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University Extension

Saving Fuel in Field Operations

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Fall tillage

The first and most important step in saving fuel used for field operations is to ask "Is this operation really necessary? Will I recoup benefits in excess of the costs?" Fall tillage may loosen soil, but even if yield is increased will it cover the costs of a $10 or $20 per acre tillage operation? If fall tillage is done primarily to create a darker warm, dry surface for seed germination, mounting row cleaners on the planter will achieve the same results by warming the soil surface after planting. If a dark soil surface is desired before planter operation, strip tillage would be a better choice, which causes less area of soil to be tilled than full-width tillage (e.g. with a disk or chisel plow).

Deep primary tillage often requires over 1.5 gal/ac of diesel fuel. Shallow secondary tillage may require nearly another gal/ac diesel fuel. Add the risk of soil erosion and nutrient loss and tillage costs may outweigh benefits. Soil may be compacted by excessive field trips. Using controlled traffic lanes during harvest can minimize soil compaction. Avoid driving loaded grain carts randomly through the field and excessively loading the combine grain tank. Set the combine to evenly spread residue. Avoid creating conditions that may result in an unnecessary tillage operation.

Another consideration producers need to keep in mind is residue management. Producers who want to leave 30 percent surface residue at planting time next year probably should not go to the field in the fall with a tillage implement, particularly into soybean residue. Even in corn stubble, if soybeans will be planted next year, yield trials often show little benefit of tillage to increase soybean yield.

Saving fuel during field operations

When tractor power is used for drawbar fieldwork (whether it's fertilizer injection, planting and spraying in a no-till operation, or tillage) several strategies can save fuel. Key points to saving fuel during tractor field use are keeping a current maintenance schedule, proper ballasting and tire inflation, and selecting a fuel saving gear and throttle setting.

Keeping your maintenance schedule current as suggested in the tractor owner/operator's manual will improve fuel economy. In an earlier Missouri case-study, replacing air and fuel filters on tractors brought in for dynamometer testing lowered fuel use by about 4 percent for the same power output.

Although recognized as important, tractor operator's often don't check total tractor weight or front- and rear-axle ballasting. Proper ballasting enables the tractor to efficiently transfer power to the drawbar and avoids wasting energy. Total tractor weight required depends on tractor style (true four-wheel drive, mechanical-front-drive, or two-wheel drive) and field speed. Use your tractor manual or see Table 1 for suggested pounds per tractor horsepower. Having this weight properly split between the front- and rear-axle also affects efficiency. Proper weight split is affected by tractor style and whether the attached implement is pulled or mounted. Check the tractor operator's manual or see table 2 for suggested guidelines. Using cast-iron weights allows ballast to be removed for fuel savings in lighter drawbar work (e.g. spraying).

Table 1. Gross tractor weight, lb/Hp

Speed, mi/hr	<4.5	5	>5.5
Tractor type			
2WD & MFD (lb/Hp)	130	120	110
4WD (lb/Hp)	110	100	90

Table 2. Front-to-rear axle ratio as percentage of total weight

Tractor type	Towed/drawbar %Front/%Rear	Semi-mounted %Front/%Rear	Fully-mounted %Front/%Rear
2WD	25/75	30/70	35/65
MFD	35/65	35/65	40/60
4WD	55/45	55/45	60/40

Tire inflation pressure should be correctly adjusted for the load the individual tire is carrying. Consult the tractor operator's manual or check with the tractor or tire dealer as correct inflation pressure for a given weight depends on tire size, use as a single or dual, and if the tire will be used at high speed (e.g. greater than 25 mi/h). Most operator's are aware of the damage under inflation can cause to tires. Over inflation contributes to excessive wheel slippage and fuel use.

For lighter drawbar loads such as moving equipment, spraying, and lighter tillage (e.g. rotary hoeing, row-crop cultivating, or field cultivating if implements are not too wide or operated too deeply) shifting to a higher gear and reducing the engine throttle setting will reduce fuel use per acre. If using the power-take-off (PTO) such as with a windrower or baler, engine speed will need to be maintained at the rated PTO speed. Some newer, high-horsepower tractors use electronic controls to automatically shift to a higher transmission gear and reduce engine speed to maximize fuel economy while also maintaining correct PTO shaft speed for PTO applications.

In summary, energy saving can be significant when best conservation practices are used, in tillage, planting, harvest, residue management and distribution, nitrogen application, and proper operation and maintenance of farm equipment. Energy use is a significant component of crop production and it should be considered as a key production input. As

stated earlier, questions should be asked before any field operation decision, “Is this field operation necessary? Do benefits exceed losses?”

October 2005