

2017 IRRIGATION EQUIPMENT COST SURVEY IN KANSAS

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The Land Use Survey Center in the Department of Agricultural Economics at Kansas State University (KSU) conducted an Irrigation Equipment Cost Survey in the fall of 2017 by contacting businesses involved in selling and servicing irrigation systems. The survey was conducted primarily through in-person interviews. In some cases, forms were emailed to dealers for completion. Fifteen irrigation well and equipment dealers across Kansas were contacted. The majority of irrigation done in Kansas is in the western part of the state, so 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 reflect data for that calendar year. All data were reviewed by irrigation specialists. Data from the survey responses were summarized in this paper to increase the information available on irrigation equipment costs. Similar surveys were conducted in 2013, 2009, 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 the 2017 survey are reported and comparisons made between the 2013 and 2017 surveys. The 2009 report is available on AgManager.info at <http://www.agmanager.info/land-leasing/land-buying-valuing/land-use-value-research>.

Sources of Irrigation Equipment Costs

Well

Useful life for a well was 26 years in the 2017 survey, four years less than the 2013 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 2017. They were 50', 100', 200', 300', 400', 500', 600', and 700' (Table 2). Survey results indicate that well costs have increased for all well depths since 2009.

Pump/Gearhead

In the 2017 survey, useful life for a pump/gearhead was 13 years, which is seven years shorter than the 2013 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 2017 (Table 3). According to survey results, pump and gearhead costs increased for all well depths, except the 700' depth.

Flood System Underground Pipe

Useful life for underground pipe was 31 years in the 2017 survey compared to 35 years in the 2013 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 flood irrigation system the 2017 survey showed a cost of \$5,944. This was a decrease of 6.3% from the 2013 survey cost of \$6,344 (Table 4).

Furrow Flood System/Gated Pipe

For a furrow flood system, useful life was 21 years in the 2017 survey compared to 20 years in the 2013 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 2017 survey cost of

\$11,925 reflected a decrease of 11.1% from the 2013 survey cost of \$13,416 (Table 4). The Surge Furrow Flood System cost in the 2017 survey for 2,640 feet was \$16,547, which was a decrease of 7.9% from the 2013 survey cost of \$17,966 (Table 4).

Tailwater Reuse System

Useful life for a tailwater reuse system was 40 years in the 2017 survey which was the same as the 2013 survey (Table 1). For income tax purposes, tailwater reuse systems have a depreciable life of 15 years. The 2017 survey showed the tailwater reuse system to cost \$19,000 which was the same as the 2013 survey (Table 4).

Land Leveling

According to 2017 survey results, the useful life for land leveling was an infinite period of time, which was the same as the 2013 survey (Table 1). For income tax purposes land leveling has a depreciable life of 15 years. The 2017 survey showed land leveling to cost \$106 an acre. This was the same as the 2013 survey (Table 4).

Center Pivot System

For a center pivot system, useful life was 25 years in the 2017 survey, which is the same as the 2013 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 2017 survey cost was \$68,843. This reflected a 6.4% decrease from the 2013 survey cost of \$73,550 (Table 4).

Center Pivot System Underground Pipe and Wiring

Useful life for underground pipe was 28 years in the 2017 survey compared to 30 years in the 2013 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 associated with a center pivot system, the 2017 survey cost was \$15,155. This cost reflected a decrease of 2% from the 2013 survey cost of \$15,462 (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 2017 survey, useful life for a natural gas engine was 9 years compared to 10 years in the 2013 survey (Table 1). This engine has a depreciable life of 7 years for tax purposes. Eight well depths were used in gathering costs for all engines in 2017 (Tables 6 and 7). The survey indicated that from 2013 to 2017 natural gas engine costs decreased less than 5% for all well depths for both flood and center pivot systems.

Diesel Engines

Useful life for a diesel engine was 10 years in the 2017 survey, which was the same as the 2013 survey (Table 1). The diesel engine has a depreciable tax life of 7 years. The survey responses indicated that from 2013 to 2017, new diesel motor costs associated with all well depths increased for both flood and center pivot systems (Tables 6 and 7), with the exception of flood at the 500' well depth showing a 0.29% decrease.

Electric Motor

For an electric motor, useful life was 19 years in the 2017 survey compared to 15 years in the 2013 survey (Table 1). Electric motors have a depreciable life of 7 years for tax purposes. As a general rule, the cost of electric motors tended to increase from 2013 to 2017, with exceptions of the 200' flood and 400' center pivot well depths where costs decreased 0.38% and 0.05%, respectively.

