2009 IRRIGATION EQUIPMENT COST SURVEY IN KANSAS

JEN SCHLEGEL
and
LEAH J. TSOODLE

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Jen Schlegel is an Extension Assistant and Leah Tsoodle is an Extension Associate in the Department of Agricultural Economics, Kansas State University (KSU), Manhattan, Kansas 66506.

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The Land Use Value Project in the Department of Agricultural Economics at Kansas State University (KSU) conducted an Irrigation Equipment Cost Survey in 2009 by contacting businesses involved in selling and servicing irrigation systems. The survey was conducted primarily over the phone. In some cases, forms were faxed to dealers for completion. Thirty-eight irrigation well and equipment dealers, and thirty-two irrigation engine dealers across Kansas were contacted. Twelve dealers chose not to respond. Due to the fact that the majority of irrigation done in Kansas is in the western part of the state, the majority of dealers were located there. Survey questions pertained to different components of irrigation systems (e.g., well, pump/gearhead, underground pipe, pivot) with regards to expected useful life and cost. The survey responses in 2009 reflect data for the 2008 calendar year, and so will be reported as 2008 data. All data were reviewed by irrigation specialists. From the survey results, data were summarized in this paper to increase the information available on irrigation equipment costs. Similar surveys were conducted in 2005 and 2001; each of these surveys collected data for the calendar year prior to the year in which they were conducted. The data from both of these surveys are reported and comparisons made between the 2009 and 2005 surveys.

Sources of Irrigation Equipment Costs

Well

Useful life for a well was 28 years in the 2009 survey which was the same as the 2005 survey (Table 1). The well has a depreciable life of 7 years for income tax purposes. Eight well depths were used in gathering costs for new wells in 2009. They were 50', 100', 200', 300', 400', 500', 600', and 700' (Table 2). Well costs appear to have increased for all well depths.

Pump/Gearhead

In the 2009 survey, useful life for a pump/gearhead was 28 years which was the same as the 2005 survey (Table 1). The pump/gearhead has a depreciable life of 7 years for income tax purposes. Eight well depths were again used in gathering costs for new equipment in 2009 (Table 3). According to survey results, pump and gearhead costs for all well depths decreased.

Flood System Underground Pipe

Useful life for underground pipe was 28 years in the 2009 survey compared to 30 years in the 2005 survey (Table 1). For income tax purposes, underground pipe has a depreciable life of 7 years. For 1,320 feet of underground pipe in a food irrigation system the 2009 survey showed a cost of $4,290. This was an increase of 16% from the 2005 survey cost of $3,696 (Table 4).

Furrow Flood System/Gated Pipe

For a furrow flood system, useful life was 25 years in the 2009 survey compared to 23 years in the 2005 survey (Table 1). The furrow flood system has a depreciable life of 7 years for income tax purposes. For 2,640 feet of the conventional furrow flood system, the 2009 survey cost of $12,158 reflected an increase of 4.5% over the 2005 survey cost of $11,640 (Table 4). The Surge Furrow Flood System cost in the 2009 survey for 2,640 feet was $16,349, which was an increase of 6% from the 2005 survey cost of $15,419 (Table 4).

Tailwater Reuse System

Useful life for a tailwater reuse system was 30 years in the 2009 survey which was the same as the 2005 survey (Table 1). For income tax purposes, tailwater reuse systems have a depreciable life of 15 years. The 2009 survey showed the tailwater reuse system to cost $16,000 which was the same as the 2005 survey (Table 4).

Land Leveling

According to 2009 survey results, the useful life for land leveling was an infinite period of time which was the same as the 2005 survey (Table 1). For income tax purposes land leveling has a depreciable life of 15 years. The 2009 survey showed land leveling to cost $88 an acre. This was the same as the 2005 survey (Table 4).

Center Pivot System

For a center pivot system, useful life was 20 years in the 2009 survey compared to 21 years in the 2005 survey (Table 1). For income tax purposes, a center pivot is depreciable over 7 years. For a system used to irrigate a quarter section (approximately 130 acres irrigated), the 2009 survey cost was $44,065. This reflected a 1.7% increase from the 2005 survey cost of $43,350 (Table 4).

Center Pivot System Underground Pipe and Wiring

Useful life for underground pipe was 28 years in the 2009 survey compared to 30 years in the 2005 survey (Table 1). For income tax purposes, underground pipe has a depreciable life of 7 years. For 1,320 feet of underground pipe and wiring (UG P & W) associated with a center pivot system the 2009 survey cost was $9,768. This cost reflected an increase of 9.6% over the 2005 survey cost of $8,910 (Table 4).

Engines

Power unit information was collected separately for both flood and center pivot irrigation systems because of differences in system power requirements. Center pivot systems generally require an engine with more horsepower than a flood system due to greater system pressure requirements. Table 5 shows the specific horsepower and total dynamic head (TDH) associated with each well depth for each engine type.

