

# Conserve fuel with ballasting

**T**HIS year's weather may have you feeling like you're always climbing out of a rut, but proper ballasting can spare your tractor and your fuel bill from a similar fate.

For tractor operators, carrying insufficient ballast results in excessive drive wheel slippage and an obvious waste of fuel, says Mark Hanna, ISU Extension ag engineer. Conversely, carrying too much ballast on a tractor dramatically lowers wheel slip but results in greater rolling resistance as the tractor sinks too far into the soil, causing wheels to be constantly climbing out of a deep rut.

As you prepare for harvest, consider adjustments to tractors and equipment that can help you conserve fuel. Adding and removing cast iron ballast weights can be daunting, but proper ballasting improves tractor performance and fuel efficiency.

According to Hanna, having a semi-annual weight management strategy may be the best approach.

"Late spring and summer typically call for lighter drawbar work such as planting, spraying and mowing," says Hanna. "Removing excess ballast to suit your summer duties ultimately saves you time and fuel."

Measuring and increasing ballast during heavy field operations in the fall is also critical. "Adding ballast for greater drawbar power needs such as tillage is especially important if a tractor has been reduced for lighter summer loads," notes Hanna. "Field operations that demand more of the tractor's engine power to be transferred to the



## Farm Energy

By DANA PETERSEN

drawbar require appropriate ballasting to maximize performance and minimize excessive wheel slip."

### Measuring wheel slippage

It's often difficult to accurately measure wheel slippage with the naked eye, but technology can help. Many larger, modern tractors have an option to display wheel slippage to the operator. To maximize transfer of power from drive axles to the drawbar, optimum amounts of wheel slippage depend on the soil surface.

On firm, untilled soil wheel slippage should be approximately 6% to 13%. More slippage is allowed on a tilled surface, 8% to 16%, and even more on a noncohesive sandy soil. Conversely, approximately 4% to 8% is optimal on concrete. Checking wheel slippage on tractors equipped to display this information provides an easy check to determine if the tractor is optimally applying fuel and horsepower to the drawbar.

### Watch weight distribution

If tractor wheel slippage is outside these suggested ranges for operation with drawbar loads, Hanna recommends checking the operator's manual for a solution. Since only wheels on powered axles supply traction, it's important to



distribute total tractor weight properly between front and rear axles.

The table below shows that optimal weight split between axles is affected by the type of tractor and whether the attached implement is pulled or mounted.

For example, manure tank wagons and grain carts have significant tongue weight and can be considered "fully-mounted" drawbar loads because they add weight to the tractor's rear axle similar to fully-mounted implements.

If slippage can't be easily checked and tractor axle weights are not known, they should be measured to gain confidence that fuel isn't being wasted. Total tractor weight, as well as the weight being carried on each axle, can be conveniently checked on commercial scales at your local grain elevator or co-op.

### Check tire inflation

In addition to proper ballasting, you need to monitor the axle weight in order to calculate the load each tire carries, says Hanna. Correct tire inflation pressure can be found from load and inflation tables available on the tire manufacturer's website or in the equipment operator's manual. Correct inflation pressure of a specific tire size for a given weight also depends on speed of travel and whether the tire is used as a single or dual.

Because underinflated tires wear sidewalls quickly, a natural tendency is to overinflate tires for a given load. Unfortunately, overinflation reduces contact of the tire's lugs with the soil and results in excessive slippage and increased fuel use.

*Petersen is the program coordinator for the Farm Energy Conservation and Efficiency Initiative, sponsored by the Iowa Energy Center.*

## Put weight on, or take it off?

**P**ROPER ballasting can help tractors conserve fuel and operate more efficiently. A new publication from Iowa State University Extension explains the mechanics of measuring ballast to ensure tractor performance isn't hindered by excessive or inadequate weight for the job at hand.

"Ballasting Tractors for Fuel Efficiency," PM 2089G, can be downloaded from ISU Extension's Online store at [www.extension.iastate.edu/store](http://www.extension.iastate.edu/store). Although many larger, modern tractors can display wheel slippage to the operator, the publication also has ballasting and tire inflation guidelines for older models. Keep these in mind:

- Know the proper weight that should be carried on the front and rear axles of the tractor to efficiently transfer engine horsepower to drive wheels. Ensure weight being carried by the tractor is in this range by checking these weights on a scale.
- Check tractor slippage and consider reducing tractor ballast during periods when the tractor will be used with lighter drawbar loads.
- Use a good tire inflation gauge capable of readings within 1 to 2 psi and manage inflation pressure according to tire load and tractor use conditions.

### Front-to-rear axle weight ratio as percentage of total weight

Tractor type	Towed/drawbar		Semi-mounted		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	

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