Table 1. Irrigation Equipment Depreciation and Useful Life Results

Equipment	Depreciable Life in Years	2017 Survey Useful Life in Years	2013 Survey Useful Life in Years	2009 Survey Useful Life in Years
Well	7 years	26	30	30
Pump/Gearhead	7 years	13	20	30
Underground Pipe	7 years	31	35	30
Furrow Flood System	7 years	21	20	25
Center Pivot	7 years	25	25	20
Tailwater Reuse System	15 years	40	40	30
Land Leveling	15 years	infinite	infinite	infinite
Natural Gas/Propane Engine	7 years	9	10	10
Diesel Engine	7 years	10	10	10
Electric Motor	7 years	19	15	15

Table 2. Well Costs by Depth

Well Depth	2017	2013	2009	2017-2009*	
	Survey Average	Survey Average	Survey Average	\$ Change	% Change
50'	\$18,073	No Data	\$7,335	\$10,738	146.39%
100'	\$23,667	No Data	\$13,525	\$10,142	74.99%
200'	\$34,104	No Data	\$23,510	\$10,594	45.06%
300'	\$45,670	No Data	\$29,585	\$16,085	54.37%
400'	\$54,438	No Data	\$37,985	\$16,453	43.31%
500'	\$64,232	No Data	\$44,035	\$20,197	45.87%
600'	\$74,025	No Data	\$45,230	\$28,795	63.66%
700'	\$84,166	No Data	\$60,795	\$23,371	38.44%

*Because there are no 2013 data, the change is calculated between 2017 and 2009 survey data.

Table 3. Pump and Gearhead Costs by Well Depth

Well Depth	2017	2013	2009	2017-2013	
	Survey Average	Survey Average	Survey Average	\$ Change	% Change
50'	\$17,984	\$15,609	\$12,160	\$2,375	15.22%
100'	\$21,674	\$18,445	\$14,855	\$3,229	17.51%
200'	\$29,140	\$25,830	\$21,180	\$3,310	12.81%
300'	\$38,239	\$35,673	\$27,315	\$2,566	7.19%
400'	\$45,877	\$42,643	\$34,430	\$3,234	7.58%
500'	\$54,982	\$50,853	\$42,405	\$4,129	8.12%
600'	\$62,071	\$59,280	\$47,285	\$2,791	4.71%
700'	\$72,080	\$73,913	\$52,360	(\$1,833)	-2.48%

Table 4. Irrigation Equipment Costs

	2017	2013	2009	2017-2013	
	Survey Average	Survey Average	Survey Average	\$ Change	% Change
Flood System Underground Pipe (1,320 ft.)	\$5,944	\$6,344	\$4,290	(\$400)	-6.31%
Furrow Flood System (2,640 ft.)	\$11,925	\$13,416	\$12,159	(\$1,491)	-11.11%
Surge Furrow Flood System (2,640 ft.)	\$16,547	\$17,966	\$16,349	(\$1,419)	-7.90%
Tailwater Reuse System	\$19,000	\$19,000	\$16,000	\$0	0.00%
Land Leveling (\$/Acre)	\$106	\$106	\$88	\$0	0.00%
Center Pivot System	\$68,843	\$73,550	\$44,065	(\$4,707)	-6.40%
Center Pivot System Underground Pipe & Wiring (1,320 ft.)	\$15,155	\$15,462	\$9,768	(\$307)	-1.99%

Table 5. Horsepower Requirements by Total Dynamic Head and Energy Type*

	TDH (feet)	Flow rate	
		800 gpm Required Horsepower	500 gpm Required Horsepower
Natural Gas	50	20.7	13.0
	100	41.4	25.9
	200	62.2	51.8
	300	103.6	77.7
	400	145	103.6
	500	186.5	129.5
	600	227.9	155.4
	700	269.4	181.3
Diesel	50	20.7	13.0
	100	41.4	25.9
	200	62.2	51.8
	300	103.6	77.7
	400	145	103.6
	500	186.5	129.5
	600	227.9	155.4
	700	269.4	181.3
Electric	50	15.0	9.4
	100	29.9	18.7
	200	59.9	37.4
	300	89.8	56.1
	400	119.7	74.8
	500	149.6	93.5
	600	179.6	112.2
	700	209.5	130.9

*The horsepower requirements for irrigation systems for a given flow rate and TDH are the same. However a center pivot system will typically require around 50 feet, or more, of additional TDH due to the sprinkler package pressure requirements. The horsepower requirements in this table assume a pump efficiency of 75%, engine derating of 65%, and electric motor efficiency of 90%.