Natural Gas Engines

In the 2009 survey, useful life for a natural gas engine was 10 years compared to 9 years in the 2005 survey (Table 1). This engine has a depreciable life of 7 years. Eight well depths were used in gathering costs for all engines in 2009 (Tables 6 and 7). The survey indicated that from 2005 to 2009 natural gas engine costs increased for both flood and center pivot systems with the exception of the 700’ well depth center pivot systems where costs decreased.

Diesel Engines

Useful life for a diesel engine was 10 years in the 2009 survey compared to 8 years in the 2005 survey (Table 1). The diesel engine has a depreciable life of 7 years. The survey responses indicated that from 2005 to 2009, new diesel motor costs associated with all well depths increased for both flood and center pivot systems (Tables 6 and 7).

Electric Motor

For an electric motor, useful life was 16 years in the 2009 survey compared to 15 years in the 2005 survey (Table 1). Electric motors have a depreciable life of 7 years. As a general rule, the cost of electric motors tended to increase from 2005 to 2009, with exceptions of the 500' and 600' well depths for center pivot systems where costs decreased.

Table 1. Irrigation Equipment Depreciation and Useful Life Results

Equipment	Depreciable Life in Years	2009 Survey Average Useful Life in Years	2005 Survey Average Useful Life in Years	2001 Survey Average Useful Life in Years
Well	7	28	28	16
Pump/Gearhead	7	28	28	18
Underground Pipe (Flood and Center Pivot)	7	28	30	29
Furrow Flood System	7	25	23	23
Center Pivot	7	20	21	22
Tailwater Reuse System	15	30	30	30
Land Leveling	15	infinite	infinite	infinite
Nat. Gas/Propane Engine	7	10	9	9
Diesel Engine	7	10	8	8
Electric Motor	7	16	15	15

Table 2. Well Costs by Depth

Well Depth	2009 Survey Average	2005 Survey Average	2001 Survey Average	2009-2005 $ Change	2009-2005 % Change
50'	$7,335	$6,820	$4,520	$515	7.55%
100'	$13,525	$12,620	$7,165	$905	7.17%
200'	$23,510	$21,220	$12,195	$2,290	10.79%
300'	$29,585	$27,330	$17,185	$2,255	8.25%
400'	$37,985	$34,440	$22,180	$3,545	10.29%
500'	$44,035	$42,550	$27,170	$1,485	3.49%
600'	$45,230	$44,440	$32,195	$790	1.78%
700'	$60,795	$57,400	$37,190	$3,395	5.91%

Table 3. Pump and Gearhead Costs by Well Depth

Well Depth	2009 Survey Average	2005 Survey Average	2001 Survey Average	2009-2005 $ Change	2009-2005 % Change
50'	$12,160	$12,545	$11,940	-$385	-3.07%
100'	$14,855	$16,080	$13,695	-$1,225	-7.62%
200'	$21,180	$23,620	$18,505	-$2,440	-10.33%
300'	$27,315	$29,770	$23,310	-$2,455	-8.25%
400'	$34,430	$38,085	$28,115	-$3,655	-9.60%
500'	$42,405	$46,165	$32,925	-$3,760	-8.14%
600'	$47,285	$47,705	$38,085	-$420	-0.88%
700'	$52,360	$54,115	$42,960	-$1,755	-3.24%

Table 4. Irrigation Equipment Costs

Equipment	2009 Survey Average	2005 Survey Average	2001 Survey Average	2009-2005 $ Change	2009-2005 % Change
Flood System Underground Pipe (1,320 ft)	$4,290	$3,696	$3,993	$594	16.07%
Furrow Flood System (2,640 ft)	$12,158	$11,640	$8,811	$518	4.45%
Surge Furrow Flood System (2,640 ft)	$16,349	$15,419	$12,249	$930	6.03%
Tailwater Reuse System	$16,000	$16,000	$15,000	$0	0.00%
Land Leveling ($/acre)	$88	$88	$88	$0	0.00%
Center Pivot System	$44,065	$43,350	$35,567	$715	1.65%
Center Pivot System Underground Pipe & Wiring (1,320 ft)	$9,768	$8,910	$8,745	$858	9.63%

