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Improving Diesel Fuel Efficiency for Spring Field Operations

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Abstract

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Improving Diesel Fuel Efficiency for Spring Field Operations



By Mark Hanna and Dana Petersen, Department of Agricultural and Biosystems Engineering

Spring is here and, not surprisingly, diesel prices are trending upward. Taking time to implement a few simple management techniques can reduce farm fuel consumption and keep machinery running smoothly.

Even with an established tillage strategy, it may be time to review profitability potential. Once you till beyond the first 3 to 4 inches of soil in a given tillage operation, the amount of fuel used increases directly with tillage depth. Even on some colder, wetter glacial till soils on Iowa State University research farms in north central and central Iowa, corn yields have been as good or better from chisel plowing at a 6 to 8 inch depth as compared to subsoiling or ripping at depths of 12 inches or more. Three-to-five year averages from tillage plot comparisons at ISU research farms around the state generally have shown no yield differences across systems (e.g., no-till, chisel, subsoil/rip) when soybeans were grown ([PM 2089D, Limiting field operations](#)).

Regardless of tillage management, some spring tractor operations will be required. Several techniques can help to save 5 to 15 percent or more of fuel. Consistently changing engine air and fuel filters on a timely basis, as suggested in the tractor operation manual, saves 3 to 4 percent of fuel ([PM 2089L, Tractor maintenance to conserve energy](#)). Cooling system maintenance is also important to ensure that the optimal combustion occurs.

Tractor operations required for row crops often don't demand peak power from the tractor. When pulling lighter drawbar loads such as small tillage equipment or a planter that may be mismatched to the tractor's power, improve fuel efficiency by shifting the transmission to a higher gear and reducing the engine throttle setting ([PM-2089M, Shift up and throttle back to save tractor fuel](#)). Tractor tests indicate average fuel savings of 10 percent

can be obtained when operating at three-fourths tractor load and approximately 20 percent savings at one-half load. Some newer, higher horsepower tractors offer the option to do this automatically through use of electronic load sensors and a continuously variable transmission.

Tractor drive wheels must slip a bit to develop optimal fuel efficiency on soil surfaces. Optimal slip varies with conditions, but for heavier drawbar loads slip should be in a range of about 8 to 13 percent on firm (untilled) soil and slightly greater, about 10 to 15 percent slip on tilled soil throughout most of Iowa. Slip is difficult to see with the naked eye at these levels, but measurement is often available from the dashboard on newer/higher horsepower tractors. If slip is outside these ranges, consult the operation manual (or [PM 2089G, Ballasting tractors for fuel efficiency](#)) for further information on proper ballasting.

Tire inflation also affects wheel slip and fuel economy. Know the correct inflation pressure for the weight the tire is carrying, use a good tire inflation gauge capable of reading lower pressures – less than 30 pound per square inch (psi) – in 2 psi increments and check pressure periodically.

Most diesel tractors are relatively fuel efficient even at partial loads when the operator follows these tips, and shifting to a higher gear and reducing the throttle setting is particularly important for partial loads. Before purchasing a new or used tractor, it's still a good idea to consider size requirements, including engine power, hydraulic system capacity and braking ability. Information from OECD (Nebraska) tractor tests can be used to help compare projected fuel use by tractors under consideration ([PM 2089O, Fuel efficiency factors for tractor selection](#)).

More information on these and other farm energy management topics from ISU Farm Energy can be found at <http://farmenergy.exnet.iastate.edu/>.

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