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Weekly Farm Economics: Machinery Cost Estimates for 2021

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Machinery cost estimates for 2021 have been released and are available on the farmdoc website (see [Management section of farmdoc](#)). Machinery costs are updated every two years, with the last update occurring in 2019. Substantial increases in list prices of machinery occurred between 2019 and 2021. Machinery costs would have been higher had not interest rates been reduced from 2019 to 2021.

Machinery Cost Estimates for 2021

Estimated machinery costs often are used in setting custom rates where one individual performs a field operation for another individual. We provide machinery cost estimates which may be helpful in setting custom rates. An additional amount for profit should be added to our cost estimates, as we have not added an amount for returns.

Machinery costs estimates are available in the Management section of *farmdoc* in five publications:

1. Machinery Cost Estimates: [Field Operations](#) -- shows per acre costs of performing field operations such as chisel plowing, field cultivating, planting, and spraying.
2. Machinery Cost Estimates: [Tractors](#) -- shows per hour costs of operating various horsepower tractors.
3. Machinery Cost Estimates: [Harvesting](#) -- shows per acre costs of harvesting corn and soybeans, as well as use of grain cart.
4. Machinery Cost Estimates: [Forage Field Operations](#) -- shows per acre costs of performing forage operations.
5. Machinery Cost Estimates: [Summary](#) -- Contains summary tables from the above operations.

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Factors Impacting Estimated Machinery Costs

Costs are estimated using an economic engineering approach that relies on formulas developed by the American Society of Agricultural Engineers (ASAE). From 2019 to 2021, most of the estimated machinery costs went up.

Factors impacting costs are illustrated for a 310 PTO horsepower tractor in Table 1, which shows per hour costs of operations from 2017, 2019, and 2021. The 2021 estimates appear in the 2021 tractor costs publications, while the 2017 and 2019 costs appear in the machinery costs' 2017 and 2019 editions.

Total costs for the 310 horsepower tractor were estimated at \$181.10 per hour in 2019 (see Table 1) and per hour increased by 4% to \$189.20 per hour in 2021 (see Table 1).

	Total	= Overhead	+ Fuel	+ Labor
	\$/hour	\$/hour	\$/hour	\$/hour
2017 Costs	164.30	110.90	33.60	19.80
2019 Costs	181.10	122.90	37.30	20.90
2021 Costs	189.20	126.10	41.10	22.00

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Per hour costs are divided into overhead, fuel, and labor categories. Overhead includes depreciation, interest, insurance and housing, and repairs. Formulas are used to estimate each cost, and the purchase price enters those formulas. The purchase price is assumed to equal 85% of the list price of the tractor. Between 2019 and 2021, the list price on a 310 HP tractor increased by 9.1% from \$410,256 in 2019 to \$447,479 in 2021. The list price increase will also increase costs but is countered by a decline in interest rates from 5.5% in 2019 to 4.5% in 2021. Still, overhead costs increased from \$122.90 per acre to \$126.10 per acre. More detail on the approaches used to estimate overhead costs are given in the [Machinery Cost Estimates: Tractors](#) publication.

Fuel use on a 310 horsepower tractor is estimated at 13.6 gallons per hour. The diesel fuel price was increased from \$2.50 per gallon in 2019 to \$2.75 per gallon in 2021. Due to the fuel price increases, fuel costs for the 310 horsepower tractor increased from \$37.30 per hour in 2019 to \$41.10 per hour in 2021 (see Table 1).

Labor costs per hour increased from \$20.90 per hour in 2019 to \$22.00 per hour in 2021 (see Table 1). A \$19 per hour rate was used in 2019 compared to a \$20 per hour rate in 2021. Labor time is assumed to be 1.1 times the tractor hour resulting in a 10% higher cost per tractor hour.

Table 2 shows estimated costs in 2019 and 2021 for several different tractor sizes, combining corn and soybeans, a chisel plow, and a conventional planter. In all cases, estimated costs went up and ranged from 2% to 19%.

Table 2. Estimated Costs and List Prices for Select Machines and Operations in 2019 and 2021

	Estimated Costs			List Prices		
	2019	2021	Change	2019	2021	Change
	\$/hour	\$/hour	change			
120 PTO HP Tractor	83.80	87.00	3.8%	\$161,538	\$174,296	7.9%
225 PTO HP Tractor	130.30	137.10	5.2%	274,867	302,785	10.2%
310 PTO HP Tractor	181.10	189.20	4.5%	410,256	447,479	9.1%
590 Engine HP Tractor ¹	237.70	255.00	7.3%	487,819	549,435	12.6%
	\$/acre	\$/acre				
Combining - Corn ²	37.60	38.50	2.4%	642,250	687,500	7.0%
Combining - Soybeans ²	32.70	33.40	2.1%	577,750	619,000	7.1%
	\$/acre	\$/acre				
Chisel Plow ³	12.70	13.60	7.1%	63,890	68,114	6.6%
Conventional planter ³	14.40	17.20	19.4%	134,502	157,182	16.9%

¹ This was a 570 horsepower tractor in 2019

² List price includes the separator and the head.

³ List prices are only for the field implements.

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Summary

Costs for most operations are higher in 2021 than in 2019, with most of the increases due to increases in list prices of machines.

References

Lattz, D. and G. Schnitkey. "[Machinery Cost Estimates: Field Operations.](#)" Illinois Farm Management Handbook, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, updated October 11, 2021.

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