

Center-Pivot-Irrigated Corn

Cost-Return Budget

Department of Agricultural Economics



Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Troy J. Dumler
Agricultural Economist, SW

Curtis R. Thompson
Crops and Soils, SW

Daniel M. O'Brien
Agricultural Economist, NW

Roger Stockton
Crops and Soils, NW

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 third of Kansas. Kansas ranked eighth in the nation in both corn acreage (32 million acres) and corn production (416 million bushels) in 2000.

The majority of irrigated corn production in Kansas is located in the western third of the state, averaging 204 million bushels during the 1995-2000 period, or 73 percent of the state's production. Southwest Kansas is the predominant irrigated corn region in the state, averaging 140 million bushels from 765,000 harvested irrigated acres annually for the 5-year period. West central Kansas averaged 20.5 million bushels from 129,000 harvested irrigated acres, and northwest Kansas averaged 43 million bushels annually from 252,000 acres during this same time period. South central Kansas is the other major irrigated corn producing area in the state, averaging 40 million bushels and 243,000 harvested acres per year during the 1995-2000 period.

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

Item	Yield Level (bu)			
	160	190	220	
Seed, 1,000/acre	28	32	36	\$1.16/1,000
Fertilizer:				
N (anhydrous)	189	225	260	\$0.16/lb
N	0	0	0	\$0.23/lb
P	69	82	94	\$0.21/lb
K	0	0	0	\$0.14/lb
Lime	0	0	0	\$0.01/lb
Herbicide				
Bicep II Magnum	2.0	2.0	2.0	\$10.06/qt
Marksman	2.0	2.0	2.0	\$3.67/pt
+ Aim	0.33	0.33	0.33	\$8.40/oz
+ Adjuvants	1.0	1.0	1.0	\$1.00/ac
Insecticide / Fungicide				
Force 3G	5.4	5.4	5.4	\$3.93/lb
Capture 2EC	0.08	0.08	0.08	\$208.41/lb
Irrigation water, in	14	19	24	\$3.72/in

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 one inch per acre higher in southwest than in northwest Kansas. Budgeted corn yields are 15 bushels per acre higher in southwest compared to 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. Alternative expected yields can help producers compare the profitability of crop enterprises on farmland tracts with varying yield potential. Land values and government payments have been adjusted for alternative yield levels in the budgets. In customizing a budget to your farm, attention should be given to using land values representative of your farm's productive capacity.

Price per bushel represents an expected harvest price in Scott City, Kan., accounting for government marketing loan

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

Item	Yield Level (bu)			
	145	175	205	
Seed, 1,000/acre	26	30	34	\$1.16/1,000
Fertilizer:				
N (anhydrous)	172	207	243	\$0.16/lb
N	0	0	0	\$0.23/lb
P	62	75	88	\$0.21/lb
K	0	0	0	\$0.14/lb
Lime	0	0	0	\$0.01/lb
Herbicide				
Bicep II Magnum	2.0	2.0	2.0	\$10.06/qt
Marksman	2.0	2.0	2.0	\$3.67/pt
+ Aim	0.33	0.33	0.33	\$8.40/oz
+ Adjuvants	1.0	1.0	1.0	\$1.00/ac
Insecticide / Fungicide				
Force 3G	5.4	5.4	5.4	\$3.93/lb
Capture 2EC	0.08	0.08	0.08	\$208.41/lb
Irrigation water, in	13	18	23	\$3.72/in

price support levels. Corn producers in other regions of western Kansas should use an expected price that is representative for their location.

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.

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

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

	Yield Level (bu)			
ITEM	160	190	220	
Tillage/Planting/Chemical Applications:				
Chisel	1	1	1	\$6.70/ac
Disk	1	1	1	\$5.93/ac
Field cultivate	1	1	1	\$5.97/ac
Plant	1	1	1	\$7.79/ac
Anhydrous application	1	1	1	\$5.14/ac
Fertilizer application	0	0	0	\$3.67/ac
Herbicide application	2	2	2	\$3.59/ac
Insecticide / fungicide application	1	1	1	\$3.69/ac
Harvest				
Base charge	0	0	0	\$0.00/ac
Extra charge for yields exceeding	0	0	0	\$0.200/bu
Hauling	160	190	220	\$0.087/bu
Non-machinery labor	0.50	0.50	0.50	\$10.00/hr
Irrigation labor	0.50	0.50	0.50	\$10.00/hr
Land value/acre	\$589	\$736	\$883	6.00%
Interest on capital				8.0%
Irrigation Equipment	Investment, \$/ac		Years	Salvage value
Well, pump and gearhead value	\$317.42		15	0%
Power unit and meter	\$41.27		7	0%
Irrigation system	\$360.90		10	0%

