gearhead value	$424.00		25	0%
Power unit and meter	$98.00		7	0%
Irrigation system	$476.00		25	25%

Table 2B. *Machinery and Land Resources — Center-Pivot-Irrigated Corn - NW Kansas*

	Yield Level (bu)			Custom
Item	160	200	240	Rate
Tillage/Planting/Chemical Applications:				
Chisel	1	1	1	$11.04/a
Disk	1	1	1	$9.07/a
Field cultivate	1	1	1	$8.29/a
Plant	1	1	1	$12.48/a
Anhydrous application	1	1	1	$9.68/a
Fertilizer application	0	0	0	$4.80/a
Herbicide application	2	2	2	$5.15/a
Insecticide / fungicide application	1	1	1	$5.14/a
Harvest				
Base charge	1	1	1	$25.33/a
Extra charge for yields exceeding	71	71	71	$0.188/bu
Hauling	160	200	240	$0.164/bu
Non-machinery labor	1.17	1.29	1.41	$13.00/hr
Irrigation labor	0.50	0.50	0.50	$13.00/hr
Land charge/rent	$42.40	$53.00	$63.60	
Interest on capital				8.0%
Irrigation Equipment	Investment, $/a		Years	Salvage value
Well, pump and gearhead value	$424.00		25	0%
Power unit and meter	$98.00		7	0%
Irrigation system	$476.00		25	25%

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Irrigation Costs

Any land preparation costs are included with the land charge. Price of the energy source and Total Dynamic Head (TDH) are the major factors affecting pumping costs. For instance, at 300 TDH, an increase in natural gas prices from $3 to $4 per mcf causes pumping costs to increase from $2.22 to $2.97 per acre-inch. At 500 TDH, the same increase in natural gas price causes pumping costs to increase from $3.71 to $4.94 per acre-inch. See MF-836, *Irrigation Capital Requirements and Energy Costs*, for an explanation of Total Dynamic Head and other examples of pumping costs for natural gas, diesel, electricity and propane.

The choice of a flood or center pivot system depends on: (1) available capital; (2) labor availability during the growing season; (3) the terrain, which may require a center pivot system; and (4) soil type. Capital requirements will run $20,000 to $40,000 higher for sprinkler over flood irrigation systems. However, labor requirements can be considerably less for the sprinkler system.

Irrigation Water Applications & Corn Yields

Irrigation wells in western Kansas vary in their pumping capacities, depending on their geographic location within the Ogallala Aquifer and the degree to which groundwater supplies have been depleted in past years. University research and field observations show a strong correlation between the amount of water available for crop use and irrigated corn yields in western Kansas. In these crop budgets irrigation water application levels vary with budgeted corn yields. The lowest yield level (i.e., "Level 1") in these budgets represents corn yields, costs, and returns for irrigation wells with limited water pumping capacity of 13 to 14 acre-inches per year. "Level 2" represents irrigated corn yields, costs, and returns in western Kansas when 17 to 19 acre-inches of water are pumped. In Kansas, legal restrictions exist that prohibit pumping more than 24 acre-inches of irrigation water per year on field crops. The third water application/yield level (i.e., "Level 3") in these budgets represents irrigation water applications of 20 to 24 acre inches, with the top end of this range equal to the maximum legal limit in Kansas.