Table 6. Flood Irrigation Engine Costs

		2017 Survey Average	2013 Survey Average	2009 Survey Average	2017-2013	
					\$ Change	% Change
Natural Gas	TDH					
	50'	\$7,498	\$7,773	\$3,750	(\$275)	-3.54%
	100'	\$7,698	\$8,023	\$3,860	(\$325)	-4.05%
	150'	\$8,042	\$8,452	\$4,400	(\$410)	-4.85%
	250'	\$11,266	\$11,683	\$5,900	(\$417)	-3.57%
	350'	\$17,001	\$17,652	\$10,170	(\$651)	-3.69%
	450'	\$28,396	\$28,415	\$27,100	(\$19)	-0.07%
	550'	28396	\$28,415	\$29,200	(\$19)	-0.07%
	650'	28396	\$28,415	\$31,320	(\$19)	-0.07%
Diesel	TDH					
	50'	\$6,861	\$6,795	\$3,915	\$66	0.97%
	100'	\$8,798	\$8,605	\$5,305	\$193	2.24%
	150'	\$12,287	\$11,793	\$6,865	\$494	4.19%
	250'	\$18,782	\$18,205	\$8,830	\$577	3.17%
	350'	\$23,570	\$23,011	\$10,750	\$559	2.43%
	450'	\$33,533	\$33,629	\$13,515	(\$96)	-0.29%
	550'	\$38,799	\$37,909	\$17,630	\$890	2.35%
	650'	38799	\$37,909	\$19,950	\$890	2.35%
Electric	TDH					
	50'	\$2,136	\$2,120	\$1,190	\$16	0.75%
	100'	\$3,017	\$2,958	\$1,765	\$59	1.99%
	150'	\$4,424	\$4,441	\$2,350	(\$17)	-0.38%
	250'	\$7,142	\$7,073	\$5,355	\$69	0.98%
	350'	\$8,472	\$8,437	\$6,205	\$35	0.41%
	450'	\$10,190	\$10,120	\$9,060	\$70	0.69%
	550'	\$12,272	\$12,074	\$10,195	\$198	1.64%
	650'	\$14,353	\$14,028	\$11,330	\$325	2.32%

Table 7. Center Pivot Irrigation Engine Costs

		2017	2013	2009	2017-2013	
		Survey	Survey	Survey	\$ Change	% Change
		Average	Average	Average		
Natural Gas	TDH					
	50'	\$7,498	\$7,773	\$3,750	(\$275)	-3.54%
	100'	\$7,698	\$8,023	\$3,860	(\$325)	-4.05%
	200'	\$10,066	\$10,583	\$4,760	(\$517)	-4.89%
	300'	\$13,833	\$14,492	\$5,935	(\$659)	-4.55%
	400'	\$24,669	\$24,837	\$13,060	(\$168)	-0.68%
	500'	\$28,396	\$28,415	\$20,080	(\$19)	-0.07%
	600'	\$28,396	\$28,415	\$30,260	(\$19)	-0.07%
	700'	\$28,396	\$28,415	\$33,425	(\$19)	-0.07%
Diesel	TDH					
	50'	\$6,861	\$6,795	\$3,915	\$66	0.97%
	100'	\$8,798	\$8,605	\$5,305	\$193	2.24%
	200'	\$14,424	\$13,926	\$7,875	\$498	3.58%
	300'	\$22,964	\$22,519	\$10,275	\$445	1.98%
	400'	\$24,337	\$23,635	\$12,970	\$702	2.97%
	500'	\$36,385	\$35,947	\$15,740	\$438	1.22%
	600'	\$36,385	\$35,947	\$20,500	\$438	1.22%
	700'	\$36,385	\$35,947	\$23,100	\$438	1.22%
Electric	TDH					
	50'	\$2,136	\$2,120	\$1,190	\$16	0.75%
	100'	\$3,017	\$2,958	\$1,765	\$59	1.99%
	200'	\$5,631	\$5,583	\$3,600	\$48	0.86%
	300'	\$7,856	\$7,757	\$5,960	\$99	1.28%
	400'	\$9,277	\$9,282	\$7,995	(\$5)	-0.05%
	500'	\$12,104	\$11,978	\$10,920	\$126	1.05%
	600'	\$13,806	\$13,629	\$11,390	\$177	1.30%
	700'	\$15,508	\$15,280	\$11,860	\$228	1.49%