Table 5. Horsepower Requirements by Well Depth and Energy Type

		Flood System		Center Pivot System	
	Well Depth	Total Dynamic Head (TDH)	Required Horsepower	Total Dynamic Head (TDH)	Required Horsepower
Natural Gas					
	50'	50	20.7	50	20.7
	100'	100	41.4	100	41.4
	200'	150	62.2	200	82.9
	300'	250	103.6	300	124.3
	400'	350	145.0	400	165.8
	500'	450	186.5	500	207.2
	600'	550	227.9	600	248.6
	700'	650	269.4	700	290.1
Diesel					
	50'	50	20.7	50	20.7
	100'	100	41.4	100	41.4
	200'	150	62.2	200	82.9
	300'	250	103.6	300	124.3
	400'	350	145.0	400	165.8
	500'	450	186.5	500	207.2
	600'	550	227.9	600	248.6
	700'	650	269.4	700	290.1
Electric					
	50'	50	15.0	50	15.0
	100'	100	29.9	100	29.9
	200'	150	44.9	200	59.9
	300'	250	74.8	300	89.8
	400'	350	104.8	400	119.7
	500'	450	134.7	500	149.6
	600'	550	164.6	600	179.6
	700'	650	194.5	700	209.5

At some well depths center pivot has 50 more TDH due to greater system pressure requirements
These requirements are based on a flow rate of 800 gallons per minute

Pump Efficiency = 75% Engine Derating = 65% Electric Motor Efficiency = 90%

Flood Irrigated Acres = 155 Center pivot Irrigated Acres = 130

Table 6. Flood Irrigation Engine Costs

	Well Depth	2009 Survey Average	2005 Survey Average	2001 Survey Average	2009-2005 $ Change	2009-2005 % Change
Natural Gas						
	50'	$3,750	$3,570	$3,300	$180	5.04%
	100'	$3,860	$3,300	4,000	$560	16.97%
	200'	$4,400	$4,315	4,115	$85	1.97%
	300'	$5,900	$5,660	5,225	$240	4.24%
	400'	$10,170	$9,855	10,790	$315	3.20%
	500'	$27,100	$26,690	24,665	$410	1.54%
	600'	$29,200	$28,738	24,665	$463	1.61%
	700'	$31,320	$30,785	34,400	$535	1.74%
Diesel						
	50'	$3,915	$3,755	$4,565	$160	4.26%
	100'	$5,305	$4,825	5,415	$480	9.95%
	200'	$6,865	$6,740	6,045	$125	1.85%
	300'	$8,830	$8,815	8,780	$15	0.17%
	400'	$10,750	$10,590	9,570	$160	1.51%
	500'	$13,515	$13,230	12,650	$285	2.15%
	600'	$17,630	$17,435	16,505	$195	1.12%
	700'	$19,950	$19,715	21,235	$235	1.19%
Electric						
	50'	$1,190	$1,080	$1,010	$110	10.19%
	100'	$1,765	$1,620	1,515	$145	8.95%
	200'	$2,350	$2,260	2,165	$90	3.98%
	300'	$5,355	$5,230	4,420	$125	2.39%
	400'	$6,205	$6,120	5,655	$85	1.39%
	500'	$9,060	$8,600	5,390	$460	5.35%
	600'	$10,195	$9,600	6,585	$595	6.20%
	700'	$11,330	$10,600	9,790	$730	6.89%

Table 7. Center Pivot Irrigation Engine Costs

	Well Depth	2009 Survey Average	2005 Survey Average	2001 Survey Average	2009-2005 $ Change	2009-2005 % Change
Natural Gas						
	50'	$3,750	$3,570	$3,300	$180	5.04%
	100'	$3,860	$3,300	4,000	$560	16.97%
	200'	$4,760	$4,685	4,590	$75	1.60%
	300'	$5,935	$5,820	6,135	$115	1.98%
	400'	$13,060	$12,925	13,735	$135	1.04%
	500'	$20,080	$14,726	24,665	$5,354	36.36%
	600'	$30,260	$26,195	34,400	$4,065	15.52%
	700'	$33,425	$37,665	34,400	-$4,240	-11.26%
Diesel						
	50'	$3,915	$3,755	$4,565	$160	4.26%
	100'	$5,305	$4,825	5,415	$480	9.95%
	200'	$7,875	$7,400	7,265	$475	6.42%
	300'	$10,275	$9,960	8,825	$315	3.16%
	400'	$12,970	$12,200	11,445	$770	6.31%
	500'	$15,740	$15,475	14,265	$265	1.71%
	600'	$20,500	$18,937	18,330	$1,563	8.26%
	700'	$23,100	$21,842	21,235	$1,258	5.76%
Electric						
	50'	$1,190	$1,080	$1,010	$110	10.19%
	100'	$1,765	$1,620	1,515	$145	8.95%
	200'	$3,600	$3,130	2,890	$470	15.02%
	300'	$5,960	$5,625	3,590	$335	5.96%
	400'	$7,995	$7,740	6,865	$255	3.29%
	500'	$10,920	$10,970	9,435	-$50	-0.46%
	600'	$11,390	$11,395	7,185	-$5	-0.04%
	700'	$11,860	$11,820	10,920	$40	0.34%