COST-RETURN PROJECTION — CENTER-PIVOT-IRRIGATED CORN — SOUTHWEST KANSAS

	Yield Level (bu)			Your
	170	**205**	**240**	**Farm**
INCOME PER ACRE				
A. Yield per acre	170	205	240	
B. Price per bushel	$ 4.44	$ 4.44	$ 4.44	
C. Net government payment	$ 29.92	$ 32.53	$ 35.13	
D. Indemnity payments	$	$	$	
E. Miscellaneous income	$	$	$	
F. Returns/acre ((A × B) + C + D + E)	$ 784.72	$ 942.73	$ 1,100.73	
COSTS PER ACRE				
1. Seed	$ 62.72	$ 71.68	$ 80.64	
2. Herbicide	28.68	28.68	28.68	
3. Insecticide / Fungicide	35.30	35.30	35.30	
4. Fertilizer and Lime	210.67	253.81	296.95	
5. Crop Consulting	6.50	6.50	6.50	
6. Crop Insurance				
7. Drying				
8. Miscellaneous	10.00	10.00	10.00	
9. Custom Hire / Machinery Expense	137.82	150.14	162.46	
10. Non-machinery Labor	15.57	16.97	18.36	
11. Irrigation				
a. Labor	6.50	6.50	6.50	
b. Fuel and Oil	69.60	104.40	139.20	
c. Repairs and Maintenance	3.96	5.94	7.92	
d. Depreciation on Equipment and Well	45.24	45.24	45.24	
e. Interest on Equipment	44.68	44.68	44.68	
12. Land Charge / Rent	42.40	53.00	63.60	
G. SUB TOTAL	$ 719.64	$ 832.83	$ 946.02	
13. Interest on ½ Nonland Costs	23.49	27.60	31.70	
H. TOTAL COSTS	$ 743.13	$ 860.43	$ 977.72	
I. RETURNS OVER COSTS (F - H)	$ 41.59	$ 82.30	$ 123.00	
J. TOTAL COSTS/BUSHEL (H ÷ A)	$ 4.37	$ 4.20	$ 4.07	
K. RETURN TO ANNUAL COST (I + 13) ÷ G	9.04%	13.20%	16.35%	

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Other Corn Production Management Resources

K-State Research and Extension has a number of resources available relating to irrigated corn production. The *Corn Production Handbook*, C-560, provides information on recommended corn production practices in Kansas. *Diagnosing Corn Production Problems in Kansas*, S-54, is a resource in the diagnosis of likely causes of slow growth, distorted appearance, off-colors, injury and death of corn plants from planting through harvest. These and other corn production-related publications can be obtained through K-State Research and Extension offices or via the K-State Research and Extension Web site, *www.oznet.ksu.edu*.

COST-RETURN PROJECTION — CENTER-PIVOT-IRRIGATED CORN — NORTHWEST KANSAS

	Yield Level (bu)			Your
	160	**200**	**240**	**Farm**
INCOME PER ACRE				
A. Yield per acre	160	200	240	
B. Price per bushel	$ 4.44	$ 4.44	$ 4.44	
C. Net government payment	$ 29.92	$ 32.53	$ 35.13	
D. Indemnity payments	$	$	$	
E. Miscellaneous income	$	$	$	
F. Returns/acre ((A × B) + C + D + E)	$ 740.32	$ 920.53	$1,100.73	
COSTS PER ACRE				
1. Seed	$ 58.24	$ 67.20	$ 76.16	
2. Herbicide	35.54	35.54	35.54	
3. Insecticide / Fungicide	35.30	35.30	35.30	
4. Fertilizer and Lime	197.24	247.64	296.95	
5. Crop Consulting	6.50	6.50	6.50	
6. Crop Insurance				
7. Drying				
8. Miscellaneous	10.00	10.00	10.00	
9. Custom Hire / Machinery Expense	134.30	148.38	162.46	
10. Non-machinery Labor	15.18	16.77	18.36	
11. Irrigation				
a. Labor	6.50	6.50	6.50	
b. Fuel and Oil	69.60	104.40	139.20	
c. Repairs and Maintenance	3.96	5.94	7.92	
d. Depreciation on Equipment and Well	45.24	45.24	45.24	
e. Interest on Equipment	44.68	44.68	44.68	
12. Land Charge / Rent	42.40	53.00	63.60	
G. SUB TOTAL	$ 704.67	$ 827.08	$ 948.40	
13. Interest on ½ Nonland Costs	22.89	27.37	31.80	
H. TOTAL COSTS	$ 727.56	$ 854.45	$ 980.20	
I. RETURNS OVER COSTS (F - H)	$ 12.76	$ 66.08	$ 120.53	
J. TOTAL COSTS/BUSHEL (H ÷ A)	$ 4.55	$ 4.27	$ 4.08	
K. RETURN TO ANNUAL COST (I + 13) ÷ G	5.06%	11.30%	16.06%	

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