

NORTH DAKOTA TRACTOR USE STUDY

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In North Dakota, approximately 1/3 of the energy used in agriculture is used during field operations. To assist in providing a basis for making good fuel management decisions in this area, an on-farm fuel study designed to determine fuel requirements of field operations and tractor efficiencies was conducted during three cropping seasons. Approximately 80 farmers voluntarily cooperated by keeping fuel use records on 150 tractors doing field operations.

The statewide averages for the information collected on six major field operations is shown in Figure 1. Fuel consumption is shown as gallons of diesel fuel per acre.

Fuel consumption can greatly vary among farms. For instance, the average fuel consumption for chisel plowing recorded by individual farmers ranged from a high of 1.9 gallons/acre to a low of .5 gallons/acre. Therefore, the information here should be used as an estimate. More accurate figures can be obtained by keeping individual records.

Information collected from two-wheel drive and four-wheel drive tractors was analyzed separately. The overall average indicates very little measurable difference in fuel efficiency on a gallon per acre basis between the two tractor types. This indicates that the amount of energy needed for performing field operations should be nearly constant, regardless of the size of implement and

tractor used. However, implement size and tractor horse power needs to be properly matched.

Combining operations can provide energy savings. Results show that a grain drill and cultivation operation hitched together required .8 gallon/acre; if conducted separately an additional .3 gallon/acre was required. Similar results were shown for other combination operations.

The deeper the penetration of a tillage tool the greater will be the energy required to perform the job. The information collected indicates that while chisel plowing, deeper tillage depths caused a greater increase in energy use with two-wheel drive than with four-wheel drive. This may indicate that four-wheel drive may handle heavier loads more efficiently.

Also, while chisel plowing, the tractors operating at slower speeds and deeper depths used much more fuel per acre than those operating at faster speeds and shallower depths.

The farmers cooperating with the program indicated that by keeping fuel use records they were able to identify high energy consuming field operations and inefficient tractors. Also, sharing their information through this Extension program provides other farmers the opportunity to benefit when dealing with high fuel costs associated with crop production.

Figure 1

NORTH DAKOTA TRACTOR USE STUDY												
State Averages												
1978-1979-1980												
	Moldboard Plowing		Discing		Chisel Plowing		Cultivating		Drilling		Harrowing	
	2WD	4WD	2WD	4WD	2WD	4WD	2WD	4WD	2WD	4WD	2WD	4WD
Gallons/Acre	1.6	1.6	.9	.8	.8	.8	.6	.6	.5	.5	.2	.2
Gallons/Hour	4.7	10.9	5.9	9.3	6.1	10.0	6.0	10.1	5.2	7.9	5.0	7.1
Acres/Hour	3.2	7.1	7.1	12.9	8.6	13.3	10.3	17.4	11.9	17.4	25.6	34.1
Depth (in.)	6.4	7.0	4.3	4.2	5.4	5.8	4.5	4.4	2.2	2.4	2.1	2.0
MPH	4.9	5.3	5.6	5.4	5.3	5.4	5.8	6.0	6.1	6.1	6.7	7.1

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