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

	<u>Yield Level (bu)</u>			
ITEM	145	175	205	
Tillage/Planting/Chemical Applications:				
Chisel	1	1	1	\$6.38/ac
Disk	1	1	1	\$5.19/ac
Field cultivate	1	1	1	\$5.51/ac
Plant	1	1	1	\$8.29/ac
Anhydrous application	1	1	1	\$5.00/ac
Fertilizer application	0	0	0	\$3.59/ac
Herbicide application	2	2	2	\$3.50/ac
Insecticide / fungicide application	1	1	1	\$3.55/ac
Harvest				
Base charge	0	0	0	\$0.00/ac
Extra charge for yields exceeding	0	0	0	\$0.200/bu
Hauling	145	175	205	\$0.087/bu
Non-machinery labor	0.50	0.50	0.50	\$10.00/hr
Irrigation labor	0.50	0.50	0.50	\$10.00/hr
Land value/acre	\$589	\$736	\$883	6.00%
Interest on capital				8.0%
Irrigation Equipment	Investment, \$/ac		Years	Salvage value
Well, pump and gearhead value	\$317.42		15	0%
Power unit and meter	\$41.27		7	0%
Irrigation system	\$360.90		10	0%

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 grow-

ing 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.

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

	Yield Level (bu)			Your Farm
	160	190	220	
INCOME PER ACRE				
A. Yield per acre	160	190	220	
B. Price per bushel	\$ 2.28	\$ 2.28	\$ 2.28	
C. Net government payment	\$ 14.76	\$ 16.05	\$ 17.33	
D. Indemnity payments	\$	\$	\$	
E. Miscellaneous income	\$	\$	\$	
F. Returns/acre ((A × B) + C + D + E)	\$ 379.56	\$ 449.25	\$ 518.93	
COSTS PER ACRE				
1. Seed	\$ 32.48	\$ 37.12	\$ 41.76	
2. Herbicide	31.23	31.23	31.23	
3. Insecticide / Fungicide	37.89	37.89	37.89	
4. Fertilizer and Lime	44.73	53.22	61.34	
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	88.39	97.01	105.63	
10. Non-machinery Labor	5.00	5.00	5.00	
11. Irrigation				
a. Labor	5.00	5.00	5.00	
b. Fuel and Oil	52.08	70.68	89.28	
c. Repairs and Maintenance	4.62	6.27	7.92	
d. Depreciation on Equipment and Well	63.15	63.15	63.15	
e. Interest on Equipment	16.09	16.09	16.09	
12. Land Charge / Rent	35.34	44.16	52.98	
G. SUB TOTAL	\$ 432.49	\$ 483.32	\$ 533.77	
13. Interest on 1/2 Nonland Costs	15.89	17.57	19.23	
H. TOTAL COSTS	\$ 448.38	\$ 500.88	\$ 553.00	
I. RETURNS OVER COSTS (F - H)	\$ -68.82	\$ -51.63	\$ -34.07	
J. TOTAL COSTS/BUSHEL (H ÷ A)	\$ 2.80	\$ 2.64	\$ 2.51	
K. RETURN TO ANNUAL COST (I + 13) ÷ G	-12.24%	-7.05%	-2.78%	

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

	Yield Level (bu)			Your Farm
	145	175	205	
INCOME PER ACRE				
A. Yield per acre	145	175	205	
B. Price per bushel	\$ 2.28	\$ 2.28	\$ 2.28	
C. Net government payment	\$ 14.76	\$ 16.05	\$ 17.33	
D. Indemnity payments	\$	\$	\$	
E. Miscellaneous income	\$	\$	\$	
F. Returns/acre ((A × B) + C + D + E)	\$ 345.36	\$ 415.05	\$ 484.73	
COSTS PER ACRE				
1. Seed	\$ 30.16	\$ 34.80	\$ 39.44	
2. Herbicide	31.23	31.23	31.23	
3. Insecticide / Fungicide	37.89	37.89	37.89	
4. Fertilizer and Lime	40.54	48.87	57.36	
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	82.59	91.21	99.83	
10. Non-machinery Labor	5.00	5.00	5.00	
11. Irrigation				
a. Labor	5.00	5.00	5.00	
b. Fuel and Oil	48.36	66.96	85.56	
c. Repairs and Maintenance	4.29	5.94	7.59	
d. Depreciation on Equipment and Well	63.15	63.15	63.15	
e. Interest on Equipment	16.09	16.09	16.09	
12. Land Charge / Rent	35.34	44.16	52.98	
G. SUB TOTAL	\$ 416.13	\$ 466.80	\$ 517.62	
13. Interest on 1/2 Nonland Costs	15.23	16.91	18.59	
H. TOTAL COSTS	\$ 431.37	\$ 483.70	\$ 536.20	
I. RETURNS OVER COSTS (F - H)	\$ -86.00	\$ -68.65	\$ -51.47	
J. TOTAL COSTS/BUSHEL (H ÷ A)	\$ 2.97	\$ 2.76	\$ 2.62	
K. RETURN TO ANNUAL COST (I + 13) ÷ G	-17.01%	-11.09%	-6.35%	

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Troy J. Dumler et al., *Center-Pivot-Irrigated Corn Cost-Return Budget*, Kansas State University, October 2001.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

MF-585

October 2001

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.